The College Panda
10 Practice Tests
for the
SAT Math

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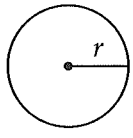
Math Test --- No Calculator

25 Minutes, 20 Questions

Reference



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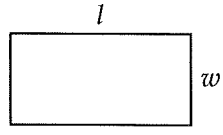

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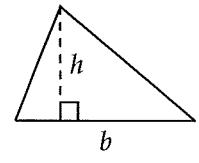

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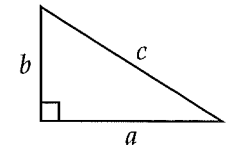

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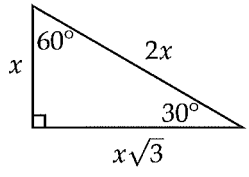
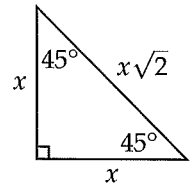
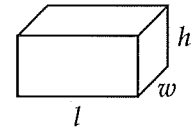




Special Right Triangles



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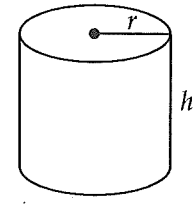

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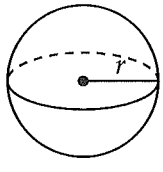

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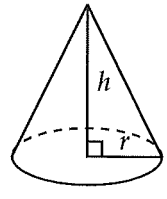
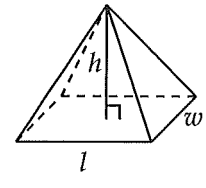


$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

3

3

1

The volume of a balloon is given by the equation $V = t^2 - 3t + 3$. What is the volume of the balloon after 3 seconds?

A) 3
B) 6
C) 9
D) 12

2

Which of the following is equivalent to $\dfrac{\frac{1}{x}}{x+3}$?

A) $\dfrac{1}{x(x+3)}$
B) $\dfrac{x}{x+3}$
C) $\dfrac{x+3}{x}$
D) $x(x+3)$

3

A faulty register records only \$5 for every \$8 deposit. If the register shows a total balance of \$40, what is the actual balance?

A) \$25
B) \$64
C) \$72
D) \$80

4

If

$$(x-2)^2 + (y-3)^2 + (z+4)^2 = 0$$

what is the value of $x + y + z$?

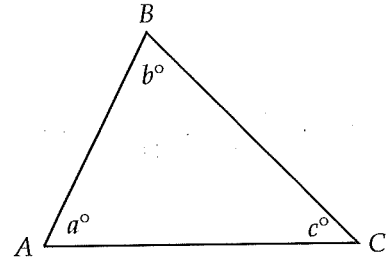
A) -4
B) 0
C) 1
D) 2

5

If $3^{x-3} = 27$, what is the value of x?

A) 0
B) 3
C) 6
D) 9

6



Note: Figure not drawn to scale.

The triangle above is isosceles and $b > a$. Which of the following must be FALSE?

A) $AB = BC$
B) $AB = AC$
C) $AC = BC$
D) $a = c$

3  3

7

In the xy-plane, the line $y = mx - 7$ is parallel to the line $2x + 3y = 6$. What is the value of m?

A) $-\frac{3}{2}$

B) $\frac{3}{2}$

C) $-\frac{2}{3}$

D) $\frac{2}{3}$

8

For a lemonade stand, the total cost c, in dollars, of selling n cups of lemonade is given by $c = 100 + 1.5n$. What is the best interpretation of the number 100 in this equation?

A) The cost of each cup of lemonade

B) The number of cups of lemonade sold on the first day

C) The initial cost of setting up the lemonade stand

D) The maximum total cost of running the lemonade stand

9

Which of the following is equal to $(5 + 2i)(5 - 2i)$? (Note: $i = \sqrt{-1}$)

A) 21

B) 29

C) $21 - 20i$

D) $29 + 20i$

10

The graph of a parabola in the xy-plane has x-intercepts at $\frac{3}{5}$ and $-\frac{1}{2}$. Which of the following could be the equation of the parabola?

A) $y = (5x - 1)(2x + 3)$

B) $y = (5x + 1)(2x - 3)$

C) $y = (5x - 3)(2x + 1)$

D) $y = (5x + 3)(2x - 1)$

11

During a trip, Jonathan had driven a total of 75 miles by 6:20 PM and a total of 85 miles by 6:40 PM. He drove at the same rate for the entire trip. At what time had he driven a total of 140 miles?

A) 7:30 PM

B) 8:00 PM

C) 8:30 PM

D) 9:00 PM

12

The equation $\frac{kx^2 + 14x - 20}{3x - 2} = 5x + 8 - \frac{4}{3x - 2}$ is true for all values of $x \neq \frac{2}{3}$, where k is a constant. What is the value of k?

A) 8

B) 9

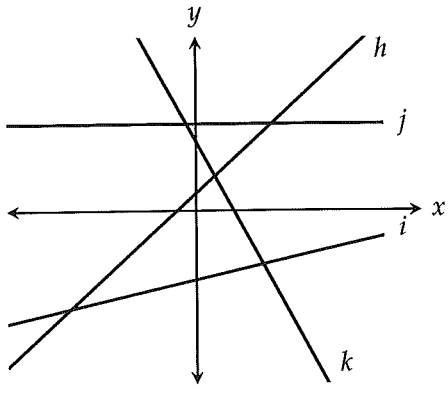
C) 11

D) 15

3

3

13



In the figure above, lines h, i, j, and k are graphed in the xy-plane. Which of the following correctly orders them by their slope from least to greatest?

A) $k < j < i < h$

B) $k < i < j < h$

C) $k < j < h < i$

D) $j < k < i < h$

14

$$\left(\frac{1}{m}\right)^2 - 2\left(\frac{1}{m}\right)\left(\frac{1}{n}\right) + \left(\frac{1}{n}\right)^2$$

Which of the following is equivalent to the expression shown above?

A) $\left(\frac{1}{\sqrt{m}} - \frac{1}{\sqrt{n}}\right)^4$

B) $\left(\frac{1}{m} - \frac{1}{n}\right)^2$

C) $\frac{1}{(m-n)^2}$

D) $\frac{2}{m^2 - mn + n^2}$

15

The expression $\frac{3x^2+4}{x+1}$ is equivalent to which of the following?

A) $3x - 3 + \frac{1}{x+1}$

B) $3x - 3 + \frac{7}{x+1}$

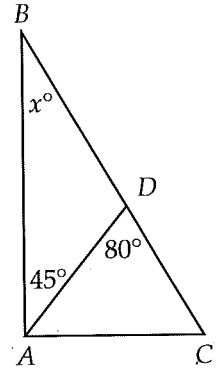
C) $3x + 3 + \frac{1}{x+1}$

D) $3x + 3 + \frac{7}{x+1}$

16

If $|1 - x| > 4$ and x is positive, what is one possible value of x?

17



Note: Figure not drawn to scale.

In the figure above, what is the value of x?

18

x	y
1	0
2	h
h	k

In the table above, if $y = x^2 + x - 2$, what is the value of k?

19

If $k^2 + 4k = 45$ and $k > 0$, what is the value of $k + 2$?

20

$$x^3 - 3x^2 + 3x - 9 = 0$$

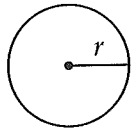
For what real value of x is the equation above true?

4 4

Math Test --- Calculator

55 Minutes, 38 Questions

Reference



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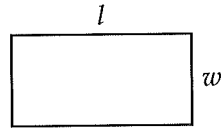

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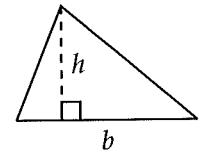

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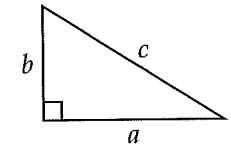

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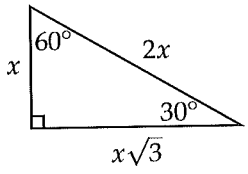

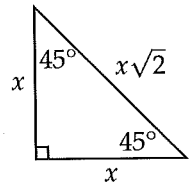

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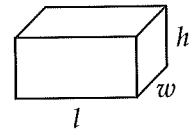
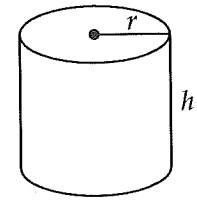


$V = lwh$



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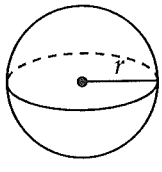
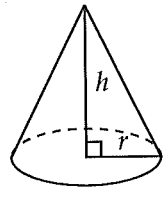
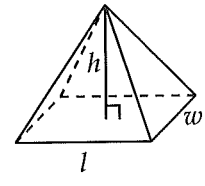


$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

4  4

1

Before a big test, James memorized 10 percent more words than Zach. Zach memorized 30 percent more words than Amy. If Amy memorized a words, how many words did James memorize in terms of a?

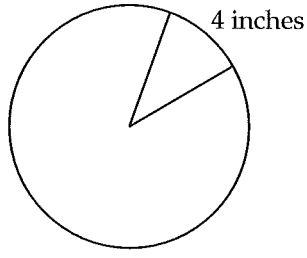
A) $(1.10)(1.30)a$

B) $\dfrac{a}{(1.10)(1.30)}$

C) $\dfrac{a}{(0.9)(0.7)}$

D) $1.40a$

2



A certain pizza restaurant cuts slices out at every 4 inches along the edge of a pizza, as shown in the figure above. What is the maximum number of full pizza slices that can be cut out from a circular pizza with a radius of 10 inches?

A) 7

B) 8

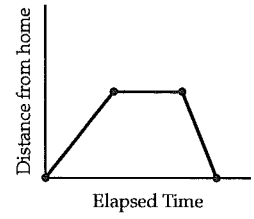
C) 14

D) 15

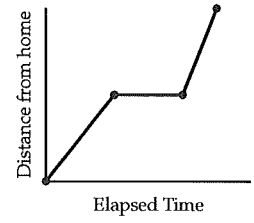
3

Last Saturday, Maya drove from her house to the bookstore, where she stayed for several hours before driving back home. Which of the following graphs could represent Maya's trip?

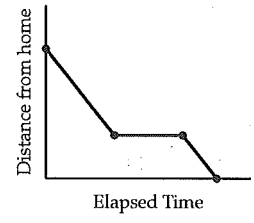
A)



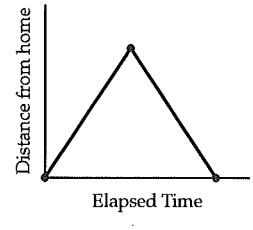
B)



C)



D)



4

4

	Use social media	Do not use social media	Total
Under 30	240	200	440
30 or older	120	160	280
Total	360	360	720

The table above shows the distribution of age and social media presence for 720 employees at a company. If an employee who uses social media is selected at random, what is the probability the employee is age 30 or older?

A) $\frac{1}{3}$

B) $\frac{4}{9}$

C) $\frac{1}{2}$

D) $\frac{2}{3}$

5

The function f is defined by $f(x) = x^2 + bx + c$, where b and c are constants. If the graph of f has x-intercepts at -5 and 3, which of the following correctly gives the values of b and c?

A) $b = -5, c = 3$

B) $b = -3, c = 5$

C) $b = -2, c = -15$

D) $b = 2, c = -15$

6

In the xy-plane, the line $y = mx + b$, where m and b are constants, is a reflection of line l across the y-axis. At which of the following points do the two lines intersect?

A) $(0, b)$

B) $(0, -b)$

C) $(0, m)$

D) $(m, 0)$

7

Rocket	Fuel burned (liters)
Rocket 1	7
Rocket 2	12
Rocket 3	17
Rocket 4	23
Rocket 5	29
Rocket 6	32
Rocket 7	35

The distance d, in meters, traveled by a rocket depends on the amount of fuel f, in liters, it burns according to the equation $d = \frac{2}{3}f$. Based on the table above, how many rockets traveled more than 20 meters?

A) One

B) Two

C) Three

D) Four

4 4

8

The table below summarizes student enrollment at three different universities.

	Undergraduate	Graduate	Total
State University	32,791	5,835	38,626
A&M University	26,802	4,631	31,433
Southwest University	19,443	2,918	22,361
Total	79,036	13,384	92,420

A researcher decides to interview a student who attends either State University or Southwest University. Which of the following is closest to the probability that the chosen student is an undergraduate at Southwest University?

A) 0.21
B) 0.25
C) 0.32
D) 0.54

9

A grocery store has two recycling machines outside. The first recycling machine took in 240 plastic bottles and 180 metal cans. The second took in 30 percent more plastic bottles but 10 percent less metal cans. The second machine recycled what percent more items than the first (rounded to the nearest percent)?

A) 9%
B) 11%
C) 13%
D) 15%

10

Ashley estimates that there are a marbles in a jar. Harry, who knows the actual number of marbles in the jar, b, notes that Ashley's estimate is within 15 marbles (inclusive) of the actual number of marbles. Which of the following inequalities represents the relationship between Ashley's estimate and the actual number of marbles in the jar?

A) $-15 \leq a - b \leq 15$
B) $a \leq b + 15$
C) $a \geq b - 15$
D) $a + b \geq 15$

11

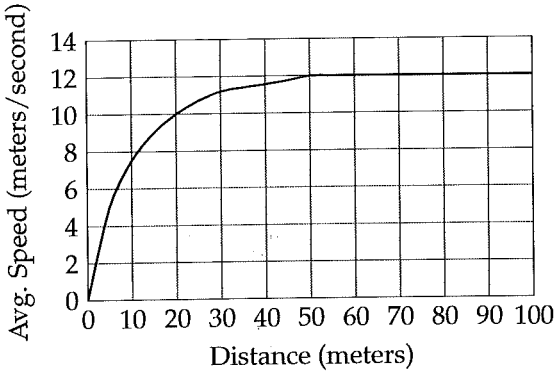
A circle in the xy-plane is centered at $(1, 2)$ and contains the point $(4, 6)$. Which of the following could be the equation of the circle?

A) $(x-1)^2 + (y-2)^2 = 5$
B) $(x-1)^2 + (y-2)^2 = 25$
C) $(x+1)^2 + (y+2)^2 = 5$
D) $(x+1)^2 + (y+2)^2 = 25$

4

4

Questions 12-13 refer to the following information.



John is training for the 100-meter-dash, a sprint race in track and field competitions. The graph above shows his average speed at different points during his last race.

12

According to the graph, what percentage of the race had John completed before he reached his maximum average speed?

A) 10%
B) 20%
C) 40%
D) 50%

13

Which of the following best describes John's performance during his last race?

A) John maintained a constant speed throughout the entire race.
B) John accelerated to his maximum speed and maintained it for the rest of the race.
C) John accelerated to his maximum speed and then maintained a lower constant speed for the rest of the race.
D) John accelerated to his maximum speed and then slowed down in the middle of the race before reaching his maximum speed again.

14

The value of a stock is going up by 200% every hour. Which of the following best describes the relationship between time (in hours) and the value of the stock?

A) Increasing linear
B) Decreasing linear
C) Exponential growth
D) Exponential decay

15

A sports equipment manufacturer produced 3,600 footballs and 2,200 basketballs during the fall. In the winter, it produced 3,060 footballs and a certain number of basketballs. If the manufacturer decreased the production of basketballs by the same percentage as it did for footballs, how many basketballs did it produce in the winter?

A) 1,810
B) 1,870
C) 1,920
D) 1,950

4  4

16

If $\frac{x}{5} = \frac{k}{y}$, where k is a constant, and $y = 3$ when $x = 10$, what is the value of y when $x = 2$?

A) 10
B) 12
C) 15
D) 18

17

The number of books in a warehouse can be found using the expression $4,000 + 100bd$, where b is the number of boxes of books the warehouse receives each day over a period of d days. What is the best interpretation of the number 100 in the expression?

A) The number of books in each box
B) The number of books received each day
C) The number of boxes received that contain books
D) The number of days it takes to receive each box

18

Of the following four scenarios, which one would result in exponential decay of the total amount of money kept in a safe?

A) The owner withdraws a third of the money remaining in the safe every month.
B) The owner withdraws 100 dollars every month from the safe.
C) The owner withdraws 10% of the original amount of money in the safe every month.
D) The owner empties the account in five months by withdrawing an equal amount of money each month.

19

If $\sqrt{x} + \sqrt{y} = 4\sqrt{y}$, where $x > 0$ and $y > 0$, what is x in terms of y?

A) $16y$
B) $9y$
C) $6y$
D) $4y$

20

Richard has seven times as many pineapples as Fred. Nathan has three times as many pineapples as Fred. Richard has 32 more pineapples than Nathan. How many pineapples does Fred have?

A) 7
B) 8
C) 11
D) 12

21

During a high school basketball game, Michael scores 30 times for a total of 68 points. If he ended the game with x two-pointers and y three-pointers, solving which of the following systems of equations gives x and y?

A) $x + y = 30$
$2x + 3y = 68$

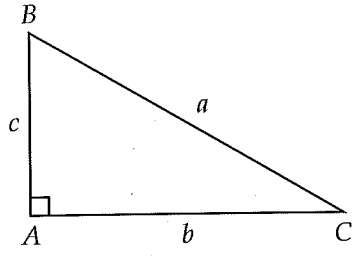
B) $x + y = 68$
$2x + 3y = 30$

C) $x + y = 30$
$3x + 2y = 68$

D) $x + y = 68$
$3x + 2y = 30$

4  4

22



Given right triangle ABC above, which of the following is equal to $\frac{c}{b}$?

A) $\tan B$

B) $\frac{1}{\tan B}$

C) $\cos B$

D) $\frac{1}{\cos B}$

23

To determine whether low lighting affects reading speed, a researcher randomly selected 30 subjects to participate in a study. Half of the subjects were randomly assigned to read an article under low lighting (400 lumens) while the other half read the same article under normal lighting (900 lumens). The resulting data showed that the subjects who read the article under low lighting took significantly longer than those who read the article under normal lighting. Based on the design and results of the study, which of the following is an appropriate conclusion?

A) Low lighting is harmful to the eyes.

B) Everyone reads slower under low lighting.

C) Low lighting is likely to cause a decrease in reading speed.

D) High lighting (1,200 lumens) is likely to cause an increase in reading speed.

24

A train traveling at an average speed of 80 miles per hour takes 8 hours to complete a given trip. How much time would it take the train to complete the same trip if it traveled at an average speed of 120 miles per hour?

A) 4 hours

B) 4 hours and 30 minutes

C) 5 hours and 20 minutes

D) 5 hours and 30 minutes

▼

Questions 25-26 refer to the following information.

The kinetic energy of an object is given by $\frac{1}{2}mv^2$, where m is the mass of the object and v is its velocity.

25

If the kinetic energy of a moving tennis ball is doubled, its velocity must have increased by what factor?

A) 4

B) 2

C) $\sqrt{3}$

D) $\sqrt{2}$

26

A radioactive element loses 15 percent of its mass and 20 percent of its velocity. By what percent has its kinetic energy decreased?

A) 32%

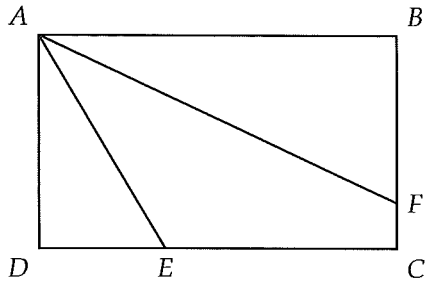
B) 36.2%

C) 24.8%

D) 45.6%

▲

27



In rectangle $ABCD$ above, E is on $\overline{DC}$, F is on $\overline{BC}$, $DE = 6$, and $FC = 1$. If angle A is trisected (divided into three equal angles) by $\overline{AE}$ and $\overline{AF}$, what is the length of $\overline{BF}$?

A) 5
B) $5\sqrt{2} - 1$
C) $5\sqrt{3} - 1$
D) $6\sqrt{3} - 1$

28

$$x - 3y = 4$$
$$2(x-1) - 6(y+2) = -6$$

How many solutions (x, y) are there to the system of equations above?

A) Zero
B) One
C) Two
D) More than two

Questions 29-30 refer to the following information.

$$f_{obs} = f_s\left(\frac{v_w}{v_w - v_a}\right)$$

An ambulance is moving at a velocity v_a, in meters per second, towards an observer standing still on a sidewalk. Because of this movement, the actual frequency of the sound waves emitted by the ambulance's siren f_s, in hertz, is perceived by the observer to be a different frequency f_{obs}. The siren's sound waves travel at a velocity v_w, in meters per second. The formula above shows the relationship between these variables.

29

Which of the following expresses the velocity of the ambulance in terms of the other variables?

A) $v_a = \dfrac{f_s v_w}{f_{obs} v_w}$

B) $v_a = \dfrac{f_{obs} v_w}{f_{obs} + f_s v_w}$

C) $v_a = \dfrac{f_s v_w - f_{obs} v_w}{f_{obs}}$

D) $v_a = \dfrac{f_{obs} v_w - f_s v_w}{f_{obs}}$

30

If the velocity of the siren's sound waves is 340 meters per second, the velocity of the ambulance is 22 meters per second, and the observer perceives the frequency of the siren's sound waves to be 500 hertz, which of the following is closest to the actual frequency of the siren's sound waves?

A) 468
B) 496
C) 507
D) 535

4  4

31

Gracie regularly buys six different items at the grocery store. The average price of the items is \$30. The prices of five of the items are \$7, \$25, \$36, \$40, and \$44. What is the price of the sixth item?

32

$$(3x + 2y)^2$$

If the expression above can be written as $ax^2 + bxy + cy^2$, where a, b, and c are constants, what is the value of $a + b + c$?

33

$$g(x) = \sqrt{(x-1)(x-2)}$$

What is one possible value of x for which the function g above is undefined?

34

At a certain pizza restaurant, 8 ounces of cheese is enough for $\frac{2}{3}$ of a pizza. Given that there are 16 ounces in a pound, how many pizzas can be produced with 12 pounds of cheese?

35

$$y - 3x \leq -10$$
$$y + 2x \geq 45$$

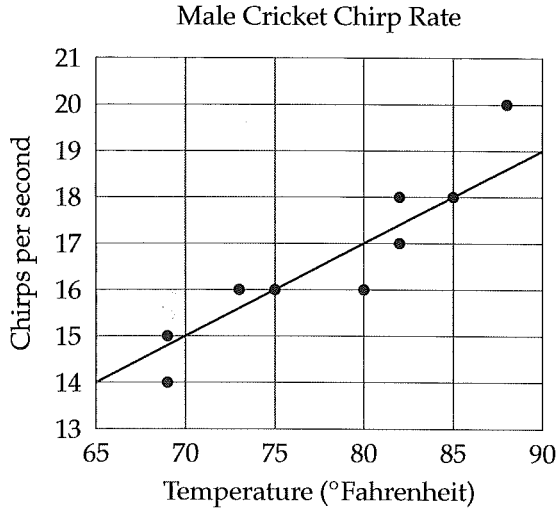
In the xy-plane, a point with coordinates (h, k) lies in the solution set of the system of inequalities above. What is the minimum possible value of h?

36

Call center A handles 20% fewer calls than Call center B. Call center B handles 20% fewer calls than Call center C. If Call center A handles 1,200 calls, how many calls does Call center C handle?

Questions 37-38 refer to the following information.

Male crickets vary their chirp rate according to the temperature. The scatterplot below shows the relationship between chirp rate and temperature for 9 crickets. The line of best fit is also shown.



37

Based on the line of best fit, what is the predicted male cricket chirp rate at a temperature of 80 degrees Fahrenheit?

38

What is the chirp rate of the male cricket represented by the data point that is farthest from the line of best fit?

2

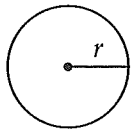
Practice Test 2

3  3

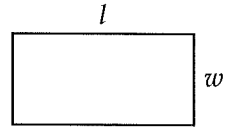
Math Test --- No Calculator

25 Minutes, 20 Questions

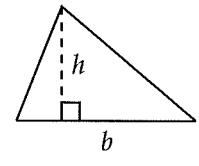
Reference



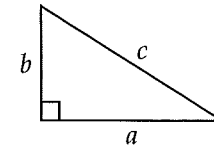
$A = \pi r^2$
$C = 2\pi r$



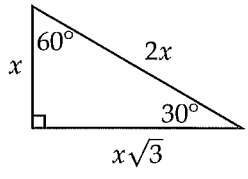
$A = lw$

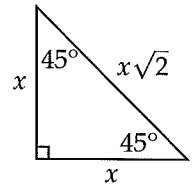


$A = \frac{1}{2}bh$

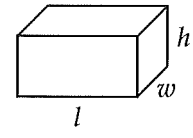


$c^2 = a^2 + b^2$

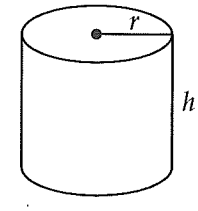




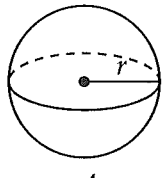
Special Right Triangles



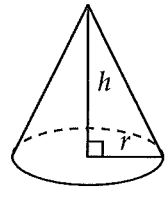
$V = lwh$



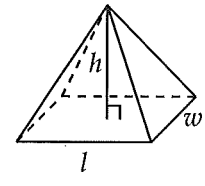
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

3

3

1

Which of the following expressions is NOT equivalent to $ab(c+d)$?

A) $abd + abc$
B) $ab(d+c)$
C) $ba(c+d)$
D) $abc + bd$

2

At a movie theater, an adult ticket costs \$10 and a bag of popcorn costs \$6. If a group of adults bought tickets to a movie and 4 bags of popcorn, what expression could be used to determine how much in total the group spent, in dollars?

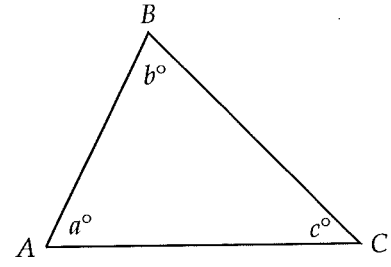
A) $10x + 6$, where x is the number of adults
B) $10x + 24$, where x is the number of adults
C) $16x$, where x is the number of adults
D) $6x + 10$, where x is the number of bags of popcorn purchased

3

If $xy = 5$, which of the following CANNOT be a value for x?

A) -6
B) -5
C) 0
D) 1

4



Note: Figure not drawn to scale.

In the figure above $AB = AC$ and $c = 50°$. What is the value of a?

A) 65
B) 70
C) 75
D) 80

5

Barbara has x dolls in her doll collection. If Barbara has half as many dolls as Tanya does and Tanya has y dolls, which of the following equations must be true?

A) $y = x + 2$
B) $y = \frac{1}{2}x$
C) $y = 2x$
D) $xy = 2$

6

What is the sum of the solutions to $2x^2 - 6x + 2 = 0$?

A) -3
B) -1
C) 1
D) 3

3 3

7

Let the function f be defined by $f(x) = 2x^3 - 1$, and let the function g be defined by $g(x) = x^2 + 3$, what is the value of $f(g(1))$?

A) 4
B) 23
C) 56
D) 127

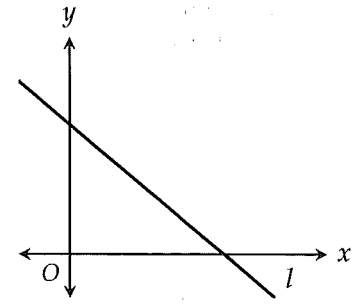
8

$$ax + 4y = 14$$
$$5x + 7y = 8$$

In the system of equations above, a is a constant and x and y are variables. If the system has no solution, what is the value of a?

A) $\frac{20}{7}$
B) $\frac{35}{4}$
C) $-\frac{35}{4}$
D) $-\frac{20}{7}$

9



The graph of line l is shown in the xy-plane above. The equation of line n (not shown) is $y = mx + b$, where m and b are constants. If line l is perpendicular to line n, which of the following must be true?

A) $m < 0$
B) $m > 0$
C) $b > 0$
D) $b < 0$

10

On Friday, Janice read x pages every 30 minutes for 4 hours, and Kim read y pages every 15 minutes for 5 hours. Which of the following represents the total number of pages read by Janice and Kim on Friday?

A) $4x + 5y$
B) $8x + 20y$
C) $20x + 8y$
D) $120x + 75y$

3

3

11

Victor wants to sell 3 watches, each at the same price. After negotiating with customers, however, he ends up selling one at a 30% discount, one at a 20% discount, and one at a 10% discount. If Victor sold the watches for a total of $240, how many much money did he lose by giving the discounts?

A) $45
B) $60
C) $75
D) $90

12

$$x^2 + kx + 9 = (x + a)^2$$

In the equation above, k and a are positive constants. If the equation is true for all values of x, what is the value of k?

A) 0
B) 3
C) 6
D) 9

13

The lengths of the three sides of a triangle are different prime numbers. If two of the sides have lengths 3 and 11, which of the following could be the length of the third side?

I. 7
II. 13
III. 17

A) I only
B) II only
C) I and II only
D) I, II, and III

14

$$ax + \frac{1}{2}y = 16$$
$$4x + 3y = 8$$

In the system of equations above, a is a constant. If the system has no solution, what is the value of a?

A) $\frac{2}{3}$
B) 2
C) 8
D) 24

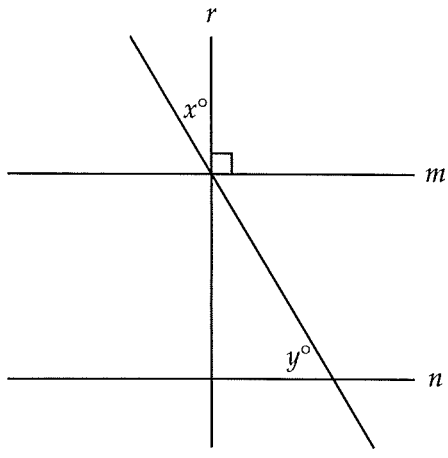
15

If $27^{81} = 3^x$, what is the value of x?

A) 27
B) 84
C) 100
D) 243

3 3

16



Note: Figure not drawn to scale.

In the figure above, line m is parallel to line n and is perpendicular to line r. If $y = 2x$, what is the value of y?

17

A salad dressing supplier ensures that there are 7.5 ounces of salad dressing in every container. How many containers would be required to hold 150 ounces of salad dressing?

18

If $\frac{1}{2}x - \frac{1}{3}x = 1 + \frac{1}{2}$, what is the value of x?

19

x	$f(x)$	$g(x)$
1	4	0
2	6	2
3	5	6
4	2	4

Four values for the functions f and g are shown in the table above. If $g(m) = 6$, what is the value of $f(m)$?

20

$$x^2 - 5x + c = 0$$

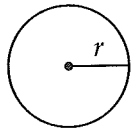
In the quadratic equation above, c is a constant. If the equation has two solutions for x, one of which is -3, what is the value of the other solution?

4 4

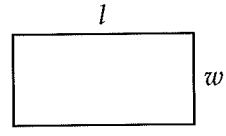
Math Test --- Calculator

55 Minutes, 38 Questions

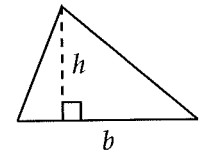
Reference



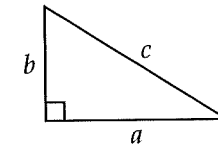
$A = \pi r^2$
$C = 2\pi r$



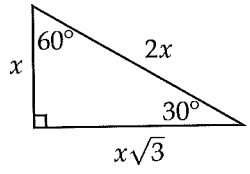
$A = lw$

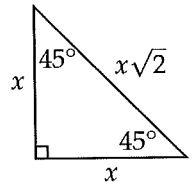


$A = \frac{1}{2}bh$

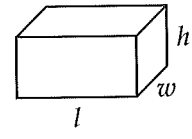


$c^2 = a^2 + b^2$

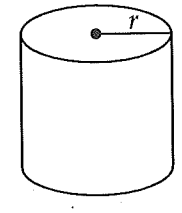




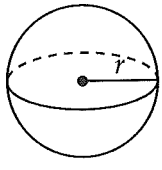
Special Right Triangles



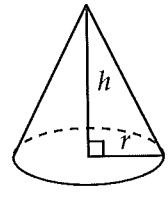
$V = lwh$



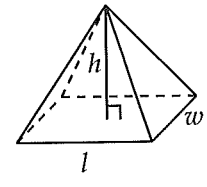
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

4  4

1

A small shop can manufacture 4 windows every 5 hours. At that rate, how long will it take to manufacture 7 windows?

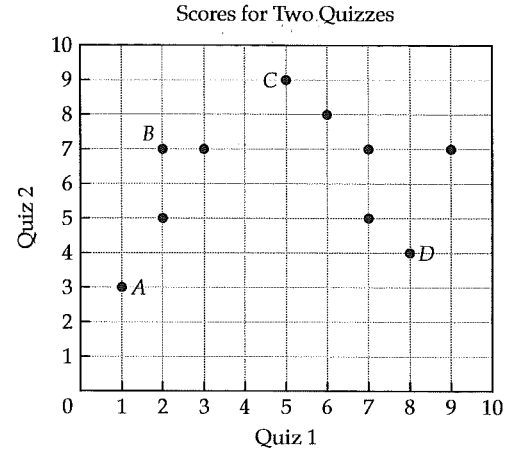
A) 8 hr
B) 8 hr 15 min
C) 8 hr 30 min
D) 8 hr 45 min

2

If the area of a circle is $\frac{\pi}{4}$, what is the diameter of the circle?

A) $\frac{1}{4}$
B) $\frac{1}{2}$
C) 1
D) $\frac{3}{2}$

3



Ten students in a class have taken two quizzes so far. For each student, the score for the first quiz was plotted against the score for the second quiz in the grid shown above. Which labeled grid point represents the student for whom the difference between the scores of the two quizzes was greatest?

A) *A*
B) *B*
C) *C*
D) *D*

4

An analyst determines that the cost of an order depends on the quantity ordered in the following way: $C = 3600 - 400q + 20q^2$, where $q \geq 0$. According to this model, for which of the following values of q would the cost of an order be the lowest?

A) 5
B) 10
C) 15
D) 20

4

4

5

The table below shows the oil production (in thousands of barrels) for four states from 2010 to 2014.

	2010	2011	2012	2013	2014	Total
Arkansas	12,391	11,802	12,468	12,859	13,172	62,692
Louisiana	19,429	21,024	23,371	24,647	25,409	113,880
Oklahoma	27,673	29,263	29,826	32,584	34,673	154,019
Texas	48,297	52,702	53,065	54,911	55,616	264,591
Total	107,790	114,791	118,730	125,001	128,870	595,182

Based on the table, if an oil barrel was produced in 2012, which of the following is closest to the probability that the barrel was produced in Arkansas?

A) 0.10
B) 0.20
C) 0.30
D) 0.50

6

If X is 20% of Y and Y is 30% of Z, then what percent of Z is X?

A) 5%
B) 6%
C) 8%
D) 12%

7

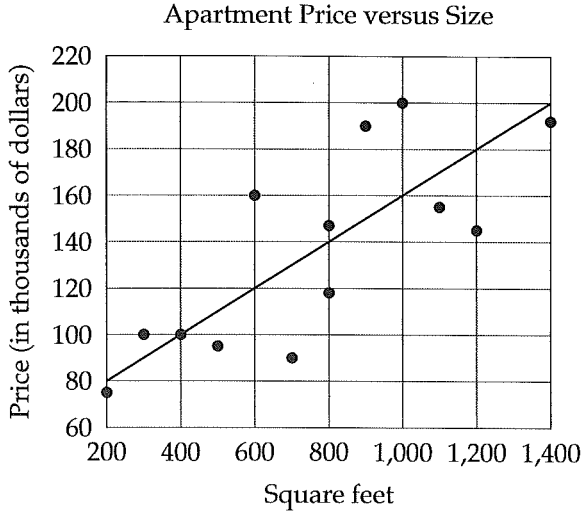
When 5 times a number y is divided by 8, the result is 15. What is the value of y?

A) 20
B) 22
C) 24
D) 26

4 4

Questions 8-9 refer to the following information.

The scatterplot below shows the relationship between apartment price and size for 13 apartments. The line of best fit is also shown.



8

According to the line of best fit, which of the following best approximates the size in square feet of the apartment for which the price is estimated to be 180 thousand dollars?

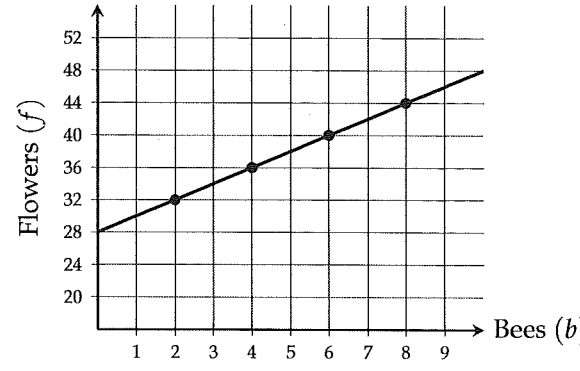
A) 600
B) 800
C) 1,000
D) 1,200

9

For the 600 square foot apartment, the actual price is how many dollars more than the price predicted by the line of best fit?

A) 20,000
B) 30,000
C) 40,000
D) 50,000

Questions 10-11 refer to the following information.



A botanist uses the graph above to show the number of flowers f that blossom in a garden with b bees.

10

What is the meaning of the f-intercept?

A) The average number of flowers that blossom
B) The maximum number of flowers that blossom
C) The number of flowers that blossom per bee
D) The number of flowers that blossom in a garden without any bees

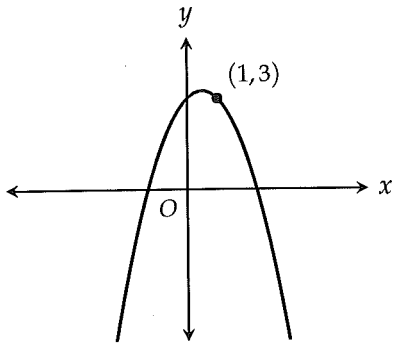
11

Which of the following describes the relationship between f and b?

A) $f = 28 + 0.5b$
B) $f = 28 + 2b$
C) $b = 28 + 0.5f$
D) $b = 28 + 2f$

4  4

12



The graph of the function g in the xy-plane is shown above. If f is another function defined in the same xy-plane and $f(1) = 1$, then g could be which of the following?

A) $f - 1$
B) $f - 2$
C) $f + 1$
D) $f + 2$

13

This year, Roger beat Rafael in 25% of their tennis matches. If Rafael won 18 matches, how many matches did Roger win?

A) 2
B) 3
C) 4
D) 6

14

One calorie is equivalent to 4.184 joules of energy. One calorie also represents the amount of energy required to raise the temperature of 1 gram of water by 1° Celsius. Based on this information, raising the temperature of 1 gram of water by 120° Fahrenheit would require how many joules of energy, to the nearest hundredth? (1° Celsius = 33.8° Fahrenheit)

A) 12.76
B) 13.88
C) 14.32
D) 14.85

15

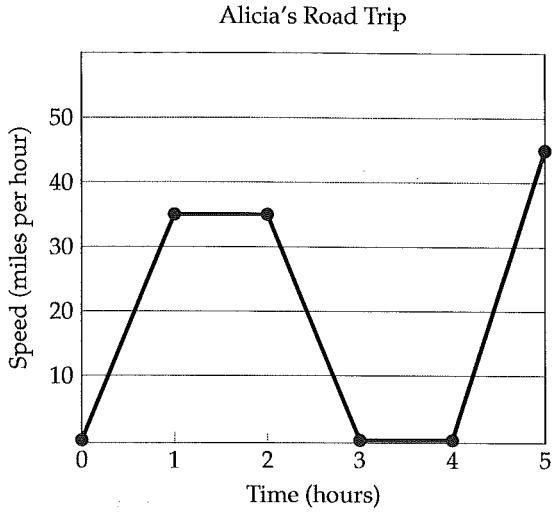
$$|n - 2| < 5$$

How many integers n satisfy the inequality above?

A) Six
B) Seven
C) Eight
D) Nine

4  4

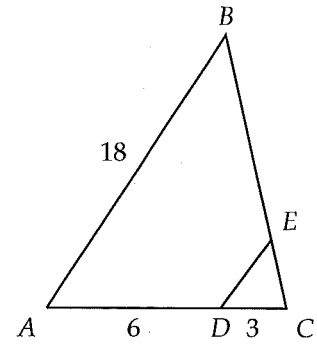
16



The graph above shows Alicia's speed during a road trip. She stopped at a rest stop during her trip to take a nap. Based on the graph, Alicia stopped for her nap after how many hours of driving?

A) 1
B) 2
C) 3
D) 4

17



In the figure above, $\overline{DE}$ is parallel to $\overline{AB}$. If $AD = 6$, $DC = 3$, and $AB = 18$, what is the length of $\overline{DE}$?

A) 3
B) 6
C) 9
D) 12

18

A school district wants to make at least 600 but no more than 700 computers available to students. To meet this goal, the superintendent puts aside a budget to install 8 new computers every month. If there is a total of 200 computers available at the schools in the district currently, which of the following inequalities gives the possible number of months t for which the school district can continue to add new computers? Assume t is an integer.

A) $50 \leq t \leq 62$
B) $50 \leq t \leq 63$
C) $75 \leq t \leq 87$
D) $75 \leq t \leq 88$

4  4

19

$$E = \frac{P - N}{P + N}$$

The net effective charge between two particles as a proportion of total charge is represented by E in the formula above, where P is the magnitude of the positive charge and N is the magnitude of the negative charge. Which of the following expresses N in terms of P and E?

A) $N = \frac{EP}{E-1}$

B) $N = \frac{EP}{E+1}$

C) $N = \frac{P+EP}{E-1}$

D) $N = \frac{P-EP}{E+1}$

20

If $a = x^2 - 5x + 2$ and $b = 3x^3 + 4x^2 - 6$, what is $3a - b$ in terms of x?

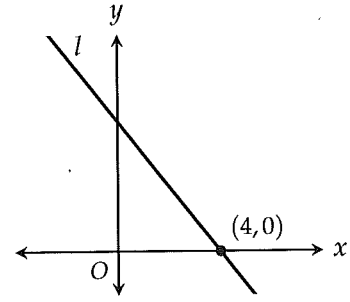
A) $4x^2 - 15x + 12$

B) $-3x^3 - x^2 - 15x + 12$

C) $-3x^3 - x^2 - 15x$

D) $-3x^3 + 7x^2 - 15x + 12$

21



In the xy-plane above, line l has slope $-\frac{5}{4}$. What is the area of the triangle bounded by line l, the x-axis, and the y-axis?

A) 5

B) 8

C) 10

D) 16

22

The price of a textbook this year is 20% greater than the price last year. If this year's price is p, what was last year's price in terms of p?

A) $\frac{1}{5}p$

B) $\frac{4}{5}p$

C) $\frac{5}{6}p$

D) $\frac{6}{5}p$

4  4

23

$$y = x^2 - 2x - 3$$

A parabola in the xy-plane is given by the equation above. Which of the following equivalent forms of the equation displays the coordinates of the vertex of the parabola as constants or coefficients?

A) $y = (x-1)^2 - 4$
B) $y = (x-1)^2 - 2$
C) $y = (x-3)(x+1)$
D) $y + 3 = x(x+2)$

24

$$T = 2\pi\sqrt{\frac{L}{9.8}}$$

The time it takes a clock pendulum to repeat its motion is called its period. The formula above shows the relationship between T, the period of the pendulum, in seconds, and L, the length of the pendulum, in meters. Which of the following is closest to L when T is 8?

A) 14.4
B) 15.9
C) 16.3
D) 17.1

25

The number of dandelions in a large park is recorded over the course of five months, as shown in the table below.

Month	Dandelions
1	12,500
2	2,500
3	500
4	100
5	20

Which of the following best describes the relationship between time and the number of dandelions during the five months?

A) Increasing linear
B) Decreasing linear
C) Exponential growth
D) Exponential decay

Questions 26-27 refer to the following information.

The table below gives the distribution of weights, to the nearest pound, for 50 lobsters harvested off the coast of Maine and 50 lobsters harvested off the coast of Massachusetts.

Weight (pounds)	Maine	Massachusetts
1	20	30
2	20	15
3	8	5
4	2	0

26

What is the mean weight, in pounds, of all the harvested lobsters?

A) 1.34
B) 1.45
C) 1.67
D) 1.78

4  4

27

According to the data, which of the following accurately compares the median weight of the lobsters harvested off the coast of Maine with that of the lobsters harvested off the coast of Massachusetts?

A) The median weight of the lobsters from Maine is one pound less than that of the lobsters from Massachusetts.

B) The median weight of the lobsters from Maine is one pound more than that of the lobsters from Massachusetts.

C) The median weight of the lobsters from Maine is half a pound more than that of the lobsters from Massachusetts.

D) The median weight of the lobsters from Maine is the same as that of the lobsters from Massachusetts.

28

The number of girls in a class is three more than four times the number of boys. If there is a total of 33 students in the class, how many boys are there?

A) 6

B) 8

C) 10

D) 27

29

Taylor has a bank account earning 5 percent interest compounded annually. If her initial deposit was \$1,000 and she makes a withdrawal of \$200 after 3 years, which of the following represents the total amount in her account after 7 years?

A) $1{,}000(1.05)^7 - 200$

B) $1{,}000(1.05)^3 + 800(1.05)^4$

C) $1{,}000(1.05)^3 - 200(1.05)^4$

D) $1{,}000(1.05)^7 - 200(1.05)^4$

30

Alex and Brian weigh a total of 300 pounds. Alex and James weigh a total of 280 pounds. James and Brian weight a total of 350 pounds. How many pounds do Alex, Brian, and James weigh altogether?

A) 425

B) 445

C) 450

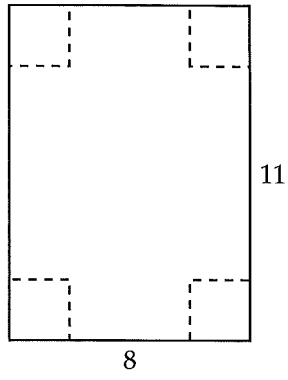
D) 465

31

The measures of the three angles of a triangle are $2y$, $3y$, and $60°$. What is the value of y?

4 4

32



Squares of side length 2 are removed from the corners of an 8 by 11 piece of paper shown above by cutting along the dashed lines. The sides of the paper are then folded up to create a rectangular box with an open top. How many cubes of side length 1 are needed to completely fill this box?

33

A food manufacturer fills containers of seasoning with various spices, pepper, and salt. The amount of pepper p, in milligrams, used in the seasoning can be modeled by the equation $p = \frac{10 + 3s}{4}$, where s is the amount of salt, in milligrams, in the seasoning. According to the model, how many milligrams of pepper are added for every 1 milligram increase in the amount of salt?

34

Number of Vacations each Year

	0	1	2+	Total
Doctor		45		100
Lawyer	35	40	20	95
Total		85		195

The incomplete table above shows the results of a survey that asked a group of doctors and lawyers how many vacations they take each year. If a doctor from the surveyed group is chosen at random, the probability that the doctor takes at least 1 vacation each year is $\frac{4}{5}$. How many people from the surveyed group take at least 2 vacations each year?

35

$$y \leq \frac{1}{2}x - 5$$

$$y \geq 3x - 20$$

In the xy-plane, a point with coordinates (h, k) lies in the solution set of the system of inequalities above. What is the maximum possible value of h?

4  4

36

What is the remainder when $x^2 + 2x + 1$ is divided by $x + 3$?

Questions 37-38 refer to the following information.

$$C = 100 + \frac{36}{n}$$

A boutique shop is selling handmade necklaces. The cost per necklace C can be determined by the equation above, where n is the number of necklaces made.

37

What is the total cost of making 6 necklaces?

38

If the shop sells each necklace for \$150, how many necklaces should be made so that the shop makes a total profit of \$564 after all of them are sold?

3

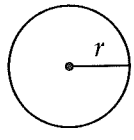
Practice Test 3

3  3

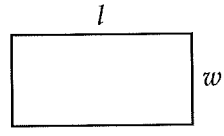
Math Test --- No Calculator

25 Minutes, 20 Questions

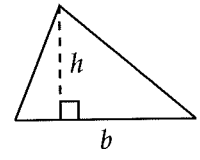
Reference



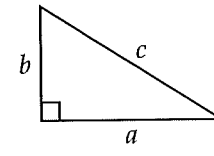
$A = \pi r^2$
$C = 2\pi r$



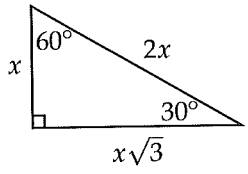
$A = lw$

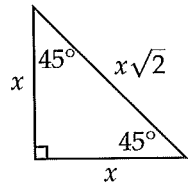


$A = \frac{1}{2}bh$

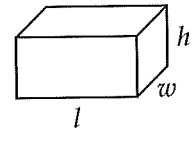


$c^2 = a^2 + b^2$

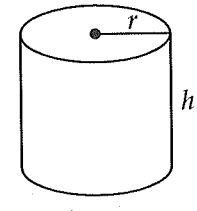




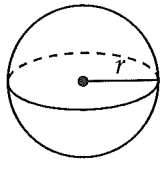
Special Right Triangles



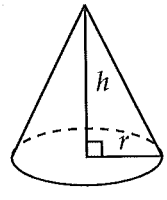
$V = lwh$



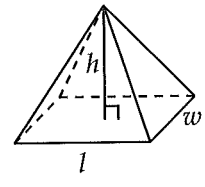
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

3  3

1

$$0 < \left|\frac{5}{x}\right| < 1$$

Which of the following values of x satisfies the inequality above?

A) -8
B) -3
C) 2
D) 3

2

If $c = \frac{ab}{d}$ and $d \neq 0$, then $\frac{1}{ab} =$

A) $c + d$
B) cd
C) $\frac{1}{cd}$
D) $\frac{c}{d}$

3

If $x^2 < 25$, which of the following must be true?

A) $0 < x < 5$
B) $-5 < x < 0$
C) $-5 < x < 5$
D) $x < 5$

4

The total amount of water w, in gallons, left in a tank can be modeled by the equation $w = 300 - 5t$, where t is the number of hours since the tank started leaking. Which of the following is the best interpretation of the number 5 in the equation?

A) The tank is empty after 5 hours.
B) The tank loses 5 gallons of water each hour.
C) The tank continues to lose water until 5 gallons are left.
D) Each hour, the tank loses 5 less gallons of water than it did the previous hour.

5

In the xy-plane, the line with equation $3x + 4y = 6$ is perpendicular to the line with equation $y = mx + b$, where m and b are constants. What is the value of m?

A) $-\frac{4}{3}$
B) $-\frac{3}{4}$
C) $\frac{3}{4}$
D) $\frac{4}{3}$

6

$$3x + ky = 8$$
$$x + 4y = -1$$

If (x, y) is a solution to the system of equations above and k is a constant, what is y in terms of k?

A) $\frac{5}{k-12}$

B) $\frac{11}{k-12}$

C) $\frac{7}{k-4}$

D) $\frac{9}{k-4}$

7

$$2 + 3i + 4i^2 + 5i^3 + 6i^4$$

If the expression above is equivalent to $a + bi$, where a and b are constants, what is the value of $a + b$? (Note $i = \sqrt{-1}$)

A) 2

B) 6

C) 10

D) 12

8

A car has a gas mileage of 32 miles per gallon when it travels at an average speed of 65 miles per hour. If the car travels for t hours at 65 miles per hour, which of the following expressions represents the amount of gas, in gallons, the car has consumed?

A) $\frac{32}{65t}$

B) $\frac{65}{32t}$

C) $\frac{32t}{65}$

D) $\frac{65t}{32}$

9

$$x^2 - x = 4$$

What are the solutions x to the quadratic equation above?

A) $\frac{-1 \pm \sqrt{15}}{2}$

B) $\frac{1 \pm \sqrt{15}}{2}$

C) $\frac{-1 \pm \sqrt{17}}{2}$

D) $\frac{1 \pm \sqrt{17}}{2}$

10

If $y^8 = m$ and $y^9 = \frac{2}{3}$, what is the value of y in terms of m?

A) $\frac{2}{3}m$

B) $\frac{2}{3m}$

C) $\frac{3}{2}m$

D) $\frac{3}{2m}$

11

$$2x(x - y)(x + y)$$

Which of the following is equivalent to the expression above?

A) $4x^3 - 2xy^2$

B) $2x^3 + 2xy^2$

C) $2x^3 - 2xy^2$

D) $2x^3 - 4xy + 2xy^2$

3  3

12

If $m+6$ divided by 2 is 4 less than $4m$, what is the value of m?

A) 2
B) 3
C) 4
D) 5

13

If a line contains the points $(0,0)$ and $(12,16)$, then the line will also contain which of the following points?

A) $(2,3)$
B) $(3,2)$
C) $(3,4)$
D) $(4,3)$

14

$$\sin x = \cos y$$

In the equation above, x and y are measured in radians. Which of the following could be x in terms of y?

A) $\frac{\pi}{2} - y$
B) $\frac{\pi}{2} + y$
C) $y - \frac{\pi}{2}$
D) $\pi - y$

15

The equation $(2x-b)(7x+b) = 14x^2 - cx - 16$ is true for all values of x, where b and c are constants. If $b > 0$, what is the value of c?

A) -20
B) 20
C) 28
D) 36

16

Battery A runs out of energy after 132 minutes. Battery B runs out of energy twice as fast. Battery C runs out of energy three times as fast as Battery B. If used one at a time, what is the total number of minutes that all three batteries can provide energy for?

17

If $(x+3)(x-3) = 91$, what is the value of x^2?

18

A scientist counts 80 cells in a petri dish and finds that each one splits into two new cells every hour. How many cells are in the petri dish after 5 hours?

3  3

19

$$f(x) = ax^3 + b$$

In the function f defined above, a and b are constants. If $f(-1) = 4$ and $f(1) = 10$, what is the value of b?

20

$$\frac{x}{y+2} = 2$$

$$3(y-5) - x = -16$$

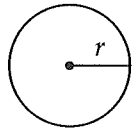
If (x, y) is the solution to the system of equations above, what is the value of x?

4  4

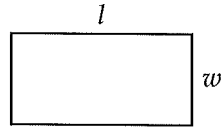
Math Test --- Calculator

55 Minutes, 38 Questions

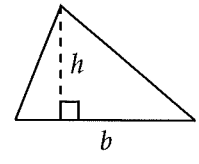
Reference



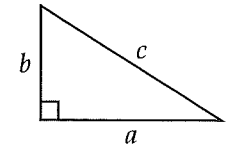
$A = \pi r^2$
$C = 2\pi r$



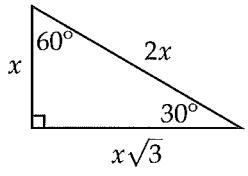
$A = lw$

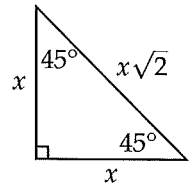


$A = \frac{1}{2}bh$

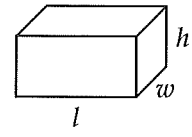


$c^2 = a^2 + b^2$

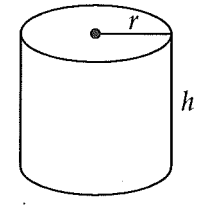




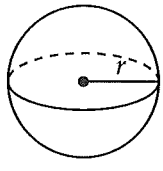
Special Right Triangles



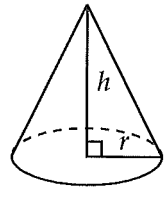
$V = lwh$



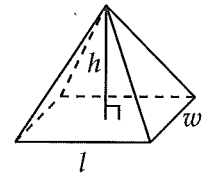
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

4

4

1

The original price of a suit is \$1000. A salesman decides to discount it by 30%. Later on, the manager decides to give a 15% discount off the salesman's price. What is the final price of the suit?

A) \$350
B) \$485
C) \$550
D) \$595

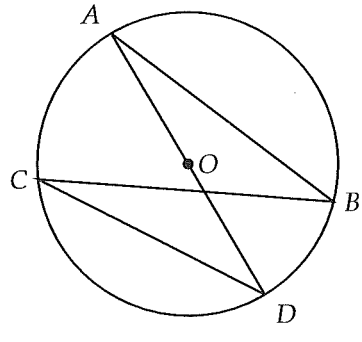
2

$$a(3-a)+2(a+5)$$

Which of the following is equivalent to the expression above?

A) $-a^2+5a+5$
B) $-a^2+5a+10$
C) $4a+5$
D) $4a+10$

3



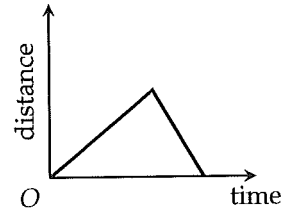
The circle above has center O. Which of the following line segments from the figure above is greatest in length?

A) $\overline{AB}$
B) $\overline{AD}$
C) $\overline{BC}$
D) It cannot be determined from the information given.

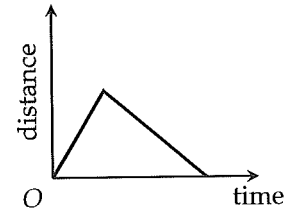
4

Jones climbed a mountain at a speed of 1 kilometer per hour and came down at a speed of 2 kilometers per hour. Which of the following could be the graph of his distance from the bottom of the mountain as a function of time?

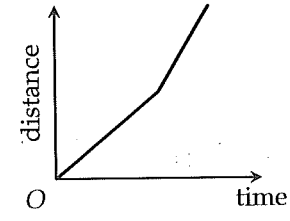
A)



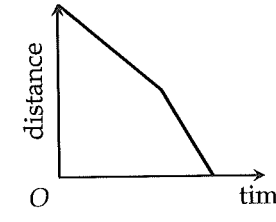
B)



C)

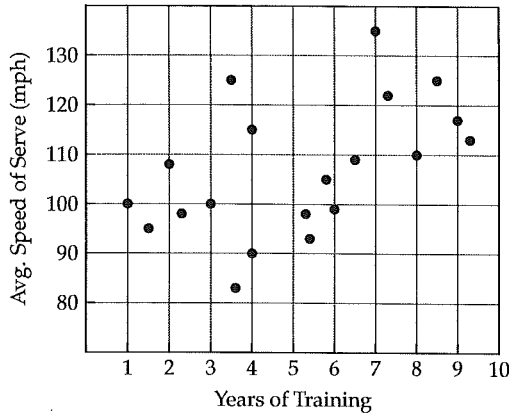


D)



4 4

5



The average speed of serve and number of years of training were recorded for 20 tennis players and plotted in the grid above. Which of the following statements is supported by the plotted data?

A) The player with the least number of years of training had the slowest serve.

B) The player with the highest number of years of training had the fastest serve.

C) More than half of the players had a serve exceeding 110 miles per hour.

D) More than half of the players had more than 5 years of training.

6

	Passed exam	Did not pass exam
No breakfast	82	18
Ate breakfast	88	12

A teacher conducted a survey to determine the effect of eating breakfast on the same day an exam is taken. The results of the survey are shown in the table above. If one of the students who did not pass the exam is chosen at random, what is the probability that the person chosen ate breakfast on the same day of the exam?

A) $\frac{3}{25}$

B) $\frac{2}{5}$

C) $\frac{3}{5}$

D) $\frac{2}{3}$

7

$$y = x^2 + 10x + 16$$

The equation above represents a parabola in the xy-plane. Which of the following equivalent forms of the equation displays the minimum value of y as a constant or coefficient?

A) $y = (x+8)(x+2)$

B) $y - 16 = x(x+10)$

C) $y = (x+5)^2 - 9$

D) $y = (x-5)^2 + 9$

4

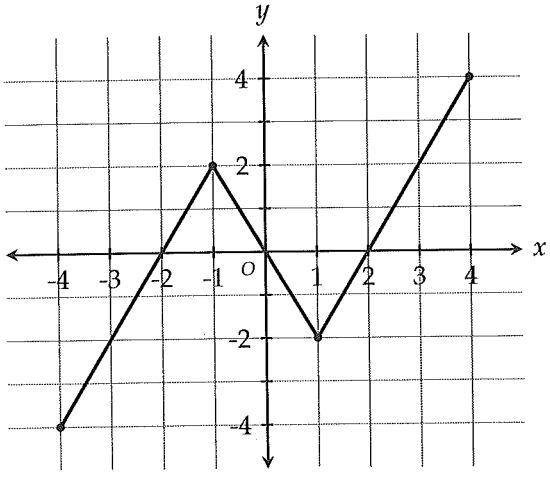
4

8

A class of 45 students is divided into two groups. If one group has 9 less students than the other, how many students are in the smaller group?

A) 12
B) 18
C) 24
D) 27

9

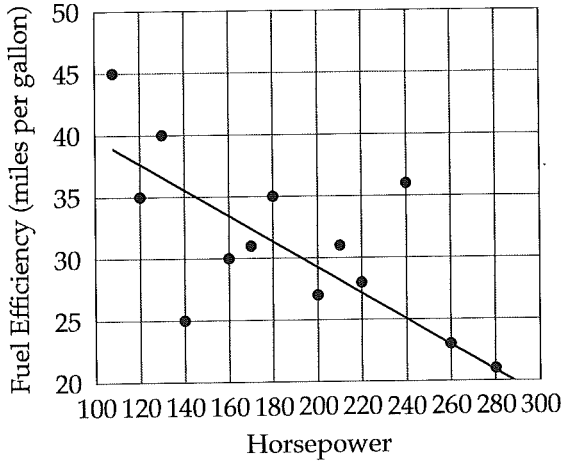


The function f is graphed in the xy-plane above. If $f(c) = f(3)$, which of the following could be the value of c?

A) -3
B) -2
C) -1
D) 2

Questions 10-11 refer to the following information.

Horsepower and Fuel Efficiency for 15 cars



The scatterplot above shows the relationship between horsepower and fuel efficiency for 15 cars. The line of best fit is also shown.

10

Which of the following is the best interpretation of the meaning of the slope of the line of best fit?

A) The predicted increase in a car's horsepower for every mile per gallon decrease in fuel efficiency
B) The predicted decrease in a car's horsepower for every mile per gallon decrease in fuel efficiency
C) The predicted mile per gallon increase in a car's fuel efficiency for every decrease of one horsepower
D) The predicted mile per gallon decrease in a car's fuel efficiency for every decrease of one horsepower

4  4

11

How many of the 15 cars have a fuel efficiency below the one predicted by the line of best fit?

A) 2
B) 4
C) 5
D) 6

12

If m and b are real numbers and $m > 0$ and $b > 0$, then the line whose equation is $y = mx + b$ cannot contain which of the following points?

A) $(0, 1)$
B) $(1, 1)$
C) $(-1, 1)$
D) $(0, -1)$

13

At a kitchen equipment store, the price of pots is \$14 and the price of pans is \$10. If Amy spends more than \$100 but less than \$150 to buy 3 pots and x pans, which of the following is NOT a possible value of x?

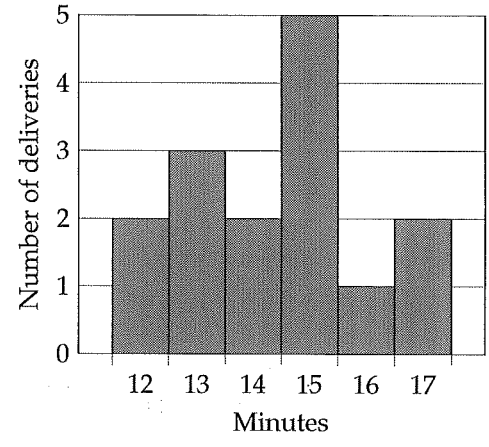
A) 6
B) 8
C) 10
D) 12

14

A textbook company ships its books in boxes that can hold 30 pounds. One particular order calls for a shipment of 800 books. If each book weighs 1.4 kilograms, how many boxes will be required to fulfill this order? (1 kilogram = 2.2 pounds)

A) 81
B) 82
C) 83
D) 84

15

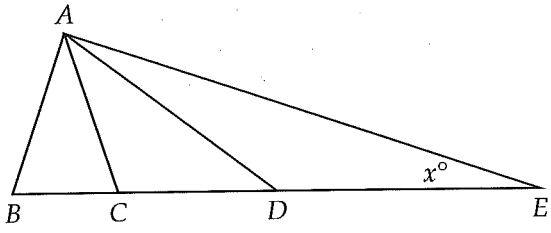


A local pizza restaurant advertises a service that delivers pizza within 15 minutes. The histogram above was produced by a customer who timed the restaurant's delivery service to the nearest minute for 15 deliveries. Based on the histogram, what is the mean delivery time, in minutes, of the restaurant?

A) 14.4
B) 14.8
C) 15.2
D) 15.6

4  4

16



In the figure above, $\angle BAC = 20°$ and $AB = AC$. If triangles ACD and ADE are isosceles, what is the value of x?

A) 10
B) 15
C) 20
D) 25

17

A large group of friends go out to dinner at a restaurant which charges them a service fee of 12 percent of the original price of their meal. After this fee is factored in, the group uses a coupon to get 25 percent off the total. In the end, what percent discount did the group receive off the original price?

A) 13%
B) 16%
C) 18%
D) 20%

18

A rectangular box is 4 in wide, 6 in long, and 8 in deep. If the box is to be filled with cubes, each with a side length of 2 in, until no space is left inside, how many cubes are needed?

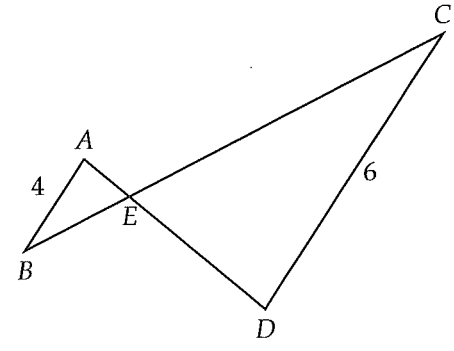
A) 12
B) 24
C) 32
D) 48

19

If $y > 0$ and $\frac{y^b}{y^{\frac{1}{2}}} = \frac{1}{y^2}$, what is the value of b?

A) $-\frac{3}{2}$
B) $-\frac{5}{2}$
C) $\frac{3}{2}$
D) $\frac{5}{2}$

20



Note: Figure not drawn to scale.

In the figure above, $\overline{AB}$ is parallel to $\overline{CD}$. If $BC = 15$, what is the length of EC?

A) 6
B) 7
C) 8
D) 9

4  4

21

Tom buys a pack of baseball cards everyday. Each pack contains 7 cards but he gives away the two least valuable ones to his brother. Which of the following best describes the relationship between time (in days) and the total number of baseball cards in Tom's collection?

A) Increasing linear
B) Decreasing linear
C) Exponential growth
D) Exponential decay

▼

Questions 22-23 refer to the following information.

Jane is performing an experiment in which she combines potassium and water to produce potassium hydroxide. The amount of water w, in milliliters, needed to create a chemical reaction between potassium and water can be modeled by the equation $w = 1.6a + 10$, where a is the amount of potassium hydroxide, in grams, Jane wishes to produce from the reaction.

22

According to the model, what is the meaning of the 1.6 in the equation?

A) An additional 1.6 milliliters of water is needed to react with one additional gram of potassium.
B) An additional 1.6 milliliters of water is needed to produce one more gram of potassium hydroxide.
C) One gram of potassium hydroxide can be produced by reacting 1.6 milliliters of water with potassium.
D) One additional milliliter of water is needed to produce 1.6 more grams of potassium hydroxide.

23

According to the model, how much more potassium hydroxide, in grams, is produced for each additional milliliter of water used in the reaction?

A) 0.6
B) 0.625
C) 0.875
D) 1.6

▲

24

A parking meter charges \$0.25 for the first 30 minutes and \$0.10 for every additional 5 minutes. If Megan is charged \$1.35 for parking at this specific meter, how many minutes did she park for?

A) 70
B) 75
C) 80
D) 85

25

Which of the following is an equation of a circle in the xy-plane with center $(3, -1)$ and a radius of 4?

A) $(x-3)^2 + (y+1)^2 = 4$
B) $(x-3)^2 + (y+1)^2 = 16$
C) $(x+1)^2 + (y-3)^2 = 4$
D) $(x+3)^2 + (y-1)^2 = 16$

4  4

26

A cylinder has a base radius of r and a height of h. If the radius is reduced by 30%, how would the volume of the cylinder change?

A) The volume would be decreased by 49 percent.
B) The volume would be decreased by 50 percent.
C) The volume would be decreased by 51 percent.
D) The volume would be decreased by 60 percent.

Questions 27-28 refer to the following information.

$$N_e = \frac{4N_f N_m}{N_f + N_m}$$

Evolutionary biologists measure a species' effective population N_e to assess its health and evolutionary patterns. The formula above relates N_e to N_f, the number of females capable of breeding, and N_m, the number of males capable of breeding.

27

Which of the following expresses the number of females capable of breeding in terms of the effective population and the number of males capable of breeding?

A) $N_f = \frac{N_e N_m}{N_e - 4N_m}$
B) $N_f = \frac{N_e N_m}{4N_m - N_e}$
C) $N_f = \frac{4N_e N_m}{N_e + N_m}$
D) $N_f = \frac{N_e + N_m}{4N_e N_m}$

28

In 2013, animal conservationists reported that there were 1,200 male Himalayan muskdeer capable of breeding and 800 female Himalayan muskdeer capable of breeding. What was the effective population of Himalayan muskdeer in 2013?

A) 1,740
B) 1,860
C) 1,920
D) 2,080

29

Tammy picks three sides of a rectangle and adds their lengths to get 140 cm. Gladys picks three sides of the same rectangle and adds their lengths to get 100 cm. What is the perimeter of the rectangle in cm?

A) 120
B) 140
C) 150
D) 160

30

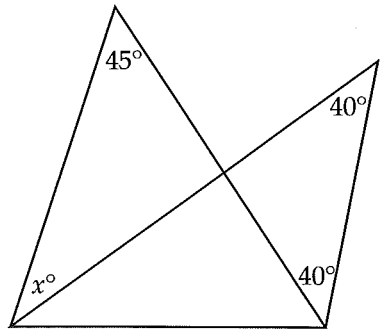
$$\frac{\sqrt{2x^2 - 14}}{a} = 3$$

If $x > 0$ and $a = 2$ in the equation above, what is the value of x?

A) 4
B) 5
C) 6
D) 7

4  4

31



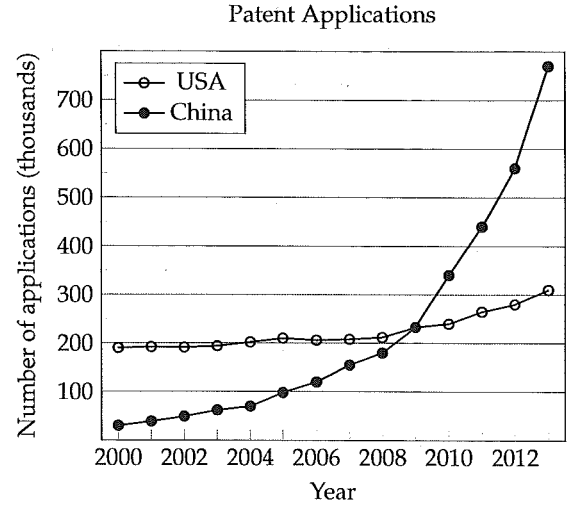
Note: Figure not drawn to scale.

In the figure above, what is the value of x?

32

A technology company finds that 11 out of every 600 emails sent through its servers are lost. At this rate, how many emails are lost if 42,000 emails are sent through its servers?

33



The graph above shows the annual number of patent applications in the U.S. and in China from 2000 to 2012. In which year did the U.S. and China have the same number of patent applications?

34

For all $x \geq 3$, $f(x) = \dfrac{\sqrt{x-3}}{2}$. If $f(n) = 3$, what is the value of n?

4  4

35

If $-4k + 12 \geq -24$, what is the maximum possible value of $3k$?

36

When $3x^2 + x + 2$ is divided by $x - 1$, the result can be expressed as $ax + b + \frac{c}{x-1}$, where a, b, and c are constants. What is the value of $a + b + c$?

Questions 37-38 refer to the following information.

Juan's restaurant serves burritos during lunch and dinner. On a typical day, 25 percent more burritos are sold during lunch than during dinner. If x represents the number of burritos sold during lunch, the total number of burritos sold on a typical day can be represented by the expression ax, where a is a constant.

37

What is the value of a in the expression?

38

If the restaurant typically sells 360 burritos during dinner, how many burritos does the restaurant typically sell during lunch?

Name: _____

4

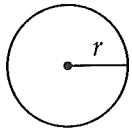
Practice Test 4

3  3

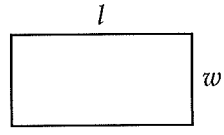
Math Test --- No Calculator

25 Minutes, 20 Questions

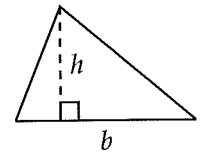
Reference



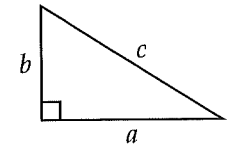
$A = \pi r^2$
$C = 2\pi r$



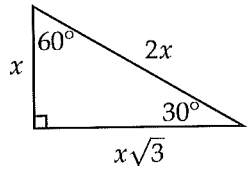
$A = lw$

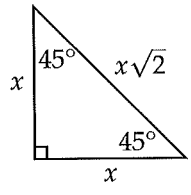


$A = \frac{1}{2}bh$

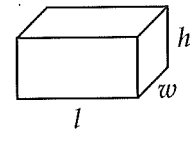


$c^2 = a^2 + b^2$

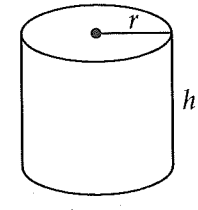




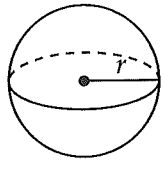
Special Right Triangles



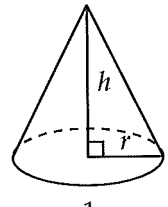
$V = lwh$



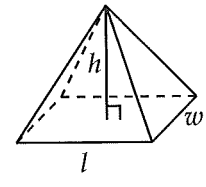
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

1

If $3x - 6 = -6 + 3x$, which of the following must be true for this equation?

A) The equation is true only if $x = 0$.
B) The equation is true only if $x = 1$.
C) The equation is true only if $x = 2$.
D) The equation is true for any value of x.

2

Kevin has collected m coins. Ellie has collected half as many as Kevin, but 5 more than Robert. In terms of m, how many coins has Robert collected?

A) $2m - 5$
B) $\frac{m}{2} + 5$
C) $2m + 5$
D) $\frac{m}{2} - 5$

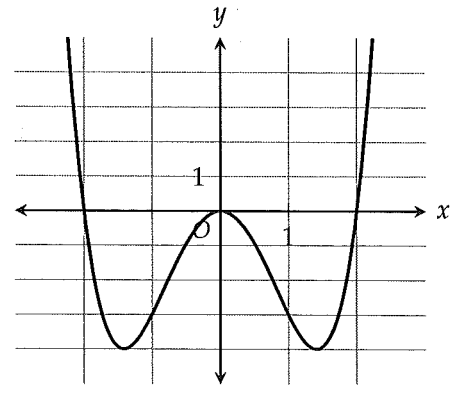
3

$$y = 40 + 10t$$

A teacher gives her class a test. After grading the tests, she finds that the model above can be used to predict a student's score y on the test in terms of the number of hours t the student spent studying for the test. Based on the model, by how much would one additional hour of studying increase a student's score on the test?

A) 4
B) 10
C) 20
D) 40

4



Which of the following could be the function g, as shown above?

A) $g(x) = x^2(x+2)^2$
B) $g(x) = x^3(x-2)$
C) $g(x) = x^2(x+2)(x-2)$
D) $g(x) = (x+2)^2(x-2)^2$

5

$$-2x - y = -9$$
$$5x - 2y = 18$$

Which of the following ordered pairs (x, y) fulfills the system of equations above?

A) $(-4, 1)$
B) $(2, 5)$
C) $(3, 3)$
D) $(4, 1)$

6

What is the product of all values of a that satisfy $3a^2 - 12a - 9 = 0$?

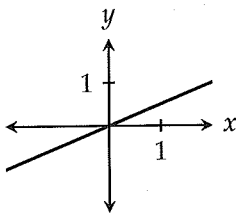
A) -4
B) -3
C) 3
D) 4

3 3

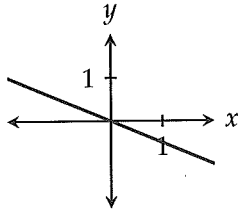
7

In which of the following figures is the slope of line shown closest to $-\frac{1}{2}$?

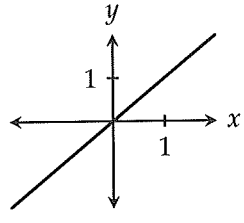
A)



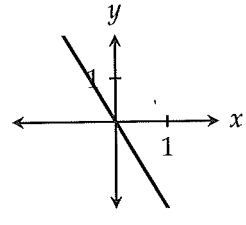
B)



C)



D)



8

The function f is defined by $f(x) = 2x^2 - ax - 7$, where a is a constant. If the graph of f intersects the x-axis at $(-1, 0)$, what is the value of a?

A) -9
B) -5
C) 5
D) 9

9

$$k^2x^{2a} = x^{2a+2}$$

In the equation above, k, x, and a are positive integers greater than 1. What is the value of $x - k$?

A) -1
B) 0
C) 1
D) 2

10

Which of the following CANNOT be the lengths of the sides of a triangle?

A) 3, 5, 7
B) 3, 24, 24
C) 4, 6, 9
D) 4, 7, 2

11

What is the value of $\sin 30° - \cos 60°$?

A) 0
B) $\frac{1-\sqrt{3}}{2}$
C) $\frac{\sqrt{2}-1}{2}$
D) $\frac{\sqrt{3}-1}{2}$

12

The graph of the equation $y = 2x - b$ passes through the point $(2b, -9)$. What is the value of b?

A) -6

B) -3

C) 3

D) 6

13

$$\frac{2i+1}{3i-2}$$

If the expression above is written in the form $a + bi$, where a and b are constants, what is the value of b?

A) $-\frac{4}{13}$

B) $\frac{4}{13}$

C) $-\frac{7}{13}$

D) $\frac{7}{13}$

14

$$s = 120 - 5c$$

A train conductor uses the equation above to set the speed s, in miles per hour, of a train carrying c tons of cargo. According to the equation, what is the best interpretation of the number 5 in the equation?

A) For every increase of 1 ton in cargo, the conductor increases the train's speed by 5 miles per hour.

B) For every decrease of 1 ton in cargo, the conductor increases the train's speed by 5 miles per hour.

C) For every increase of 5 tons in cargo, the conductor increases the train's speed by 1 mile per hour.

D) For every decrease of 5 tons in cargo, the conductor increases the train's speed by 1 mile per hour.

15

$$x = 1 - 2y$$

$$4y = x^2 + 3$$

How many ordered pairs (x, y) in the xy-plane are solutions to the system of equations above?

A) 0

B) 1

C) 2

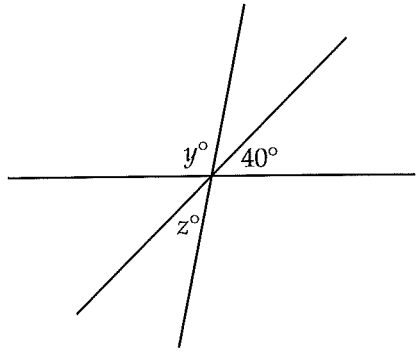
D) Infinitely many

16

If $\frac{1}{a+2b} = 5$, then what is the value of $a + 2b$?

3 3

17



Note: Figure not drawn to scale.

Three lines intersect in the figure above. What is the value of $y + z$?

18

If $c + d = -5$ and $c - d = -12$, then what is the value of $c^2 - d^2$?

19

$$\frac{3}{2x} - \frac{2}{3x} = \frac{5}{3}$$

If $x \neq 0$, for what value of x is the equation above true?

20

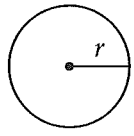
$$7(2.5x - 1.5) = 12(0.5x - 0.3)$$

What is the solution to the equation above?

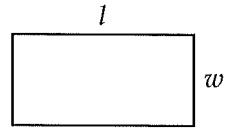
Math Test --- Calculator

55 Minutes, 38 Questions

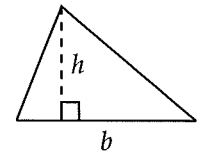
Reference



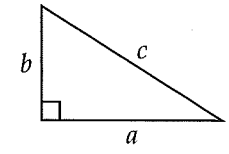
$A = \pi r^2$
$C = 2\pi r$



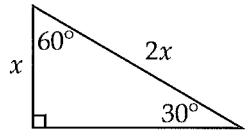
$A = lw$

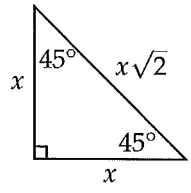


$A = \frac{1}{2}bh$

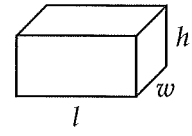


$c^2 = a^2 + b^2$

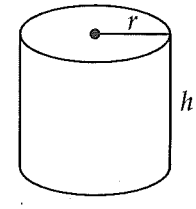




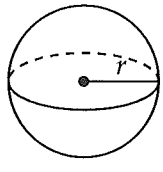
Special Right Triangles



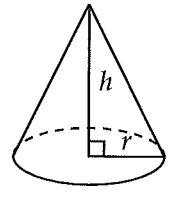
$V = lwh$



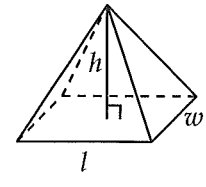
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

4

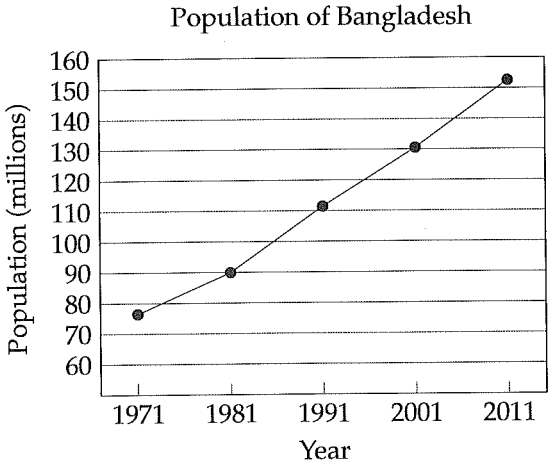
4

1

When a certain gas tank is 70% empty, it contains 12 gallons. How many gallons can a full tank hold?

A) 30
B) 36
C) 40
D) 42

2



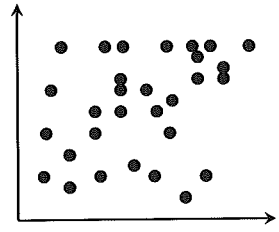
According to the graph above, which of the following is closest to the increase in the population of Bangladesh from 1971 to 2001?

A) 21 million
B) 54 million
C) 62 million
D) 75 million

3

Which scatterplot shows a positive association that is not linear?

A)



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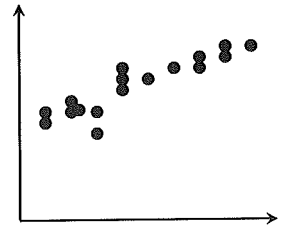
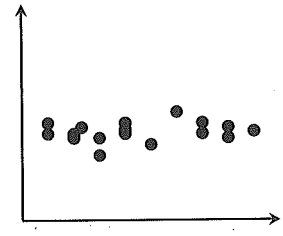
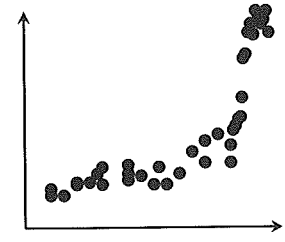


C)



D)



4

The table below shows the daily programming breakdown in hours at three different radio stations.

Station	Music	Commercials	News
WROK	18	5	1
WPOP	16	5	3
KJAZ	15	4	5

Approximately what percentage of the day does WPOP spend on commercials?

A) 12.5%
B) 18.3%
C) 20.8%
D) 66.7%

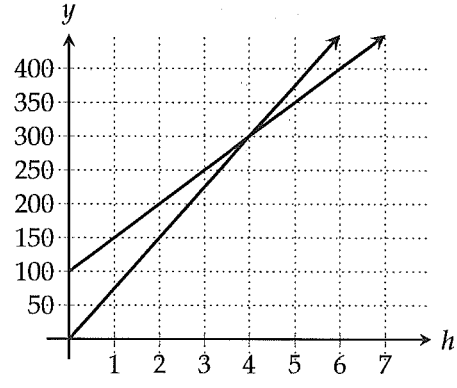
5

If 15 is added to one-fourth of a number, the result is 4 times the number. What is the number?

A) -4
B) -2
C) 2
D) 4

Questions 6-7 refer to the following information.

Lawyers John and Will review legal documents. John charges an initial consultation fee and then \$50 for each hour of legal review. Will does not charge a consultation fee but charges \$75 for each hour of legal review. The graph below shows the two lawyers' wages, where h is the number of hours worked and y is the total wage in dollars.



6

How much does John charge for his initial consultation?

A) \$100
B) \$200
C) \$300
D) \$400

7

Which of the following inequalities gives all the values of h for which it is less expensive to hire John than it is to hire Will for legal review?

A) $h \geq 0$
B) $h > 4$
C) $0 \leq h < 4$
D) $h > 300$

8

	Type of vehicle		
Age (years)	Cars	Trucks	Total
3 or Less	36,108	19,467	55,575
4 to 8	43,552	22,630	66,182
9 to 15	44,601	24,973	69,574
Over 15	32,296	23,071	55,637
Total	156,557	90,141	246,698

The table above summarizes the number of cars and trucks on the road in a certain state district by the age of the vehicle. If a vehicle in the state district is selected at random, which of the following is closest to the probability that the vehicle is a car that is 9 to 15 years old?

A) 0.18
B) 0.28
C) 0.44
D) 0.64

9

If $\frac{2a+3b}{a-b} = \frac{3}{4}$, then $\frac{a}{b}$?

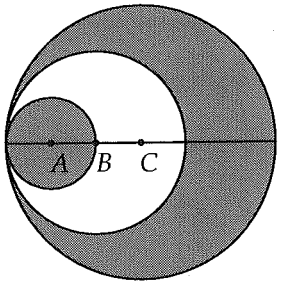
A) -3
B) $-\frac{1}{3}$
C) $\frac{1}{3}$
D) 3

10

If $a = 2x^3y^2 - 3x^2y^3$ and $b = -3x^3y^2 + 2x^2y^3$, what is $a + b$ in terms of x and y?

A) $x^3y^2 + x^2y^3$
B) $x^3y^2 - x^2y^3$
C) $-x^3y^2 - x^2y^3$
D) $-x^3y^2 + x^2y^3$

11



In the figure above, circle A has a radius of 2, circle B has a radius of 4, and circle C has a radius of 6. What is the area of the shaded region?

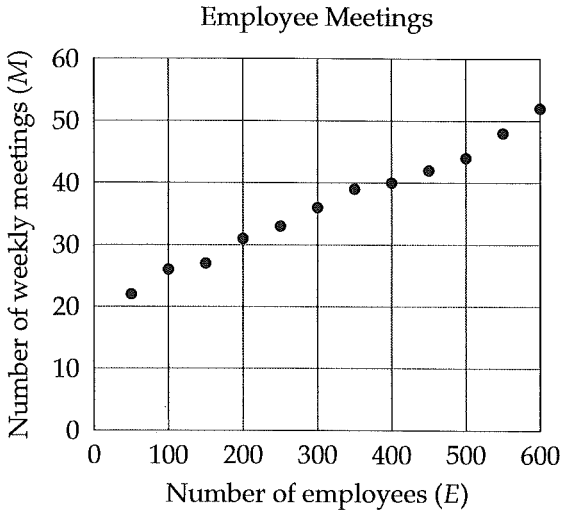
A) 18π
B) 20π
C) 22π
D) 24π

12

If M is 30% of N, N is 40% of O, and P is 50% of O, then what is the value of $\frac{M}{P}$?

A) $\frac{6}{25}$
B) $\frac{3}{10}$
C) $\frac{2}{5}$
D) $\frac{3}{5}$

13



The scatterplot above shows the number of employees E and the number of weekly meetings M at 7 companies selected at random. Which of the following equations best models the relationship between E and M?

A) $M = 0.05E + 20$
B) $M = 0.1E + 16$
C) $M = 0.5E + 18$
D) $M = 5E + 25$

Questions 14-15 refer to the following information.

$$R(Q) = 20Q$$
$$C(Q) = 14Q + 114$$

The total revenue generated by a particular product and the total cost of producing it are both functions of the quantity of products sold. The function $R(Q)$ gives the total revenue when the quantity sold is Q units. The function $C(Q)$ gives the total cost when the quantity sold is Q units.

14

How will the total cost change if the quantity of units sold is decreased by 5?

A) The total cost will decrease by \$70.
B) The total cost will increase by \$70.
C) The total cost will decrease by \$44.
D) The total cost will increase by \$60.

15

At what quantity of units sold will the total revenue generated by the product equal the total cost of producing it?

A) 17
B) 18
C) 19
D) 20

16

A publisher determines the number of pages p that should go into a children's book by using the equation $p = 8 + 0.5k$, where k is the total number of pictures in the book. Based on the equation, how many more pictures would be needed to add one more page to a children's book?

A) 0.5
B) 1
C) 2
D) 8

4

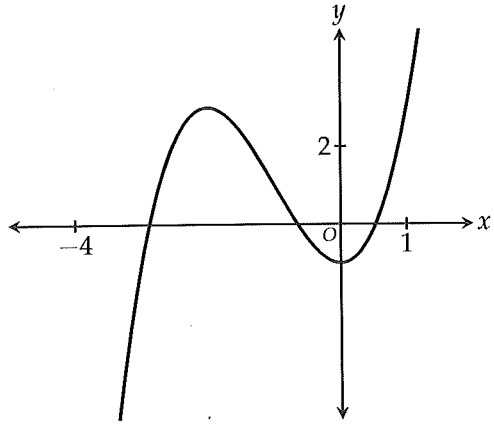
4

17

Jane receives $2.75 each month for each square foot of an apartment that she rents out. If the apartment has an area of 500 square feet, how much rent, in dollars, would Jane receive from a tenant who occupies the entire area for one year?

A) 16,500
B) 17,250
C) 18,375
D) 19,750

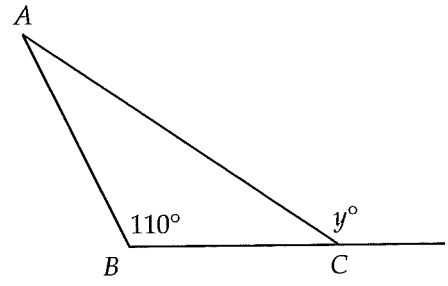
18



The graph of the function f in the xy-plane is shown above. For how many values of x in the portion of the graph shown above does $f(x) = 2$?

A) None
B) One
C) Two
D) Three

19



Note: Figure not drawn to scale.

In the figure above, $AB = BC$ and $\angle ABC = 110°$. What is the value of y?

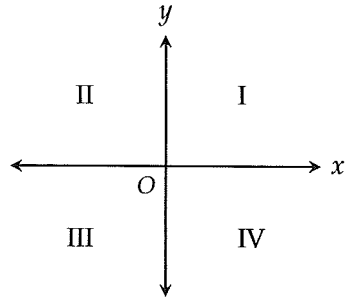
A) 125
B) 130
C) 135
D) 145

20

A rectangle has a perimeter of 110 cm. The width of the rectangle is 35 cm more than its length. What is the area of the rectangle in square centimeters?

A) 200
B) 332
C) 450
D) 564

21



In the figure above, which quadrants contain the points (x, y) that satisfy the condition $\frac{2x}{y} = -1$?

A) II only
B) II and IV only
C) I and III only
D) I, II, III, and IV

22

If $f(4) = -2$, which of the following CANNOT be the definition of f?

A) $f(x) = x - 6$
B) $f(x) = x^2 - 4x - 2$
C) $f(x) = -3x + 14$
D) $f(x) = -2(x - 3)^2$

23

The mean tire pressure of the cars at Dealer A is equal to the mean tire pressure of the cars at Dealer B. However, while the standard deviation of the tire pressures of the cars at Dealer A is 2.5 psi (pounds per square inch), the standard deviation of the tire pressures of the cars at Dealer B is 1.2 psi. Which of the following statements must be true?

A) The mean tire pressure of the cars at Dealer A is 1.3 psi less than the mean tire pressure of the cars at Dealer B.
B) The median tire pressure of the cars at Dealer A is 1.3 psi less than the median tire pressure of the cars at Dealer B.
C) The median tire pressure of the cars at Dealer A is 1.3 psi greater than the median tire pressure of the cars at Dealer B.
D) The tire pressures of the cars at Dealer A are more variable than the tire pressures of the cars at Dealer B.

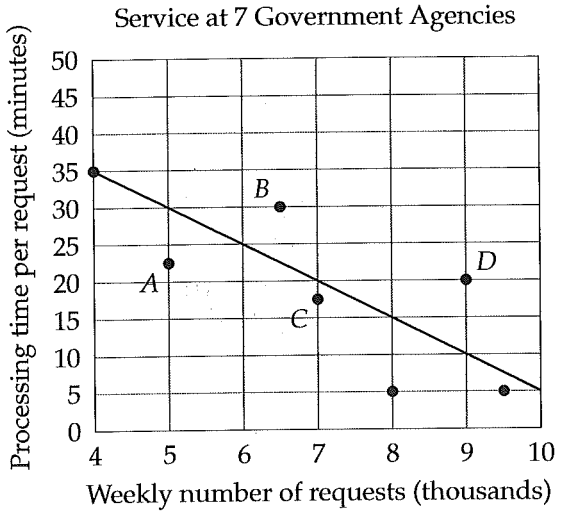
24

The base of a cylinder has a circumference of 5π. The height of the cylinder is 4. What is the volume of the cylinder?

A) 20π
B) 25π
C) 40π
D) 50π

4 4

Questions 25-26 refer to the following information.



The scatterplot above shows the weekly number of requests received at 7 different government agencies and their processing time per request. The line of best fit is also shown.

25

How many of the 7 government agencies have a processing time per request that differs by more than 5 minutes from that predicted by the line of best fit?

A) 3
B) 4
C) 5
D) 6

26

Of the labeled points, which represents the government agency that spends the most time processing all of its requests each week?

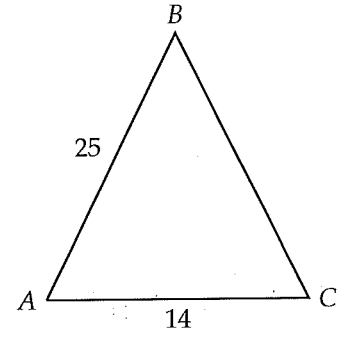
A) *A*
B) *B*
C) *C*
D) *D*

27

Alfred's favorite drink is 2 parts lime juice to 5 parts raspberry soda. Jenny's favorite drink is 1 part lime juice to 4 parts raspberry soda. If Jenny has a bottle containing 21 ounces of Alfred's favorite drink, how many ounces of raspberry soda should she add to it to get her favorite drink?

A) 6
B) 7
C) 8
D) 9

28



In the triangle above, $AB = AC$. What is the value of $\sin A$?

A) 0.28
B) 0.56
C) 0.84
D) 0.96

29

Anna opens a bank account with an initial deposit of $1,000. The bank account will earn 3 percent interest compounded annually for the first 5 years, after which it will earn 7 percent interest compounded annually. Which of the following expressions represents the total amount in the account after t years, where $t > 5$?

A) $1{,}000(1.03)^5(1.07)^t$

B) $1{,}000(1.03)^{t-5}(1.07)^t$

C) $1{,}000(1.03)^5(1.07)^{t-5}$

D) $1{,}000(1.03)^5(1.07)^{t+5}$

30

Solution A is 60% acid and solution B is 40% acid. Solving which of the following systems of equations gives the number of gallons of solution A, a, and the number of gallons of solution B, b, that should be mixed together to produce 100 gallons of a solution that is 55% acid?

A)
$$a + b = 100$$
$$0.6a + 0.4b = 0.55$$

B)
$$a + b = 55$$
$$0.6a + 0.4b = 100$$

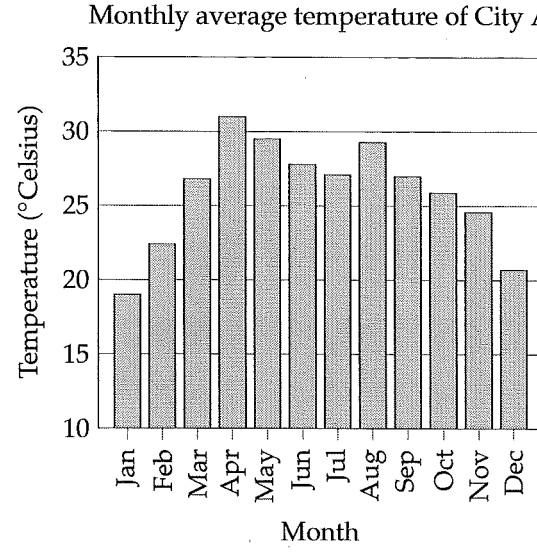
C)
$$a + b = 100$$
$$0.6a + 0.4b = 55$$

D)
$$a + b = 100$$
$$0.4a + 0.6b = 0.55$$

31

Mary runs around a circular track with a radius of 25 meters. If she runs at 75 meters per minute, how many minutes will it take her to run one lap around the track, rounded to the nearest integer?

32



Based on the graph above, for how many months out of the year does City A experience a monthly average temperature less than 25 degrees Celsius?

33

$$(x - a)(x - a - b) = 0$$

In the quadratic equation above, a and b are constants greater than zero. If 3 and 8 are two solutions to the equation, what is the value of b?

4  4

34

If $-4n + 7 > -12$ and $-4n - 7 < -12$, what is one possible value of n?

35

Let the function f be defined by $f(x) = x^2 - x + 3$. If $f(m + 1) = 5$ and $m > 0$, what is the value of m?

36

When $2x^2 - 5x + 3$ is divided by $2x + 1$, the result can be written as $x - 3 + \frac{R}{2x+1}$, where R is a constant. What is the value of R?

Questions 37-38 refer to the following information.

After a ball is dropped, it continues to bounce off the ground. It reaches a height of 128 centimeters after its first bounce and a height of 54 centimeters after its fourth bounce. The height reached after each bounce is always the same fraction of the height reached after the previous bounce.

37

What is the height, in centimeters, the ball reaches after its fifth bounce?

38

At what height, to the nearest centimeter, was the ball dropped from initially?

5

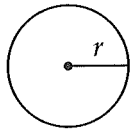
Practice Test 5

3 3

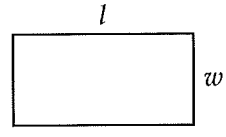
Math Test --- No Calculator

25 Minutes, 20 Questions

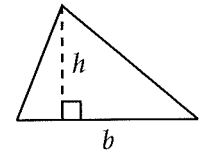
Reference



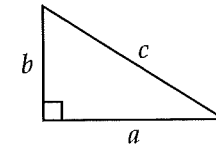
$A = \pi r^2$
$C = 2\pi r$



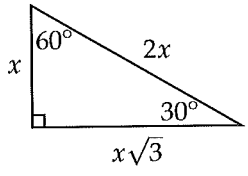
$A = lw$

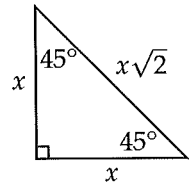


$A = \frac{1}{2}bh$

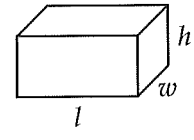


$c^2 = a^2 + b^2$

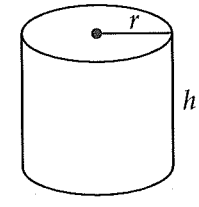




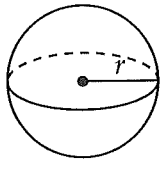
Special Right Triangles



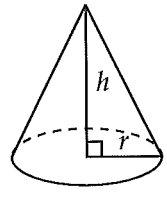
$V = lwh$



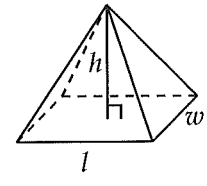
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

3  3

1

Which of the following expressions is equivalent to $\dfrac{\frac{x}{y}}{\frac{y}{z}}$?

A) $\frac{x}{z}$

B) $\frac{z}{x}$

C) $\frac{xz}{y^2}$

D) $\frac{y^2}{xz}$

2

Paulina owns a certain number of dishes. 24 added to 3 times the number of dishes is equal to 9 times the number of dishes. How many dishes does Paulina own?

A) 4

B) 6

C) 8

D) 9

3

A movie rental service charges \$15 as a monthly subscription fee and \$3 per movie rented. If Alex rents x movies per month from this service, which of the following expressions gives the total amount, in dollars, he spends on movie rentals in one year?

A) $12(18x)$

B) $15+12(3x)$

C) $12(15)+3x$

D) $12(15+3x)$

4

If $\dfrac{x^{a^2}\cdot x^{b^2}}{x^{2ab}} = x^{25}$, $x>1$, which of the following could be the value of $a-b$?

A) 3

B) 4

C) 5

D) 6

5

$$v = 100 + 25h$$

The daily number of visitors v to a store that is open for h hours each day can be modeled by the equation above, where $h \geq 1$. According to the model, how many more daily visitors can the store expect if it were open for two more hours each day?

A) 25

B) 50

C) 100

D) 200

6

If $mb<0$, then the line whose equation is $y=mx+b$ cannot contain which of the following points?

A) $(-1,0)$

B) $(0,1)$

C) $(1,0)$

D) $(0,-1)$

3  3

7

$$-3x + 2y = 5$$
$$-9x + 6y = 18$$

The system of equations above has how many solutions (x, y)?

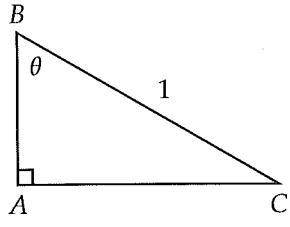
A) Zero
B) One
C) Two
D) More than two

8

If $\dfrac{x + x}{x \cdot x \cdot x \cdot n} = 1$, where $n \neq 0$, then $n =$

A) $\dfrac{1}{x^2}$
B) $\dfrac{2}{x^2}$
C) $\dfrac{x^2}{2}$
D) $2x^2$

9



Given right triangle ABC above, which of the following gives the length of $\overline{AB}$ in terms of θ?

A) $\sin\theta$
B) $\cos\theta$
C) $\tan\theta$
D) $\dfrac{1}{\sin\theta}$

10

Which of the following functions has a graph in the xy-plane that does not cross the x-axis?

A) $f(x) = 1 - x^2$
B) $f(x) = |x - 1|$
C) $f(x) = (x - 1)^2 + 1$
D) $f(x) = x^3 - 1$

11

Which of the following is equivalent to $\left(\dfrac{1}{xy}\right)(2x + 2y)$?

A) $\dfrac{1}{x} + \dfrac{1}{y}$
B) $\dfrac{2}{x} + \dfrac{2}{y}$
C) $\dfrac{2}{x} + \dfrac{2}{xy} + \dfrac{2}{y}$
D) $2x^2y + 2xy^2$

12

$$\frac{1}{3}x + \frac{1}{6}y = 5$$
$$\frac{3}{5}x + \frac{1}{5}y = -4$$

Which of the following ordered pairs (x, y) fulfills the system of equations above?

A) $(-50, 130)$
B) $(2, 26)$
C) $(5, 20)$
D) $(20, -10)$

13

The number of people on a social networking site doubles every 6 months. If the site had an initial membership of 200 people when it launched, which of the following equations represents the site's total membership M t years after its launch?

A) $M = 200(2t)$
B) $M = 200(2)^t$
C) $M = 200(2)^{\frac{t}{2}}$
D) $M = 200(2)^{2t}$

14

$$\frac{4i}{i-1}$$

Which of the following is equivalent to the expression above? (Note: $i = \sqrt{-1}$)

A) $-2+2i$
B) $-2-2i$
C) $2+2i$
D) $2-2i$

15

$$p(x) = (3x^2 - 5)(x + k) - 20$$

In the polynomial $p(x)$ defined above, k is a constant. If x is a factor of $p(x)$, what is the value of k?

A) -6
B) -4
C) 2
D) 4

16

Matt collects rare baseball cards. Each pack of baseball cards he buys contains 12 cards, two of which are rare. He currently has 40 rare cards. If his goal is to have 100 rare baseball cards, how many more packs of baseball cards will he have to buy?

17

If f is a function defined by $f(x) = \frac{2x-5}{6}$, for what value of x is $f(x) = \frac{1}{2}$?

18

If $\frac{3c}{d} = 4$, what is the value of $\frac{60d}{c}$?

3  3

19

$$y = x^2 - 10x + k$$

In the equation above, k is a constant. If the equation represents a parabola in the xy-plane that is tangent to the x-axis, what is the value of k?

20

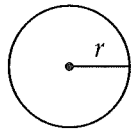
What is one possible solution to the equation $\frac{22}{x+3} - \frac{6}{x-2} = 1$?

4 4

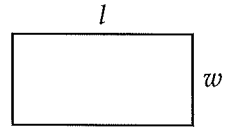
Math Test --- Calculator

55 Minutes, 38 Questions

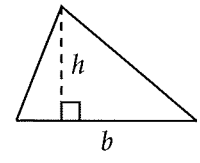
Reference



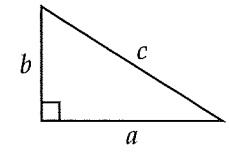
$A = \pi r^2$
$C = 2\pi r$



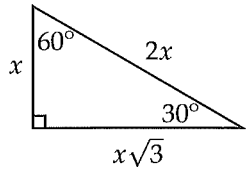
$A = lw$

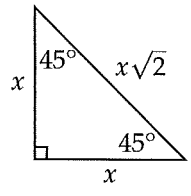


$A = \frac{1}{2}bh$

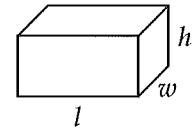


$c^2 = a^2 + b^2$

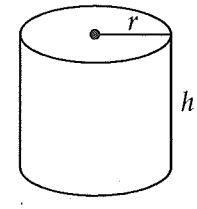




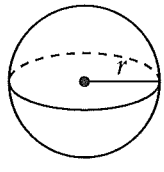
Special Right Triangles



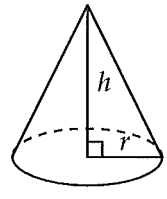
$V = lwh$



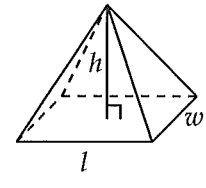
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

4  4

1

Anita is moving back to Mexico and exchanges 400 U.S. dollars for 6,650 Mexican pesos. Based on this information, which of the following is closest to the number of pesos one U.S. dollar is worth?

A) 15.83
B) 15.97
C) 16.24
D) 16.63

2

A bottle contains x ounces of soda. After Harry drinks from it, there are y ounces left. In terms of x and y, what percent of the bottle did Harry consume?

A) $\frac{x}{100(x-y)}\%$
B) $\frac{100(x-y)}{x}\%$
C) $\frac{100y}{x}\%$
D) $\frac{y}{100x}\%$

3

If $\frac{x-a}{5} = 12$ and $a = 10$, what is the value of x?

A) 40
B) 50
C) 60
D) 70

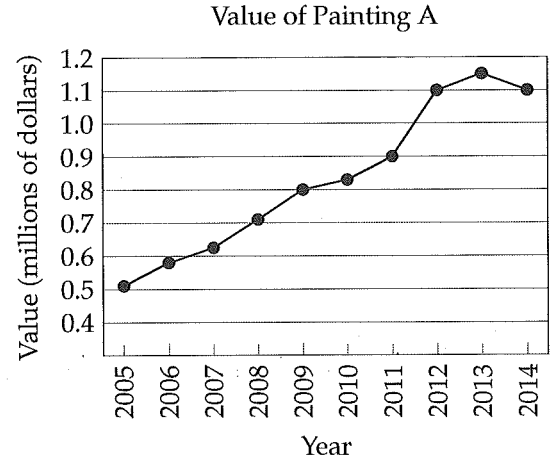
4

$$w = 20 + 0.4s$$

The equation above can be used to model the weight w of a tire, in pounds, after a pump is used to inflate the tire for s seconds. What is the increase in the weight of the tire, in pounds, for every second the pump is used?

A) 0.4
B) 0.6
C) 2
D) 5

Questions 5-6 refer to the following information.



The line graph above shows the dollar value of a piece of artwork, Painting A, from 2005 to 2014.

5

According to the graph, what was the greatest change (in absolute value) in the value of the painting between two consecutive years?

A) $20,000
B) $100,000
C) $200,000
D) $650,000

4  4

6

What was the average rate of change in the value of Painting A from 2009 to 2014?

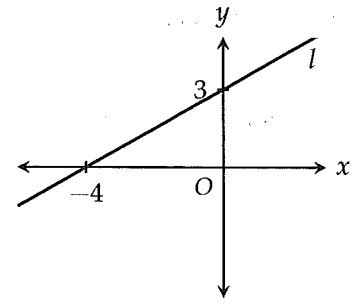
A) \$20,000 per year
B) \$30,000 per year
C) \$50,000 per year
D) \$60,000 per year

7

In the xy-plane, how many times does the graph of $f(x) = (x-3)(x-1)(x+2)^2$ intersect the x-axis?

A) 2
B) 3
C) 4
D) 5

8



The graph of the line l is shown in the xy-plane above. The y-intercept of line l is 3 and the x-intercept is -4. If line m is perpendicular to line l, what is the slope of line m?

A) $-\frac{4}{3}$
B) $-\frac{3}{4}$
C) $-\frac{1}{2}$
D) $\frac{3}{4}$

9

At a retail store, a salesperson can choose between two salary options. The first option is a monthly salary of \$2,800. The second option is a monthly salary of \$1,500 and a \$12 commission on each dress shirt sold. Which of the following inequalities gives the number of dress shirts x that must be sold in a month for the salary offered by the second option to exceed the one offered by the first?

A) $x > 108$
B) $x \geq 108$
C) $x > 109$
D) $x \geq 109$

4  4

10

Town	Number of coffee shops
A	14
B	2
C	11
D	9
E	13
F	12
G	10

The table above shows the number of coffee shops in seven different towns. Removing which of the following towns from the data would bring the mean number of coffee shops and the median number of coffee shops for the six remaining towns closest together in value?

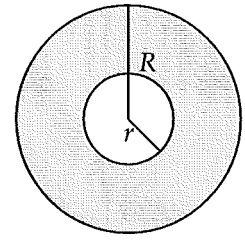
A) Town A
B) Town B
C) Town C
D) Town D

11

A store owner increases the price of a pillow by 35 percent, but a customer uses a coupon to buy the pillow at 35 percent off the already increased price. If the original price of the pillow was p dollars, which of the following represents the final price in terms of p?

A) $(1.35)(0.65)p$
B) $(1.35)(1.65)p$
C) $(0.35)(1.65)p$
D) $1.35p - 0.35p$

Questions 12-13 refer to the following information.



The side of a tire is shown above. The surface area S of the tire is given by $S = \pi^2(R^2 - r^2)$, where R is the outer radius and r is the inner radius.

12

Which of the following expresses the outer radius in terms of the surface area and the inner radius?

A) $R = \sqrt{\frac{S}{\pi^2}} + r$

B) $R = \sqrt{\frac{S}{\pi^2} + r^2}$

C) $R = \sqrt{S + \pi^2 r^2}$

D) $R = \sqrt{\frac{S - \pi^2 r^2}{\pi^2}}$

13

What is the surface area, in square meters, of a tire with an outer radius of 10 meters and an inner radius of 4 meters?

A) $6\pi^2$
B) $84\pi^2$
C) $96\pi^2$
D) $116\pi^2$

4  4

14

A coal-processing plant can process 90 tons of coal per minute. Three trucks can deliver 135 tons of coal per hour. What is the minimum number of trucks necessary to keep up with the plant?

A) 40
B) 80
C) 100
D) 120

15

Which of the following is an equation of a circle in the xy-plane with center $(2, -3)$ and a circumference of 20π?

A) $(x+2)^2 + (y-3)^2 = 20$
B) $(x-2)^2 + (y+3)^2 = 20$
C) $(x-2)^2 + (y+3)^2 = 100$
D) $(x+2)^2 + (y-3)^2 = 400$

16

$$f(x) = x^3 + 2$$

$$g(x) = 2x$$

The functions f and g are defined above. If $f(b) = 29$, what is the value of $g(b)$?

A) 4
B) 6
C) 8
D) 10

17

$$-4x^2y + 3x^2y^2$$

$$2xy^2 - 5x^2y^2$$

What is the sum of the two polynomials above?

A) $-4x^2y + 2xy^2 - 2x^2y^2$
B) $-4x^2y + 2xy^2 + 3x^2y^2$
C) $-2x^2y - 2x^2y^2$
D) $-2x^3y^3 - 2x^4y^4$

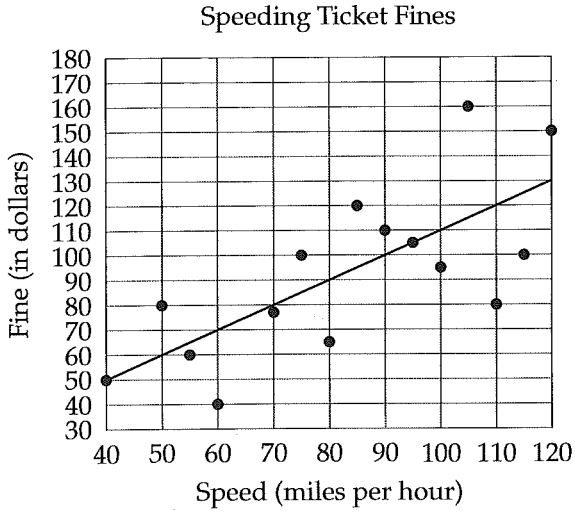
18

Researchers are attempting to model the growth of the recovering hawksbill turtle population in East Africa. They estimate the population to be 200 in the first year. In the second year, they record a population of 600 turtles. How much greater would the estimated population be in the third year if the turtle population growth were exponential rather than linear?

A) 800
B) 1000
C) 1200
D) 1800

4 4

Questions 19-20 refer to the following information.



The scatterplot above shows the relationship between the speed of the driver and the amount of the fine, in dollars, for 15 speeding tickets issued by a local police department. The line of best fit is also shown.

19

Based on the line of best fit, what is the predicted fine, in dollars, for a driver speeding at 90 miles per hour?

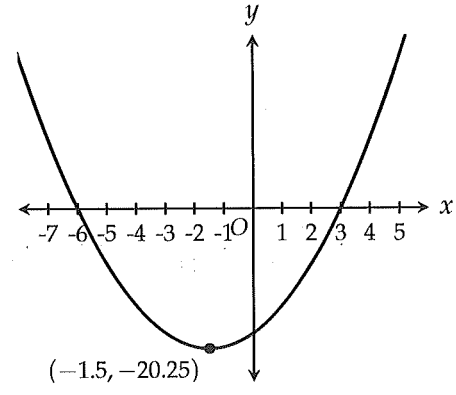
A) 70
B) 80
C) 90
D) 100

20

Which of the following is the best interpretation of the slope of the line of best fit in the context of this problem?

A) The estimated fine increase, in dollars, for every mile per hour over the speed limit
B) The estimated fine increase, in dollars, for every 10 miles per hour over the speed limit
C) The estimated increase in the speed of the driver, in miles per hour, for every one dollar increase in the fine
D) The estimated increase in the speed of the driver, in miles per hour, for every 10 dollar increase in the fine

21



A parabola is shown in the xy-plane above. Which of the following equations correctly represents the parabola by displaying the x-intercepts of the parabola as constants or coefficients?

A) $y = (x + 1.5)^2 - 20.25$
B) $y = (x - 1.5)^2 - 20.25$
C) $y = (x + 6)(x - 3)$
D) $y = (x - 6)(x + 3)$

4  4

22

The table below shows the distribution of FTC complaints, categorized by payment method and the dollar value of all transactions made under each method.

Method of payment	Number of complaints	Total value of transactions
Bank Account Debit	38,527	$85,433,040
Cash Advance	17,332	$168,972,138
Check	12,917	$88,603,695
Credit Cards	46,736	$96,440,695
Internet	5,734	$9,651,081
Money Order	8,707	$55,898,113
Prepaid Cards	119,100	$80,860,327
Telephone Bill	1,028	$870,511
Wire Transfer	106,472	$500,705,082
Total	356,553	$1,087,434,682

If an FTC complaint is chosen at random, which of the following is closest to the probability that the complaint is related to the payment method whose transactions accounted for the highest dollar value?

A) 0.05
B) 0.16
C) 0.30
D) 0.46

23

Jake has a bank account that earns 5 percent interest compounded annually. After 8 years, he has a total of $4,000 in the account. Which of the following represents the value of his initial deposit?

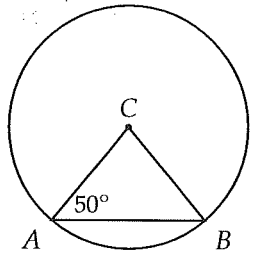
A) $\frac{4,000}{(0.95)^8}$

B) $\frac{4,000}{(1.05)^8}$

C) $4,000(0.95)^8$

D) $4,000 - 4,000(.05)(8)$

24



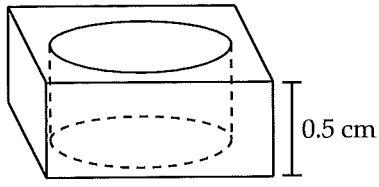
In the figure above, A and B are points on the circle C. If the area of the circle is 54π, what is the area of the sector formed by central angle ACB?

A) 10π
B) 12π
C) 14π
D) 16π

4

4

25



The figure above shows a metal ring with two square faces and a thickness of 0.5 cm. The square faces have a side length of 2.5 cm and the circular hole has a diameter of 2 cm. Which of the following is closest to the volume, in cubic centimeters, of the metal used to form the ring?

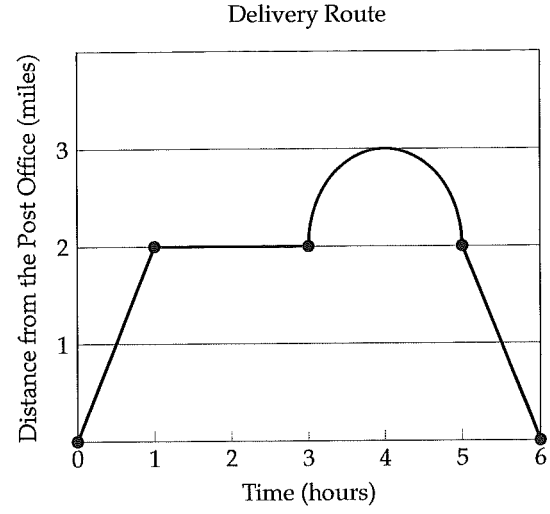
A) 1.07
B) 1.55
C) 2.14
D) 3.11

26

In the xy-plane, line l passes through $(0,0)$ and is perpendicular to the line $3x + y = c$, where c is a constant. If the two lines intersect at the point $(k, k-4)$, what is the value of k?

A) 4
B) 6
C) 8
D) 10

27



Pat delivers packages for the post office. The graph above shows his distance from the post office during his delivery route. Which portion of the graph represents the times when Pat is driving along a circular road around the post office?

A) The portion from 0 hours to 1 hour
B) The portion from 1 hour to 3 hours
C) The portion from 3 hours to 5 hours
D) The portion from 5 hours to 6 hours

28

A bakery standardizes muffins to weigh between $1\frac{3}{4}$ and $2\frac{1}{4}$ ounces. If m is the weight of a muffin from this bakery, which of the following inequalities expresses the possible values of m?

A) $\left|m - 1\frac{3}{4}\right| < \frac{1}{4}$
B) $|m - 2| < \frac{1}{4}$
C) $|m - 2| < \frac{1}{2}$
D) $\left|m - 1\frac{3}{4}\right| < \frac{1}{2}$

4  4

29

On vacation, Jill spends $\frac{1}{4}$ of her money the first day. Then she spends $\frac{1}{4}$ of the money she has left on the second day. She starts the third day with \$180 left to spend. How many dollars did she have at the start of her vacation?

A) 280
B) 320
C) 360
D) 400

30

If $3n - 8 < x < n$, which of the following must be true?

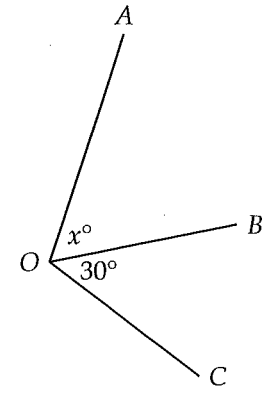
I. $n - x < 0$
II. $n < 4$
III. $2x < 4n - 8$

A) I and II only
B) II only
C) II and III only
D) I, II, and III

31

Martin took a random sample of fast food orders at a local restaurant and found that 30 percent of the orders in the sample included fries. Out of 550 orders at the same restaurant, what would be the estimated number of orders that do NOT include fries?

32



Note: Figure not drawn to scale.

In the figure above, the measure of $\angle AOB$ is $\frac{2}{5}$ the measure of $\angle AOC$. What is the value of x?

33

$$\frac{4}{5} - 3\left(\frac{1}{2} + x\right) = \frac{3}{10} - 4x$$

What is the solution to the equation above?

34

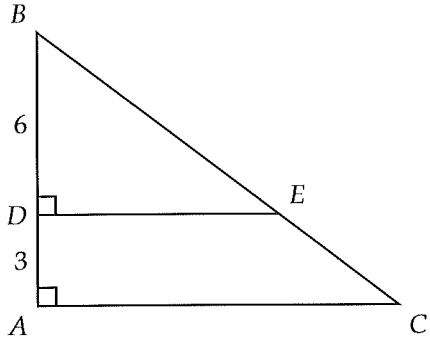
The product of a and b is 912. If b is 10 more than 2 times a and $a > 0$, what is the value of a?

4  4

35

There are 50 questions on a quiz given to a class of students. Only 20% of the class answered all the questions on the quiz. Of the remaining students, half answered two-fifths of the questions and the other half answered three-fifths. What was the average number of questions answered on this quiz?

36



In the figure above, $AD = 3$, $BD = 6$, and $BC = 15$. What is the area of trapezoid $ADEC$?

Questions 37-38 refer to the following information.

Years of Experience	Commission rate
1	0.05
2	0.075
3	0.12
4	0.15
5	0.18
6 or more	0.20

The chart above shows the commission structure for the salespeople at a given company. Each salesperson's monthly salary can be calculated by using the formula $S = 2,400 + cx$, where S is the monthly salary, in dollars, c is the commission rate, and x is the salesperson's sales, in dollars, for the given month.

37

Becky, a salesperson with 3 years of experience, brings in $5,000 in sales in January. In dollars, what is Becky's salary in January?

38

A salesperson with 1 year of experience earns $4,500 in salary during one month. He would have earned $9,960 in salary during that same month if he had how many more years of experience?

6

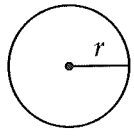
Practice Test 6

3  3

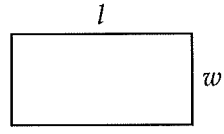
Math Test --- No Calculator

25 Minutes, 20 Questions

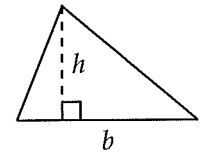
Reference



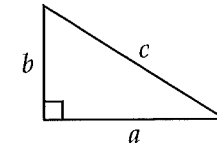
$A = \pi r^2$
$C = 2\pi r$



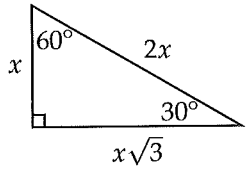
$A = lw$

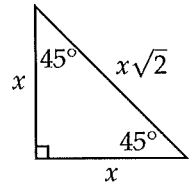


$A = \frac{1}{2}bh$

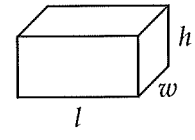


$c^2 = a^2 + b^2$

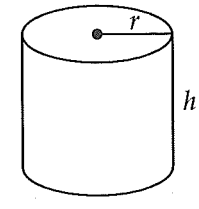




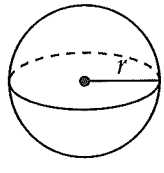
Special Right Triangles



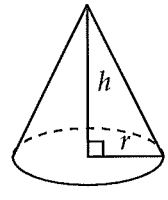
$V = lwh$



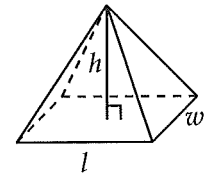
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

3  3

1

If $3y \cdot 4y = \frac{3}{7} \cdot \frac{4}{7}$ and $y > 0$, what is the value of y?

A) $\frac{1}{49}$

B) $\frac{1}{14}$

C) $\frac{1}{7}$

D) $\frac{2}{7}$

2

A grocery store uses crates to store a total of $36a$ apples and $24w$ watermelons. Each crate can be used to store either 12 apples or 6 watermelons. Which of the following expressions gives the total number of crates the grocery store uses to store apples and watermelons?

A) $3a + 4w$

B) $4a + 3w$

C) $\frac{1}{4a} + \frac{1}{3w}$

D) $\frac{1}{3a} + \frac{1}{4w}$

3

If the ratio of m to n is 3 to 4, which of the following could be true?

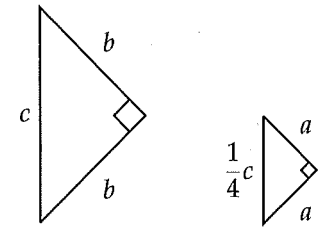
A) $m = 0, n = \frac{3}{4}$

B) $m = 2, n = \frac{8}{3}$

C) $m = 9, n = 16$

D) $m = 12, n = 9$

4



Note: Figure not drawn to scale.

Two right triangles are shown in the figure above. What is the value of b in terms of a?

A) $2a$

B) $2a\sqrt{2}$

C) $4a$

D) $4a\sqrt{2}$

5

Jacob reads at a pace of 23 pages every 50 minutes. If a book contains a total of 740 pages, and Jacob has read for a total of t minutes, which of the following expresses the number of pages in the book he has yet to read?

A) $740 - 0.125t$

B) $740 - 0.46t$

C) $740 - 23t$

D) $740 - 27.6t$

6

If $f(x) = \sqrt{x} + 1$, what is $f(x^2 + 4)$ equal to?

A) $x + 3$

B) $x + 5$

C) $\sqrt{x^2 + 4} + 1$

D) $\sqrt{x^3 + 4x} + 1$

3

3

7

At a hospital, the average number of minutes a doctor spends with each patient can be modeled by the equation $y = 30 - 3x$, where x is the number of forms the doctor must fill out each day. In the context of this problem, what is the meaning of the number 3 in the equation?

A) One form takes a doctor an average of 3 minutes to fill out.

B) A doctor fills out an average of 3 forms for each patient.

C) A doctor decreases the time spent with each patient by 3 minutes for every form that must be filled out each day.

D) A doctor spends an average of 3 minutes with each patient.

8

If $2^{a+4} = 8^a$, what is the value of a?

A) 1

B) 2

C) 3

D) 4

9

If $\dfrac{2a+2b}{3c+3d} = 1$, what is the value of $\dfrac{3a+3b}{4c+4d}$?

A) $\dfrac{2}{3}$

B) $\dfrac{3}{4}$

C) $\dfrac{4}{3}$

D) $\dfrac{9}{8}$

10

At a fast food restaurant, a group of friends orders 5 tacos for x dollars each. The group also orders 7 burgers, each of which has a price double the price of a taco. If the restaurant applies a 5% tax to the total cost, which of the following represents the group's total bill, in dollars?

A) $19x + 0.05(12)$

B) $1.05(12x)$

C) $1.05(19x)$

D) $0.05(12x)$

11

Which ordered pair (x, y) satisfies the system of equations below?

$$5x + y = 9$$
$$10x - 7y = -18$$

A) $(-2, 19)$

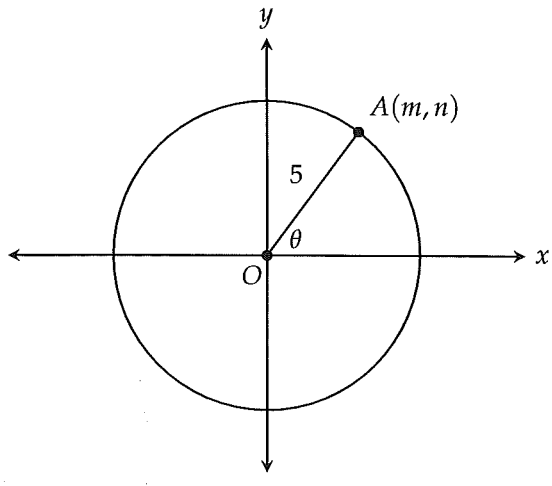
B) $(1, 4)$

C) $(3, -6)$

D) $(5, -1)$

3  3

12



In the xy-plane above, a circle with radius 5 has its center at the origin. Point A lies on the circle and has coordinates (m, n). What is n in terms of θ?

A) $5\sin\theta$
B) $5\cos\theta$
C) $\tan\theta$
D) $5(\sin\theta + \cos\theta)$

13

The expression $\frac{x+1}{x+2} - \frac{x-2}{x-1}$ is equivalent to which of the following?

A) $-\frac{5}{(x+2)(x-1)}$
B) $-\frac{1}{(x+2)(x-1)}$
C) $\frac{3}{(x+2)(x-1)}$
D) $\frac{2x^2+3}{(x+2)(x-1)}$

14

$$\frac{4+i}{1-i} + \frac{2-i}{1+i}$$

Which of the following is equal to the expression above? (Note: $i = \sqrt{-1}$)

A) $-2-i$
B) $2+i$
C) $4+i$
D) $4-i$

15

If $(mx+c)(nx+3) = 12x^2 + 5x - 3$ for all values of x, where m, n, and c are constants, what is the value of $m+n$?

A) 7
B) 8
C) 12
D) 13

16

A computer contains 2 memory cards. Each memory card gives 4 gigabytes of memory. How many gigabytes of memory will the computer have in total if 4 more memory cards are added?

17

If 3 more than the square of m is less than m multiplied by 4, what is one possible value of m?

3

3

18

$$30\left(x^3+\frac{1}{6}x^2+\frac{2}{3}x\right)=ax^3+bx^2+cx$$

In the equation above, a, b, and c are constants. If the equation is true for all values of x, what is the value of $a+b+c$?

19

$$5x+16y=36$$
$$cx+dy=9$$

The system of equations above, where c and d are constants, has infinitely many solutions. What is the value of cd?

20

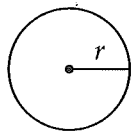
A hair shampoo comes in regular bottles and deluxe bottles. A deluxe bottle contains 6 more ounces of shampoo than a regular one. If four regular bottles and three deluxe bottles contain a total of 74 ounces of shampoo, how many ounces of shampoo does a deluxe bottle contain?

4 4

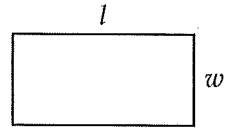
Math Test --- Calculator

55 Minutes, 38 Questions

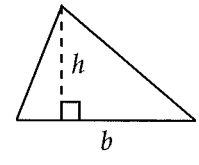
Reference



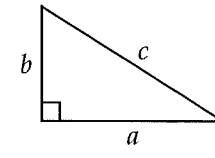
$A = \pi r^2$
$C = 2\pi r$



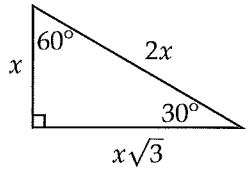
$A = lw$

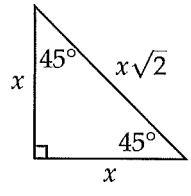


$A = \frac{1}{2}bh$

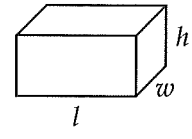


$c^2 = a^2 + b^2$

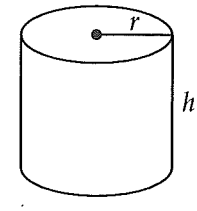




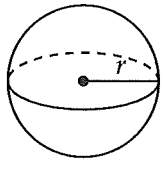
Special Right Triangles



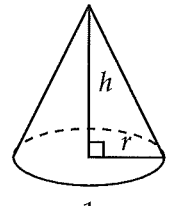
$V = lwh$



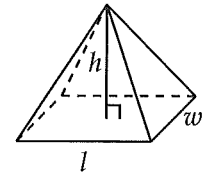
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

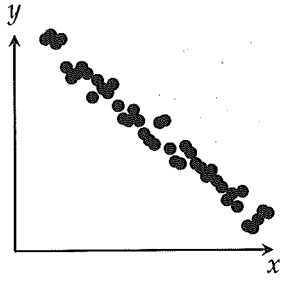
There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

4  4

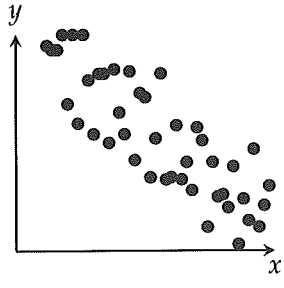
1

Which scatterplot shows the weakest negative association between x and y?

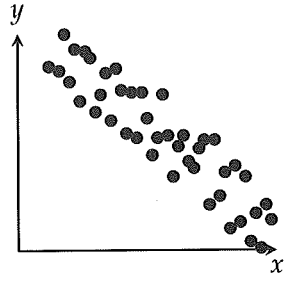
A)



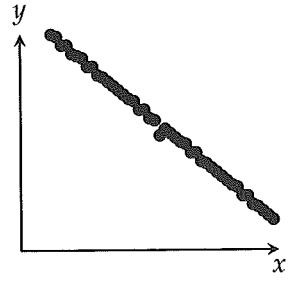
B)



C)



D)



2

The table below shows the weight of the winning pumpkin at a local Halloween contest by year.

Year	Non-Organic	Organic
2010	398	261
2011	429	280
2012	447	292
2013	488	286
2014	473	317
2015	495	324

In 2012, the winning non-organic pumpkin was approximately what percent larger than the winning organic pumpkin?

A) 35%

B) 53%

C) 65%

D) 71%

3

Number of Shots of Flu Vaccine

	No vaccine	1	2	Total
Contracted flu	6	8	6	20
Did not contract flu	24	28	36	88
Total	30	36	42	108

The table above was produced by a health clinic after it administered shots of flu vaccine to students at a school. Based on the table, what proportion of the students at the school received 2 shots of the vaccine and still contracted the flu?

A) $\frac{1}{18}$

B) $\frac{1}{7}$

C) $\frac{1}{6}$

D) $\frac{3}{10}$

4  4

4

$$3(2xy + xyz + yz) - (3xy + 5xyz - 2yz)$$

Which of the following expressions is equal to the one above?

A) $3xy + 8xyz + yz$
B) $3xy - 4xyz - yz$
C) $3xy - 2xyz + 5yz$
D) $3xy - 2xyz + 3yz$

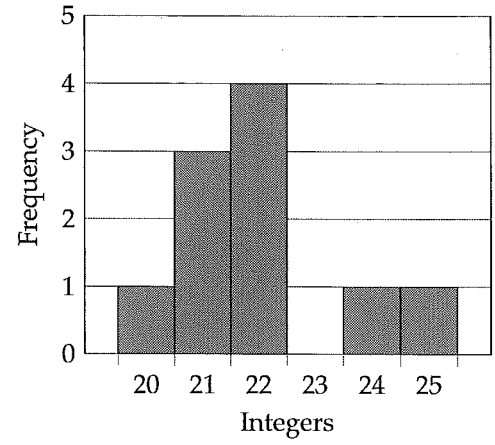
5

$$\frac{2}{11} < \frac{3}{x} < \frac{5}{14}$$

How many different integer values of x satisfy the inequality above?

A) 6
B) 7
C) 8
D) 9

6



The graph above shows the frequency distribution of a list of randomly generated integers between 20 and 26. What is the mean of the list of integers?

A) 21.5
B) 22
C) 22.5
D) 23

7

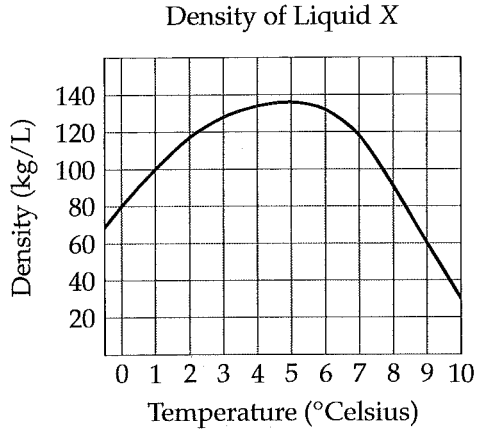
One number is 4 times another number, and they sum to -20. What is the greater of the two numbers?

A) -16
B) -12
C) -8
D) -4

4

4

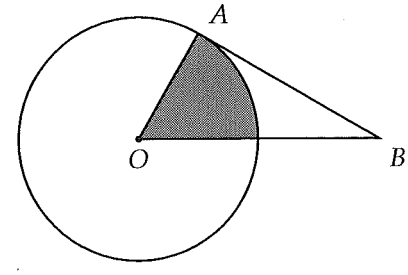
8



The graph above shows the density, in kilograms per liter, of Liquid X at different temperatures. Based on the graph, which of the following is closest to the mass, in kilograms, of 10 liters of Liquid X at 9 degrees Celsius?

A) 10
B) 100
C) 500
D) 1,000

9



Note: Figure not drawn to scale.

In the figure above, the circle has center O and segment $\overline{AB}$ is tangent to the circle. If angle ABO measures $\frac{\pi}{10}$ radians and the area of the shaded sector is π, what is the area of the circle?

A) 5π
B) 6π
C) 8π
D) 9π

10

A person's maximum heart rate, in beats per minute, can be estimated by the expression $220 - x$, where x is the person's age in years for $20 \leq x \leq 70$. If it is generally recommended that at least 50% but not more than 80% of the maximum heart rate be reached during exercise, which of the following inequalities represents the target heart rate h, in beats per minute, for a 30-year-old?

A) $105 < h < 152$
B) $105 \leq h \leq 180$
C) $95 \leq h \leq 152$
D) $95 \leq h \leq 180$

4  4

11

A book has 50 more pages than another book. If the total number of pages in both books is 400, how many pages does the longer book have?

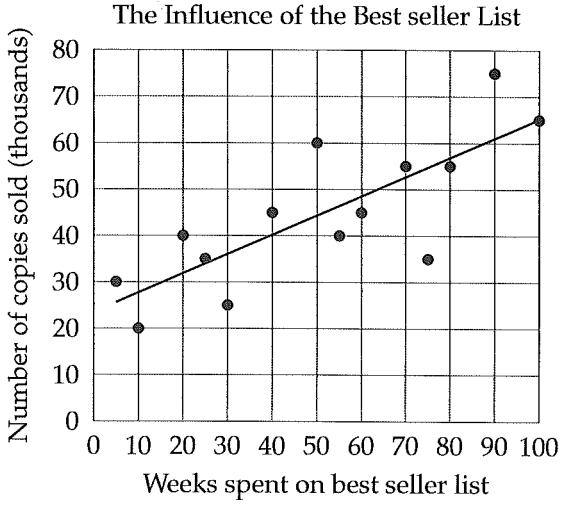
A) 150

B) 175

C) 200

D) 225

12



For each of 14 books, the number of weeks spent on a store's best seller list and the number of copies sold are shown in the scatterplot above. The line of best fit is also shown. Which of the following is the best interpretation of the y-intercept of the line of best fit in the context of this problem?

A) The predicted number of copies sold for a book that has not been on the best seller list

B) The predicted number of weeks spent on the best seller list for a book that has not sold any copies

C) The predicted increase in the number of copies sold for each additional week a book spends on the best seller list

D) The predicted increase in the number of weeks a book spends on the best seller list for each additional copy sold

Questions 13-14 refer to the following information.

A scoop of sugar is added to a drink. The amount of sugar a in grams that is dissolved in the drink s seconds after the sugar has been added is represented by the equation below.

$$a = 8 - \frac{4}{s+1}$$

13

What is the best interpretation of the number 8 in this context?

A) There was 8 grams of sugar already dissolved in the drink before the scoop of sugar was added.

B) Every 8 seconds, 4 grams of sugar gets dissolved in the drink.

C) After 8 seconds, all the added sugar will be dissolved in the drink.

D) After a very long time, the amount of sugar dissolved in the drink will approach 8 grams.

14

Which of the following expresses s in terms of a?

A) $\frac{a}{4-a}$

B) $\frac{4-a}{a}$

C) $\frac{4-a}{a-8}$

D) $\frac{a-8}{4-a}$

4  4

15

Time (months)	Number of ants
0	3,000
4	6,000
8	12,000
12	24,000

The table above gives the number of ants on an industrial ant farm over 12 months. Which of the following functions models the number of ants, $A(t)$, after t months?

A) $3{,}000t$

B) $3{,}000 + 750t$

C) $3{,}000 \cdot 2^t$

D) $3{,}000 \cdot 2^{\frac{t}{4}}$

16

If $3(a+b) = \frac{2}{3}$, what is the value of $\frac{a+b}{2}$?

A) $\frac{1}{18}$

B) $\frac{1}{9}$

C) $\frac{1}{6}$

D) $\frac{2}{9}$

17

$$2y + 3x = 5$$
$$2y - 3x = 5$$

Which of the following describes the graph of the system of equations above in the xy-plane?

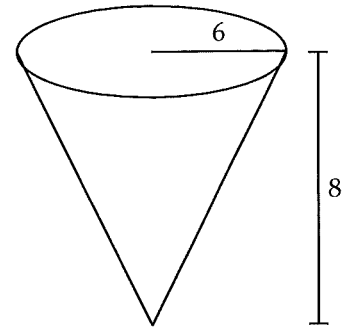
A) A single line

B) Two parallel lines

C) Two perpendicular lines

D) Two distinct intersecting lines that are not perpendicular

18



The figure above shows a paper cup in the shape of a right circular cone with a base radius of 6 and a height of 8. The cup is filled with water until its depth reaches half the height of the cone. What is the volume of the water in the cup?

A) 12π

B) 16π

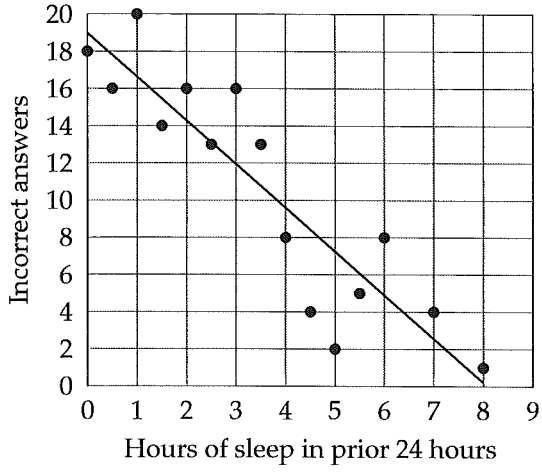
C) 48π

D) 96π

4 4

19

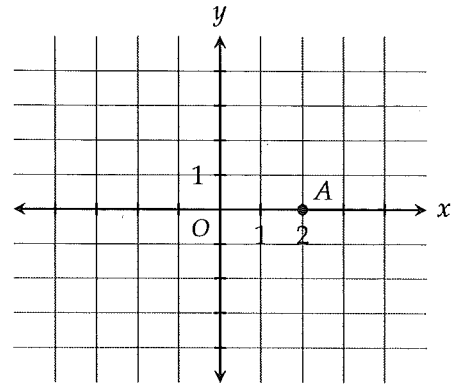
Exam Performance after Sleep Deprivation



In a study, researchers gave an exam to subjects who had varying amounts of sleep in the 24 hours prior to the exam. The results are shown in the scatterplot above, along with the line of best fit. The subject who had 3 hours of sleep in the 24 hours prior to the exam answered how many more questions incorrectly than would be predicted by the line of best fit?

A) 2
B) 3
C) 4
D) 6

Questions 20-21 refer to the following information.



20

Point B (not shown) is located by starting at A, moving 2 units down and then moving 1 unit to the right. If a line is drawn through points A and B, what is the y-intercept of the line?

A) $\frac{1}{2}$
B) 1
C) 2
D) 4

21

Line l (not shown) contains point A and has a slope of 6. Which of the following points is on line l?

A) (1,6)
B) (2,6)
C) (3,6)
D) (6,1)

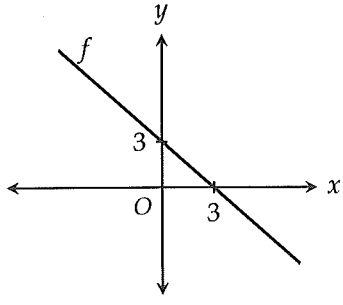
4  4

22

This year, a company consumed 30 percent fewer sheets of paper than it did last year. If the company used 270,000 sheets of paper this year, approximately how many sheets did it use last year?

A) 351,000
B) 362,000
C) 378,000
D) 386,000

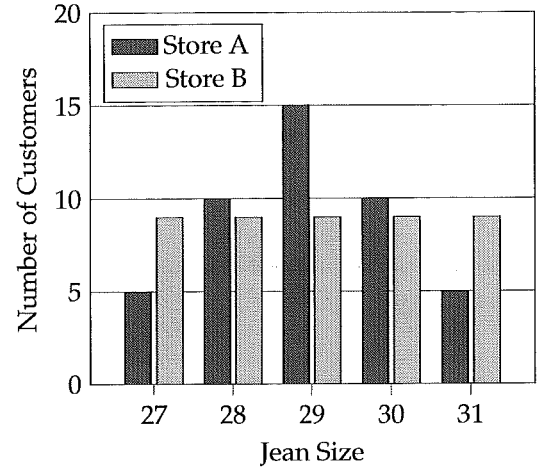
23



The function f is graphed in the xy-plane above. If the function g is defined by $g(x) = f(x) + 2$, what is the x-intercept of $g(x)$?

A) -1
B) 0
C) 1
D) 5

24



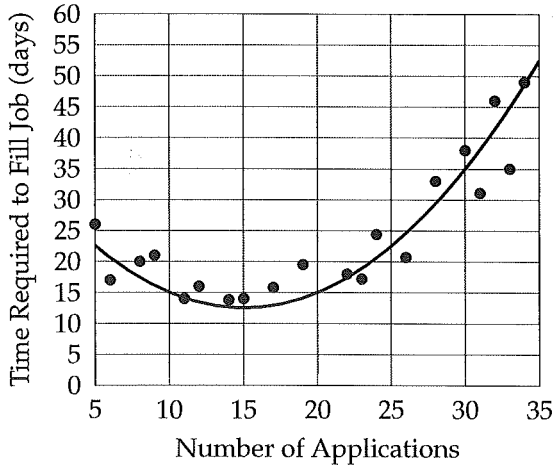
The bar chart above shows the distribution of jean sizes for 45 customers at Store A and 45 customers at Store B. Which of the following correctly compares the standard deviation of jean sizes for the customers at each of the stores?

A) The standard deviation of jean sizes for the customers at Store A is larger.
B) The standard deviation of jean sizes for the customers at Store B is larger.
C) The standard deviation of jean sizes for the customers at Store A and Store B is the same.
D) The relationship cannot be determined from the information given.

4  4

Questions 25-26 refer to the following information.

For each of 20 job openings, the scatterplot below relates the number of applications to the time required to fill the opening. A quadratic function that best fits the data is modeled in the graph below.



25

According to the best fit curve, which of the following best approximates the number of days required to fill a job for which there are 20 applications?

A) 6
B) 15
C) 18
D) 24

26

Which of the following is the best interpretation of the vertex of the best fit curve in this context?

A) The number of days required to fill a job for which there are 5 applications
B) The minimal number of applications required to fill a job within 15 days
C) The number of applications for a job that requires the least amount of time to fill
D) The number of applications for a job that requires 15 days to fill

27

The graph of the function f is the graph of the function g compressed horizontally by a factor of 2 and shifted to the right by 1. Which of the following correctly defines the function f?

A) $f(x) = g(2x - 1)$
B) $f(x) = g(2x - 2)$
C) $f(x) = g\left(\frac{1}{2}x - \frac{1}{2}\right)$
D) $f(x) = g\left(\frac{1}{2}x - 1\right)$

28

Nancy and Stacy both open bank accounts at the same time. However, Nancy's account earns 8 percent interest compounded annually, whereas Stacy's account earns only 4 percent interest compounded annually. If Nancy deposited $1,000 initially, approximately how much did Stacy deposit initially if they have the same amount of money in their accounts after 10 years?

A) 1360
B) 1380
C) 1420
D) 1460

4  4

29

At a school, there is one math teacher for every 10 students, one English teacher for every 15 students, and one science teacher for every 30 students. If the total number of math, science, and English teachers is k, how many students are there at the school, in terms of k?

A) $3k$
B) $4k$
C) $5k$
D) $10k$

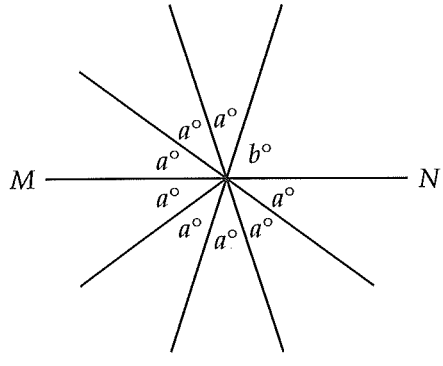
30

$$y = (2x - 1)(2x - 11)$$

A parabola with vertex (a, b) in the xy-plane is represented by the equation above. What is the value of b?

A) -25
B) 3
C) 6
D) 11

31



In the figure above, MN is a line. What is the value of b?

32

Product reports suggest that 10 percent of all calculators require AAA type batteries and 25 percent of all alarm clocks require AAA type batteries. If there are 550 calculators and 440 alarm clocks in stock at a store, what is the estimated difference between the number of calculators that require AAA batteries and the number of alarm clocks that require AAA batteries?

33

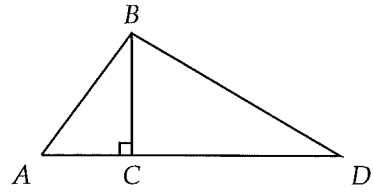
If $f(x) = 3x - 1$ and $2f(b) = 28$, what is the value of $f(2b)$?

34

If $10 + \frac{6}{x} = 22$ and $x > 0$, what is the value of x?

4  4

35



In $\triangle ABD$ above, $AB = 10$, $AC = 6$, and $CD = 8\sqrt{3}$. What is the length of $\overline{BD}$?

36

If $9 \leq -5x - 6 \leq 34$, a is the greatest possible value of x, and b is the least possible value of x, what is the value of $a - b$?

Questions 37-38 refer to the following information.

At a certain airline, the total cost of checking in a bag is the sum of

- a fixed fee of $25, and
- an additional charge of $3 for each pound the bag's weight exceeds the overweight limit of 50 pounds.

37

If the total cost of checking a bag in is $70, what is the weight of the bag in pounds?

38

The total cost C, in dollars, of checking in an overweight bag weighing x pounds can be found by using the formula $C = ax - b$, where a and b are constants. What is the value of $a + b$?

7

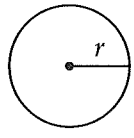
Practice Test 7

3  3

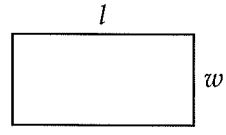
Math Test --- No Calculator

25 Minutes, 20 Questions

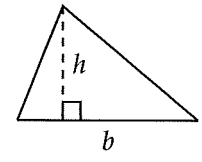
Reference



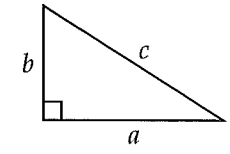
$A = \pi r^2$
$C = 2\pi r$



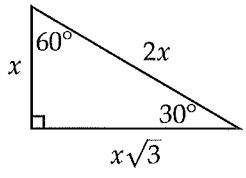
$A = lw$

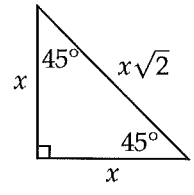


$A = \frac{1}{2}bh$

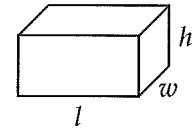


$c^2 = a^2 + b^2$

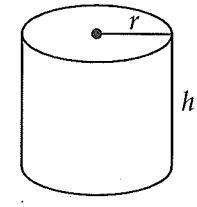




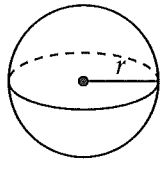
Special Right Triangles



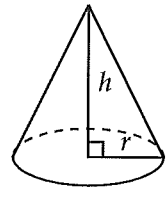
$V = lwh$



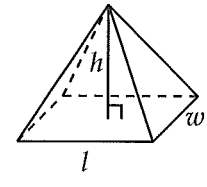
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

3

3

1

Which of the following is equal to $\sqrt[3]{x^2} \cdot \sqrt{x^3}$?

A) x

B) $x^{\frac{9}{4}}$

C) $x^{\frac{13}{6}}$

D) x^3

2

To improve his health, James resolves to lose x pounds each month. If James weighs 230 pounds now, which of the following expressions represents his weight m months from now?

A) $mx - 230$

B) $230m - mx$

C) $230 + mx$

D) $230 - mx$

3

If $a = b + c$, which of the following must be equal to ab?

A) $b^2 + c$

B) $b^2 - c$

C) $b^2 + bc$

D) $b^2 - bc$

4

$$y = 200 + 25x$$

An insurance company uses the equation above to calculate the monthly auto insurance premium y, in dollars, for a driver with x previous car accidents. What is the increase in the monthly insurance premium, in dollars, for each accident?

A) 8

B) 25

C) 75

D) 200

5

$$\frac{3x - 2}{12x^2}$$

Which of the following is equivalent to the expression above?

A) $-\frac{1}{2x}$

B) $\frac{x}{12}$

C) $\frac{1}{4x} - \frac{1}{6x^2}$

D) $\frac{x}{4} - \frac{x^2}{6}$

6

What is the equation of the line that is perpendicular to the y-axis and passes through the point $(3, 4)$?

A) $x = 3$

B) $x = 4$

C) $y = 3$

D) $y = 4$

7

Which of the following is equivalent to $(m + n + 1)(m + n - 1)$?

A) $m^2 + 2mn + n^2 - 1$

B) $m^2 - 2mn + n^2 - 1$

C) $m^2 - n^2 - 1$

D) $m^2 + 2m + n^2 + 2n - 1$

8

Colin bought a winter jacket for x dollars, but Jonas managed to find the same jacket at a 20 percent discount. If they both had to pay a sales tax of 10 percent on the final price, which of the following expressions represents the total amount, in dollars, Colin and Jonas spent on their jackets?

A) $(1.1)(1.8x)$
B) $(1.1)(1.2x)$
C) $(0.1)(1.8x)$
D) $(0.1)(1.2x)$

9

$$p = at^3 - bt + c$$

The equation above gives the population p, in thousands, of a certain species after t years. The species has a fertility rate of a, a death rate of b, and an initial population of c. Which of the following gives b in terms of p, a, t, and c?

A) $\frac{p - at^3 - c}{b}$
B) $\frac{c + at^3 - p}{b}$
C) $\frac{p - at^3 + c}{b}$
D) $\frac{at^3 - c - p}{b}$

10

$$R = 16{,}000 + 7{,}000F$$

Jake sells his famous lobster rolls at his own restaurant and at several franchise locations. He uses the equation above to model his business finances, where F is the number of franchise locations and R is the total monthly revenue of the entire business. According to the model, what is the best interpretation of the 16,000 in the equation?

A) The monthly revenue generated by each franchise location
B) The total monthly revenue generated by all franchise locations
C) The monthly revenue generated by Jake's own restaurant
D) The number of lobster rolls the entire business sells each month

11

In the xy-plane, a line has an x-intercept of -2 and a y-intercept of -4. What is the slope of the line?

A) -2
B) $-\frac{1}{2}$
C) $\frac{1}{2}$
D) 2

12

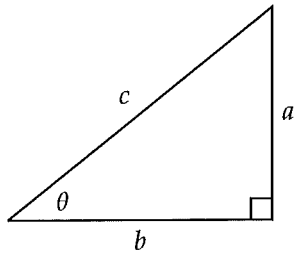
x	3	4	5	6	7
$f(x)$	-10	m	-2	2	n

The values in the table above define a linear function. What is the value of $m + n$?

A) -4
B) 0
C) 4
D) 8

3 3

13



Given the right triangle above, which of the following is equal to a?

A) $a \tan \theta$

B) $b \sin \theta$

C) $c \sin \theta$

D) $c \cos \theta$

14

$$x^2 + 3bx + 2b^2 = 0$$

In the quadratic equation above, b is a constant. What are the solutions x to the equation in terms of b?

A) $-4b$ and $-2b$

B) $-\frac{3b}{2}$ and $\frac{b}{2}$

C) $-2b$ and $-b$

D) b and $2b$

15

A semicircle has a perimeter of P and a radius of r. Which of the following represents r in terms of P?

A) $\frac{P}{\pi}$

B) $\frac{P}{2\pi}$

C) $\frac{P}{\pi + 2}$

D) $\frac{P}{2\pi + 2}$

16

A certain type of printer can print 50 pages in 3 minutes. How many pages can 4 printers of the same type print in 12 minutes?

17

$$2x - 3y = -1$$
$$-x + y = -1$$

According to the systems of equations above, what is the value of x?

18

If $\left(x^{2a-3}\right)^2 = x^{14}$, then what is the value of a?

19

If $2x + 2y = 9$, what is the value of $0.5x + 0.5y$?

3  3

20

$$p(x) = 4x^3 - kx + k$$

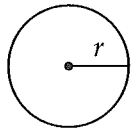
In the polynomial $p(x)$ defined above, k is a constant. If $x + 1$ is a factor of $p(x)$, what is the value of k?

4 4

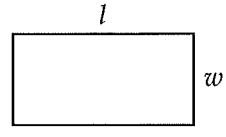
Math Test --- Calculator

55 Minutes, 38 Questions

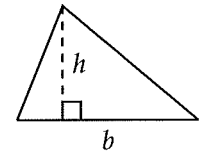
Reference



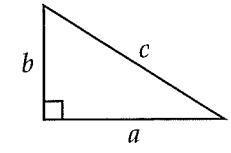
$A = \pi r^2$
$C = 2\pi r$



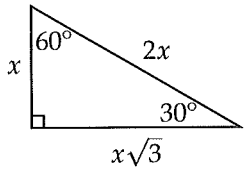
$A = lw$

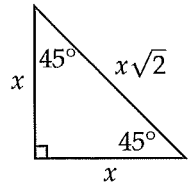


$A = \frac{1}{2}bh$

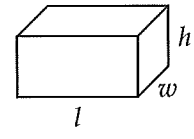


$c^2 = a^2 + b^2$

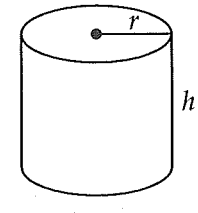




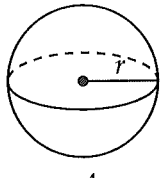
Special Right Triangles



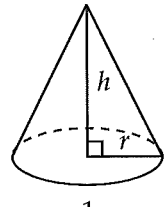
$V = lwh$



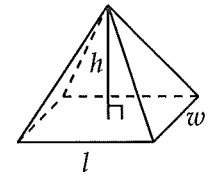
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

4 4

1

Mon	3,830
Tue	2,960
Wed	2,435
Thu	2,605
Fri	3,860
Sat	5,695
Sun	6,230
Total	27,615

The table above shows the number of visitors to a museum over the course of one week. Based on the table, what is the mean number of visitors each day from Monday to Friday?

A) 3,138
B) 3,945
C) 4,326
D) 5,523

2

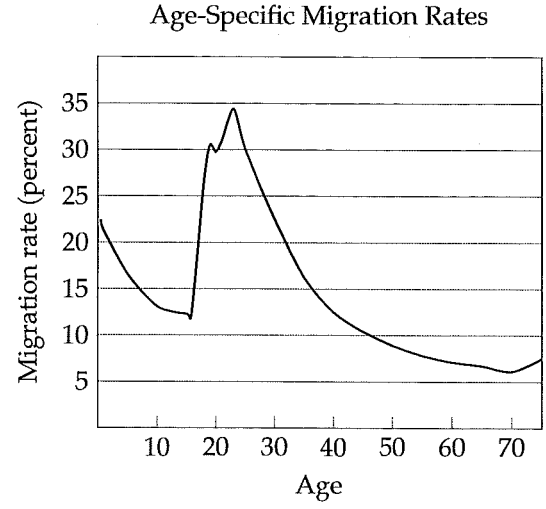
1 mile = 5280 feet

61 centimeters = 2 feet

Based on the information above, how many centimeters are equivalent to 3 miles?

A) 161,040
B) 322,080
C) 483,120
D) 644,160

3



The graph above shows how likely people of different ages are to migrate, or move away, from their original home. Which of the following is closest to the age at which the migration rate is highest?

A) 18
B) 20
C) 25
D) 30

4

Kevin surveyed a random sample of teachers in his district to determine whether new textbooks or new computers are a higher priority for schools. Of the 120 teachers surveyed, 37.5% think new computers are a higher priority. Based on this information, about how many of the 2,200 teachers in the district would be expected to think new textbooks are a higher priority?

A) 680
B) 825
C) 1,200
D) 1,375

4

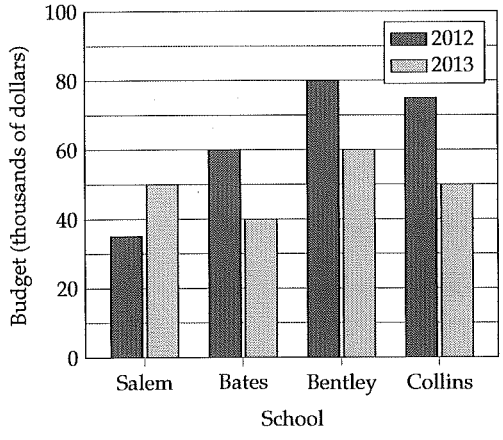
4

5

Jamie bought apples, bananas, and oranges at a store. The number of apples was 2 less than the number of bananas. The number of oranges was 4 times the number of apples. Of the following, which could be the total number of items that Jamie bought?

A) 18
B) 22
C) 26
D) 30

Questions 6-7 refer to the following information.



6

Which of the following schools had a budget in 2013 that was approximately $\frac{2}{3}$ of its budget in 2012?

I. Bates
II. Bentley
III. Collins

A) I only
B) I and III only
C) II and III only
D) I, II, and III

7

From 2012 to 2013, the total budget for all four schools decreased by approximately what percent?

A) 20%
B) 25%
C) 30%
D) 33%

8

$$f(x) = \begin{cases} x+2 & \text{if } x \geq 0 \\ x-2 & \text{if } x < 0 \end{cases}$$

The function f is defined above. Which of the following CANNOT be $f(x)$ for any value of x?

A) -6
B) -4
C) 1
D) 3

9

$$x^2 + (y-3)^2 = 25$$

The graph of the equation above in the xy-plane is a circle. At what points does the circle intersect the y-axis?

A) $(0,-2)$ and $(0,8)$
B) $(0,-3)$ and $(0,7)$
C) $(0,-8)$ and $(0,2)$
D) $(0,-22)$ and $(0,28)$

4  4

10

A house is losing a fourth of its value every year. Which of the following best describes the relationship between time (in years) and the value of the house?

A) Increasing linear
B) Decreasing linear
C) Exponential growth
D) Exponential decay

11

$$y = 2(x+4)(3x-18)$$

The equation above represents a parabola in the xy-plane. Which of the following equivalent equations displays the x- and y-coordinates of the vertex of the parabola as constants or coeffcients?

A) $y = 6(x+4)(x-6)$
B) $y = 6x^2 - 12x - 144$
C) $y = (2x+8)(3x-18)$
D) $y = 6(x-1)^2 - 150$

12

A restaurant conducted a survey to determine what customers would think about a new sandwich menu item for lunch. During lunch time, the restaurant owner put the sandwich on the menu for 8 dollars and the first 40 customers to buy it were asked for their opinions. Which of the following factors makes it least likely that a reliable conclusion can be drawn about the opinions of all the restaurant's customers concerning the new sandwich menu item?

A) The sample size
B) The time the survey was given
C) The price of the sandwiches
D) The way the customers were selected for the survey

13

Sam deposits $800 into an account that earns 4 percent interest each year, compounded semiannually. Which of the following is closest to the total amount in his account after 5 years?

A) $971
B) $973
C) $975
D) $977

14

James is traveling to France and needs to exchange 800 U.S. dollars for euros. He looks up the official exchange rate and sees that 1 euro is worth 1.40 U.S. dollars. However, the currency exchange station at the airport is offering 1 euro for 1.55 U.S. dollars. Approximately how many more euros would James have if he converts his money at the official exchange rate rather than at the one offered at the airport?

A) 50
B) 55
C) 60
D) 65

15

$$f(x) = x^2 - 3x$$
$$g(x) = 2x + 14$$

The functions f and g are defined above. For how many values of k is it true that $f(k) = g(k)$?

A) None
B) One
C) Two
D) More than two

4  4

16

At a toy store, two dolls and three toy cars cost 88 dollars. However, three dolls and two toy cars cost 62 dollars. How much does one doll and one toy car cost, in dollars?

A) 28
B) 30
C) 32
D) 34

17

The graph of the function f contains the points $(0,3)$, $(-2,7)$, and $(5,k)$. If the graph of f is a line, what must the value of k be?

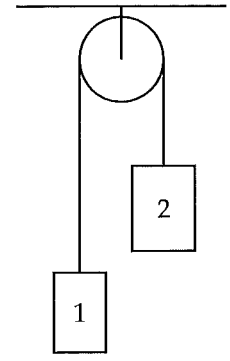
A) -13
B) -7
C) 5
D) 8

18

A researcher surveyed a random sample of 200 engineers working in Silicon Valley and determined that the mean salary for the engineers has a 95% confidence interval of \$90,000 to \$110,000. Which of the following conclusions is the most reasonable based on the confidence interval?

A) There is a 95% chance that the true mean salary of all the engineers working in Silicon Valley is between \$90,000 and \$110,000.
B) There is a 95% chance that the true mean salary of all the engineers working in California is between \$90,000 and \$110,000.
C) 95% of all the engineers working in Silicon Valley earn a salary between \$90,000 and \$110,000.
D) There is evidence to suggest that the true mean salary of all the engineers working in Silicon Valley is between \$90,000 and \$110,000.

Questions 19-20 refer to the following information.



In the figure above, two objects are connected by a cord and hung over a pulley. The tension T, in newtons, in the cord can be found using the equation below.

$$T = \frac{2m_1m_2}{m_1 + m_2}g$$

where m_1 and m_2 are the masses of object 1 and object 2, respectively, in kilograms, and g is the acceleration due to Earth's gravity measured in $\frac{\text{m}}{\text{sec}^2}$.

19

Which of the following expresses g in terms of the other variables?

A) $\frac{T(m_1 + m_2)}{2m_1m_2}$
B) $\frac{2m_1m_2}{T(m_1 + m_2)}$
C) $\frac{2(m_1 + m_2)}{Tm_1m_2}$
D) $T(m_1 + m_2) - 2m_1m_2$

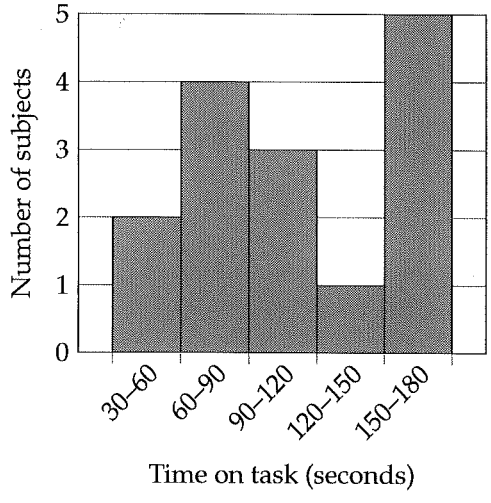
4  4

20

If the masses of both object 1 and object 2 were doubled, how would the tension in the cord be affected?

A) The tension would stay the same.
B) The tension would be halved.
C) The tension would be doubled.
D) The tension would be quadrupled (multipled by a factor of 4).

21



In an experiment, researchers recorded the time, in seconds, 15 subjects were able to remain focused on a difficult task. The results of the experiment are summarized in the table above. Which of the following could be the average time on task, in seconds, for the 15 subjects?

A) 68
B) 92
C) 123
D) 149

22

A function $f(x)$ has two properties:

$$f(a+b) = f(a) - b$$

$$f(2) = 10$$

What is the value of $f(5)$?

A) 5
B) 7
C) 9
D) 11

23

If $(x+y)^2 - (x-y)^2 = 60$ and x and y are positive integers, which of the following could be a value of $x+y$?

A) 6
B) 8
C) 10
D) 12

4  4

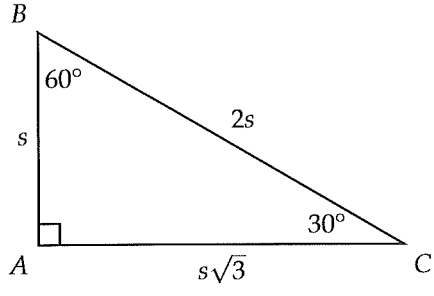
24

	Average Overtime Hours per Week				
	1-3	4-6	7-9	10+	Total
Marketing	6	7	5	6	24
Engineering	4	4	7	10	25
Accounting	1	15	18	3	37
Human Resources	2	5	4	3	14
Total	13	31	34	22	100

The table above shows the number of employees in different departments at a company, categorized by the average number of overtime hours they work. Which department at the company has the highest proportion of employees who work less than an average of 6 overtime hours per week?

A) Marketing
B) Engineering
C) Accounting
D) Human Resources

25



In triangle ABC above, the lengths of the sides relate to one another as shown. If a new triangle is created by increasing s by 40 percent and maintaining the relationship among the sides, the area of the new triangle is how many times greater than the area of triangle ABC?

A) 1.16
B) 1.96
C) 1.98
D) 2.16

26

$$x^2 - y^2 = 48$$
$$x + y = 12$$

If (x, y) is the solution to the system of equations above, what is the value of xy?

A) 28
B) 32
C) 45
D) 64

27

The function f is defined by a polynomial. If $f(0) = 3$, which of the following must be true about $f(x)$?

A) The remainder when $f(x)$ is divided by $x + 3$ is 0.
B) The remainder when $f(x)$ is divided by $x - 3$ is 0.
C) The remainder when $f(x)$ is divided by x is -3.
D) The remainder when $f(x)$ is divided by x is 3.

4 4

Questions 28-29 refer to the following information.

Number of orders	Processing time t per order (minutes)
60	$1 \leq t \leq 5$
80	$6 \leq t \leq 12$

The table above summarizes the orders that need to be processed by a warehouse on a certain day.

28

If T represents the total number of hours needed to process all the orders in the table, which of the following inequalities gives the possible values of T?

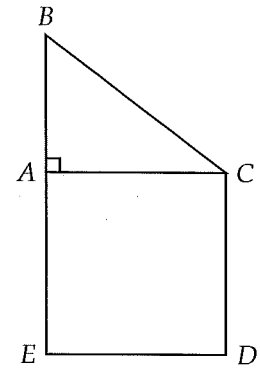
A) $8 \leq T \leq 16$
B) $8 \leq T \leq 21$
C) $9 \leq T \leq 16$
D) $9 \leq T \leq 21$

29

The warehouse finds that a new machine can cut the processing time of each order in half. If this new machine is used to process the orders in the table, which of the following CANNOT be the processing time of an order?

A) 1.2 minutes
B) 2.8 minutes
C) 3.6 minutes
D) 5.5 minutes

30



In the figure above, $ACDE$ is a square and ABC is a right triangle. If $AB = 3$ and $BC = 5$, what is the length of $\overline{BD}$ (not shown)?

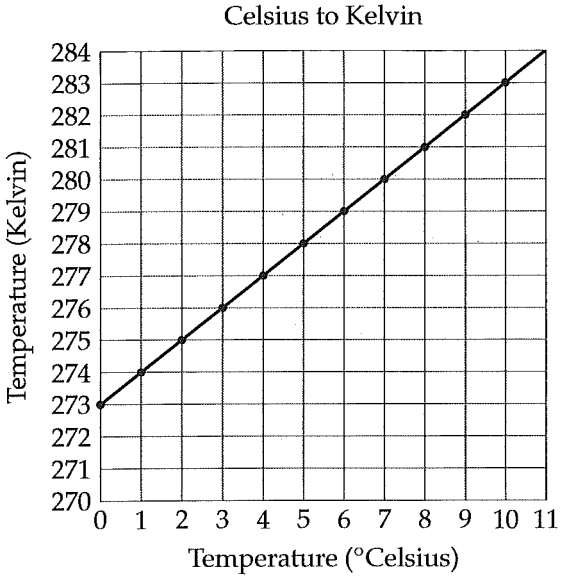
A) $\sqrt{53}$
B) $\sqrt{62}$
C) 8
D) $\sqrt{65}$

31

If $a = \frac{2}{3b}$ and $ax = \frac{5}{6b}$ for $b \neq 0$, what is the value of x?

4  4

32



In a class lab report, a student mistakenly calculates 279 kelvin to be equal to 2 degrees Celsius. Based on the graph above, by how many degrees Celsius is the correct result greater than what the student calculated?

33

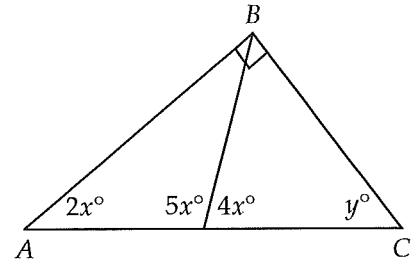
$$l = \frac{7}{4}(a + 5)$$

A biologist uses the model above to estimate the length l of a garden snake, in inches, based on the snake's age a, in months. According to the model, by how many inches in length does a garden snake grow over 5 months?

34

A furniture store offers a free chair for every four chairs that a customer purchases. The price of each chair is \$12. If Alice spends a total of \$108 on chairs, how many chairs did she receive altogether?

35

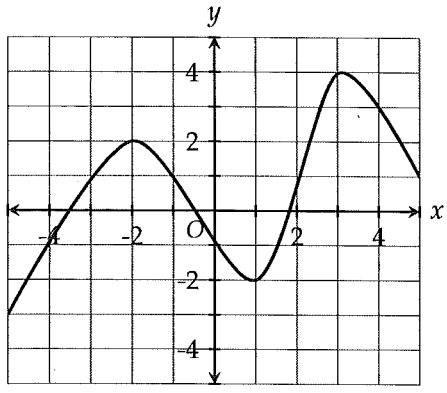


Note: Figure not drawn to scale.

In right triangle ABC above, what is the value of y?

4 4

36



What is the difference between the minimum and maximum values of the function graphed in the xy-plane above, for $-5 \leq x \leq 5$?

Questions 37-38 refer to the following information.

$$y = \frac{x}{36}$$

The equation above gives the number of revolutions y that a tire makes in traveling a distance of x meters without slipping.

37

How far in meters has the tire traveled after making 2.5 revolutions?

38

What is the radius of the tire to the nearest tenth of a meter?

8

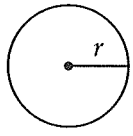
Practice Test 8

3  3

Math Test --- No Calculator

25 Minutes, 20 Questions

Reference



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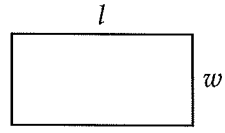
$C = 2\pi r$



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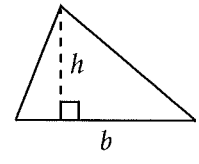

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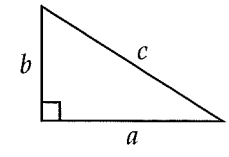
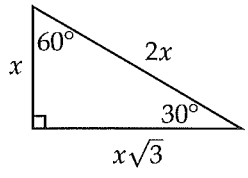
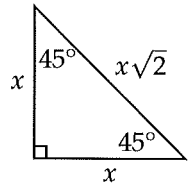
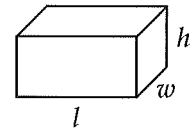


$c^2 = a^2 + b^2$

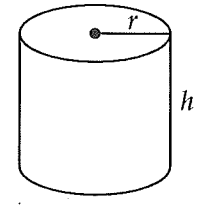




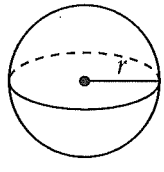
Special Right Triangles



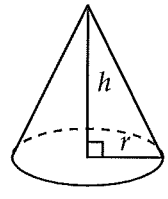
$V = lwh$



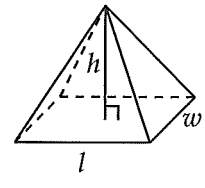
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

3 3

1

If $x > 0$ and $9x^2 = 40$, which of the following is equivalent to the value of x?

A) $\left(\frac{40}{9}\right)^2$

B) $\frac{\sqrt{40}}{9}$

C) $\sqrt{\frac{9}{40}}$

D) $\sqrt{\frac{40}{9}}$

2

Which of the following is equal to $\sqrt[3]{b^{\frac{1}{2}}}$?

A) $b^{\frac{1}{6}}$

B) $b^{\frac{2}{3}}$

C) $b^{\frac{3}{2}}$

D) b^6

3

Line k has a negative slope and passes through the origin. If line m is perpendicular to line k, which of the following must be true?

A) Line m passes through the origin.

B) Line m does not pass through the origin.

C) Line m has a positive slope.

D) Line m has a negative slope.

4

$$y = 500 - 4x$$

A manager operates a retail store that sells shirts. She uses the equation above to model the number of shirts left in inventory each day after x coupons for the shirts have been given out to customers. What does the number 500 in the equation mean?

A) The store starts each day with 500 shirts in inventory.

B) Each day, an average of 500 shirts are sold to customers using coupons.

C) It takes 500 coupons to sell all the shirts left in inventory.

D) There are 500 shirts left in inventory on days when no coupons are given out.

5

If $|x + 3| < 2$, which of the following could be the value of $|x|$?

A) 1

B) 4

C) 6

D) 10

6

$$(a + b)^2 - (a - b)^2$$

The expression above is equivalent to which of the following?

A) $2ab$

B) $4ab$

C) $4ab + 2b^2$

D) $2a^2 + 2b^2$

3  3

7

If $f(x+1) = 3x+2$, the function f could be defined by which of the following?

A) $f(x) = 3x-2$
B) $f(x) = 3x-1$
C) $f(x) = 3x+1$
D) $f(x) = 3x+5$

8

The total price of x pens is 4 dollars and the total price of y notebooks is 6 dollars. Which of the following expresses the total cost of 9 pens and 7 notebooks, in dollars?

A) $9\left(\frac{x}{4}\right)+7\left(\frac{y}{6}\right)$
B) $9\left(\frac{4}{x}\right)+7\left(\frac{6}{y}\right)$
C) $7\left(\frac{x}{4}\right)+9\left(\frac{y}{6}\right)$
D) $7\left(\frac{4}{x}\right)+9\left(\frac{6}{y}\right)$

9

For every transaction made, an electronic payment system charges \$0.30 plus 2% of the amount of the transaction. If the system charges \$5.00 for a transaction, which of the following equations gives the amount a, in dollars, of the transaction?

A) $a = \frac{5}{0.02} - 0.30$
B) $a = \frac{5}{2} - 0.30$
C) $a = \frac{5-0.30}{0.02}$
D) $a = \frac{5-0.30}{2}$

10

$$y = 20 - 4x$$

Kagan keeps a collection of coins in his car to pay for city parking. Kagan withdraws money from his coin collection according to the equation above, where y is the dollar amount left in his collection after x weekly withdrawals. What does it mean that $(5,0)$ is a solution to this equation?

A) Kagan's coin collection will be empty after 5 weeks.
B) Kagan withdraws 5 dollars every week.
C) Kagan withdraws 5 dollars every 4 weeks.
D) Kagan withdraws 4 dollars every 5 weeks.

11

If $m = \frac{1}{\sqrt{n}}$, where $m > 0$ and $n > 0$, what is n in terms of m?

A) $n = \frac{1}{\sqrt{m}}$
B) $n = \frac{1}{m}$
C) $n = \frac{1}{m^2}$
D) $n = m^2$

12

If $\sqrt{4+\sqrt{x}} = 1+\sqrt{3}$, what is the value of x?

A) 0
B) 2
C) 6
D) 12

13

$$y = 3x - 1$$
$$y = (x+1)^2$$

The system of equations above has how many solutions?

A) 0
B) 1
C) 2
D) Infinitely many

14

$$x - 6 = \frac{\sqrt{2x}}{2}$$

What is the solution set for the equation above?

A) $\left\{\frac{9}{2}\right\}$
B) $\{8\}$
C) $\left\{\frac{9}{2}, 8\right\}$
D) $\{3, 8\}$

15

The expression $\frac{2x^2 - 5x}{2x - 1}$ is equivalent to which of the following?

A) $x - 3 - \frac{3}{2x-1}$
B) $x - 3 + \frac{3}{2x-1}$
C) $x - 2 - \frac{2}{2x-1}$
D) $x - 2 + \frac{2}{2x-1}$

16

Maria's English teacher has noticed that Maria is behind in her reading. To catch up, Maria is assigned to read k pages each day, where k is a constant. After 7 days, her teacher sees that she is on page 120. After 11 days, Maria is on page 196. What is the value of k?

17

If $\frac{2}{3}x = 5 - \frac{3}{5}y$, what is the value of $10x + 9y$?

18

$$-4x - 15y = -17$$
$$-x + 5y = -13$$

If (x, y) is the solution to the system of equations above, what is the value of x?

19

The expression $\frac{3x+7}{5} - \frac{1-2x}{5}$ is how much more than x?

20

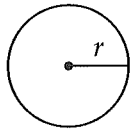
A country consists of a mainland and 9 outlying islands. If the mainland's population is 6 times the average population of the islands, then the mainland's population is what fraction of the total population of the country?

4 4

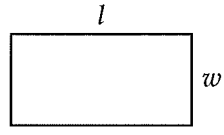
Math Test --- Calculator

55 Minutes, 38 Questions

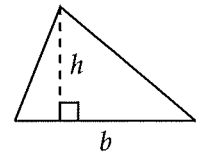
Reference



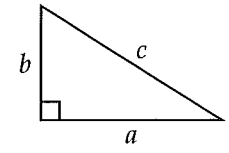
$A = \pi r^2$
$C = 2\pi r$



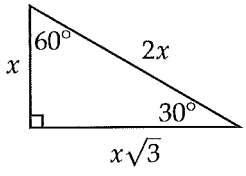
$A = lw$

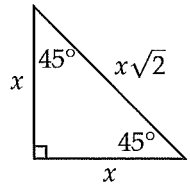


$A = \frac{1}{2}bh$

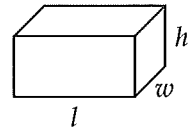


$c^2 = a^2 + b^2$

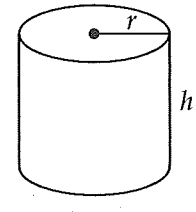




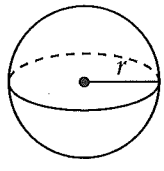
Special Right Triangles



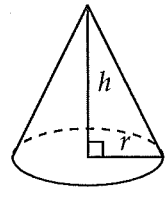
$V = lwh$



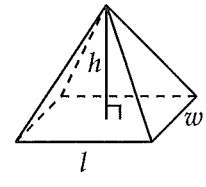
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

4  4

1

$$v = 550 - 9.8t$$

The equation above gives the velocity v of a ball t seconds after it is thrown vertically upwards with an initial velocity of 550 meters per second. After approximately how many seconds will the ball stop and start to drop back to the ground?

A) 47.8
B) 51.4
C) 55.5
D) 56.1

2

Year	Seal population
2000	350
2001	342
2002	348
2003	357
2004	345
2005	
2006	355

The incomplete table above shows the seal population in an Arctic region from 2000 to 2006. Which of the following is a reasonable approximation of the seal population in the same region in 2005?

A) 35
B) 350
C) 3,500
D) 350,000

3

The table below shows the number of vowels and consonants in 4 different languages.

Language	Vowels	Consonants	Total
Danish	32	20	52
German	17	25	42
Greek	5	18	23
Portuguese	14	23	37

Based on the table, vowels make up approximately 38% of the alphabet in which language?

A) Danish
B) German
C) Greek
D) Portuguese

4

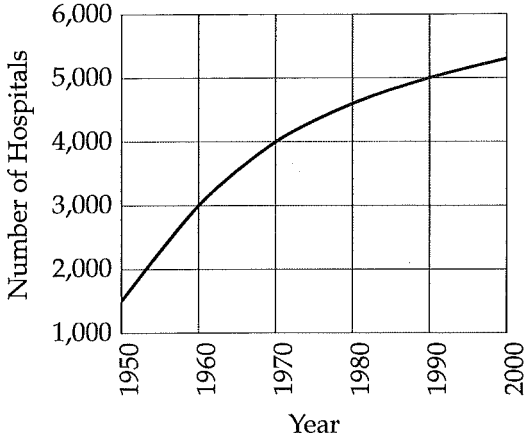
Jonas walks 10 miles in 2.5 hours. How long will it take him to walk 25 miles?

A) 6 hours and 15 minutes
B) 6 hours and 20 minutes
C) 6 hours and 30 minutes
D) 6 hours and 45 minutes

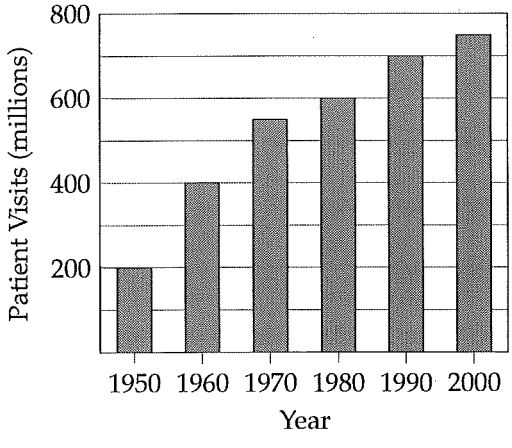
4  4

Questions 5-6 refer to the following information.

United States Hospitals, 1950-2000



Total Number of Patient Visits in the U.S.



5

Which of the following is NOT a valid conclusion from the information shown in the graphs?

A) From 1960 to 1990, the number of hospitals increased by approximately 2,000.

B) From 1950 to 2000, the number of hospitals increased.

C) In 1970, there were about 550 million patient visits.

D) From 1950 to 1960, the number of patient visits increased by approximately 50%.

6

According to the graphs, which of the following best approximates the average number of patient visits per hospital in 1990?

A) 120,000

B) 130,000

C) 140,000

D) 150,000

7

	Chicken over rice	Lamb over rice	Total
Lunch	72	36	108
Dinner	204	108	312
Total	276	144	420

The table above shows the distribution of meals ordered from a food truck during lunch and dinner. Based on the data, what proportion of the lamb over rice orders came during dinner time?

A) $\frac{1}{4}$

B) $\frac{9}{35}$

C) $\frac{9}{26}$

D) $\frac{3}{4}$

4 4

8

At the start of the semester, Andrew could swim a mile in 16 minutes. At the end of the semester, he could swim a mile in 12 minutes. What is the percent decrease (to the nearest percent) in his time from the start to the end of the semester?

A) 20%
B) 25%
C) 33%
D) 40%

9

Amy charges $60 per hour for freelance design work and earns a minimum of $3,600 every 2 weeks. The number of hours she works each week depends on the job. If x represents the number of hours Amy works each week over a 2-week period, which of the following inequalities gives all possible values of x?

A) $x \leq 30$
B) $x \geq 30$
C) $x \leq 60$
D) $x \geq 60$

10

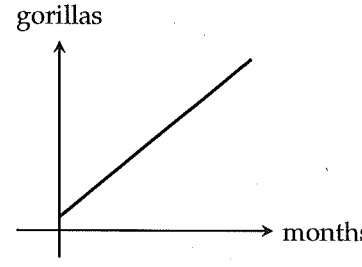
A wine manufacturer produced x bottles of wine in its first production run. In its second run, it produced 35 percent less. If the manufacturer produced 3,900 bottles in its second run, what is the value of x?

A) 5,265
B) 5,750
C) 5,830
D) 6,000

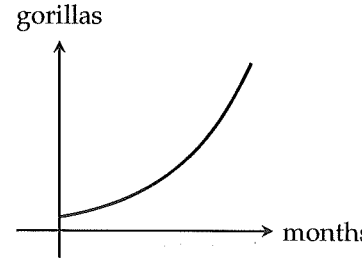
11

The population of gorillas increases by 100 every month. Which of the following graphs could model the gorilla population as a function of time?

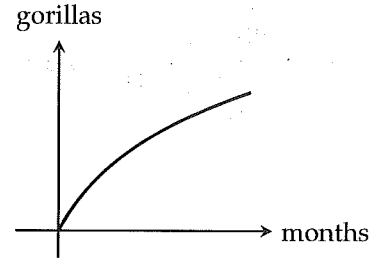
A)



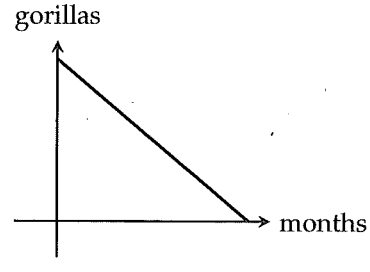
B)



C)



D)



4  4

12

	Actual		
Forecast	Rain	No rain	Total
Rain	75	20	95
No rain	50	220	270
Total	125	240	365

A weather station summarizes the accuracy of its daily rain forecasts for the past year (365 days) in the table above. What fraction of the station's daily rain forecasts last year were correct?

A) $\frac{15}{73}$

B) $\frac{3}{5}$

C) $\frac{15}{19}$

D) $\frac{59}{73}$

Questions 13-14 refer to the following information.

A kitchen renovation company charges \$120 per square foot for the first 50 square feet and then \$200 per square foot thereafter.

13

Which of the following expressions gives the company's charge, in dollars, for renovating a kitchen with an area of $k + 75$ square feet?

A) $10,000 + 120k$

B) $11,000 + 200k$

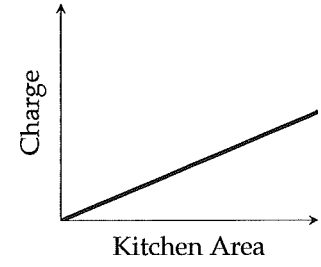
C) $21,000 + 200k$

D) $5,000 + 320k$

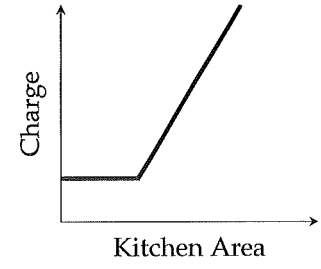
14

Which of the following graphs could show the relationship between the area of the kitchen to be renovated and the company's charge?

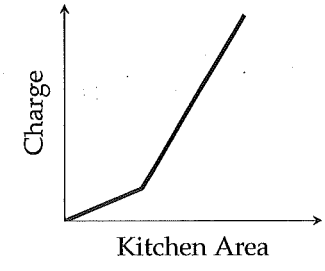
A)



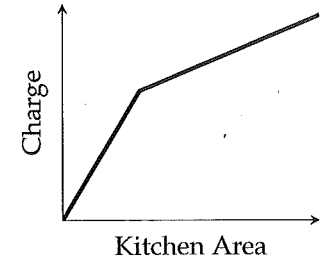
B)



C)



D)



4  4

15

If $xy = k$, where k is a constant, and $y = \frac{1}{2}$ when $x = 6$, what is the value of x when $y = 9$?

A) $\frac{1}{3}$

B) $\frac{3}{4}$

C) 3

D) 27

16

Darcy keeps \$5,000 in a bank account that does not earn any interest. Every week, she withdraws 10 percent of the money in the account for spending. To the nearest cent, how much has she withdrawn in total after 8 weeks?

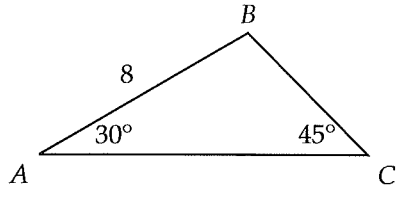
A) \$2,610.78

B) \$2,638.05

C) \$2,755.28

D) \$2,847.66

17



In the figure above, $\angle BAC = 30°$, $\angle BCA = 45°$, and $AB = 8$. What is the length of $\overline{BC}$?

A) 4

B) $4\sqrt{2}$

C) $4\sqrt{3}$

D) $8\sqrt{2}$

18

Breaths per minute				
7	8	10	12	14
18	18	18	19	20
21	21	22	23	24

The table above lists the resting breath rates (in breaths per minute) of 15 college-age students. If a student with a resting breath rate of 18 breaths per minute is added to the values listed, which of the following statistical measures of the data will change?

I. Mean
II. Median
III. Range

A) I only

B) I and II only

C) II and III only

D) I, II, and III

19

$$y = x^2 - k$$

In the equation above, k is a constant. If the graph of the equation in the xy-plane is a parabola with x-intercepts of -4 and 4, what is the minimum value of y in terms of k?

A) $-k$

B) $1 - k$

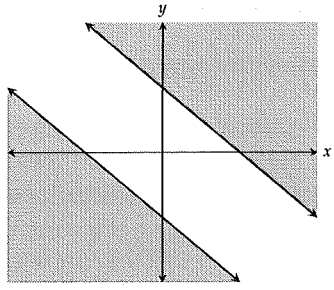
C) $4 - k$

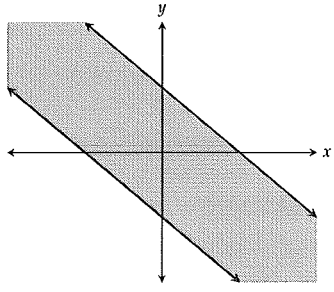
D) $16 - k$

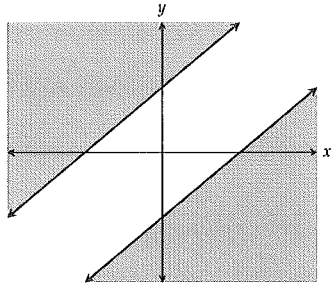
4  4

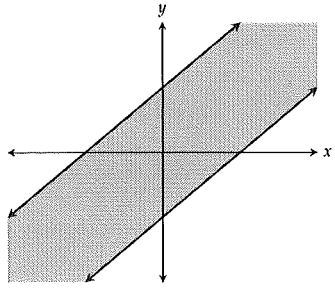
20

Which of the following graphs represents all x and y such that $-1 \leq x + y \leq 1$?

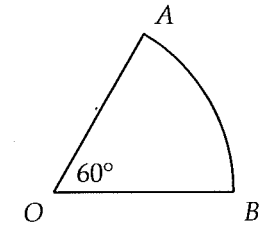
A) 

B) 

C) 

D) 

21



In the figure above, $\overset{\frown}{AB}$ is an arc of the circle with center O. If the area of sector OAB is 96π, what is the length of arc $\overset{\frown}{AB}$?

A) 6π
B) 8π
C) 10π
D) 12π

Questions 22-23 refer to the following information.

The graph of the function $f(x)$ is the graph of the function $g(x)$ stretched vertically by a factor of 2 and shifted down by 3.

22

If $g(5) = 8$, what is the value of $f(5)$?

A) 1
B) 7
C) 10
D) 13

23

Which of the following correctly defines the function f?

A) $f(x) = -3g(x) + 2$
B) $f(x) = \frac{1}{2}g(x) - 3$
C) $f(x) = g(2x) - 3$
D) $f(x) = 2g(x) - 3$

4  4

24

Of the following situations, which one would most likely begin an exponential growth of the number of greeting cards being sent?

A) Ann sends 3 greeting cards everyday to a different person.

B) Every month, thirty students send greeting cards to their penpals abroad who each agree to send one of their own back.

C) Jake sends greeting cards to 3 different friends, who all agree to send greeting cards to three of their friends who agree to do the same.

D) Caleb sends 3 greeting cards for every 2 greeting cards that he receives.

25

A company ships medium and large refrigerators by using trucks of two different sizes. A large truck can carry 4 medium refrigerators and 5 large refrigerators. A small truck can carry 3 medium refrigerators and 2 large refrigerators. If a is the number of large trucks and b is the number of small trucks, which of the following represents the number of trucks of each size necessary to deliver an order for 20 medium refrigerators and 30 large refrigerators?

A) $4a + 3b \geq 20$
$2a + 5b \geq 30$

B) $3a + 4b \leq 20$
$5a + 2b \leq 30$

C) $4a + 3b \geq 20$
$5a + 2b \geq 30$

D) $4a + 3b \geq 30$
$5a + 2b \geq 20$

26

In the xy-plane, the points $(a, 7)$ and $(b, 12)$ lie on the graph of $y = x^2 + 3$. What is the minimum possible value of $a + b$?

A) -5

B) -1

C) 1

D) 5

27

$$x^2 - 4x + y^2 + 6y = 12$$

The graph of the equation above in the xy-plane is a circle. What is the circumference of the circle?

A) 5π

B) 10π

C) 25π

D) 50π

28

$$2x^2 - 10x + k = 0$$

The equation above, in which k is a constant, has two solutions m and n. If $m > n$ and $m - n = 9$, what is the value of n?

A) -5

B) -2

C) 4

D) 7

4  4

29

A medical research center selected a random sample of 500 patients suffering from disease X and found that the patients had a mean recovery time of 3.5 days and a margin of error of 1.25 days. Based on these results, which of the following is an appropriate conclusion?

A) The true mean recovery time of all patients suffering from disease X is 3.5 days.

B) The true mean recovery time of all patients suffering from disease X is likely between 2.25 days and 4.75 days.

C) All patients suffering from disease X take 3.5 days to recover.

D) All patients suffering from disease X take at least 2.25 days but no more than 4.75 days to recover.

30

For how many different positive integer values of m does $(mx - 10)^2 = 0$ have integer solutions?

A) None

B) Two

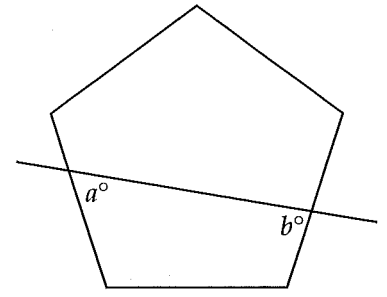
C) Four

D) Six

31

Traveling at an average speed of 40 miles per hour, a bus takes 3 hours to complete its morning route. At what average speed, in miles per hour, must the bus travel if it is to complete its morning route in 2.5 hours?

32



In the figure above, line l intersects a regular pentagon. What is the value of $a + b$?

33

$$\sin 24 = \cos 3k + 6$$

In the equation above, the angle measures are in degrees. If $0° < k < 90°$, what is the value of k?

34

$$0.3x - 0.7y = 1$$
$$kx - 2.8y = 3$$

In the system of equations above, k is a constant. If the system has no solution, what is the value of k?

35

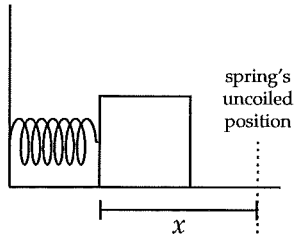
The functions f and g are defined by $f(x) = x^2 + 2$ and $g(x) = 4x - 3$. If $a > 0$, for what value of a does $g(f(a)) = 41$?

36

A square and a rectangle have the same area. The length of the rectangle is 8 inches less than twice the side of the square. The width of the rectangle is 3 inches more than the side of the square. What is the area of the square?

Questions 37-38 refer to the following information.

A wooden block with a mass of 0.8 kilograms is pressed against a coiled spring on a frictionless surface as shown in the figure below.



The potential energy P, in joules, of the spring is given by the formula

$$P = \frac{1}{2}kx^2$$

where x is the distance, in meters, the spring is displaced from its uncoiled position and k is a constant, in newtons per meter. The spring is currently displaced 0.05 meters and has a potential energy of 10 joules.

37

What is the potential energy, in joules, of the spring when it is displaced 0.08 meters?

38

The kinetic energy K, in joules, of an object is given by the formula $K = \frac{1}{2}mv^2$, where m is the mass of the object in kilograms and v is its velocity in meters per second. When the spring is uncoiled, all of its potential energy gets transferred to the wooden block as kinetic energy. What is the velocity of the block, in meters per second, immediately after the spring is uncoiled?

9

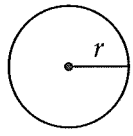
Practice Test 9

3 3

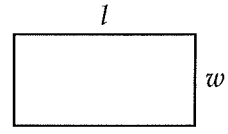
Math Test --- No Calculator

25 Minutes, 20 Questions

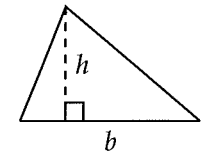
Reference



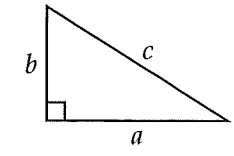
$A = \pi r^2$
$C = 2\pi r$



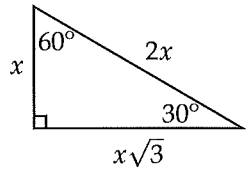
$A = lw$

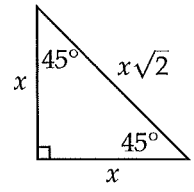


$A = \frac{1}{2}bh$

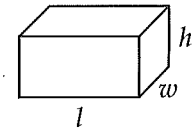


$c^2 = a^2 + b^2$

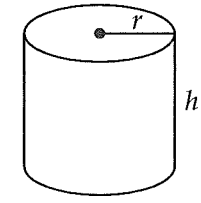




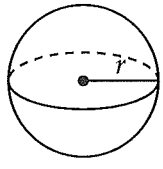
Special Right Triangles



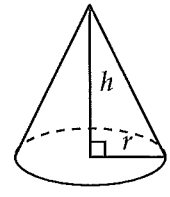
$V = lwh$



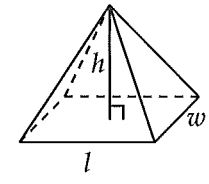
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

3

3

1

A chess set comes with 32 pieces and a checkers set comes with 24 pieces. If a board game club decides to buy a chess sets and b checkers sets, which of the following expressions represents how many more chess pieces than checkers pieces they will receive?

A) $32a - 24b$

B) $32b - 24a$

C) $32a + 24b$

D) $56a - 56b$

2

Which of the following is equal to $\frac{2^{-5}}{2^{-3}}$?

A) $\frac{1}{2^8}$

B) $\frac{1}{4}$

C) 4

D) 2^{15}

3

If $4b = 7$, what is the value of $12b - 3$?

A) 18

B) 21

C) 24

D) 27

4

Which of the following is equivalent to the expression $\frac{2a^2b - 3ab^2 + ab}{ab}$?

A) $2a^2b - 3ab^2 + 1$

B) $2a^2b - 3b + ab$

C) $2a - 3ab^2 + ab$

D) $2a - 3b + 1$

5

John is a member of a recreational bowling league. His bowling scores from 2006 to 2015 can be modeled by the equation $p = 80.5 + 16.8t$, where t represents the number of years since he joined the league in 2006 and p represents the average number of points he scored per game. Which of the following is the best interpretation of the number 16.8 in the equation?

A) The total number of points John scored in 2006

B) The average number of points John scored per game in 2006

C) The yearly increase in the average number of points John scored per game

D) The average number of games John played each year

6

If $c^{-\frac{1}{3}} = x$, where $c > 0$ and $x > 0$, which of the following equations gives c in terms of x?

A) $c = -x^3$

B) $c = \sqrt[3]{x}$

C) $c = \frac{1}{\sqrt[3]{x}}$

D) $c = \frac{1}{x^3}$

7

An apartment complex charges tenants \$3.50 per 1,000 gallons of water used and \$12.00 for trash removal each month. Which of the following expressions represents a tenant's total monthly charges, in dollars, for g gallons of water used and trash removal?

A) $0.00035g + 12$

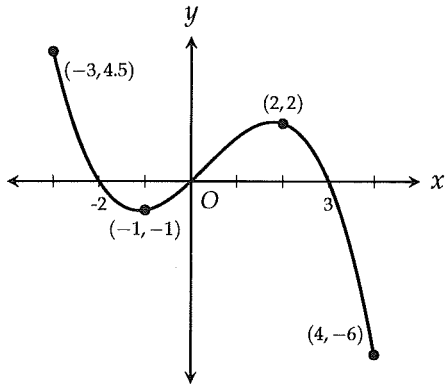
B) $0.0035g + 12$

C) $0.035g + 12$

D) $3.50g + 12$

3 3

8



The function $y = f(x)$, defined for $-3 \leq x \leq 4$, is graphed in the xy-plane above. Which of the following gives all values of x for which $f(x)$ is negative?

A) $-3 \leq x \leq 4$
B) $-2 < x \leq 4$
C) $-2 < x < 0$ and $3 < x \leq 4$
D) $-3 \leq x < -2$ and $0 < x < 3$

9

A factory ships boxes of calculators to schools. Each shipment can be modeled by the equation $w = 0.3n + 2$, where w is the total weight of the shipment, in pounds, and n is the number of calculators in the shipment. Which of the following could be the meaning of the number 2 in the equation?

A) The weight of the box used in each shipment
B) The weight of each calculator
C) The minimum number of calculators in each shipment
D) The average weight of each shipment

10

If $8a^2 = 3(a^2 + b)$ and $b \neq 0$, what is the value of $\frac{a^2}{b}$?

A) $\frac{1}{5}$
B) $\frac{3}{5}$
C) $\frac{5}{3}$
D) 5

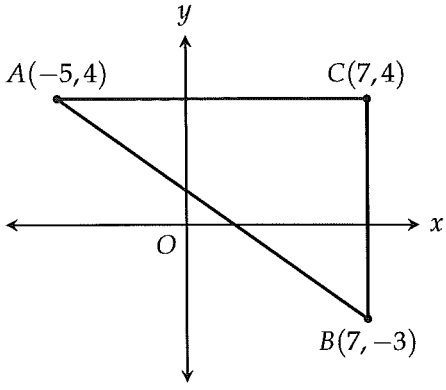
11

Two restaurants x miles away from each other are positioned a inches apart on a certain map that is drawn to scale. What is the distance, in inches, on the map between two restaurants that are y miles apart?

A) $\frac{a}{xy}$
B) $\frac{xy}{a}$
C) $\frac{ay}{x}$
D) $\frac{ax}{y}$

3 3

12



Right triangle ABC is shown in the xy-plane above. What is the value of $\tan A$?

A) $\frac{7}{12}$

B) $\frac{3}{4}$

C) $\frac{7}{9}$

D) $\frac{12}{7}$

13

Bob can finish painting a house in 4 days. Carl can finish painting a house in 6 days. Which of the following equations can be used to find the number of days d that Bob and Carl would need to finish painting one house working together?

A) $\frac{d}{4}+\frac{d}{6}=1$

B) $\frac{4}{d}+\frac{6}{d}=1$

C) $\frac{d}{4}+\frac{d}{6}=12$

D) $\frac{4}{d}+\frac{6}{d}=12$

14

When $5x+3$ is divided by $x+m$, where m is a constant, the result can be written as $5+\frac{r}{x+m}$. What is r in terms of m?

A) $3-5m$

B) $3m-5$

C) $5m+3$

D) $8m$

15

$$-2x+6y=10$$
$$-3x+9y=18$$

How many solutions (x,y) are there to the system of equations above?

A) Zero

B) One

C) Two

D) More than two

16

If $2(b-3)-3(2b+5)=-33$, what is the value of b?

17

For what value of k is $5-\frac{6}{k}=-13$?

18

The graph of a line in the xy-plane passes through points $(0,0)$ and $(1,2)$. The graph of a second line passes through points $(1,2)$ and $(k,0)$. If the two lines are perpendicular, what is the value of k?

19

$$x^2 + 2xy + y^2 = 25$$
$$x - y = 7$$

If (x,y) is a solution to the system of equations above, what is one possible value of x?

20

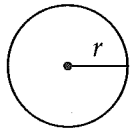
A clothing store carries red ties and blue ties. The number of red ties in stock is 40 less than three times the number of blue ties in stock. If there are 10 more red ties than blue ties in stock, how many blue ties are in stock?

4 4

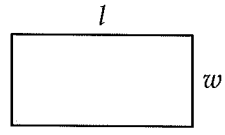
Math Test --- Calculator

55 Minutes, 38 Questions

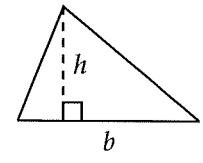
Reference



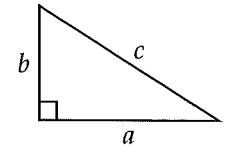
$A = \pi r^2$
$C = 2\pi r$



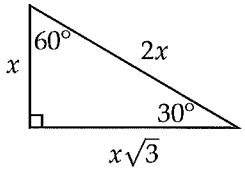
$A = lw$

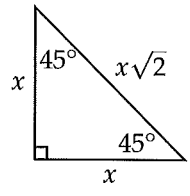


$A = \frac{1}{2}bh$

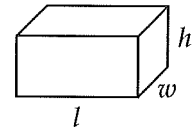


$c^2 = a^2 + b^2$

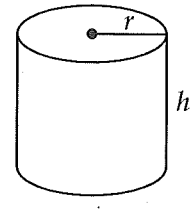




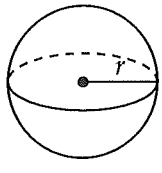
Special Right Triangles



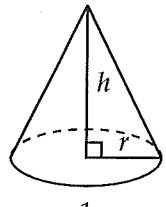
$V = lwh$



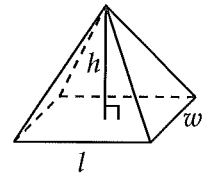
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

4  4

1

Jonathan can edit at least 15 essays per day but no more than 18 essays per day. Which of the following could be the total number of essays he edits in a week?

A) 98
B) 102
C) 112
D) 130

2

Gillian scored an 84 on her midterm and a 94 on her final. Which of the following best approximates the percent increase in her score from her midterm to her final?

A) 10.6%
B) 11.9%
C) 12.1%
D) 15.5%

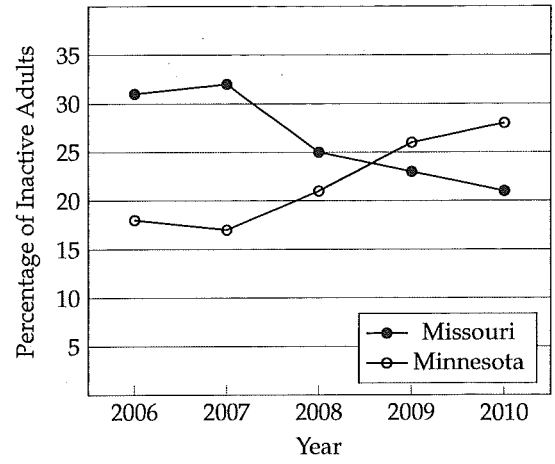
3

A factory that produces car parts found that out of a random sample of 800 parts, 11.5% were faulty. If the margin of error was 2.8%, which of the following is the best estimate of the percent of car parts produced by the factory that are faulty?

A) 0%
B) 8%
C) 14%
D) 16%

4

Physical Inactivity among Adults in MS and MN from 2006-2010



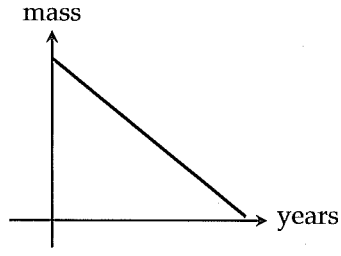
The graph above shows the percentage of physically inactive adults in Missouri and Minnesota from 2006 to 2010. Which of the following is a correct statement about the data above?

A) Minnesota had a higher percentage of physically inactive adults for none of the five years.
B) Minnesota had a higher percentage of physically inactive adults for two of the five years.
C) Minnesota had a higher percentage of physically inactive adults for three of the five years.
D) Minnesota had a higher percentage of physically inactive adults during all five years.

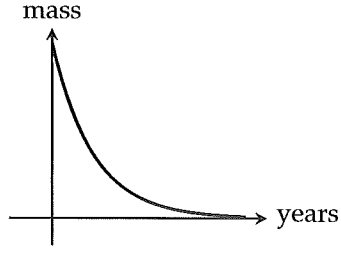
5

A radioactive element loses half its mass each year. Which of the following graphs could model the mass of the element as a function of time?

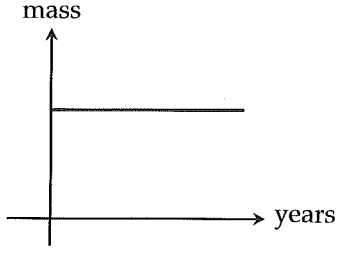
A)



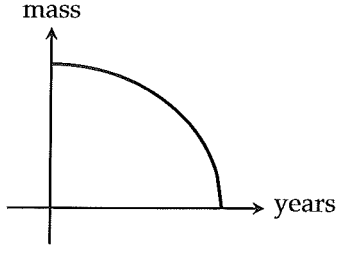
B)



C)



D)



Questions 6-7 refer to the following information.

Car battery model	Battery life
B	Half as long as Model A
C	Half as long as Model B
D	Half as long as Model C

6

According to the table, the model A car battery lasts how many times as long as the model D car battery?

A) 4
B) 8
C) 16
D) 32

7

How many model C car batteries would be required to equal the battery life of 3 model B and 4 model D car batteries?

A) 8
B) 10
C) 11
D) 12

4  4

8

Tickets to a concert are \$40 for reserved seats and \$15 for general admission seats. If a total of 1,200 tickets have been sold and x of them are for reserved seats, which of the following gives all possible values of x for which total ticket sales are at least \$30,000?

A) $x \leq 480$

B) $x \geq 480$

C) $x \leq 520$

D) $x \geq 520$

9

A cable company surveyed a random sample of 400 subscribers to determine their favorite sport to watch. The results of the survey are shown in the table below.

Basketball	80
Baseball	70
Football	150
Hockey	40
Tennis	20
Other	40

The cable company has 2 million subscribers. Based on the survey data, which of the following is most likely to be an accurate statement?

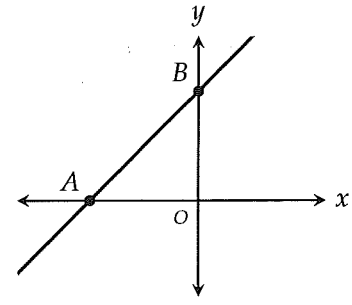
A) Baseball is the favorite sport to watch for about 200,000 subscribers

B) Baseball is the favorite sport to watch for about 450,000 subscribers

C) Football is the favorite sport to watch for about 600,000 subscribers

D) Football is the favorite sport to watch for about 750,000 subscribers

10



In the xy-plane above, the line $y = \frac{4}{3}x + 8$ crosses the x and y axes at points A and B respectively. What is the length of $\overline{AB}$?

A) 6

B) 8

C) 10

D) 12

11

During one season, a baseball player managed to hit 25 percent of the balls pitched at him. Of the balls he hit, 5 percent were home runs. Which of the following expresses the estimated number of home runs this player would hit if n balls were pitched at him?

A) $(0.25 + 0.05)n$

B) $(0.25)(.05)n$

C) $\frac{n}{(0.25)(.05)}$

D) $(1.25)(1.05)n$

4  4

Questions 12-13 refer to the following information.

The table below shows some values of x and y.

x	1	2	3	4
y	$\frac{(0)(2)}{2}$	$\frac{(1)(3)}{4}$	$\frac{(2)(4)}{6}$	$\frac{(3)(5)}{8}$

12

What is the value of y when x is equal to 5?

A) 1.8
B) 2
C) 2.4
D) 2.8

13

Which of the following equations describes the relationship between x and y in the table?

A) $y = \frac{2x-2}{x+1}$

B) $y = \frac{(x-1)(x+1)}{2x}$

C) $y = \frac{(x-1)(3x-1)}{2x}$

D) $y = \frac{(x-1)(x+1)}{2^x}$

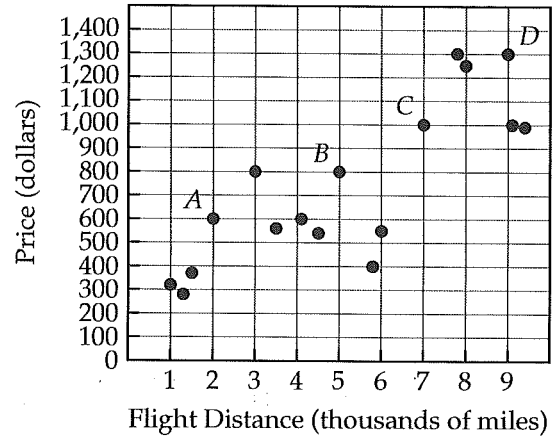
14

$$p(t) = -t^2 + 16t + k$$

The price of a stock on day number t can be modeled by the function p above, where k is a constant and $1 \leq t \leq 15$. On what number day was the price of the stock equal to what it was on day number 3?

A) 9
B) 11
C) 13
D) 15

15



A travel site summarized the flight distance and price for 17 flights in the scatterplot above. Of the labeled points, which represents the flight for which the ratio of flight distance to price is greatest?

A) *A*
B) *B*
C) *C*
D) *D*

4  4

16

Mike has \$650 in his bank account and withdraws \$16 at the end of each week. Kyle has \$100 in his bank account and deposits \$6 at the end of each week. After how many weeks will Mike and Kyle have the same amount of money in their bank accounts?

A) 17
B) 20
C) 22
D) 25

Questions 17-18 refer to the following information.

Star Rating	Number of movies
1	4
2	5
3	2
4	3
5	6

Twenty different movies were shown at a film festival and given a rating from 1 star (worst) to 5 stars (best). The results are summarized in the table above.

17

If one of the movies is chosen at random, what is the probability that the movie was given at least 3 stars?

A) 0.25
B) 0.35
C) 0.45
D) 0.55

18

What is the average star rating of the movies shown at the film festival?

A) 3.1
B) 3.3
C) 3.6
D) 4.2

19

If $\frac{4}{2x-7} > 3$, which of the following could be a value of x?

A) 1
B) 2
C) 3
D) 4

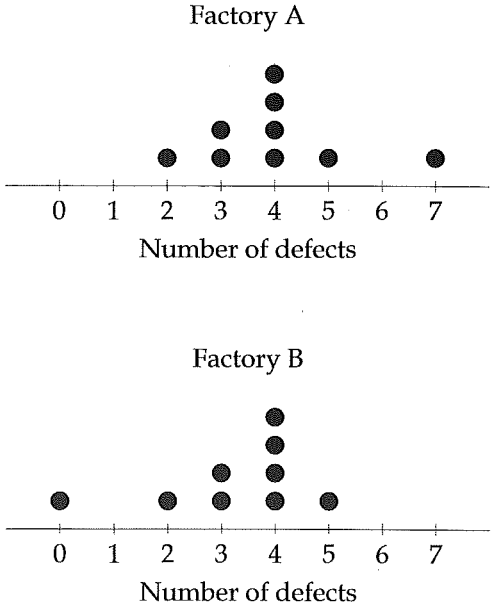
20

At a pet store, puppies sell at one price and kittens sell at another. Jimmy pays \$240 for 3 puppies and 2 kittens. Marissa pays \$210 for 1 puppy and 5 kittens. What is the price of a puppy?

A) \$30
B) \$45
C) \$60
D) \$75

4  4

21



A phone manufacturer is using two different factories to test a new product. The dotplots above show the number of defects in 9 products from each factory. Which of the following correctly compares the mean number of defects in the products from each factory?

A) The mean number of defects in the products from Factory A is greater.

B) The mean number of defects in the products from Factory B is greater.

C) The mean number of defects in the products from Factory A and Factory B is the same.

D) The relationship cannot be determined from the information given.

22

$$w = \frac{5}{7}(2a + 1)$$

Conservationists use the equation above to estimate the wing span w of an eagle, in inches, based on the eagle's age a, in years. According to the equation, an increase of 1 inch in the wingspan of an eagle takes how many years?

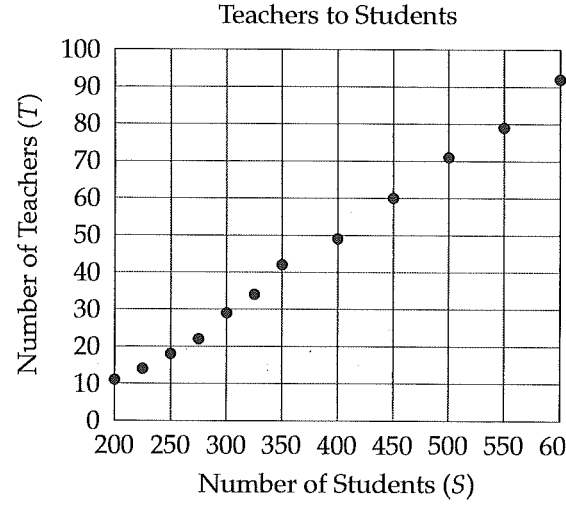
A) 0.7

B) 1.4

C) 2

D) 2.8

23



The scatterplot above shows the number of teachers T and the number of students S at 12 schools selected at random. Which of the following equations best models the relationship between T and S?

A) $T = 0.15S - 20$

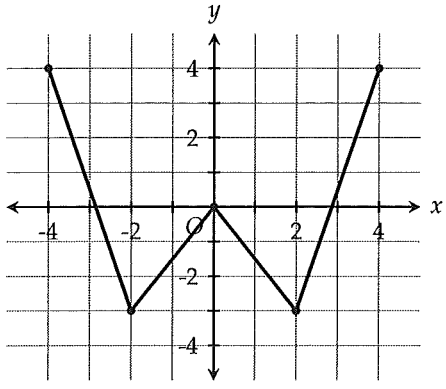
B) $T = 0.2S - 30$

C) $T = 0.2S + 11$

D) $T = 10S + 10$

4  4

24



The complete function f is shown in the xy-plane above. If $f(x) = k$ has two solutions, which of the following could be the value of k?

I. -3
II. 0
III. 2.5

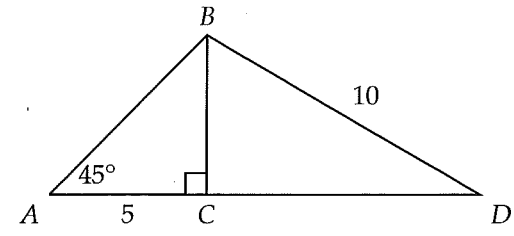
A) I and II only
B) III only
C) I and III only
D) I, II, and III

25

In a regular polygon with n sides, the degree measure of each interior angle is given by the expression $\frac{180(n-2)}{n}$. Which of the following expressions gives the radian measure of each interior angle of the polygon?

A) $\frac{\pi(n-2)}{n}$
B) $\frac{\pi(n-2)}{2n}$
C) $\frac{\pi(n-2)}{4n}$
D) $\frac{2\pi(n-2)}{n}$

26



In $\triangle ABD$ above, $AC = 5$ and $BD = 10$. What is the length of $\overline{CD}$?

A) $5\sqrt{2}$
B) $5\sqrt{3}$
C) 6
D) $6\sqrt{2}$

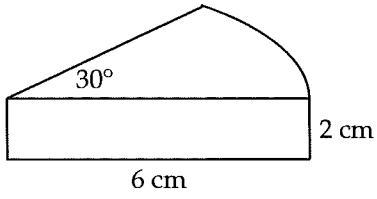
27

Anne and her family took two camping trips to Site X. During the second trip, they all used a new mosquito repellent that advertises itself as the most effective in reducing mosquito bites. After the second trip, they all reported a lower number of mosquito bites than they had after the first trip. Which of the following is an appropriate conclusion?

A) The new mosquito repellent will cause a reduction in mosquito bites for any camper.
B) The new mosquito repellent will cause a reduction in mosquito bites for any camper at Site X.
C) The new mosquito repellent was the cause of the reduction in mosquito bites for Anne and her family during the second camping trip.
D) No conclusion about cause and effect can be made regarding the new mosquito repellent and its effectiveness in reducing mosquito bites.

4  4

28



A wedge formed by a central angle of 30° as shown above was cut from a circular block of cheese with a radius of 6 cm and a thickness of 2 cm. What is the volume, in cubic centimeters, of the wedge?

A) 3π

B) 6π

C) 9π

D) 12π

29

The function f is defined by $f(x) = \frac{1}{2}x + a$, where a is a constant. If $f(a) = 3$, what is the value of $f(8)$?

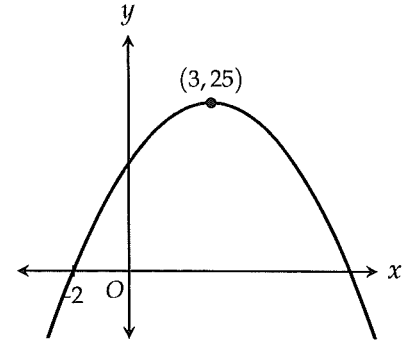
A) 6

B) 7

C) 8

D) 9

30



The graph of the equation $y = -x^2 + 6x + 16$ is a parabola with vertex $(3,25)$ as shown in the xy-plane above. If one of the x-intercepts is at -2, which of the following equivalent forms of the equation shows the x-intercepts of the parabola as constants or coefficients?

A) $y = -2(x+2)(x-8)$

B) $y = -(x+2)(x-8)$

C) $y = (x+2)(x-8)$

D) $y = -(x-3)^2 + 25$

31

A car is traveling along a highway at 80 miles per hour. Before it exits the highway and enters a residential area, it must slow down to meet the residential speed limit of 30 miles per hour. If it decelerates so that its speed drops by 2 miles per hour every second, how many seconds will it take the car to slow down to the residential speed limit?

4 4

32

Every day, Dave eats either a sandwich or pizza for lunch. Over 42 days, Dave had pizza 3 times for every 4 times he had a sandwich. Over the next x days, he had pizza 3 times for every 2 times he had a sandwich. If at the end of this entire period he had pizza as many times as he had a sandwich, what is the value of x?

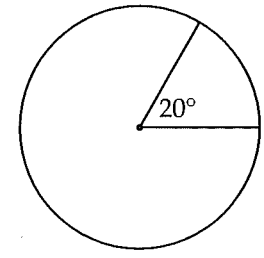
33

A printer's input capacity is the maximum number of sheets of paper the printer can hold at one time. The table below gives the distribution of input capacities for a randomly selected group of printers.

Input Capacity (pages)	Frequency
200	3
300	4
400	x
500	10
600	10

If the median input capacity of these printers is 400 pages, what is the maximum possible value of x?

34



Note: Figure not drawn to scale.

To make a certain light fixture, a blacksmith cuts wedges from a 270-gram iron disk, as shown in the figure above. Each wedge forms a 20° angle at the center of the disk. If the weight of the disk is uniformly distributed, how many grams does each wedge weigh?

35

$$\frac{1}{2}x^2 - 3y^2 = 55$$

$$x = -4y$$

If (x, y) is a solution to the system of equations above, what is the value of y^2?

4  4

36

In the xy-plane, the line defined by the equation $y = 3x - 5$ passes through the vertex of a parabola with x-intercepts of 3 and 15. What is the y-coordinate of the vertex of the parabola?

Questions 37-38 refer to the following information.

The initial price of a computer is a dollars. For each month that passes by, the price is reduced to 10 percent less than the price for the previous month. Based on this information, the price P of the computer can be modeled by the equation

$$P = a(r)^n$$

where n is the number of months that have passed and r is a constant.

37

What is the value of r?

38

The price of the computer decreases by n percent every 3 months. What is the value of n?

10

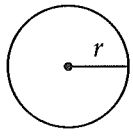
Practice Test 10

3  3

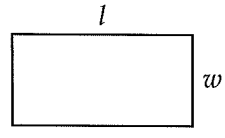
Math Test --- No Calculator

25 Minutes, 20 Questions

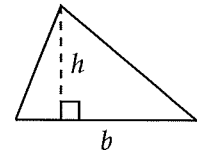
Reference



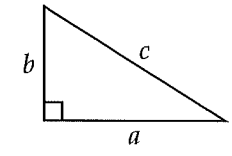
$A = \pi r^2$
$C = 2\pi r$



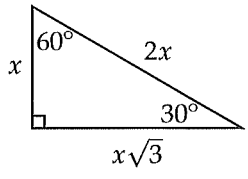
$A = lw$

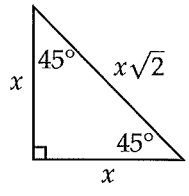


$A = \frac{1}{2}bh$

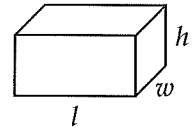


$c^2 = a^2 + b^2$

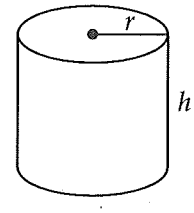




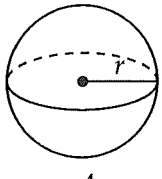
Special Right Triangles



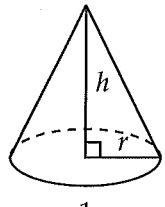
$V = lwh$



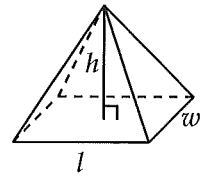
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

3 3

1

If $y + \frac{3}{5} = \frac{27}{35}$, then what is the value of y?

A) $-\frac{6}{35}$

B) $\frac{6}{35}$

C) $\frac{4}{5}$

D) $\frac{48}{35}$

2

At a bookstore, each magazine costs the same price. If 8 magazines cost d dollars, then which of the following expresses the number of magazines that can be purchased for 15 dollars?

A) $\frac{15d}{8}$

B) $\frac{d}{120}$

C) $\frac{120}{d}$

D) $\frac{8d}{15}$

3

Line m is graphed in the xy-plane. If an equation for line m is $6y + 2x = 5$, which of the following statements is true?

A) Line m has a slope of -3.

B) Line m has a slope of $\frac{1}{3}$.

C) The x-intercept of line m is $\frac{5}{2}$ and the y-intercept is $\frac{5}{6}$.

D) The x-intercept of line m is $\frac{5}{6}$ and the y-intercept is $\frac{5}{2}$.

4

If $3\sqrt{x^3} = \sqrt{72}$, what is the value of x?

A) 2

B) 3

C) 4

D) 5

5

$$(x - c)^2 = x + 3$$

If $c = 3$, what is the solution set of the equation above?

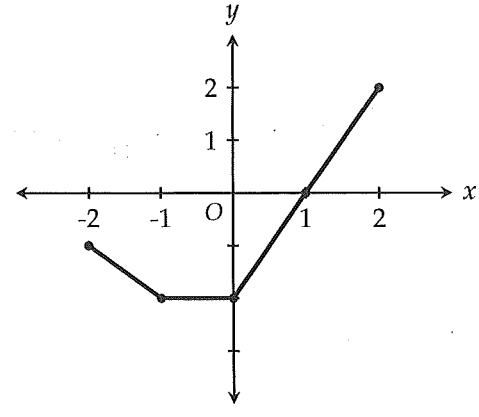
A) $\{1\}$

B) $\{6\}$

C) $\{1, 6\}$

D) $\{-3, 1, 6\}$

6



The graph of $f(x)$ is shown in the xy-plane above. If $f(a) = -2$, which of the following is a possible value of a?

A) -1.5

B) -0.5

C) 1

D) 2

3

3

7

Anna writes checks from her checkbook to pay her business expenses. The number of checks c left in her checkbook after t weeks is given by the equation $c = 120 - 2t$. What is the meaning of the number 120 in the equation?

A) The number of checks Anna writes each week

B) The number of weeks it takes for Anna to write all the checks in her checkbook

C) The number of checks left in Anna's checkbook at the end of one week

D) The initial number of checks in Anna's checkbook

8

$$\sqrt{\frac{1}{2x}} - 2 = 3$$

If $x \neq 0$, for what real value of x is the equation above true?

A) $\frac{1}{50}$

B) $\frac{1}{22}$

C) $\frac{2}{25}$

D) $\frac{1}{2}$

9

An online office supply store sells pens at p dollars per box and offers free shipping on orders of \$75 or more. If John decides to order new pens from this store, which of the following inequalities expresses the number of boxes n that he must purchase for the order to qualify for free shipping?

A) $n \leq \frac{p}{75}$

B) $n \geq \frac{p}{75}$

C) $n \leq \frac{75}{p}$

D) $n \geq \frac{75}{p}$

10

$$\frac{3(-h+3)+2}{4} = \frac{5-(1-2h)}{10}$$

In the equation above, what is the value of h?

A) $\frac{43}{19}$

B) $\frac{47}{19}$

C) $\frac{47}{14}$

D) $\frac{47}{11}$

3  3

11

$$3x + 5y = 10$$
$$-x + y = 2$$

Which of the following ordered pairs (x, y) satisfies the system of equations above?

A) $(-2, 0)$
B) $(0, 2)$
C) $(2, 4)$
D) $(4, 6)$

12

Which of the following expressions is equivalent to $\left(\frac{1}{z-y}\right)\left(\frac{1}{y}-\frac{1}{z}\right)$?

A) $\frac{1}{yz}$
B) $\frac{1}{y^2z^2}$
C) $-\frac{1}{(y-z)^2}$
D) -1

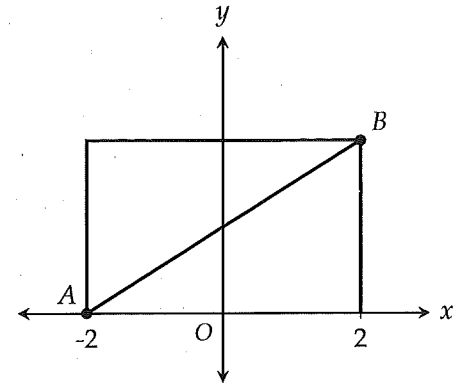
13

$$x + ay = 5$$
$$2x + 6y = b$$

In the system of equations above, a and b are constants. If the system has one solution, which of the following could be the values of a and b?

A) $a = 3, b = 10$
B) $a = 3, b = 12$
C) $a = 3, b = -4$
D) $a = 10, b = 3$

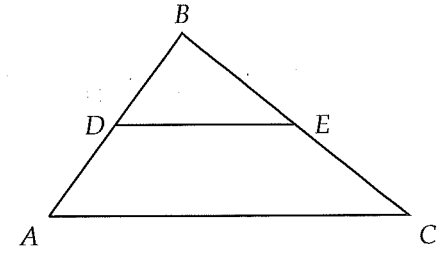
14



In the xy-plane above, line segment $\overline{AB}$ is the diagonal of a rectangle. If the area of the rectangle is 20, what is the slope of $\overline{AB}$?

A) 1.25
B) 1.5
C) 2.5
D) 5

15



In the figure above, D is the midpoint of $\overline{AB}$ and E is the midpoint of $\overline{BC}$. The area of trapezoid $ADEC$ is how many times the area of triangle DBE?

A) 2
B) 2.5
C) 3
D) 3.5

3  3

16

If $\frac{3}{x} = 12$, what is the value of $\frac{2}{x}$?

17

In a class, there is one boy for every 2 girls. If 30 more girls join the class, there will be 7 girls for every boy. How many boys are in the class?

18

$$3x - 2y = 6$$
$$9x - 6y = 2a$$

If the system of equations above has infinitely many solutions, what is the value of a?

19

There are 50 tennis balls, 20 of which are blue, in a container. After x blue tennis balls are removed, 25% of the tennis balls in the container are blue. What is the value of x?

20

$$x - y + 2 = 0$$
$$(x+2)^2 - 7(x+2) + 25 = 4y - 5$$

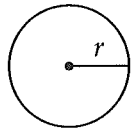
If (x, y) is a solution to the system of equations above, what is one possible value of x?

4 4

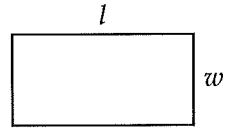
Math Test --- Calculator

55 Minutes, 38 Questions

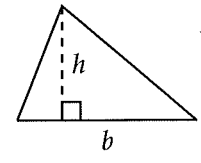
Reference



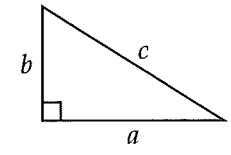
$A = \pi r^2$
$C = 2\pi r$



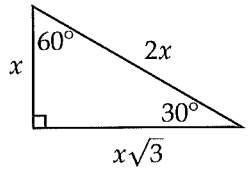
$A = lw$

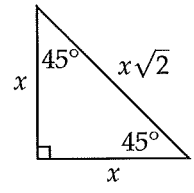


$A = \frac{1}{2}bh$

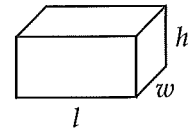


$c^2 = a^2 + b^2$

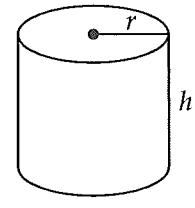




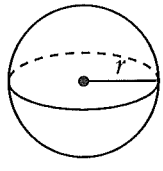
Special Right Triangles



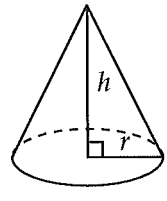
$V = lwh$



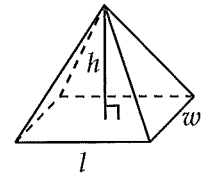
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}lwh$

There are 360 degrees of arc in a circle.
There are 2π radians of arc in a circle.
The sum of the measures of the angles of a triangle, in degrees, is 180.

4

4

1

In 2005, a toy manufacturer found that an estimated 4 out of every 15 dolls produced posed a safety hazard to young children. If the manufacturer produced 6 million dolls in 2005, which of the following is closest to the estimated number of dolls produced by the manufacturer in 2005 that do NOT pose a safety hazard?

A) 1.6 million
B) 4.4 million
C) 4.6 million
D) 4.8 million

2

Rachel discarded exactly 45 percent of the pens that she owned. Which of the following could be the total number of pens that she has left?

A) 22
B) 24
C) 26
D) 28

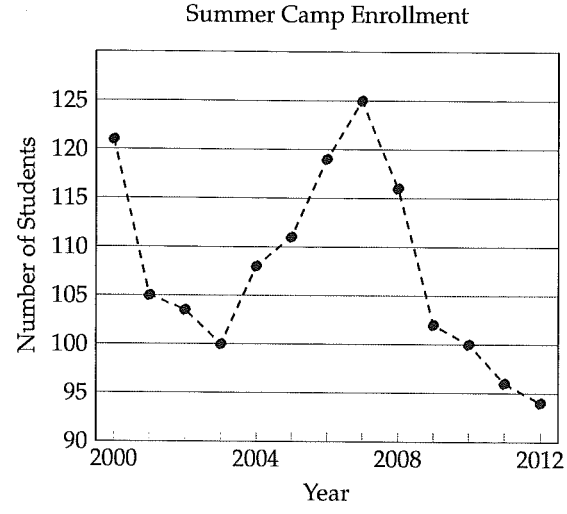
3

Atomic Mass (in amu)				
1	4	7	9	11
12	14	16	18	22
25	28	32	38	42

The table above gives the atomic mass, to the nearest amu, of 15 different elements. Based on the table, what is the median atomic mass, in amu, of these elements?

A) 14
B) 15
C) 16
D) 18

4



The graph above shows the number of students who enrolled in a summer math camp from 2000 to 2012. According to the graph, the student enrollment was the same in which of the following years?

A) 2000 and 2007
B) 2001 and 2004
C) 2002 and 2012
D) 2003 and 2010

5

Which of the following expressions is NOT equal to 0 for some value of x?

A) $(x+1)^2$
B) $\sqrt{x}+1$
C) $\sqrt{x+1}$
D) $|x+1|$

Questions 6-7 refer to the following information.

Projected Sales for Toy X

Price of Toy X	Projected number of toys sold
$10	50,000
$20	40,000
$30	30,000
$40	30,000
$50	30,000

6

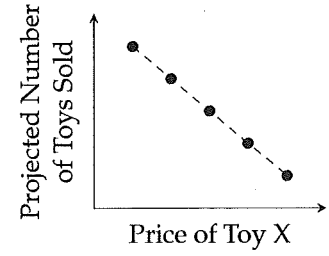
Based on the projections, how much more money would be received from sales of Toy X when the price is $40 than when the price is $20?

A) $100,000
B) $400,000
C) $600,000
D) $700,000

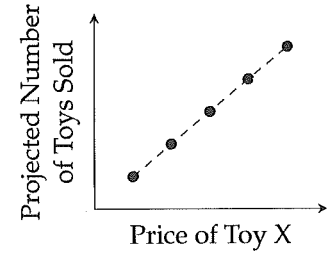
7

Based on the table, which of the following graphs best represents the relationship between the price of Toy X and the projected number of toys sold?

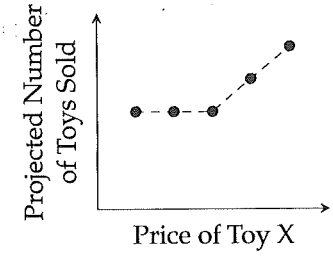
A)



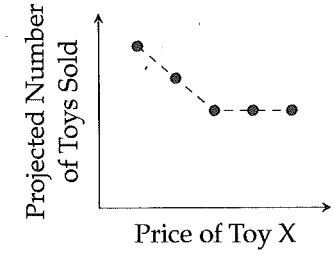
B)



C)



D)



4  4

8

In a recent study comparing two high schools, a random sample of students from School A and a random sample of students from School B were surveyed. The results of the study indicated that 85% of the students from School A spend at least 3 hours each day reading, while 70% of the students from School B spend at least 3 hours each day reading. If the margin of error for both samples were the same, which of the following statements is best supported by the study's results?

A) Students from School A read more because School A has better teachers.

B) Students from School A read more because students from School A study harder.

C) There is evidence that students from School A read more than students from School B.

D) There is evidence that students from School A read more fiction novels than students from School B.

9

Oleg is deciding between renting and buying an apartment. The purchase price is \$180,000. If he rents it, he will pay \$1,100 in rent each month, in addition to monthly fees of \$150 for utilities and parking. If x represents the number of months he stays in the apartment, what are all the values of x for which buying the apartment is less expensive than renting it?

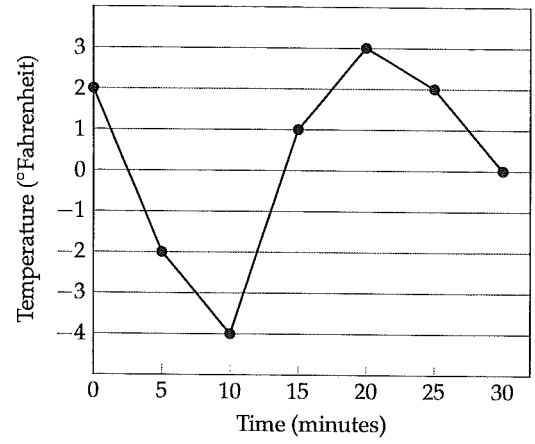
A) $x < 144$

B) $x > 144$

C) $x < 164$

D) $x > 164$

10



The graph above gives the inside temperature of a refrigerator as it is being adjusted over time. On which of the following intervals does the temperature change (in absolute value) by 5 degrees Fahrenheit?

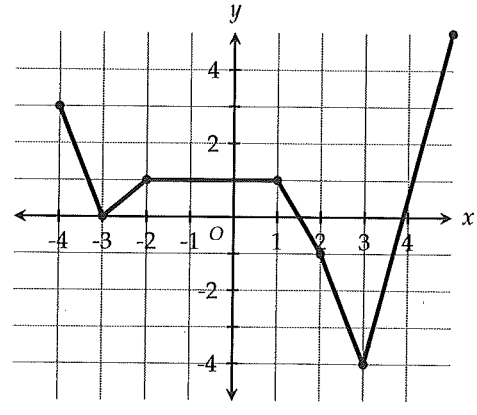
A) 0 to 5 minutes

B) 5 to 10 minutes

C) 10 to 15 minutes

D) 20 to 25 minutes

11



The graph above shows the function g. What is the value of $g(3)$?

A) −4

B) 0

C) 3

D) 4

4 4

12

	Car	Train	Total
Late	20	15	35
On time			225
Total			260

A company decides to investigate whether the mode of transportation taken to work affects its employees' arrival to work. The results for a given day are shown in the incomplete table above. If there are 50 more employees at the company who commute by train than by car, what is the probability that an employee who was on time that day took the train?

A) $\frac{7}{13}$

B) $\frac{31}{52}$

C) $\frac{28}{45}$

D) $\frac{28}{31}$

13

An environmentalist studied a random sample of 30 rivers in China to determine whether there is a relationship between water pollution levels and the number of fish. She found significant evidence that water pollution levels are lower in rivers with large numbers of fish. Based on the results, which of the following conclusions is most appropriate?

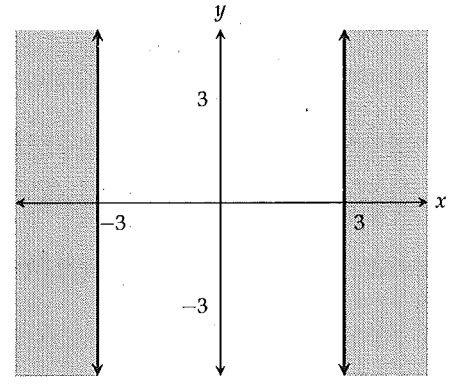
A) For rivers in China, there is a negative association between water pollution levels and the number of fish.

B) For all rivers, there is a negative association between water pollution levels and the number of fish.

C) For rivers in China, an increase in water pollution levels causes a decrease in the number of fish.

D) For all rivers, an increase in water pollution levels causes a decrease in the number of fish.

14



Which of the following inequalities is represented by the graph in the xy-plane above?

A) $|x| \leq 3$

B) $|x| \geq 3$

C) $|y| \leq 3$

D) $|y| \geq 3$

15

The number of criminal cases in a state district is recorded over the course of five years, as shown in the table below.

Year	Cases
1	450
2	400
3	350
4	300
5	250

Which of the following best describes the relationship between time and the number of cases during the five years?

A) Increasing linear

B) Decreasing linear

C) Exponential growth

D) Exponential decay

4

4

16

A chemical reaction between a block of sugar and sulfuric acid can be modeled by the equation $s = 27 - 3a$, where a is the amount of sulfuric acid, in milliliters, used in the reaction and s is the amount of sugar, in grams, left after the reaction. What does it mean for $(9, 0)$ to be a solution to this equation?

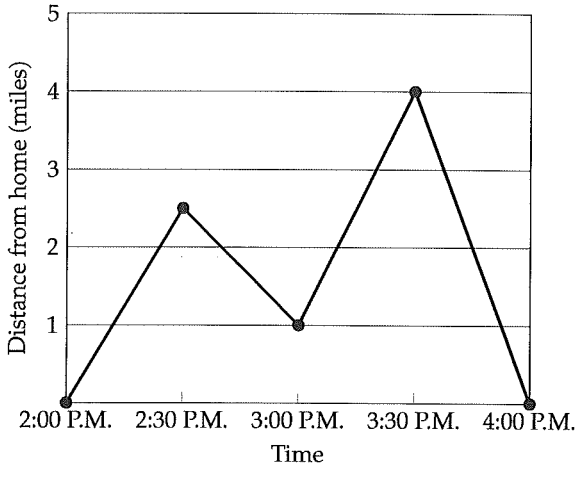
A) It takes 9 milliliters of sulfuric acid to react with 3 grams of sugar.

B) It takes 9 grams of sugar to react with 3 milliliters of sulfuric acid.

C) It takes 9 milliliters of sulfuric acid to react with 27 grams of sugar.

D) It takes 9 grams of sugar to react with 27 milliliters of sulfuric acid.

17



To run some errands, Amy travels back and forth along the straight road on which she lives. The graph above shows Amy's distance from home from 2:00 P.M. to 4:00 P.M. Based on the graph, when was Amy's average speed the greatest?

A) From 2:00 P.M. to 2:30 P.M.

B) From 2:30 P.M. to 3:00 P.M.

C) From 3:00 P.M. to 3:30 P.M.

D) From 3:30 P.M. to 4:00 P.M.

18

In a circle with center C and radius 6, minor arc $\overset{\frown}{AB}$ has a length of 4π. What is the measure, in radians, of central angle ACB?

A) $\frac{2\pi}{9}$

B) $\frac{\pi}{3}$

C) $\frac{2\pi}{3}$

D) $\frac{4\pi}{3}$

19

$$h = -6t^2 + 36t + 12$$

The height of a model rocket is modeled by the equation above, where h is the height of the rocket, in meters, and t is the number of seconds after launch. In which of the following equations do both the maximum height of the rocket and the number of seconds it takes the rocket to reach the maximum height appear as constants or coefficients?

A) $h = -6(t + 3)^2 + 42$

B) $h = -6(t - 3)^2 + 66$

C) $h = -6(t^2 - 6t - 2)$

D) $h = -6(t - 2)(t - 4) + 60$

4  4

20

A Belgian chocolate company sells milk chocolate bars for \$5 each and dark chocolate bars for \$7 each. Each milk chocolate bar costs \$2 to make and each dark chocolate bar costs \$5 to make. The company projects total sales to be at least \$5,000 and total costs to be at most \$2,800 for its chocolate bars this month. Which of the following systems of inequalities represents the possible number of milk chocolate bars m and dark chocolate bars d the company makes and sells to meet its projections?

A) $7m - 5d \geq 5,000$
$2d - 5m \leq 2,800$

B) $5m + 7d \geq 5,000$
$2m + 5d \geq 2,800$

C) $5m - 2m \geq 5,000$
$7d - 5d \leq 2,800$

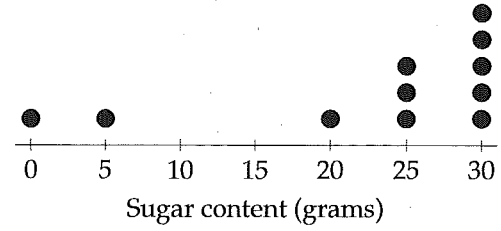
D) $5m + 7d \geq 5,000$
$2m + 5d \leq 2,800$

21

A radioactive element decays over time, losing 8 percent of its mass every 5 years. If scientists have collected an initial 500 grams of this element, how much will be left, to the nearest gram, after 30 years?

A) 41
B) 258
C) 303
D) 330

Questions 22-23 refer to the following information.



The dotplot above shows the sugar content (in grams) in each of the 11 most popular soft drinks in Japan.

22

What is the mode of the data set?

A) 0
B) 23
C) 25
D) 30

23

If the dots representing the two soft drinks with the lowest sugar content are removed from the dot plot, what will happen to the mean, median, and range of the new data set?

A) Only the mean will increase.
B) Only the mean and range will increase.
C) Only the mean and median will increase.
D) The mean, median, and range will increase.

4  4

24

Phil has a bank account that earns 6 percent interest compounded annually. His initial deposit was $10,000. After 5 years, he withdraws $4,000. What is the total amount of money he has earned in interest from the account after 10 years (to the nearest dollar)?

A) $5,898
B) $6,233
C) $6,556
D) $6,743

Questions 25-26 refer to the following information.

The table below shows the cost of a taxicab ride in 5 different cities. The base fare refers to a fixed fee that is charged regardless of the distance traveled.

City	Base Fare	Charge per $\frac{1}{4}$ of a mile traveled
A	None	$1.25
B	$1.50	$1.00
C	$2.00	$1.00
D	$2.50	$0.75
E	$3.00	$0.50

25

What is the total cost of riding a taxicab for $2\frac{1}{2}$ miles in City C?

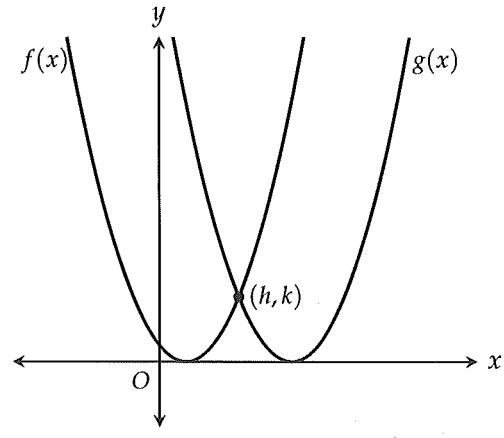
A) $10.50
B) $11
C) $11.50
D) $12

26

The total cost of a taxicab ride in City D is $11.50. In which city would the total cost of a taxicab ride of the same distance be $9.00?

A) City A
B) City B
C) City C
D) City E

27



Functions $f(x) = x^2 - 2x + 1$ and $g(x) = x^2 - 10x + 25$ are graphed in the xy-plane above. If the graphs of f and g are tangent to the x-axis and intersect at the point (h, k), what is the value of $h + k$?

A) 3
B) 7
C) 13
D) 21

4  4

28

If $x-2$ and $x+1$ are both factors of the polynomial $p(x)$, which of the following could be $p(x)$?

A) $p(x)=x^3-2x^2-5x+6$

B) $p(x)=x^3-4x^2+x+6$

C) $p(x)=x^3-6x^2+11x-6$

D) $p(x)=x^3-7x-6$

29

Two right circular cylinders A and B have the same volume. The radius of cylinder A is 20% longer than the radius of cylinder B. Which of the following statements correctly describes the relationship between the heights of the two cylinders?

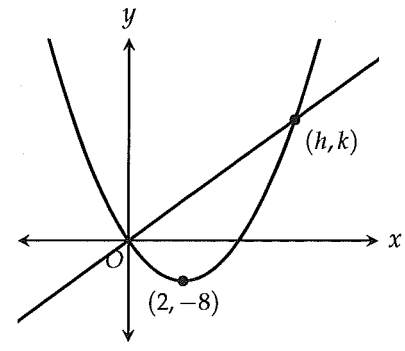
A) The height of cylinder B is 14% greater than the height of cylinder A.

B) The height of cylinder B is 20% greater than the height of cylinder A.

C) The height of cylinder B is 24% greater than the height of cylinder A.

D) The height of cylinder B is 44% greater than the height of cylinder A.

30



In the xy-plane above, a line with a slope of 4 intersects a parabola at the origin and at the point (h,k). If the vertex of the parabola is at $(2,-8)$, what is the value of k?

A) 6

B) 12

C) 18

D) 24

31

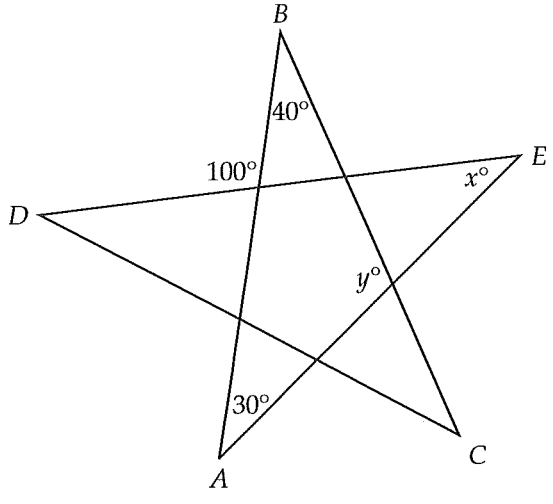
The difference between two numbers is 30. One of the numbers, x, is 20% less than the other number. What is the value of x?

4  4

32

Lianna plays a card game in which she gets 5 points for every red card she draws but loses 10 points for every black card she draws. By the end of the game, Lianna drew 7 times as many red cards as black cards for a final total of 75 points. How many red cards did she draw during the game?

33



Note: Figure not drawn to scale.

In the figure above, AB, BC, CD, DE, and EA are line segments. What is the value of $x + y$?

34

Microwave Time (seconds)	Frequency
30	10
60	4
90	x
120	3

The table above gives the distribution of microwave times, in seconds, for a random sample of frozen meals. If the mean microwave time of these meals is 72 seconds, what is the value of x?

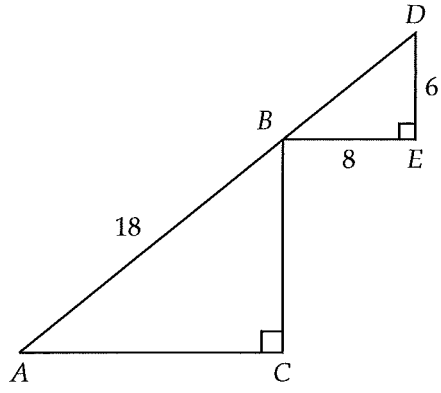
35

$$g(x) = \frac{1}{\sqrt{x+10}-9}$$

For what value of x is the function g above undefined?

4 4

36



In the figure above, points A, B, and D lie on the same line. If $AB = 18$, $BE = 8$, and $DE = 6$, what is the value of $\sin A$?

Questions 37-38 refer to the following information.

The total resistance R, measured in ohms, of a parallel circuit with two resistors is given by

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$$

where R_1 and R_2 are the resistances, in ohms, of the first and second resistors, respectively.

37

What is the total resistance, in ohms, of a parallel circuit in which the first resistor has a resistance of 6 ohms and the second has a resistance of 4 ohms?

38

In a parallel circuit with two resistors, the first resistor has twice the resistance of the second. The total resistance of the circuit is what fraction of the resistance of the second resistor?

Practice Test 1 Answers

Question categories correspond to chapters in *The College Panda's SAT Math: The Advanced Guide and Workbook.* Note that for two part questions, the category of the first question is used for both questions.

Section 3

1. [A] Functions
2. [A] Expressions
3. [B] Rates
4. [C] Manipulating and Solving Equations
5. [C] Exponents & Radicals
6. [C] Triangles
7. [C] Lines
8. [C] Interpreting Linear Models
9. [B] Complex Numbers
10. [C] Quadratics
11. [C] Rates
12. [D] More Equation Solving Strategies
13. [A] Lines
14. [B] Expressions
15. [B] Synthetic Division
16. [$x > 5$] Absolute Value
17. [35] Angles
18. [18] Functions
19. [7] Quadratics
20. [3] Manipulating and Solving Equations

Section 4

1. [A] Percent
2. [D] Circles
3. [A] Functions
4. [A] Probability
5. [D] Quadratics
6. [A] Lines
7. [B] Functions
8. [C] Probability
9. [C] Percent
10. [A] Inequalities
11. [B] Circles
12. [D] Reading Data
13. [B] Reading Data
14. [C] Exponential vs. Linear Growth
15. [B] Percent
16. [C] Manipulating and Solving Equations
17. [A] Interpreting Linear Models
18. [A] Exponential vs. Linear Growth
19. [B] Manipulating and Solving Equations
20. [B] Word Problems
21. [A] Systems of Equations
22. [B] Trigonometry
23. [C] Statistics II
24. [C] Rates
25. [D] Proportion
26. [D] Proportion
27. [D] Triangles
28. [D] Systems of Equations
29. [D] Manipulating and Solving Equations
30. [A] Manipulating and Solving Equations
31. [28] Statistics I
32. [25] Expressions
33. [$1 < x < 2$] Functions
34. [16] Rates
35. [11] Inequalities
36. [1875] Percent
37. [17] Statistics II
38. [20] Statistics II

Practice Test 1 Answer Explanations

Section 3

1. [A] $V = (3)^2 - 3(3) + 3 = 3$

2. [A] $\frac{1}{x} \div (x+3) = \frac{1}{x} \times \frac{1}{x+3} = \frac{1}{x(x+3)}$.

3. [B]

$$40 \cancel{\text{dollars shown}} \times \frac{8 \text{ actual dollars}}{5 \cancel{\text{dollars shown}}} = 64 \text{ actual dollars}$$

4. [C]

$$\frac{1}{a+2b} = 5$$

Multiply both sides by $(a+2b)$ to get

$$1 = 5(a+2b)$$

Divide both sides by 5,

$$\frac{1}{5} = a + 2b$$

5. [C]

$$3^{x-3} = 3^3$$
$$x - 3 = 3$$
$$x = 6$$

Of course, guessing and checking from the answer choices is also a valid strategy in this question.

6. [C] If $b > a$, then $AC > BC$, making answer (C) false.

7. [C] The two lines must have the same slope. Converting $2x + 3y = 6$ to slope-intercept form, we get $y = -\frac{2}{3} + 2$. Since $-\frac{2}{3}$ is the slope of this line, m must also be $-\frac{2}{3}$.

8. [C] Because the slope is 1.5, 1.5 must be the cost associated with producing each cup of lemonade. The number 100, then, must be a cost not associated with each cup of lemonade. Instead, it is the initial cost of setting up the lemonade stand, when 0 cups of lemonade have been sold. Answer (D) is incorrect because the total cost increases as more lemonade gets sold; there is no maximum.

9. [B]

$$(5+2i)(5-2i) = 25 - 10i + 10i - 4i^2 = 25 - 4i^2 = 25 + 4 = 29$$

10. [C] Only answer (C) results in a y-value of 0 both when $x = \frac{3}{5}$ and when $x = -\frac{1}{2}$.

11. [C] It took him 20 minutes to drive $85 - 75 = 10$ miles, which means he drove 1 mile every 2 minutes. At 6:40 PM, he needed to drive an additional $140 - 85 = 55$ miles to get to the 140-mile point.

$$55 \text{ miles} \times \frac{2 \text{ minutes}}{1 \text{ mile}} = 110 \text{ minutes} = 1 \text{ hour and } 50 \text{ minutes}$$

To get to the 140-mile point, he needed an additional 1 hour and 50 minutes beyond 6:40 PM, which turns out to be 8:30 PM.

12. [D] Multiply both sides by $3x - 2$.

$$kx^2 + 14x - 20 = 5x(3x - 2) + 8(3x - 2) - 4$$
$$kx^2 + 14x - 20 = 15x^2 - 10x + 24x - 20$$

Without going any further, we can compare coefficients to see that $k = 15$.

13. [A] The line with the lowest slope is k, because it has a negative slope. The next one up is j, because it's a flat line, meaning its slope is 0. Finally, $i < h$ because i is not as steep. The correct order is $k < j < i < h$.

14. [B] The expression follows the $(a - b)^2 = a^2 - 2ab + b^2$ pattern, where $a = \frac{1}{m}$ and $b = \frac{1}{n}$. Therefore, the expression is equivalent to $\left(\frac{1}{m} - \frac{1}{n}\right)^2$.

15. [B]

$$\begin{array}{r|l} & 3x - 3 \\ x+1 & \overline{3x^2 + 4} \\ & \underline{3x^2 + 3x} \\ & \quad -3x + 4 \\ & \quad \underline{-3x - 3} \\ & \qquad\quad 7 \end{array}$$

This result can be expressed as $3x - 3 + \frac{7}{x+1}$.

16. [x > 5] The best way to solve this question is trial and error. If $x = 3$, for example, $|1 - 3| = 2$, which is not greater than 4. This result indicates that we should try larger numbers. A number like 6, for example, would give $|1 - 6| = 5$, which turns out to be greater than 4.

17. [35] The measure of $\angle ADB$ must be $180 - 80 = 100$. Using $\triangle ABD$,

$$x = 180 - 45 - 100 = 35$$

18. [18] When $x = 2$, $h = 2^2 + 2 - 2 = 4$. When $x = 4$, $k = 4^2 + 4 - 2 = 18$.

19. [7]

$$k^2 + 4k = 45$$
$$k^2 + 4k - 45 = 0$$
$$(k+9)(k-5) = 0$$

Since $k > 0$, $k = 5$. Finally, $k + 2 = 7$.

20. $\boxed{3}$

$$x^3 - 3x^2 + 3x - 9 = 0$$
$$x^2(x-3) + 3(x-3) = 0$$
$$(x^2+3)(x-3) = 0$$

Because $x^2 + 3$ is always positive, x must equal 3.

Section 4

1. $\boxed{A}$ Zach memorized $(1.30)a$ words. James memorized 10 percent more than that, $(1.10)(1.30)a$ words.

2. $\boxed{D}$ The circumference of the pizza is $2\pi r = 2\pi(10) = 20\pi \approx 62.83$

   We divide this value by 4 to get the maximum number of slices that can be cut out: $62.83 \div 4 \approx 15.7$

   Since the slices must be full slices, the answer is 15.

3. $\boxed{A}$ Starting from home, Maya must start from the x-axis (a distance of 0 from home) and end up back at the x-axis. The only graphs that do that are (A) and (E). Because she stayed at the bookstore, the graph must also have a flat portion to represent her constant distance away from home during that time. Therefore, the answer is (A).

4. $\boxed{A}$

$$\frac{\text{Uses social media and age 30 or older}}{\text{Uses social media}} = \frac{120}{360} = \frac{1}{3}$$

5. $\boxed{D}$ If there are x-intercepts at -5 and 3, then $(x+5)$ and $(x-3)$ must be factors the function. Multiplying these factors,

$$(x+5)(x-3) = x^2 + 2x - 15$$

   Matching the coefficients up, $b = 2$ and $c = -15$.

6. $\boxed{A}$ Draw any line and its reflection across the y-axis. They always intersect at the y-intercept b. Therefore, $(0, b)$ is the point at which the two lines intersect.

7. $\boxed{B}$

$$d = \frac{2}{3}f$$
$$20 = \frac{2}{3}f$$
$$30 = f$$

   So 20 meters requires 30 liters of fuel. Any amount of fuel greater than 30 results in a distance farther than 20 meters. In the table, there are only two rockets that burned more than 30 liters of fuel.

8. $\boxed{C}$

$$\frac{\text{Undergraduates at Southwest}}{\text{Students at either State or Southwest}} = \frac{19,443}{38,626 + 22,361} \approx 0.32$$

9. [C] The second machine recycled $240(1.30) = 312$ plastic bottles and $180(0.9) = 162$ metal cans, a total of $312 + 162 = 474$ items. The first machine took in a total of $240 + 180 = 420$ items. Calculating the percent increase from the first to the second,

$$\frac{474 - 420}{420} \approx 0.13 = 13\%$$

10. [A] If Ashley's estimate, a, is within 15 of the actual number, b, then $b - 15 \leq a \leq b + 15$. Subtracting b from each part of the inequality (like we might in a regular equation), we get $-15 \leq a - b \leq 15$. And this makes sense. The difference between Ashley's estimate and the actual number is at most 15 (positive or negative depending on whether Ashley's estimate is too high or too low).

11. [B] The horizontal distance between the two points is 3. The vertical distance is 4. If you connect the two points, you can form a $3 - 4 - 5$ right triangle. Therefore, the distance between the two points is 5. This distance is also the radius of the circle. The standard form of a circle with center (h, k) and radius r is $(x - h)^2 + (y - k)^2 = r^2$. So, the equation of the circle is $(x - 1)^2 + (y - 2)^2 = 25$.

12. [D] John reached his maximum speed 50 meters into the race, which is $\frac{50}{100} = 50\%$ of the 100-meter-dash.

13. [B] The graph goes up and then stays at the same level. The best description of this is that John accelerated to his maximum speed and then held that speed for the rest of the race.

14. [C] Going up by 200% every hour means doubling every hour, which means this is exponential growth.

15. [B] Calculating the percent decrease for footballs,

$$\frac{3,060 - 3,600}{3,600} = -0.15 = 15\% \text{ decrease}$$

Calculating the number of basketballs produced,

$$2,200(1 - 0.15) = 2,200(0.85) = 1,870$$

16. [C] Plugging in, $\frac{10}{5} = \frac{k}{3}$, which yields $k = 6$. Using the same equation, we can cross multiply.

$$\frac{2}{5} = \frac{6}{y}$$
$$2y = 30$$
$$y = 15$$

17. [A] The expression bd represents the total number of boxes received. Since the equation gives the total number of books in the warehouse, 100 must be the number of books in each box.

18. [A] In the scenario given by choice A, the total amount of money left is always two-thirds of what it was the previous month. Because this rate is less than 1, it is exponential decay.

19. [B] Combine like terms and square both sides.

$$\sqrt{x} = 3\sqrt{y}$$
$$x = 9y$$

20. [B] If Fred has x pineapples, then Richard has $7x$ and Nathan has $3x$.

$$7x = 3x + 32$$
$$4x = 32$$
$$x = 8$$

21. [A] The total number of shots he took is $x + y$, which turns out to be 30. He scored $2x$ points from 2-pointers and $3x$ points from 3-pointers. The total number of points he scored is $2x + 3y = 68$.

22. [B] In relation to angle B, $\frac{c}{b} = \frac{\text{adjacent}}{\text{opposite}}$. This is the reciprocal of $\tan B$, $\frac{1}{\tan B}$.

23. [C] Based on the design on the study (random sampling and random assignment), we can conclude a cause and effect relationship: low lighting is likely to cause a decrease in reading speed. However, we can't say that this is true for every single person (like answer (B) does). Nor can we guess the effect of high lighting on reading speed when the study didn't involve high lighting (answer (D)). We also can't jump to the conclusion that low lighting harms the eyes (answer (A)).

24. [C] The total distance traveled by the train on the given trip is $80 \times 8 = 640$. At a speed of 120 miles per hour, the same trip would take $640 \div 120 = 5\frac{1}{3}$ hours, or 5 hours and 20 minutes (a third of an hour is 20 minutes).

25. [D]

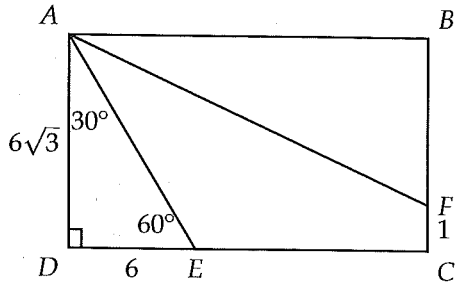
$$KE_{old} = \frac{1}{2}mv^2$$
$$KE_{new} = \frac{1}{2}m(xv)^2 = x^2\left(\frac{1}{2}mv^2\right) = x^2(KE_{old})$$
$$x^2 = 2$$
$$x = \sqrt{2}$$

26. [D]

$$KE_{old} = \frac{1}{2}mv^2$$
$$KE_{new} = \frac{1}{2}(0.85m)(0.80v)^2 = (0.85)(0.80)^2\left(\frac{1}{2}mv^2\right) = 0.544(KE_{old})$$

The kinetic energy has decreased by $1 - 0.544 = .456 = 45.6\%$.

27. $\boxed{D}$ $\triangle ADE$ is a $30-60-90$ triangle,



$AD = 6\sqrt{3}$ and $BF = 6\sqrt{3} - 1$.

28. $\boxed{D}$ Simplifying the second equation gives $x - 3y = 4$, which is the same as the first equation. Therefore, there are infinitely many solutions (more than two).

29. $\boxed{D}$

$$f_{obs} = f_s\left(\frac{v_w}{v_w - v_a}\right)$$
$$f_{obs}(v_w - v_a) = f_s v_w$$
$$f_{obs}v_w - f_{obs}v_a = f_s v_w$$
$$f_{obs}v_w - f_s v_w = f_{obs}v_a$$
$$\frac{f_{obs}v_w - f_s v_w}{f_{obs}} = v_a$$

30. $\boxed{A}$

$$f_{obs} = f_s\left(\frac{v_w}{v_w - v_a}\right)$$
$$500 = f_s\left(\frac{340}{340 - 22}\right)$$
$$500\left(\frac{340 - 22}{340}\right) = f_s \approx 468$$

31. $\boxed{28}$ If the average price of six items is \$30, then the total cost of those six items must be $6 \times 30 = \$180$. The total cost of the five items given is $7 + 25 + 36 + 40 + 44 = \$152$. So the sixth item must cost $180 - 152 = \$28$.

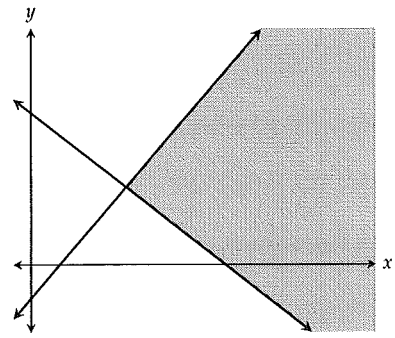
32. $\boxed{25}$ Since $(3x + 2y)^2 = 9x^2 + 12xy + 4y^2$, $9 + 12 + 4 = 25$.

33. $\boxed{1 < x < 2}$ Taking the square root of a negative number would make the function undefined. So we are looking for an x such that $(x - 1)(x - 2) < 0$. You can use trial and error or the x-intercepts of 1 and 2 to see that this only happens when $1 < x < 2$.

34. $\boxed{16}$

$$12 \cancel{\text{ pounds}} \times \frac{16 \cancel{\text{ ounces}}}{1 \cancel{\text{ pound}}} \times \frac{2/3 \text{ pizza}}{8 \cancel{\text{ ounces}}} = 16 \text{ pizzas}$$

35. $\boxed{11}$ Graphing these two inequalities in the xy-plane, we see that the minimum possible value of x occurs at the intersection of the two lines.



Solving for the intersection by setting the two equations equal to each other,

$$3x - 10 = -2x + 45$$
$$5x = 55$$
$$x = 11$$

36. $\boxed{1875}$

$$A = 0.80B \text{ and } B = 0.80C$$
$$B = \frac{A}{0.80} = \frac{1,200}{0.80} = 1,500$$
$$C = \frac{B}{0.80} = \frac{1,500}{0.80} = 1,875$$

You could also do it in one step by substituting the second equation into the first: $A = 0.80(.80C)$

37. $\boxed{17}$ At a temperature of 80°Fahrenheit, the line of best fit gives a chirp rate of 17 chirps per second.

38. $\boxed{20}$ The data point farthest from the line of best fit is the one furthest to the right, at a temperature of about 88°Fahrenheit. The chirp rate represented by this point is 20 chirps per second.

Practice Test 2 Answers

Question categories correspond to chapters in *The College Panda's SAT Math: The Advanced Guide and Workbook*. Note that for two part questions, the category of the first question is used for both questions.

Section 3

1. [D] Expressions
2. [B] Rates
3. [C] Manipulating and Solving Equations
4. [D] Triangles
5. [C] Word Problems
6. [D] Quadratics
7. [D] Functions
8. [A] Systems of Equations
9. [B] Lines
10. [B] Rates
11. [B] Word Problems
12. [C] More Equation Solving Strategies
13. [B] Triangles
14. [A] Systems of Equations
15. [D] Exponents & Radicals
16. [60] Angles
17. [20] Rates
18. [9] Manipulating and Solving Equations
19. [5] Functions
20. [8] Quadratics

Section 4

1. [D] Rates
2. [C] Circles
3. [B] Reading Data
4. [B] Functions
5. [A] Probability
6. [B] Percent
7. [C] Word Problems
8. [D] Statistics II
9. [C] Statistics II
10. [D] Interpreting Linear Models
11. [B] Interpreting Linear Models
12. [D] Functions
13. [D] Percent
14. [D] Rates
15. [D] Absolute Value
16. [C] Reading Data
17. [B] Triangles
18. [A] Inequalities
19. [D] Manipulating and Solving Equations
20. [B] Expressions
21. [C] Lines
22. [C] Percent
23. [A] Quadratics
24. [B] Manipulating and Solving Equations
25. [D] Exponential vs. Linear Growth
26. [C] Statistics I
27. [B] Statistics I
28. [A] Word Problems
29. [D] Percent
30. [D] Systems of Equations
31. [24] Word Problems
32. [56] Volume
33. [.75] Interpreting Linear Models
34. [55] Probability
35. [6] Inequalities
36. [4] Synthetic Division
37. [636] Manipulating and Solving Equations
38. [12] Manipulating and Solving Equations

Practice Test 2 Answer Explanations

Section 3

1. [D] Distributing,
$$ab(c+d) = abc + abd$$
(D) is not equivalent because it's missing an a in the second term.

2. [B] The adults spent $10x$ on tickets and $4(6) = 24$ dollars on popcorn. That's a total of $10x + 24$, where x is the number of adults.

3. [C] x cannot be 0 because anything multiplied by 0 is 0. It doesn't matter what y is.

4. [D] Since $AB = AC$, $b = c$. So $b = 50$, and $a = 180 - b - c = 180 - 50 - 50 = 80$.

5. [C] From the information,
$$x = \frac{1}{2}y$$
$$y = 2x$$

6. [D] Sum $= -\frac{b}{a} = -\frac{-6}{2} = 3$.

7. [D]
$$g(1) = (1)^2 + 3 = 4$$
$$f(4) = 2(4)^3 - 1 = 128 - 1 = 127$$

8. [A] For the system to have no solution, the coefficients should be able to match but the constants on the right hand side shouldn't. Looking at the y's, we need to multiply the first equation by $\frac{7}{4}$ to get the coefficients to match. Doing so yields
$$\frac{7}{4}a = 5$$
Solving for a, we get $a = \frac{20}{7}$.

9. [B] Line l has a negative slope. If n is perpendicular to l, then n must have a positive slope, meaning $m > 0$.

10. [B] There are 8 30-minute segments in 4 hours so Janice read $8x$ pages. There are 20 15-minute segments in 5 hours so Kim read $20y$ pages. Altogether, they read $8x + 20y$ pages.

11. [B] Let x be the original price of each watch.
$$0.7x + 0.8x + 0.9x = 240$$
$$2.4x = 240$$
$$x = \frac{240}{2.4} = 100$$
The original price of each watch was \$100. Victor would have received $100 \times 3 = \$300$ had he not given the discounts. But because he did, he lost $300 - 240 = \$60$.

12. [C] Expand the right side:

$$x^2 + kx + 9 = x^2 + 2ax + a^2$$

Comparing both sides, we see that

$$9 = a^2 \text{ and } k = 2a$$

Therefore, $a = 3$ and $k = 2 \cdot 3 = 6$

13. [B] Seven can't be the third side because $7 + 3 < 11$ (any two sides of a triangle must sum up to be greater than the third side). Seventeen can't be the third side because $3 + 11 < 17$. The only valid length for the third side is 13 (II only).

14. [A] To match the coefficients, multiply the first equation by 6 to get $6ax + 3y = 96$. Now we can see that $6a = 4$, or $a = \frac{4}{6} = \frac{2}{3}$.

15. [D]

$$\begin{aligned} 27^{81} &= 3^x \\ (3^3)^{81} &= 3^x \\ 3^{3 \cdot 81} &= 3^x \\ 243 &= x \end{aligned}$$

16. [60] The angles of the triangle are x, y, and $90°$.

$$x + y + 90 = 180$$

Since $y = 2x$,

$$\begin{aligned} x + 2x + 90 &= 180 \\ 3x &= 90 \\ x &= 30 \end{aligned}$$

Finally $y = 2x = 2(30) = 60$.

17. [20] $\dfrac{150}{7.5} = \dfrac{150}{\frac{15}{2}} = 150 \times \dfrac{2}{15} = 20$ containers.

18. [9] Multiply everything by 6.

$$\begin{aligned} \frac{1}{2}x - \frac{1}{3}x &= 1 + \frac{1}{2} \\ 3x - 2x &= 6 + 3 \\ x &= 9 \end{aligned}$$

19. [5] If $g(m) = 6$, then from the table, m must be 3 since $g(3) = 6$. Finally, $f(m) = f(3) = 5$.

20. $\boxed{8}$ The sum of the solutions is $-\frac{b}{a} = -\frac{-5}{1} = 5$. If the other solution is x, then

$$x + (-3) = 5$$
$$x = 8$$

Section 4

1. $\boxed{D}$

$$7 \cancel{\text{windows}} \times \frac{5 \text{ hours}}{4 \cancel{\text{windows}}} = 8.75 \text{ hours} = 8 \text{ hours and } 45 \text{ minutes}$$

2. $\boxed{C}$

$$\pi r^2 = \frac{\pi}{4}$$
$$r^2 = \frac{1}{4}$$
$$r = \frac{1}{2}$$

The diameter is twice the radius: $d = 2\left(\frac{1}{2}\right) = 1$

3. $\boxed{B}$ The question is asking for the biggest difference between the x-value and the y-value among the points. Point A has a difference of $3 - 1 = 2$. Point B has a difference of $7 - 2 = 5$. Point C has a difference of $9 - 5 = 4$. Point D has a difference of $8 - 4 = 4$. Point B has the largest difference.

4. $\boxed{B}$ The best way to do this is to test out each answer choice:

A) $3600 - 400(5) + 20(5)^2 = 2100$

B) $3600 - 400(10) + 20(10)^2 = 1600$

C) $3600 - 400(15) + 20(15)^2 = 2100$

D) $3600 - 400(20) + 20(20)^2 = 3600$

E) $3600 - 400(25) + 20(25)^2 = 6100$

Choice (B) is clearly the lowest.

5. $\boxed{A}$

$$\frac{\text{Barrels produced in 2012 in Arkansas}}{\text{Barrels produced in 2012}} = \frac{12,468}{118,730} \approx 0.10$$

6. $\boxed{B}$ Let $Z = 100$. Then $Y = 0.30 \times 100 = 30$ and $X = 0.20 \times 30 = 6$. X is $\frac{6}{100} = 6\%$ of Z.

7. $\boxed{C}$

$$\frac{5y}{8} = 15$$
$$5y = 120$$
$$y = 24$$

8. [D] At a price of \$180,000 along the y-axis, the line of best fit gives 1,200 square feet along the x-axis.

9. [C] The 600 square foot apartment has a price of \$160,000. The price predicted by the line of best fit is \$120,000. The difference is \$40,000.

10. [D] The f-intercept is the number of flowers that blossom when $b = 0$, when there are no bees in the garden.

11. [B] The y-intercept is 28. The line goes up 4 units for every 2 units to the right, so the slope is $4/2 = 2$. Using $y = mx + b$ form, the equation of the line is $f = 28 + 2b$.

12. [D] At $x = 1$, f is at 1 and g is at 3. Since g is 2 greater than f at $x = 1$, it's possible that g is $f + 2$.

13. [D] Rafael must have won 75% of the matches. Let x be the total number of matches they played against each other. Since 75% is $\frac{3}{4}$,

$$\frac{3}{4}x = 18$$
$$x = 24$$

Roger must have won $\frac{1}{4}(24) = 6$ matches. Another way to get this answer is to realize that 75% is three times 25%, so Rafael must have won 3 times as many matches: $18 \div 3 = 6$.

14. [D]

$$120\cancel{^\circ F} \times \frac{1\cancel{^\circ C}}{33.8\cancel{^\circ F}} \times \frac{1\ \cancel{\text{calorie}}}{1\cancel{^\circ C}} \times \frac{4.184\ \text{joules}}{1\ \cancel{\text{calorie}}} \approx 14.85\ \text{joules}$$

15. [D] Smart trial and error is the fastest way to find the bounds for n. The lower bound for n is -2 and the upper bound is 6. There are 9 integers between -2 and 6 (inclusive). If we wanted to do this problem more mathematically, we could set up the following equation:

$$-5 < n - 2 < 5$$

Adding 2,

$$-3 < n < 7$$

Since n is an integer,

$$-2 \leq n \leq 6$$

16. [C] Alicia's speed was 0 from 3 hours to 4 hours, which means she started her nap after 3 hours of driving.

17. [B] $\triangle ABC$ is similar to $\triangle DEC$. Therefore,

$$\frac{3}{9} = \frac{DE}{18}$$

Cross multiplying,

$$9(DE) = 54$$
$$DE = 6$$

18. [A] The total number of computers after t months is $200+8t$.

$$600 \leq 200+8t \leq 700$$

Subtract by 200 and then divide by 8.

$$400 \leq 8t \leq 500$$

$$50 \leq t \leq 62.5$$

Because t is an integer, $50 \leq t \leq 62$.

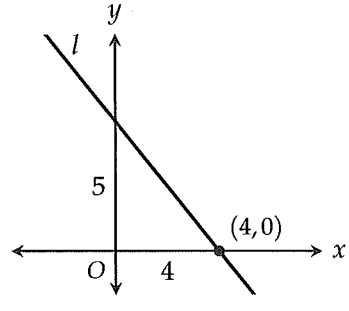
19. [D] Get rid of the fraction and put every term containing N on one side.

$$\begin{aligned} E &= \frac{P-N}{P+N} \\ E(P+N) &= P-N \\ EP+EN &= P-N \\ EN+N &= P-EP \\ N(E+1) &= P-EP \\ N &= \frac{P-EP}{E+1} \end{aligned}$$

20. [B]

$$\begin{aligned} 3(x^2-5x+2)-(3x^3+4x^2-6) &= 3x^2-15x+6-3x^3-4x^2+6 \\ &= -3x^3-x^2-15x+12 \end{aligned}$$

21. [C] Because it has a slope of $-\frac{5}{4}$, line l goes down 5 units for every 4 units to the right. Therefore, the y-intercept is 5. The base of the triangle is 4 and the height is 5.



The area of the triangle is $\frac{1}{2}(4)(5)=10$

22. [C] Let last year's price be x. Then

$$p = 1.20x$$

$$p = \frac{6}{5}x$$

$$\frac{5}{6}p = x$$

23. [A] Complete the square. Divide the middle term by 2 to get -1 and square that result to get 1. We put the -1 inside the parentheses with x and subtract the 1 at the end.

$$y = (x-1)^2 - 3 - 1$$
$$y = (x-1)^2 - 4$$

24. [B]

$$8 = 2\pi\sqrt{\frac{L}{9.8}}$$
$$\frac{8}{2\pi} = \sqrt{\frac{L}{9.8}}$$
$$\frac{64}{4\pi^2} = \frac{L}{9.8}$$
$$\frac{64}{4\pi^2} \cdot 9.8 = L \approx 15.9$$

25. [D] Each month, the number of dandelions is one-fifth of what it was the previous month. This is exponential decay.

26. [C]

$$\frac{1\times(20+30)+2\times(20+15)+3\times(8+5)+4\times(2+0)}{20+30+20+15+8+5+2} = \frac{167}{100} = 1.67$$

27. [B] The median for both Maine and Massachusetts is the average weight of the 25th and 26th lobsters. In Maine, the median is 2 pounds. In Massachusetts, the median is 1 pound.

28. [A] Let b be the number of boys. Then the number of girls is $3 + 4b$.

$$b + (3 + 4b) = 33$$
$$5b + 3 = 33$$
$$5b = 30$$
$$b = 6$$

29. [D] After the withdrawal, the amount in her account is $1,000(1.05)^3 - 200$. Taking this result and treating it as the initial value for the remaining 4 years, we get

$$[1,000(1.05)^3 - 200](1.05)^4 = 1,000(1.05)^7 - 200(1.05)^4$$

This makes sense because $1,000(1.05)^7$ is the amount she would have had in her account if she didn't make a withdrawal, and $200(1.05)^4$ is the amount of money her account lost as a result of the withdrawal.

30. $\boxed{D}$ Let Alex's weight be a, Brian's weight be b, and James's weight be j. We can make three equations:

$$\begin{cases} a+b=300 \\ a+j=280 \\ b+j=350 \end{cases}$$

Adding all three equations together, we get

$$2a+2b+2j=930$$

Dividing both sides by 2,

$$a+b+c=465$$

31. $\boxed{24}$ The angles of a triangle sum to 180.

$$\begin{aligned} 2y+3y+60&=180 \\ 5y&=120 \\ y&=24 \end{aligned}$$

32. $\boxed{56}$ The box has a length of $8-2-2=4$, a width of $11-2-2=7$, and a height of 2.

$$V=lwh=4(7)(2)=56$$

33. $\boxed{.75}$ Putting the equation into $y=mx+b$ form, $p=\frac{3}{4}s+\frac{10}{4}$. We see that the slope is $\frac{3}{4}$, or 0.75, which means 0.75 milligrams of pepper are added for every 1 milligram increase in the amount of salt.

34. $\boxed{55}$ Let x be the number of doctors who take at least 2 vacations each year.

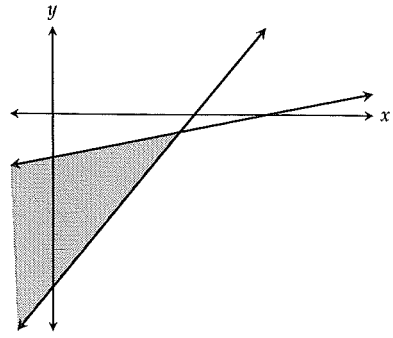
$$\frac{45+x}{100}=\frac{4}{5}$$

Cross multiplying,

$$\begin{aligned} 225+5x&=400 \\ 5x&=175 \\ x&=35 \end{aligned}$$

The number of people from the surveyed group who take at least 2 vacations each year is $35+20=55$.

35. $\boxed{6}$ Graphing the two inequalities in the xy-plane, we see that the maximum possible value of x occurs at the intersection of the two lines.



Solving for the intersection by setting the two equations equal to each other,

$$\frac{1}{2}x - 5 = 3x - 20$$
$$x - 10 = 6x - 40$$
$$-5x = -30$$
$$x = 6$$

36. $\boxed{4}$ Using the remainder theorem, the remainder is $(-3)^2 + 2(-3) + 1 = 4$.

37. $\boxed{636}$ The cost per necklace is $C = 100 + \frac{36}{6} = 106$. So the total cost is $106 \times 6 = 636$.

38. $\boxed{12}$ Let x be the number of necklaces that should be made. In selling the necklaces, the shop earns $150x$ and incurs a total cost of $x\left(100 + \frac{36}{x}\right)$. The total earnings minus the total cost should give \$564:

$$150x - x\left(100 + \frac{36}{x}\right) = 564$$
$$50x - 36 = 564$$
$$50x = 600$$
$$x = 12$$

Practice Test 3 Answers

Question categories correspond to chapters in *The College Panda's SAT Math: The Advanced Guide and Workbook.* Note that for two part questions, the category of the first question is used for both questions.

Section 3

1. [A] Absolute Value
2. [C] Manipulating and Solving Equations
3. [C] Inequalities
4. [B] Interpreting Linear Models
5. [D] Lines
6. [B] Systems of Equations
7. [A] Complex Numbers
8. [D] Rates
9. [D] Quadratics
10. [B] Exponents & Radicals
11. [C] Expressions
12. [A] Word Problems
13. [C] Lines
14. [A] Trigonometry
15. [B] More Equation Solving Strategies
16. [220] Rates
17. [100] Manipulating and Solving Equations
18. [2560] Exponential vs. Linear Growth
19. [7] Functions
20. [10] Systems of Equations

Section 4

1. [D] Percent
2. [B] Expressions
3. [B] Circles
4. [A] Functions
5. [D] Reading Data
6. [B] Probability
7. [C] Quadratics
8. [B] Word Problems
9. [C] Functions
10. [C] Statistics II
11. [C] Statistics II
12. [D] Lines
13. [D] Inequalities
14. [C] Rates
15. [A] Statistics I
16. [C] Triangles
17. [B] Percent
18. [B] Volume
19. [A] Manipulating and Solving Equations
20. [D] Triangles
21. [A] Exponential vs. Linear Growth
22. [B] Interpreting Linear Models
23. [B] Interpreting Linear Models
24. [D] Word Problems
25. [B] Circles
26. [C] Proportion
27. [B] Manipulating and Solving Equations
28. [C] Manipulating and Solving Equations
29. [D] Systems of Equations
30. [B] Manipulating and Solving Equations
31. [35] Angles
32. [770] Rates
33. [2009] Reading Data
34. [39] Functions
35. [27] Inequalities
36. [13] Synthetic Division
37. [1.8] Percent
38. [450] Percent

Practice Test 3 Answer Explanations

Section 3

1. [A] When $x = -8$, $\left|\frac{5}{-8}\right| = \frac{5}{8}$, which is between 0 and 1. None of the other answer choices work.

2. [C] Multiplying both sides by d gives us

$$cd = ab$$

Then $\frac{1}{ab} = \frac{1}{cd}$ by substitution.

3. [C] Square rooting both sides, we get $x < 5$, but we have to take into account negative values. It should be easy enough to see that $x > -5$ as well. So, $-5 < x < 5$.

4. [B] The number 5 refers to the slope of -5, which means the tank loses 5 gallons of water each hour.

5. [D] Converting $3x + 4y = 6$ to slope-intercept form, we get $y = -\frac{3}{4}x + \frac{3}{2}$. The slope is $-\frac{3}{4}$. For the lines to be perpendicular, m must be the negative reciprocal, $\frac{4}{3}$.

6. [B] To get y in terms of k, we need to eliminate x. We could use either substitution or elimination here, but we'll choose elimination. Multiply the second equation by 3 and subtract to get

$$\begin{aligned} ky - 3(4y) &= 8 - 3(-1) \\ ky - 12y &= 8 + 3 \\ y(k-12) &= 11 \\ y &= \frac{11}{k-12} \end{aligned}$$

7. [A]

$$2 + 3i + 4i^2 + 5i^3 + 6i^4 = 2 + 3i + 4(-1) + 5(-i) + 6(1) = 4 - 2i$$

So $a = 4, b = -2$, and $a + b = 2$.

8. [D] Each hour, the car travels 65 miles. Because it gets 32 miles per gallon, it uses up $\frac{65}{32}$ gallons each hour. Therefore, the total gas consumed after t hours is $\frac{65t}{32}$.

9. [D] Applying the quadratic formula to $x^2 - x - 4 = 0$,

$$x = \frac{1 \pm \sqrt{(-1)^2 - 4(1)(-4)}}{2(1)} = \frac{1 \pm \sqrt{1+16}}{2} = \frac{1 \pm \sqrt{17}}{2}$$

10. $\boxed{B}$ Multiply the first equation by y to get

$$y^9 = my$$

Now substitute this into the left side of the second equation,

$$my = \frac{2}{3}$$

$$y = \frac{2}{3m}$$

11. $\boxed{C}$

$$2x(x-y)(x+y) = 2x(x^2-y^2) = 2x^3 - 2xy^2$$

12. $\boxed{A}$

$$\frac{m+6}{2} = 4m - 4$$
$$m + 6 = 8m - 8$$
$$-7m = -14$$
$$m = 2$$

13. $\boxed{C}$ The slope of the line is $\frac{16-0}{12-0} = \frac{4}{3}$. It goes up 4 units for every 3 units to the right. Starting from $(0,0)$ (which is on the line) and using the slope, we can easily see that $(3,4)$ will be on the line.

14. $\boxed{A}$ Apply the identity $\cos y = \sin\left(\frac{\pi}{2} - y\right)$ to the equation.

$$\sin x = \cos y$$
$$\sin x = \sin\left(\frac{\pi}{2} - y\right)$$
$$x = \frac{\pi}{2} - y$$

15. $\boxed{B}$ Expand the left hand side.

$$(2x-b)(7x+b) = 14x^2 - cx - 16$$
$$14x^2 + 2bx - 7bx - b^2 = 14x^2 - cx - 16$$
$$14x^2 - 5bx - b^2 = 14x^2 - cx - 16$$

Comparing both sides, we can see that $b = 4$ (b cannot be -4 because $b > 0$). $c = 5b = 5(4) = 20$.

16. $\boxed{220}$ Battery B runs out of energy after $132 \div 2 = 66$ minutes. Battery C runs out of energy after $66 \div 3 = 22$ minutes. Together, they can provide energy for $132 + 66 + 22 = 220$ minutes.

17. $\boxed{100}$ Expand.

$$x^2 + 3x - 3x - 9 = 91$$
$$x^2 = 100$$

18. $\boxed{2,560}$ $80(2)^5 = 2,560$.

19. $\boxed{7}$ First, plug in $(-1,4)$ to get $4 = a(-1)^3 + b$. Next, plug in $(1,10)$ to get $10 = a(1)^3 + b$. We now have two equations and two unknowns:

$$4 = -a + b$$
$$10 = a + b$$

Add the two equations together to get $14 = 2b$. Finally, $b = 7$.

20. $\boxed{10}$ In the first equation, we can multiply both sides by $y + 2$ to get $x = 2(y + 2)$. Substituting this into the second equation,

$$3(y - 5) - 2(y + 2) = -16$$
$$3y - 15 - 2y - 4 = -16$$
$$y - 19 = -16$$
$$y = 3$$

Finally, $x = 2(3 + 2) = 10$.

Section 4

1. $\boxed{D}$

$$1000(1 - 0.30)(1 - 0.15) = 1000(0.7)(0.85) = \$595$$

2. $\boxed{B}$ $a(3 - a) + 2(a + 5) = 3a - a^2 + 2a + 10 = -a^2 + 5a + 10$

3. $\boxed{B}$ The diameter, which always goes through the center, is always the longest segment in a circle. $\overline{AD}$ is the only answer choice that's a diameter.

4. $\boxed{A}$ Since Jones starts at the bottom of the mountain and ends up at the bottom, the correct graph must start at the x-axis and return to the x-axis. Only graphs (A) and (B) do that. Since Jones comes down at twice the speed, the later portion of the graph should be steeper than the initial portion. Graph (B) does not reflect that, but graph (A) does.

5. $\boxed{D}$ Choice (D) is the only one that's true. There are 11 players with more than 5 years of training (to the right of 5 on the x-axis). There are 9 players with less than 5 years of training (to the left of 5 on the x-axis).

6. $\boxed{B}$

$$\frac{\text{Ate breakfast and did not pass exam}}{\text{Did not pass exam}} = \frac{12}{18 + 12} = \frac{2}{5}$$

7. [C] Anytime we're asked for a minimum or a maximum, think of the vertex or vertex form. To get vertex form, we need to complete the square. Divide the middle term by 2 to get 5 and square that result to get 25. Put the 5 inside the parentheses with x and subtract the 25 at the end.

$$y = (x+5)^2 + 16 - 25$$

$$y = (x+5)^2 - 9$$

8. [B] Let the larger group have x students. Then the smaller group has $x - 9$ students.

$$\begin{aligned} x + (x-9) &= 45 \\ 2x - 9 &= 45 \\ 2x &= 54 \\ x &= 27 \end{aligned}$$

The smaller group then has $27 - 9 = 18$ students.

9. [C] From the graph, $f(3) = 2$. Where else does the graph have a y-value of 2? When $x = -1$. Therefore, $c = -1$.

10. [C] The slope is rise over run. Because the line of best fit has a negative slope, it's the mile per gallon decrease in a car's fuel efficiency for every increase of one horsepower. However, this is not an answer choice. Going in the reverse direction, it's the mile per gallon increase in a car's fuel efficiency for every decrease of one horsepower.

11. [C] In the scatterplot, there are 5 points below the line of best fit.

12. [D] A line with a positive y-intercept will not cross the y-axis at a negative point. Therefore, when x is 0, y cannot be negative, which makes (E) the answer.

13. [D] The total amount she spends is $3(14) + 10x = 42 + 10x$. Now,

$$100 \leq 42 + 10x \leq 150$$

We could split these inequalities up and handle them separately, but we'll just do it all at once by subtracting each part by 42 and dividing by 10.

$$100 \leq 42 + 10x \leq 150$$

$$58 \leq 10x \leq 108$$

$$5.8 \leq x \leq 10.8$$

Of the answer choices, 12 is the only one that falls outside this range.

14. [C]

$$800 \cancel{\text{books}} \times \frac{1.4 \cancel{\text{kg}}}{1 \cancel{\text{book}}} \times \frac{2.2 \cancel{\text{pounds}}}{1 \cancel{\text{kg}}} \times \frac{1 \text{ box}}{30 \cancel{\text{pounds}}} \approx 82.13 \text{ boxes}$$

Because all books need to be shipped and we can't have just 0.13 of a box, the company will need 83 boxes. The last box won't be filled to capacity.

15. [A]

$$\frac{(12 \times 2) + (13 \times 3) + (14 \times 2) + (15 \times 5) + (16 \times 1) + (17 \times 2)}{15} = \frac{216}{15} = 14.4$$

16. [C] Because $\triangle ABC$ is isosceles, the remaining 160° is split between the two remaining angles: $\angle ABC = \angle ACB = 80°$. Now $\angle ACD = 180 - 80 = 100°$ and because $\triangle ACD$ is isosceles, the remaining 80° is split so that $\angle ACD = \angle ADC = 40°$. Finally, $\angle ADE = 180 - 40 = 140°$ and because $\triangle ADE$ is isosceles, the remaining 40° is split so that $\angle DAE = \angle E = 20°$. Therefore, $x = 20$.

17. [B] Let the original price be p. The price after the fee is $(1.12)p$. The price after the discount is $(0.75)(1.12)p = 0.84p$. The end price is 84% of the original price. This is equivalent to a $1 - 0.84 = 0.16 = 16\%$ discount.

18. [B] The volume of the box is $4 \times 6 \times 8 = 192$. A cube with a side length of 2 has a volume of $2^3 = 8$. The number of cubes needed is

$$192 \div 8 = 24$$

19. [A] Using our rules for exponents, we can turn the equation into

$$y^{b-\frac{1}{2}} = y^{-2}$$

Equating the exponents,

$$b - \frac{1}{2} = -2$$

$$b = -2 + \frac{1}{2} = -\frac{3}{2}$$

20. [D] Triangles ABE and DCE are similar. Therefore, the ratio of their respective sides is 4 : 6, or 2 : 3. If we let $BE = 2x$, then $EC = 3x$.

$$2x + 3x = 15$$
$$5x = 15$$
$$x = 3$$

Therefore, $EC = 3(3) = 9$.

21. [A] Each day, Tom's collection grows by $7 - 2 = 5$ cards. Because this is a constant increase, the relationship is linear growth.

22. [B] The 1.6 refers to the slope, which means each additional gram of potassium hydroxide Jane wishes to produce from the reaction requires an additional 1.6 milliliters of water.

23. [B] Because this question is asking for the change in "x" per change in "y" (the reverse of slope), we need to rearrange the equation to get a in terms of w:

$$w = 1.6a + 10$$

$$w = \frac{8}{5}a + 10$$

$$5w = 8a + 50$$

$$5w - 50 = 8a$$

$$a = \frac{5}{8}w - \frac{50}{8}$$

What we care about is the slope, which is $\frac{5}{8}$, or 0.625. This is the additional amount of potassium hydroxide that would be produced if one more milliliter of water were used in the reaction.

24. $\boxed{D}$ For the first 30 minutes, she's charged \$0.25, leaving \$1.35 − \$0.25 = \$1.10 to account for. Every additional 5 minutes costs \$0.10 so

$$\$1.10 \times \frac{5 \text{ minutes}}{\$0.10} = 55 \text{ minutes}$$

\$1.10 is the cost for an additional 55 minutes, making the total number of minutes $30 + 55 = 85$.

25. $\boxed{B}$ The standard form of a circle with center (h, k) and radius r is $(x-h)^2 + (y-k)^2 = r^2$.

26. $\boxed{C}$

$$V_{old} = \pi r^2 h$$

$$V_{new} = \pi(0.7r)^2 h = \pi(0.7)^2 r^2 h = 0.49(\pi r^2 h) = 0.49 V_{old}$$

The volume would be decreased by $1 - 0.49 = 0.51 = 51\%$.

27. $\boxed{B}$ Expand everything and move every term with N_f to the left hand side.

$$N_e = \frac{4N_f N_m}{N_f + N_m}$$

$$N_e(N_f + N_m) = 4N_f N_m$$

$$N_e N_f + N_e N_m = 4N_f N_m$$

$$N_e N_f - 4N_f N_m = -N_e N_m$$

$$N_f(N_e - 4N_m) = -N_e N_m$$

$$N_f = \frac{-N_e N_m}{N_e - 4N_m} = \frac{N_e N_m}{4N_m - N_e}$$

In the last step, the negative can be taken from the top and applied to the bottom. Think of it as multiplying both top and bottom by -1.

28. $\boxed{C}$

$$N_e = \frac{4N_f N_m}{N_f + N_m}$$

$$N_e = \frac{4(800)(1,200)}{800 + 1,200}$$

$$N_e = 1,920$$

29. $\boxed{D}$ Let the length of the rectangle be l and the width be w. Let's say that Tammy picks two "lengths" and one "width". Gladys picks two "widths" and one "length."

$$\begin{cases} 2l + w = 140 \\ l + 2w = 100 \end{cases}$$

Adding these two equations together,

$$3l + 3w = 240$$

Dividing both sides by 3,

$$l + w = 80$$

Keeping in mind that the perimeter of a rectangle is $2l + 2w$, we multiply both sides by 2.

$$2l + 2w = 160$$

30. $\boxed{B}$ Multiply both sides by 2 and then square both sides.

$$\begin{aligned} \frac{\sqrt{2x^2 - 14}}{2} &= 3 \\ \sqrt{2x^2 - 14} &= 6 \\ 2x^2 - 14 &= 36 \\ 2x^2 &= 50 \\ x^2 &= 25 \\ x &= 5 \end{aligned}$$

31. $\boxed{35}$ The missing angle in the triangle on the right is $180 - 40 - 40 = 100°$. Because vertical angles are equal, the angle on the left is also $100°$. Therefore, $x = 180 - 45 - 100 = 35$.

32. $\boxed{770}$

$$42{,}000 \cancel{\text{ email}} \times \frac{11 \text{ lost}}{600 \cancel{\text{ emails}}} = 770 \text{ lost}$$

33. $\boxed{2009}$ The lines intersect in the year 2009, which means the number of applications was the same in both countries during that year.

34. $\boxed{39}$

$$\begin{aligned} f(n) &= 3 \\ \frac{\sqrt{n-3}}{2} &= 3 \\ \sqrt{n-3} &= 6 \\ n - 3 &= 36 \\ n &= 39 \end{aligned}$$

35. $\boxed{27}$

$$\begin{aligned} -4k + 12 &\geq -24 \\ -4k &\geq -36 \\ k &\leq 9 \end{aligned}$$

The maximum value of k is 9, so the maximum value of $3k$ is 27.

36. $\boxed{13}$

$$\begin{array}{r|llllll} & 3x & + & 4 & & \\ x-1 & 3x^2 & + & x & + & 2 \\ & 3x^2 & - & 3x & & \\ \hline & & & 4x & + & 2 \\ & & & 4x & - & 4 \\ \hline & & & & & 6 \end{array}$$

This result can be expressed as $3x + 4 + \dfrac{6}{x-1}$. Therefore, $a = 3, b = 4, c = 6$, and $a + b + c = 13$.

37. $\boxed{1.8}$ If x represents the number of burritos sold during lunch, then let d represent the number of burritos sold during dinner.

$$x = 1.25d$$

Solving for d,

$$d = \frac{x}{1.25} = 0.8x$$

Therefore, the total number of burritos sold on a typical day is $x + d = x + 0.8x = 1.8x$.

38. $\boxed{450}$

$$\begin{aligned} \text{Lunch} &= (1.25)(\text{Dinner}) \\ \text{Lunch} &= (1.25)(360) = 450 \end{aligned}$$

Practice Test 4 Answers

Question categories correspond to chapters in *The College Panda's SAT Math: The Advanced Guide and Workbook.* Note that for two part questions, the category of the first question is used for both questions.

Section 3

1. [D] Manipulating and Solving Equations
2. [D] Rates
3. [B] Interpreting Linear Models
4. [C] Functions
5. [D] Systems of Equations
6. [B] Quadratics
7. [B] Lines
8. [C] Functions
9. [B] Exponents & Radicals
10. [D] Triangles
11. [A] Trigonometry
12. [B] Lines
13. [C] Complex Numbers
14. [B] Interpreting Linear Models
15. [B] Quadratics
16. $\left[\frac{1}{5}\right]$ Manipulating and Solving Equations
17. [140] Angles
18. [60] Expressions
19. $\left[\frac{1}{2}\right]$ More Equation Solving Strategies
20. $\left[\frac{3}{5}\right]$ Manipulating and Solving Equations

Section 4

1. [C] Percent
2. [B] Reading Data
3. [D] Exponential vs. Linear Growth
4. [C] Percent
5. [D] Word Problems
6. [A] Inequalities
7. [B] Inequalities
8. [A] Probability
9. [A] Manipulating and Solving Equations
10. [C] Expressions
11. [D] Circles
12. [A] Percent
13. [A] Statistics II
14. [A] Manipulating and Solving Equations
15. [C] Manipulating and Solving Equations
16. [C] Interpreting Linear Models
17. [A] Rates
18. [D] Functions
19. [D] Triangles
20. [C] Word Problems
21. [B] Lines
22. [C] Functions
23. [D] Statistics I
24. [B] Volume
25. [B] Statistics II
26. [B] Statistics II
27. [D] Word Problems
28. [D] Trigonometry
29. [C] Percent
30. [C] Systems of Equations
31. [2] Rates
32. [4] Reading Data
33. [5] Quadratics
34. [$1.25 < n < 4.75$] Inequalities
35. [1] Functions
36. [6] Synthetic Division
37. [40.5] Word Problems
38. [171] Word Problems

Practice Test 4 Answer Explanations

Section 3

1. [D] Both sides of the equation are the same (just in different order), so the equation must be true for any x.
2. [D] Ellie has collected $\frac{m}{2}$ coins, which is 5 more than Robert. So Robert must have collected $\frac{m}{2} - 5$ coins.
3. [B] The slope of the equation is 10, which means a student's score increases by 10 for each additional hour of study.
4. [C] From the graph, the x-intercepts of g are $-2, 0$, and 2. The correct $g(x)$ should output a value of zero when those numbers are plugged in. The only answer choice that does that is (C).
5. [D] Multiply the first equation by 2 and subtract to get $-9x = -36$, $x = 4$. Plugging this value back into the first equation,

$$\begin{aligned} -2(4) - y &= -9 \\ -8 - y &= -9 \\ y &= 1 \end{aligned}$$

6. [B] Product $= \frac{c}{a} = \frac{-9}{3} = -3$
7. [B] Only graphs (B), (D), and (E) have negative slopes. A line with a slope of $-\frac{1}{2}$ will not be very steep, 1 unit down for every 2 units to the right. Graph (B) is the one that shows this correctly.
8. [C] Plugging in $(-1, 0)$,

$$\begin{aligned} f(-1) &= 2(-1)^2 - a(-1) - 7 \\ 0 &= 2 + a - 7 \\ 5 &= a \end{aligned}$$

9. [B]

$$\begin{aligned} k^2x^{2a} &= x^{2a+2} \\ k^2x^{2a} &= x^{2a} \cdot x^2 \end{aligned}$$

Divide both sides by x^{2a},

$$k^2 = x^2$$

Since k and x are both positive, $k = x$. Therefore, $x - k = 0$.

10. [D] The lengths in choice (D) cannot make a triangle since $4 + 2 < 7$.
11. [A] Using the $30 - 60 - 90$ triangle relationship to find the values,

$$\sin 30^\circ - \cos 60^\circ = \frac{1}{2} - \frac{1}{2} = 0$$

12. $\boxed{B}$ Using the given point, we plug in $x = 2b$ and $y = -9$ into the equation:

$$\begin{aligned} y &= 2x - b \\ -9 &= 2(2b) - b \\ -9 &= 3b \\ -3 &= b \end{aligned}$$

13. $\boxed{C}$

$$\frac{(2i+1)}{(3i-2)} \cdot \frac{(3i+2)}{(3i+2)} = \frac{6i^2+4i+3i+2}{9i^2+6i-6i-4} = \frac{6i^2+7i+2}{9i^2-4} = \frac{-6+7i+2}{-9-4} = \frac{-4+7i}{-13} = \frac{4}{13} - \frac{7}{13}i$$

Therefore, $b = -\frac{7}{13}$.

14. $\boxed{B}$ The number 5 refers to the slope of -5, which means the train's speed *decreases* by 5 miles per hour for every 1 ton *increase* in cargo. However, this isn't in the answer choices. We have to apply the slope in the negative direction. The train's speed *increases* by 5 miles per hour for every 1 ton *decrease* in cargo.

15. $\boxed{B}$ Substituting the first equation into the second,

$$\begin{aligned} 4y &= (1-2y)^2 + 3 \\ 4y &= 1 - 4y + 4y^2 + 3 \\ 0 &= 4y^2 - 8y + 4 \\ 0 &= y^2 - 2y + 1 \end{aligned}$$

From here, it's pretty easy to finish solving for y, but for learning purposes, we'll use the discriminant to determine the number of solutions.

$$b^2 - 4ac = (-2)^2 - 4(1)(1) = 4 - 4 = 0$$

Because the discriminant is 0, there is only one value of y that satisfies the equation above, and therefore only one solution to the system of equations.

16. $\boxed{\frac{1}{5}}$

17. $\boxed{140}$ Because vertical angles are equal, the missing angle between $y°$ and $40°$ must have the same measure as angle z. Because the angles form a straight line,

$$\begin{aligned} y + z + 40 &= 180 \\ y + z &= 140 \end{aligned}$$

18. $\boxed{60}$ $c^2 - d^2 = (c+d)(c-d) = (-5)(-12) = 60$

19. $\boxed{\frac{1}{2}}$ Multiply both sides by $6x$.

$$\frac{3}{2x}(6x) - \frac{2}{3x}(6x) = \frac{5}{3}(6x)$$
$$3(3) - 2(2) = 10x$$
$$5 = 10x$$
$$\frac{1}{2} = x$$

20. $\boxed{\frac{3}{5}}$ Factor out a 5 from the left hand side.

$$7(2.5x - 1.5) = 12(0.5x - 0.3)$$
$$35(0.5x - 0.3) = 12(0.5x - 0.3)$$
$$23(0.5x - 0.3) = 0$$

From this equation, we can see that $0.5x - 0.3 = 0$. We can multiply both sides by 10 to get $5x - 3 = 0$ and $x = \frac{3}{5}$.

Section 4

1. $\boxed{C}$ When the tank is $100 - 70 = 30\%$ full, it contains 12 gallons. Let x be the number of gallons a full tank holds.

$$\frac{3}{10}x = 12$$
$$x = 40$$

2. $\boxed{B}$ From the graph, we can estimate the increase to be 130 million $-$ 76 million $=$ 54 million. It's clear that B is closest as long as we make reasonable estimations.

3. $\boxed{D}$ Scatterplot D shows exponential growth.

4. $\boxed{C}$ $\frac{5}{24} \approx 0.208 = 20.8\%$.

5. $\boxed{D}$ Let x be the number. After setting up the equation, we multiply both sides by 4.

$$15 + \frac{1}{4}x = 4x$$
$$60 + x = 16x$$
$$60 = 15x$$
$$4 = x$$

6. $\boxed{A}$ John's initial consultation fee must be a non-zero y-intercept, where the number of hours worked is 0. From the graph, the only non-zero y-intercept is 100. The other line must represent Will's wages.

7. [B] John's wages are less than Will's after the intersection point of the two lines, $h = 4$. Therefore, it is less expensive to hire John when the work is more than 4 hours, $h > 4$.

8. [A]

$$\frac{\text{Cars 9 to 15 years old}}{\text{All vehicles}} = \frac{44,601}{246,698} \approx 0.18$$

9. [A] Cross multiply.

$$\begin{aligned} 4(2a + 3b) &= 3(a - b) \\ 8a + 12b &= 3a - 3b \\ 5a &= -15b \\ \frac{a}{b} &= -3 \end{aligned}$$

10. [C] Combining like terms, $2x^3y^2 - 3x^3y^2 = -x^3y^2$ and $-3x^2y^3 + 2x^2y^3 = -x^2y^3$, giving us $-x^3y^2 - x^2y^3$.

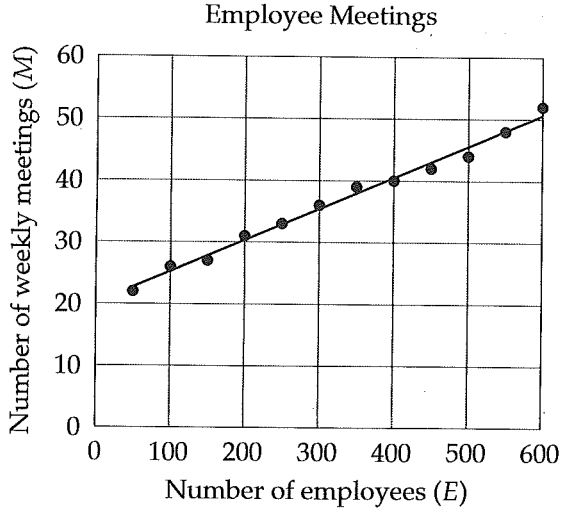
11. [D] The area of the shaded region is the sum of the shaded circle and the shaded crescent. Let's start with the easy part—the area of the shaded circle is $\pi(2)^2 = 4\pi$. To get the area of the shaded crescent, we subtract circle B from circle C: $\pi(6)^2 - \pi(4)^2 = 20\pi$. Adding the two components together,

$$4\pi + 20\pi = 24\pi$$

12. [A] Let $O = 100$. Then P is $0.50 \times 100 = 50$, N is $0.40 \times 100 = 40$, and M is $0.30 \times 40 = 12$.

$$\frac{12}{50} = \frac{6}{25}$$

13. [A] Drawing a line of best fit, we can establish a linear model from the grid points.



The line of best fit passes through $(200, 30)$ and $(400, 40)$. These are examples of points you would estimate from your line.

$$\text{Slope} = \frac{40 - 30}{400 - 200} = \frac{10}{200} = 0.05$$

So the line has an equation in the form of

$$M = 0.05E + b$$

Using the point $(200, 30)$, we can solve for b to get

$$M = 0.05E + 20$$

Another way to solve this problem is to test the two points with each of the answer choices. Only answer (A) gives accurate results.

14. $\boxed{A}$ The slope tells us the change in cost that results from a change of one unit sold. And because it's a positive slope, the total cost falls as the quantity of units sold falls. So, $14 \times 5 = 70$ is the decrease in total cost.

15. $\boxed{C}$

$$20Q = 14Q + 114$$
$$6Q = 114$$
$$Q = 19$$

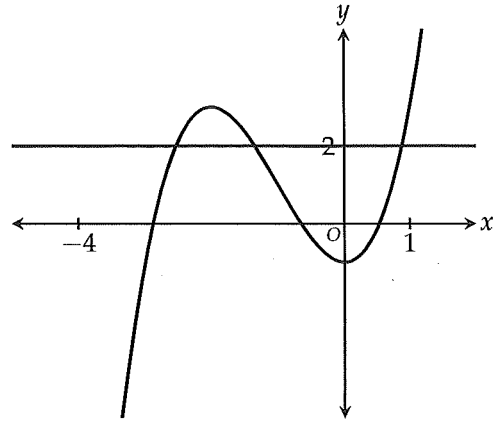
16. $\boxed{C}$ Because this question is asking for the change in "x" per change in "y" (the reverse of slope), we need to rearrange the equation to get k in terms of p:

$$p = 8 + 0.5k$$
$$2p = 16 + k$$
$$k = 2p - 16$$

Because the slope is 2, one more page requires 2 more pictures. The shortcut was to take the reciprocal of the slope of the original equation: $1/0.5 = 2$.

17. $\boxed{A}$ Jane would receive $2.75 \times 500 = 1,375$ dollars in rent for one month. For one year, she would receive $1,375 \times 12 = 16,500$ dollars.

18. $\boxed{D}$ Draw a line at $y = 2$.



The two graphs intersect at 3 different points, which means there are 3 different values of x for which $f(x) = 2$.

19. [D] $\angle A$ and $\angle C$ must add up to $180 - 110 = 70°$. Because $AB = BC$, $\angle A = \angle C$, which means they're each $70 \div 2 = 35°$. $y = 180 - 35 = 145°$.

20. [C] Let the length be x. The width is then $x + 35$.

$$\begin{aligned} 2x + 2(x + 35) &= 110 \\ 4x + 70 &= 110 \\ 4x &= 40 \\ x &= 10 \end{aligned}$$

The length is 10 and the width is $10 + 35 = 45$. Finally, the area is $10 \times 45 = 450$.

21. [B] Adjusting the equation, we get

$$y = -2x$$

which is a line with a slope of -2 that passes through the origin. If you graph it, it will run through quadrants II and IV.

22. [C] Plug 4 into each of the answer choices to see which one doesn't give -2. Answer (C) gives 2 instead of -2.

23. [D] The standard deviation says nothing about how the mean or the median of one data set compares with the mean or the median of another. The only thing it measures is how spread out, or variable, a data set is. A higher standard deviation implies that the data is more variable.

24. [B] Finding the radius from the circumference,

$$\begin{aligned} 2\pi r &= 5\pi \\ r &= 2.5 \end{aligned}$$

The volume of the cylinder is then $\pi r^2 h = \pi(2.5)^2(4) = 25\pi$

25. [B] Looking at the scatterplot, there are 4 points that are more than 5 units away vertically from the line of best fit. From left to right, they are the 2nd point, 3rd point, 5th point, and 6th point.

26. [B] Agency A spends $5,000 \times 22.5 = 112,500$ minutes processing all its requests. Agency B spends $6,500 \times 30 = 195,000$ minutes. Agency C spends $7,000 \times 17.5 = 122,500$ minutes. Agency D spends $9,000 \times 20 = 180,000$ minutes. Of these 4 agencies, Agency B spends the most time processing all its requests.

27. [D] Alfred's favorite drink is $\frac{2}{7}$ lime and $\frac{5}{7}$ raspberry soda, which means his bottle contains $\frac{2}{7}(21) = 6$ ounces of lime and $\frac{5}{7}(21) = 15$ ounces of raspberry soda. Let x be the number of ounces of raspberry soda Jenny must add to get her favorite drink, which is $\frac{4}{5}$ raspberry soda. When she adds more raspberry soda, the total number of ounces in the bottle increases by the added amount.

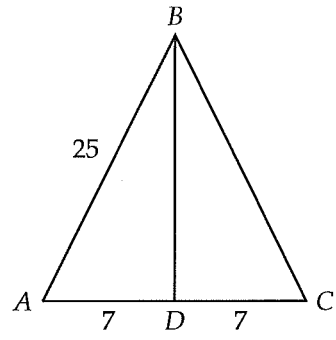
$$\frac{15 + x}{21 + x} = \frac{4}{5}$$

Cross multiplying,

$$\begin{aligned} 5(15+x) &= 4(21+x) \\ 75+5x &= 84+4x \\ x &= 9 \end{aligned}$$

Jenny must add 9 ounces of raspberry soda.

28. $\boxed{D}$ The triangle is isosceles. Draw a line down the middle to split the base in half.



Using the pythagorean theorem to find BD,

$$\begin{aligned} AD^2 + BD^2 &= AB^2 \\ 7^2 + BD^2 &= 25^2 \\ BD^2 &= 576 \\ BD &= \sqrt{576} = 24 \end{aligned}$$

Finally, $\sin A = \dfrac{24}{25} = 0.96$

29. $\boxed{C}$ The account will earn 3 percent for the first 5 years and then 7 percent for the remaining $t-5$ years. In the first five years, the total amount accumulated will be $1,000(1.03)^5$. Taking that result and treating it as the initial value for the remaining years, we get $1,000(1.03)^5(1.07)^{t-5}$.

30. $\boxed{C}$ We want a 100 gallons at the end, so $a+b=100$. One hundred gallons of a solution that is 55% acid contains 55 gallons of acid. Therefore, the acid from solution A and the acid from solution B must total 55: $0.6a+0.4b=55$.

31. $\boxed{2}$ The circumference of the track is $2\pi(25) \approx 157$ meters.

$$157 \cancel{\text{meters}} \times \frac{1 \text{ minute}}{75 \cancel{\text{meters}}} \approx 2 \text{ minutes}$$

32. $\boxed{4}$ There are four bars lower than the 25 mark on the y-axis.

33. $\boxed{5}$ We have two cases: either $a = 3$ or $a = 8$. If $a = 3$, then for 8 to also be a solution,

$$\begin{aligned} 8 - a - b &= 0 \\ 8 - 3 - b &= 0 \\ 5 - b &= 0 \\ b &= 5 \end{aligned}$$

Since this meets the condition that $b > 0$, $b = 5$. What if we let $a = 8$? Then for 3 to also be a solution,

$$\begin{aligned} 3 - a - b &= 0 \\ 3 - 8 - b &= 0 \\ -5 - b &= 0 \\ b &= -5 \end{aligned}$$

In this case, b is not greater than zero, confirming that $b = 5$ is indeed correct.

34. $\boxed{1.25 < n < 4.75}$ From the first inequality,

$$\begin{aligned} -4n + 7 &> -12 \\ -4n &> -19 \\ n &< 4.75 \end{aligned}$$

From the second inequality,

$$\begin{aligned} -4n - 7 &< -12 \\ -4n &< -5 \\ n &> 1.25 \end{aligned}$$

Putting the two results together, $1.25 < n < 4.75$.

35. $\boxed{1}$

$$\begin{aligned} f(m+1) &= 5 \\ (m+1)^2 - (m+1) + 3 &= 5 \\ m^2 + 2m + 1 - m - 1 + 3 &= 5 \\ m^2 + m - 2 &= 0 \\ (m+2)(m-1) &= 0 \\ m &= -2, 1 \end{aligned}$$

Since $m > 0$, $m = 1$.

36. $\boxed{6}$

$$\begin{array}{r|rcrcr} & x & - & 3 & & \\ \hline 2x+1 & 2x^2 & - & 5x & + & 3 \\ & 2x^2 & + & x & & \\ \hline & & - & 6x & + & 3 \\ & & - & 6x & - & 3 \\ \hline & & & & & 6 \end{array}$$

This result can be expressed as $x - 3 + \dfrac{6}{2x+1}$, from which R, the remainder, is equal to 6.

37. $\boxed{40.5}$ If we let r be the fraction, then the height reached after the second bounce is $128r$, the height reached after the third bounce is $128r^2$, and the height reached after the fourth bounce is $128r^3$.

$$128r^3 = 54$$

$$r^3 = \frac{54}{128}$$

$$r = \sqrt[3]{\frac{54}{128}} = \frac{3}{4}$$

The height reached after the fifth bounce is $54r = 54\left(\dfrac{3}{4}\right) = 40.5$

38. $\boxed{171}$ Let h be the initial height from which the ball was dropped.

$$hr = 128$$

$$h\left(\frac{3}{4}\right) = 128$$

$$h = 128\left(\frac{4}{3}\right) \approx 171$$

Practice Test 5 Answers

Question categories correspond to chapters in *The College Panda's SAT Math: The Advanced Guide and Workbook*. Note that for two part questions, the category of the first question is used for both questions.

Section 3

1. [C] Expressions
2. [A] Word Problems
3. [D] Rates
4. [C] Exponents & Radicals
5. [B] Interpreting Linear Models
6. [A] Lines
7. [A] Systems of Equations
8. [B] Manipulating and Solving Equations
9. [B] Trigonometry
10. [C] Functions
11. [B] Expressions
12. [A] Systems of Equations
13. [D] Exponential vs. Linear Growth
14. [D] Complex Numbers
15. [B] Synthetic Division
16. [30] Rates
17. [4] Functions
18. [45] Manipulating and Solving Equations
19. [25] Quadratics
20. [7 or 8] More Equation Solving Strategies

Section 4

1. [D] Rates
2. [B] Percent
3. [D] Manipulating and Solving Equations
4. [A] Interpreting Linear Models
5. [C] Reading Data
6. [D] Reading Data
7. [B] Functions
8. [A] Lines
9. [D] Inequalities
10. [B] Statistics I
11. [A] Percent
12. [B] Manipulating and Solving Equations
13. [B] Manipulating and Solving Equations
14. [D] Rates
15. [C] Circles
16. [B] Functions
17. [A] Expressions
18. [A] Exponential vs. Linear Growth
19. [D] Statistics II
20. [A] Statistics II
21. [C] Quadratics
22. [C] Probability
23. [B] Percent
24. [B] Circles
25. [B] Volume
26. [B] Lines
27. [B] Reading Data
28. [B] Absolute Value
29. [B] Word Problems
30. [B] Inequalities
31. [385] Percent
32. [20] Angles
33. [1] Manipulating and Solving Equations
34. [19] Quadratics
35. [30] Statistics I
36. [30] Triangles
37. [3000] Manipulating and Solving Equations
38. [4] Manipulating and Solving Equations

Practice Test 5 Answer Explanations

Section 3

1. [C] $\frac{x}{y} \div \frac{y}{z} = \frac{x}{y} \times \frac{z}{y} = \frac{xz}{y^2}$

2. [A] Let x be the number of dishes Paulina owns.

$$\begin{aligned} 24 + 3x &= 9x \\ 24 &= 6x \\ 4 &= x \end{aligned}$$

3. [D] Each month, Alex spends a total of $15 + 3x$ on movie rentals. So in one year, he'll spend $12(15 + 3x)$.

4. [C]

$$\begin{aligned} \frac{x^{a^2} \cdot x^{b^2}}{x^{2ab}} &= x^{25} \\ x^{a^2 - 2ab + b^2} &= x^{25} \\ a^2 - 2ab + b^2 &= 25 \\ (a-b)^2 &= 25 \\ a - b &= \pm 5 \end{aligned}$$

And 5 is the only one in the answer choices.

5. [B] The slope of 25 means that each hour brings 25 more visitors to the store. So two hours would bring $25 \times 2 = 50$ more visitors to the store.

6. [A] There are two cases: the line has a positive slope but a negative y-intercept, OR the line has a negative slope but a positive y-intercept. Try drawing both cases. In either case, the line never touches the negative side of the x-axis. Therefore, $(-1, 0)$ is the answer.

7. [A] Multiplying the first equation by 3, we can see that the coefficients of x and y match up but the constants on the right side do not. Therefore, there is no solution.

8. [B]

$$\begin{aligned} \frac{2x}{x^3 n} &= 1 \\ \frac{2}{x^2 n} &= 1 \\ \frac{2}{x^2} &= n \end{aligned}$$

9. $\boxed{B}$ In relation to θ, we're given the hypotenuse and asked for the adjacent. What trig function relates the adjacent with the hypotenuse? Cosine!

$$\cos\theta = \frac{AB}{1}$$

So, $AB = \cos\theta$.

10. $\boxed{C}$ In answer (C), $(x-1)^2$ is always greater than or equal to zero. Adding the 1 to it ensures the result is always positive. Therefore, $f(x) = (x-1)^2 + 1$ does not cross the x-axis. It's easy to see that the other answer choices have values of x that make $f(x) = 0$, which means they cross the x-axis.

11. $\boxed{B}$

$$\left(\frac{1}{xy}\right)(2x+2y) = \left(\frac{1}{xy}\right)(2x) + \left(\frac{1}{xy}\right)(2y) = \frac{2}{y} + \frac{2}{x}$$

12. $\boxed{A}$ To get rid of the fractions, multiply the first equation by 6 and the second equation by 5. The result is

$$\begin{aligned} 2x + y &= 30 \\ 3x + y &= -20 \end{aligned}$$

Subtract the equations to get $-x = 50$, $x = -50$. We can plug this result back into the first equation to get

$$\begin{aligned} 2(-50) + y &= 30 \\ -100 + y &= 30 \\ y &= 130 \end{aligned}$$

13. $\boxed{D}$ This is exponential growth at a rate of 2. Because the doubling happens twice a year, the rate should be applied $2t$ times.

14. $\boxed{D}$

$$\frac{4i}{(i-1)} \cdot \frac{(i+1)}{(i+1)} = \frac{4i^2 + 4i}{i^2 + i - i - 1^2} = \frac{-4+4i}{-2} = 2 - 2i$$

15. $\boxed{B}$ x, which can be written as $x - 0$, is a factor of $p(x)$ only if $p(0) = 0$ (the remainder theorem). Setting up an equation,

$$\begin{aligned} (3(0)^2 - 5)(0 + k) - 20 &= 0 \\ (-5)(k) - 20 &= 0 \\ -5k &= 20 \\ k &= -4 \end{aligned}$$

16. $\boxed{30}$ Matt needs $100 - 40 = 60$ more rare cards to meet his goal. If each pack contains 2 rare cards, he needs to buy $60 \div 2 = 30$ more packs.

17. $\boxed{4}$

$$\frac{2x-5}{6} = \frac{1}{2}$$
$$2x - 5 = 3$$
$$2x = 8$$
$$x = 4$$

18. $\boxed{45}$

$$\frac{3c}{d} = 4$$
$$3c = 4d$$
$$d = \frac{3c}{4}$$

Now make the substitution:

$$\frac{60d}{c} = \frac{60 \cdot \frac{3c}{4}}{c} = \frac{45c}{c} = 45$$

19. $\boxed{25}$ If a parabola is tangent to the x-axis, its equation only has one solution when set to 0.

$$x^2 - 10x + k = 0$$

The discriminant, $b^2 - 4ac$, must equal 0 for the equation above to have one solution.

$$(-10)^2 - 4(1)(k) = 0$$
$$100 - 4k = 0$$
$$k = 25$$

20. $\boxed{7 \text{ or } 8}$ Multiply both sides by $(x+3)(x-2)$.

$$22(x-2) - 6(x+3) = (x+3)(x-2)$$
$$22x - 44 - 6x - 18 = x^2 + x - 6$$
$$16x - 62 = x^2 + x - 6$$
$$0 = x^2 - 15x + 56$$
$$0 = (x-7)(x-8)$$

The two possible solutions are 7 and 8.

Section 4

1. $\boxed{D}$ $6,650 \div 400 \approx 16.63$ pesos.

2. $\boxed{B}$ Harry consumed $x - y$ ounces. To get the percentage of the bottle he drank, we divide by the original amount in the bottle, x, and multiply by 100: $\frac{100(x-y)}{x}$

3. [D]

$$\frac{x-10}{5} = 12$$
$$x - 10 = 60$$
$$x = 70$$

4. [A] The slope of the equation is 0.4, which means the weight of the tire increases by 0.4 pounds for every second the pump is used.

5. [C] The greatest change occurs between 2011 and 2012.

$$1.1 \text{ million} - 0.9 \text{ million} = 0.2 \text{ million} = \$200,000$$

6. [D] The value of Painting A was \$800,000 in 2009 and \$1,100,000 in 2014.

$$\text{Average Rate of Change} = \frac{1,100,000 - 800,000}{2014 - 2009} = \frac{300,000}{5} = \$60,000 \text{ per year}$$

7. [B] What values of x make $f(x) = 0$? We have $3, 1$, and -2. That's three times.

8. [A] Line l goes 3 units up for every 4 units to the right, which means it has a slope of $\frac{3}{4}$. Line m is perpendicular so its slope must be the negative reciprocal of line l's. The negative reciprocal of $\frac{3}{4}$ is $-\frac{4}{3}$.

9. [D] Setting up the inequality,

$$1,500 + 12x > 2,800$$
$$12x > 1,300$$
$$x > 108.333$$

Since dress shirts are sold as whole units, $x \geq 109$.

10. [B] The mean and the median get closer together when outliers, the data points furthest away from all the others, are removed. The outlier here is Town B.

11. [A] An increase of 35 percent means the resulting price is $1.35p$. A discount of 35 percent then brings the price to $(0.65)(1.35p)$, which is the same as answer A.

12. [B]

$$S = \pi^2(R^2 - r^2)$$
$$\frac{S}{\pi^2} = R^2 - r^2$$
$$\frac{S}{\pi^2} + r^2 = R^2$$
$$\sqrt{\frac{S}{\pi^2} + r^2} = R$$

13. $\boxed{B}$

$$S = \pi^2(R^2 - r^2)$$
$$S = \pi^2(10^2 - 4^2) = 84\pi^2$$

14. $\boxed{D}$ In 1 hour, the plant can process $90 \times 60 = 5400$ tons of coal. Now that we are comparing hours to hours, the rest is simple:

$$5400 \cancel{\text{tons}} \times \frac{3 \text{ trucks}}{135 \cancel{\text{tons}}} = 120 \text{ trucks}$$

15. $\boxed{C}$

$$2\pi r = 20\pi$$
$$r = 10$$

The standard form of a circle with center (h,k) and radius r is $(x-h)^2 + (y-k)^2 = r^2$. So the equation of the circle is $(x-2)^2 + (y+3)^2 = 100$.

16. $\boxed{B}$

$$f(b) = 29$$
$$b^3 + 2 = 29$$
$$b^3 = 27$$
$$b = \sqrt[3]{27}$$
$$b = 3$$
$$g(b) = 2b = 2(3) = 6$$

17. $\boxed{A}$ Combine like terms. $-4x^2y + 2xy^2 + (3x^2y^2 - 5x^2y^2) = -4x^2y + 2xy^2 - 2x^2y^2$

18. $\boxed{A}$ With linear growth, the population in the third year would be $600 + 400 = 1{,}000$. With exponential growth, the population triples each year, making the total 1,800 in the third year. The difference is $1{,}800 - 1{,}000 = 800$ turtles.

19. $\boxed{D}$ At a speed of 90 miles per hour, the line of best fit gives a fine of 100 dollars.

20. $\boxed{A}$ The slope is rise over run. Because the line of best fit has a positive slope, it's the increase in the fine for each additional mile per hour over the speed limit.

21. $\boxed{C}$ From the graph, we can see that the x-intercepts are -6 and 3, which means that two factors of the quadratic are $(x+6)$ and $(x-3)$. Answer (C) is the only one with both of these factors.

22. $\boxed{C}$ Wire transfer transactions accounted for the highest dollar value.

$$\frac{\text{Wire transfer complaints}}{\text{All complaints}} = \frac{106{,}472}{356{,}553} \approx 0.30$$

23. [B] Let x be the amount of the initial deposit.

$$x(1.05)^8 = 4{,}000$$
$$x = \frac{4{,}000}{(1.05)^8}$$

24. [B] Because $\triangle ACB$ is isosceles (radii are equal), $\angle CBA = 50°$ and $\angle ACB = 180 - 50 - 50 = 80°$.

$$\text{Area of sector} = \frac{80}{360} \times 54\pi = 12\pi$$

25. [B]

$$\text{Volume of ring} = \text{Area of base} \times \text{Height}$$
$$V = (\text{Area of square} - \text{Area of circle}) \times \text{Height}$$
$$V = (2.5^2 - \pi(1)^2) \times 0.5 \approx 1.55 \text{ cm}^3$$

26. [B] Line l is perpendicular to $y = -3x + c$, which means its slope must be $\frac{1}{3}$. Since line l also passes through $(0,0)$, its y-intercept is 0 and its equation must be $y = \frac{1}{3}x$. Finally, we plug in $(k, k-4)$, which is also on line l.

$$y = \frac{1}{3}x$$
$$k - 4 = \frac{1}{3}k$$
$$\frac{2}{3}k = 4$$
$$2k = 12$$
$$k = 6$$

27. [B] Driving along a circular road around the post office means that Pat's distance from the post office should stay the same during that time. That happens only during the portion from 1 hour to 3 hours.

28. [B] The midpoint of $1\frac{3}{4}$ and $2\frac{1}{4}$ is the average: $\left(1\frac{3}{4} + 2\frac{1}{4}\right)/2 = 2$. The midpoint is $\frac{1}{4}$ away from the boundaries of the accepted range for the weight of a muffin. So whatever m is, it must be within $\frac{1}{4}$ of the midpoint:

$$|m - 2| < \frac{1}{4}$$

29. $\boxed{B}$ Let x be the number of dollars she has at the start. After the first day, she has $0.75x$ dollars left. After the second day, she has $0.75(0.75x)$ dollars left.

$$\begin{aligned} 0.75(0.75x) &= 180 \\ 0.5625x &= 180 \\ x &= 320 \end{aligned}$$

30. $\boxed{B}$ From the given inequality, $x < n$. Subtracting both sides by n gives $x - n < 0$. Multiplying both sides by -1 gives $n - x > 0$ (note the sign change). Therefore, I is not true.

From the given inequality, $3n - 8 < n$, which gives $2n - 8 < 0$, $2n < 8$, $n < 4$. Therefore, II is true.

We can disprove III by making up some numbers. Let $n = 1$. Then $-5 < x < 1$ and $4n - 8 = -4$. But if we let $x = 0$, then $2x$ is also 0, which is greater than the -4 we got from $4n - 8$. Because we found one case where $2x \not< 4n - 8$, III is not always true.

31. $\boxed{385}$ If 30% DO include fries, then $100 - 30 = 70\%$ do not include fries.

$$70\% \text{ of } 550 = (0.70)(550) = 385$$

32. $\boxed{20}$

$$\begin{aligned} x &= \frac{2}{5}(x+30) \\ 5x &= 2(x+30) \\ 5x &= 2x + 60 \\ 3x &= 60 \\ x &= 20 \end{aligned}$$

33. $\boxed{1}$

$$\begin{aligned} \frac{4}{5} - 3\left(\frac{1}{2} + x\right) &= \frac{3}{10} - 4x \\ \frac{4}{5} - \frac{3}{2} - 3x &= \frac{3}{10} - 4x \\ x &= \frac{3}{10} - \frac{4}{5} + \frac{3}{2} = \frac{3}{10} - \frac{8}{10} + \frac{15}{10} = \frac{10}{10} = 1 \end{aligned}$$

34. $\boxed{19}$ Setting up an equation,

$$\begin{aligned} a(10 + 2a) &= 912 \\ 2a^2 + 10a &= 912 \\ 2a^2 + 10a - 912 &= 0 \\ a^2 + 5a - 456 &= 0 \end{aligned}$$

Now, we can use a graphing calculator or the quadratic formula to solve for a. In any case, you should get $a = -24$ or 19. Since $a > 0$, $a = 19$.

35. $\boxed{30}$ The fact that this question deals with percents is a hint that making up a number may be useful. We don't know the number of students in the class so let's say there are 100, in which case 20 students answered all the questions, leaving 80 students. Of the 80, 40 answered two-fifths of the questions (20 questions) and the remaining 40 answered three-fifths (30 questions).

$$\text{average} = \frac{\text{total number of questions answered}}{\text{number of students}} = \frac{20 \times 50 + 40 \times 20 + 40 \times 30}{100} = \frac{3000}{100} = 30$$

36. $\boxed{30}$ Outer triangle BAC is a multiple of the $3-4-5$ right triangle: $9-12-15$. You could have used the pythagorean theorem to find the sides if you didn't notice this. In any case, AC is 12. Inner triangle BDE is similar to outer triangle BAC. Using this similarity to find the length of DE,

$$\frac{DE}{BD} = \frac{AC}{BA}$$

$$\frac{DE}{6} = \frac{12}{6+3}$$

Cross multiplying,

$$9DE = 72$$

$$DE = 8$$

The area of the trapezoid is the area of the outer triangle minus the area of the inner triangle:

$$\frac{1}{2}(12)(9) - \frac{1}{2}(8)(6) = 54 - 24 = 30$$

37. $\boxed{3000}$ $S = 2,400 + (0.12)(5,000) = 3,000$

38. $\boxed{4}$

$$\begin{aligned} 4,500 &= 2,400 + 0.05x \\ 2,100 &= 0.05x \\ 42,000 &= x \end{aligned}$$

So the salesperson brought in \$42,000 in sales. Now we can set up a second equation to determine the necessary years of experience.

$$\begin{aligned} 9,960 &= 2,400 + c(42,000) \\ 7,560 &= 42,000c \\ 0.18 &= c \end{aligned}$$

which means he would have needed a total of 5 years of experience. That's $5 - 1 = 4$ more years than he currently has.

Practice Test 6 Answers

Question categories correspond to chapters in *The College Panda's SAT Math: The Advanced Guide and Workbook*. Note that for two part questions, the category of the first question is used for both questions.

Section 3

1. $\boxed{C}$ Manipulating and Solving Equations
2. $\boxed{A}$ Expressions
3. $\boxed{B}$ Proportion
4. $\boxed{C}$ Triangles
5. $\boxed{B}$ Rates
6. $\boxed{C}$ Functions
7. $\boxed{C}$ Interpreting Linear Models
8. $\boxed{B}$ Exponents & Radicals
9. $\boxed{D}$ Manipulating and Solving Equations
10. $\boxed{C}$ Rates
11. $\boxed{B}$ Systems of Equations
12. $\boxed{A}$ Trigonometry
13. $\boxed{C}$ Expressions
14. $\boxed{B}$ Complex Numbers
15. $\boxed{A}$ More Equation Solving Strategies
16. $\boxed{24}$ Rates
17. $\boxed{1 < m < 3}$ Word Problems
18. $\boxed{55}$ Manipulating and Solving Equations
19. $\boxed{5}$ Systems of Equations
20. $\boxed{14}$ Word Problems

Section 4

1. $\boxed{B}$ Exponential vs. Linear Growth
2. $\boxed{B}$ Percent
3. $\boxed{A}$ Probability
4. $\boxed{C}$ Expressions
5. $\boxed{C}$ Inequalities
6. $\boxed{B}$ Statistics I
7. $\boxed{D}$ Word Problems
8. $\boxed{C}$ Reading Data
9. $\boxed{A}$ Circles
10. $\boxed{C}$ Inequalities
11. $\boxed{D}$ Word Problems
12. $\boxed{A}$ Statistics II
13. $\boxed{D}$ Interpreting Linear Models
14. $\boxed{C}$ Interpreting Linear Models
15. $\boxed{D}$ Functions
16. $\boxed{B}$ Manipulating and Solving Equations
17. $\boxed{D}$ Systems of Equations
18. $\boxed{A}$ Volume
19. $\boxed{C}$ Statistics II
20. $\boxed{D}$ Lines
21. $\boxed{C}$ Lines
22. $\boxed{D}$ Percent
23. $\boxed{D}$ Functions
24. $\boxed{B}$ Statistics I
25. $\boxed{B}$ Reading Data
26. $\boxed{C}$ Reading Data
27. $\boxed{B}$ Functions
28. $\boxed{D}$ Percent
29. $\boxed{C}$ Word Problems
30. $\boxed{A}$ Quadratics
31. $\boxed{72}$ Angles
32. $\boxed{55}$ Percent
33. $\boxed{29}$ Functions
34. $\boxed{\frac{1}{2}}$ Manipulating and Solving Equations
35. $\boxed{16}$ Triangles
36. $\boxed{5}$ Inequalities
37. $\boxed{65}$ Manipulating and Solving Equations
38. $\boxed{128}$ Manipulating and Solving Equations

Practice Test 6 Answer Explanations

Section 3

1. C

$$12y^2 = \frac{12}{49}$$
$$y^2 = \frac{1}{49}$$
$$y = \frac{1}{7}$$

2. A $\frac{36a}{12} + \frac{24w}{6} = 3a + 4w$

3. B For answer choice (B), $\frac{m}{n} = \frac{2}{\frac{8}{3}} = 2 \times \frac{3}{8} = \frac{6}{8} = \frac{3}{4}$

4. C The two right triangles are similar. The sides of the triangle on the right are one-fourth the length of those of the triangle on the left. Therefore, $a = \frac{1}{4}b$, which gives $b = 4a$.

5. B Jacob reads at a rate of $23 \div 50 = 0.46$ pages per minute. Therefore, he reads $0.46t$ pages in t minutes. The number of remaining pages is the total number of pages minus what he has read: $740 - 0.46t$

6. C $f(x^2 + 4)$ means "replace x with $x^2 + 4$." So, $f(x^2 + 4) = \sqrt{x^2 + 4} + 1$. There is no simplification that can be done.

7. C The number 3 refers to the slope, which means each additional form a doctor has to fill out reduces the average time the doctor spends with each patient by 3 minutes.

8. B

$$2^{a+4} = 8^a$$
$$2^{a+4} = (2^3)^a$$
$$2^{a+4} = 2^{3a}$$
$$a + 4 = 3a$$
$$4 = 2a$$
$$2 = a$$

9. $\boxed{D}$

$$\frac{2a+2b}{3c+3d}=1$$

Multiply both sides by 3 and then divide both sides by 2:

$$\frac{a+b}{c+d}=\frac{3}{2}$$

Now multiply both sides by 3 and divide both sides by 4 to get the desired fraction:

$$\frac{3a+3b}{4c+4d}=\frac{3}{2}\cdot\frac{3}{4}=\frac{9}{8}$$

10. $\boxed{C}$ Pre-tax, the total price of the tacos is $5x$. The price of each burger is $2x$, so 7 burgers cost $14x$. The total pre-tax price is then $5x+14x=19x$. After tax, the total bill is $1.05(19x)$.

11. $\boxed{B}$ Multiply the first equation by 2 and subtract to get $9y=36$, $y=4$. Substituting this into the first equation,

$$\begin{aligned}5x+4&=9\\5x&=5\\x&=1\end{aligned}$$

12. $\boxed{A}$ Draw a line from point A to the x-axis to form a right triangle. We're given the hypotenuse and n happens to be the length of the opposite side to angle θ. What trig function relates the opposite side to the hypotenuse? Sine!

$$\begin{aligned}\sin\theta&=\frac{n}{5}\\5\sin\theta&=n\end{aligned}$$

13. $\boxed{C}$ The common denominator is $(x+2)(x-1)$.

$$\begin{aligned}\frac{x+1}{x+2}-\frac{x-2}{x-1}&=\frac{(x+1)(x-1)-(x-2)(x+2)}{(x+2)(x-1)}\\&=\frac{(x^2-1)-(x^2-4)}{(x+2)(x-1)}\\&=\frac{3}{(x+2)(x-1)}\end{aligned}$$

14. $\boxed{B}$ The common denominator is $(1-i)(1+i)$.

$$\frac{(4+i)(1+i)}{(1-i)(1+i)}+\frac{(2-i)(1-i)}{(1-i)(1+i)}=\frac{(4+i+4i+i^2)+(2-2i-i+i^2)}{1+i-i-i^2}=\frac{4+5i-1+2-3i-1}{1-(-1)}=\frac{4+2i}{2}$$
$$=2+i$$

15. $\boxed{A}$ Expand the left hand side to compare coefficients.

$$mnx^2 + cnx + 3mx + 3c = 12x^2 + 5x - 3$$
$$mnx^2 + (cn + 3m)x + 3c = 12x^2 + 5x - 3$$

So, $3c = -3$ and $cn + 3m = 5$ and $mn = 12$. So, $c = -1$ and we're left with the following two equations:

$$\begin{cases} 3m - n = 5 \\ mn = 12 \end{cases}$$

You could solve these by substituting the first equation into the second, but with a little mental trial and error, it's easy to guess that $m = 3, n = 4$. Therefore, $m + n = 7$.

16. $\boxed{24}$ The computer will have a total of $2 + 4 = 6$ memory cards, which will contribute a total $6 \times 4 = 24$ gigabytes of memory.

17. $\boxed{1 < m < 3}$

$$m^2 + 3 < 4m$$
$$m^2 - 4m + 3 < 0$$
$$(m - 3)(m - 1) < 0$$

It's not too hard to see that the expression on the left is negative when $1 < m < 3$.

18. $\boxed{55}$ $30\left(x^3 + \frac{1}{6}x^2 + \frac{2}{3}x\right) = 30x^3 + 5x^2 + 20x$. Therefore, $a = 30, b = 5$, and $c = 20$. $a + b + c = 55$.

19. $\boxed{5}$ For the system to have infinitely many solutions, the equations must be the same. We divide the first equation by 4 to get the 36 to match the 9 in the second equation. Doing this gives $c = \frac{5}{4}$ and $d = 16 \div 4 = 4$. Finally, $cd = \frac{5}{4} \times 4 = 5$

20. $\boxed{14}$ Let x be the number of ounces a regular shampoo bottle contains. A deluxe bottle then contains $x + 6$ ounces. Forming an equation,

$$4x + 3(x + 6) = 74$$
$$4x + 3x + 18 = 74$$
$$7x = 56$$
$$x = 8$$

A regular bottle contains 8 ounces and a deluxe bottle contains $8 + 6 = 14$ ounces.

Section 4

1. $\boxed{B}$ Scatterplot B is more spread apart and doesn't form a straight line as closely as the other answer choices do.

2. $\boxed{B}$ $\frac{447 - 292}{292} \approx 0.53 = 53\%$

3. $\boxed{A}$

$$\frac{\text{Received 2 shots and contracted the flu}}{\text{All students}} = \frac{6}{108} = \frac{1}{18}$$

4. $\boxed{C}$ Expand and combine like terms.

$$6xy + 3xyz + 3yz - 3xy - 5xyz + 2yz = 3xy - 2xyz + 5yz$$

5. $\boxed{C}$ Split the two inequalities up and handle them separately. For the first inequality, multiply both sides by $11x$:

$$\begin{aligned} \frac{2}{11} &< \frac{3}{x} \\ 2x &< 33 \\ x &< 16.5 \end{aligned}$$

For the second inequality, multiply both sides by $14x$:

$$\begin{aligned} \frac{3}{x} &< \frac{5}{14} \\ 42 &< 5x \\ 8.4 &< x \end{aligned}$$

Putting the two results together, $8.4 < x < 16.5$. Now because x is an integer, $9 \leq x \leq 16$. There are 8 integer values between 9 and 16 (inclusive).

6. $\boxed{B}$

$$\frac{(20 \times 1) + (21 \times 3) + (22 \times 4) + (24 \times 1) + (25 \times 1)}{1+3+4+1+1} = \frac{220}{10} = 22$$

7. $\boxed{D}$ Let one number be x and the other be $4x$.

$$\begin{aligned} x + 4x &= -20 \\ 5x &= -20 \\ x &= -4 \end{aligned}$$

The two numbers are -4 and $4 \times -4 = -16$. The larger of the two is -4.

8. $\boxed{C}$ From the graph, the density of Liquid X at 9 degrees Celsius is 60 kg/L. Ten liters of Liquid X has a mass of

$$10 \text{ L} \times \frac{60 \text{ kg}}{L} = 600 \text{ kg}$$

This is closest to the 500 in answer choice (C).

9. [A] Converting radians to degrees,

$$\frac{\pi}{10} \text{ radians} \times \frac{180^\circ}{\pi \text{ radians}} = 18^\circ$$

Because segment $\overline{AB}$ is tangent to the circle, $\angle OAB = 90^\circ$. The central angle AOB is then $180 - 18 - 90 = 72^\circ$, which is $\frac{72^\circ}{360^\circ} = \frac{1}{5}$ of 360°. This means that the sector is $\frac{1}{5}$ of the circle. Since the area of the sector is π, the area of the entire circle must be 5π.

10. [C] The estimated maximum heart rate for a 30-year-old is $220 - 30 = 190$. Fifty percent of that is 95 and eighty percent of that is 152. Therefore, $95 \leq h \leq 152$.

11. [D] Let the number of pages of the smaller book be x. The larger book then has $x + 50$ pages.

$$\begin{aligned} x + (x + 50) &= 400 \\ 2x + 50 &= 400 \\ 2x &= 350 \\ x &= 175 \end{aligned}$$

The longer book has $175 + 50 = 225$ pages.

12. [A] The y-intercept is the value of y when the value of x is 0. In this case, it's the number of copies sold for a book that has spent 0 weeks on the best seller list (has not been on the best seller list).

13. [D] Answer (A) is wrong because the initial amount of sugar already in the drink was $8 - \frac{4}{0+1} = 4$ grams. After a very long time, the fraction $\frac{4}{s+1}$ approaches zero. Therefore, the amount of sugar dissolved in the drink will approach $8 - 0 = 8$ grams.

14. [C] Multiply both sides by $(s + 1)$,

$$\begin{aligned} a(s+1) &= 8(s+1) - 4 \\ as + a &= 8s + 8 - 4 \\ as - 8s &= 4 - a \\ s(a - 8) &= 4 - a \\ s &= \frac{4-a}{a-8} \end{aligned}$$

15. [D] Test the answer choices by plugging in enough values from the table to narrow them down to one. For example, testing answer (D), we plug in $t = 8$ to get $3{,}000 \cdot 2^{8/4} = 3{,}000 \cdot 2^2 = 12{,}000$, which lines up with the number listed in the table. In fact, answer (D) is the only one that gives the correct result for all the values of t in the table.

16. [B] Divide both sides by 3,

$$(a + b) = \frac{2}{9}$$

Then

$$\frac{a+b}{2} = \frac{\frac{2}{9}}{2} = \frac{1}{9}$$

17. [D] Getting the first equation into $y = mx + b$ form,

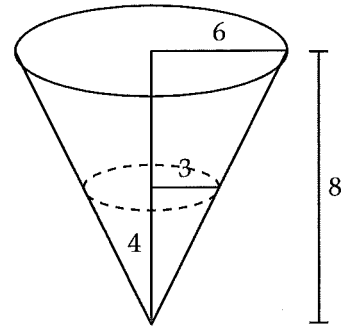
$$y = -\frac{3}{2}x + \frac{5}{2}$$

Doing the same for the second equation,

$$y = \frac{3}{2}x + \frac{5}{2}$$

The slopes are not the same nor is one the negative reciprocal of the other. Therefore, the two lines intersect but are not perpendicular.

18. [A] At a depth of half the cone's height, the radius is 3 (similar triangles).

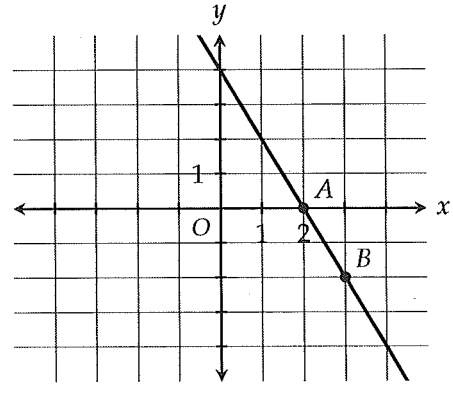


The volume of the water (the smaller cone) is

$$V = \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi(3)^2(4) = 12\pi$$

19. [C] According to the data point, the subject who had 3 hours of sleep answered 16 questions incorrectly. The line of best fit predicts a subject who had 3 hours of sleep to answer 12 questions incorrectly. That's a difference of 4 questions.

20. [D] Continuing the line, you should see that the slope is -2 and the y-intercept is 4.

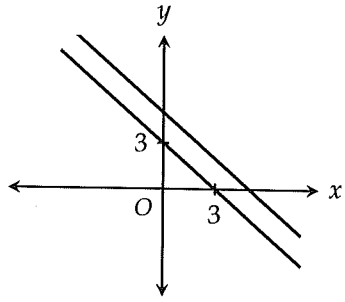


21. [C] A slope of 6 means up 6 units for every 1 unit to the right, or down 6 units for every 1 unit to the left. Starting from point A, the point $(3, 6)$ is 6 units up and 1 unit to the right. Therefore, $(3, 6)$ is on line l.

22. $\boxed{D}$

$$\begin{aligned} \text{this year} &= (0.70)(\text{last year}) \\ 270,000 &= (0.70)(\text{last year}) \\ 386,000 &\approx \text{last year} \end{aligned}$$

23. $\boxed{D}$ The graph of g is 2 units up from where f is.



It's easy to see that both the x and y intercepts are increased by 2. Therefore, the x-intercept is 5.

24. $\boxed{B}$ The distribution of jean sizes for Store A is more clustered around a single number (29) than the distribution for Store B, which is spread out equally over all sizes. Therefore, the standard deviation for Store B is larger.

25. $\boxed{B}$ At a value of 20 along the x-axis, the best fit curve gives a value of 15 along the y-axis.

26. $\boxed{C}$ In this case, the vertex is the lowest point on the best fit curve. Furthermore, none of the data points fall below the vertex. Therefore, the vertex can be interpreted as the number of applications for a job that requires the least amount of time to fill. Note that the answer is not (B). From the point $(10, 15)$ on the best fit curve, the minimal number of applications required to fill a job within 15 days is 10, and this point is clearly not the vertex.

27. $\boxed{B}$ To compress $g(x)$ horizontally by a factor of 2, substitute $2x$ for x:

$$g(2x)$$

To shift $g(x)$ to the right by 1 unit, substitute $x - 1$ for x:

$$f(x) = g(2(x-1)) = g(2x-2)$$

28. $\boxed{D}$ Let Stacy's initial deposit be x,

$$\begin{aligned} \text{Nancy} &= \text{Stacy} \\ 1,000(1.08)^{10} &= x(1.04)^{10} \\ \frac{1,000(1.08)^{10}}{(1.04)^{10}} &= x \\ 1,460 &\approx x \end{aligned}$$

29. $\boxed{C}$ Let the number of students be s.

$$\frac{s}{10}+\frac{s}{15}+\frac{s}{30}=k$$
$$3s+2s+s=30k$$
$$6s=30k$$
$$s=5k$$

30. $\boxed{A}$ The x-intercepts of the parabola are $\frac{1}{2}$ and $\frac{11}{2}$. The x-coordinate of the vertex is the average of these two values.

$$\left(\frac{1}{2}+\frac{11}{2}\right)\div 2=6\div 2=3$$

At $x=3, y=(2(3)-1)(2(3)-11)=(5)(-5)=-25$. Therefore, the vertex is at $(3,-25)$.

31. $\boxed{72}$ Because MN is a line,

$$5a=180$$
$$a=36$$

Now, $b=2a=2(36)=72$.

32. $\boxed{55}$ Calculators that require AAA batteries: $550(0.10)=55$. Alarm clocks that require AAA batteries: $440(0.25)=110$. Difference: $110-55=55$.

33. $\boxed{29}$ If $2f(b)=28$, then $f(b)=14$. Solving for b,

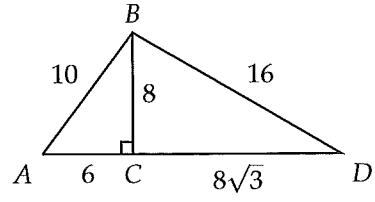
$$f(b)=3b-1$$
$$14=3b-1$$
$$15=3b$$
$$5=b$$

Finally, $f(2b)=f(10)=3(10)-1=29$.

34. $\boxed{\frac{1}{2}}$ Multiply both sides by x.

$$10x+6=22x$$
$$6=12x$$
$$\frac{1}{2}=x$$

35. $\boxed{16}$ From the $6-8-10$ triangle and the $30^\circ-60^\circ-90^\circ$ triangle relationship, $BD=16$.



36. $\boxed{5}$ Split the inequality up into two parts. In the first part,

$$\begin{aligned} 9 &\leq -5x - 6 \\ 15 &\leq -5x \\ -3 &\geq x \end{aligned}$$

In the second part,

$$\begin{aligned} -5x - 6 &\leq 34 \\ -5x &\leq 40 \\ x &\geq -8 \end{aligned}$$

Putting the two results together, $-8 \leq x \leq -3$. The greatest possible value of x is -3 and the least possible value of x is -8.

$$a - b = -3 - (-8) = 5$$

37. $\boxed{65}$ Checking in the bag costs $70 - 25 = \$45$ above the fixed fee. Therefore, the bag must exceed the overweight limit by $45 \div 3 = 15$ pounds. The total weight of the bag is then $50 + 15 = 65$ pounds.

38. $\boxed{128}$

$$\begin{aligned} C &= 25 + 3(x - 50) \\ C &= 25 + 3x - 150 \\ C &= 3x - 125 \end{aligned}$$

Therefore, $a + b = 3 + 125 = 128$.

Practice Test 7 Answers

Question categories correspond to chapters in *The College Panda's SAT Math: The Advanced Guide and Workbook.* Note that for two part questions, the category of the first question is used for both questions.

Section 3

1. [C] Exponents & Radicals
2. [D] Rates
3. [C] Manipulating and Solving Equations
4. [B] Interpreting Linear Models
5. [C] Expressions
6. [D] Lines
7. [A] Expressions
8. [A] Rates
9. [B] Manipulating and Solving Equations
10. [C] Interpreting Linear Models
11. [A] Lines
12. [B] Functions
13. [C] Trigonometry
14. [C] Quadratics
15. [C] Manipulating and Solving Equations
16. [800] Rates
17. [4] Systems of Equations
18. [5] Manipulating and Solving Equations
19. $\left[\frac{9}{4}\right]$ Manipulating and Solving Equations
20. [2] Synthetic Division

Section 4

1. [A] Statistics I
2. [C] Rates
3. [C] Reading Data
4. [D] Percent
5. [C] Word Problems
6. [B] Reading Data
7. [A] Reading Data
8. [C] Functions
9. [A] Circles
10. [D] Exponential vs. Linear Growth
11. [D] Quadratics
12. [D] Statistics II
13. [C] Percent
14. [B] Rates
15. [C] Functions
16. [B] Systems of Equations
17. [B] Lines
18. [D] Statistics II
19. [A] Manipulating and Solving Equations
20. [C] Manipulating and Solving Equations
21. [C] Statistics I
22. [B] Functions
23. [B] Manipulating and Solving Equations
24. [A] Probability
25. [B] Proportion
26. [B] Systems of Equations
27. [D] Synthetic Division
28. [D] Inequalities
29. [B] Inequalities
30. [D] Triangles
31. $\left[\frac{5}{4}\right]$ Manipulating and Solving Equations
32. [4] Reading Data
33. [8.75] Interpreting Linear Models
34. [11] Expressions
35. [50] Angles
36. [7] Functions
37. [90] Circles
38. [5.7] Circles

Practice Test 7 Answer Explanations

Section 3

1. C

$$\sqrt[3]{x^2} \cdot \sqrt{x^3} = x^{\frac{2}{3}} \cdot x^{\frac{3}{2}} = x^{\frac{2}{3}+\frac{3}{2}} = x^{\frac{13}{6}}$$

2. D After m months, he loses mx pounds. His total weight is then $230 - mx$.

3. C

$$ab = (b+c) \cdot b = b^2 + bc$$

4. B The slope of the line is 25, which means the monthly insurance premium increases by 25 for each car accident.

5. C Split the fraction up into two parts.

$$\frac{3x-2}{12x^2} = \frac{3x}{12x^2} - \frac{2}{12x^2} = \frac{1}{4x} - \frac{1}{6x^2}$$

6. D A line that is perpendicular to the y-axis is a horizontal one. Since it passes through $(3,4)$, the horizontal line must be $y = 4$.

7. A The given expression is in the pattern of $(a+b)(a-b) = a^2 - b^2$, where $a = m+n$ and $b = 1$. Therefore, the expression is equivalent to $(m+n)^2 - 1^2$, which is equal to $m^2 + 2mn + n^2 - 1$.

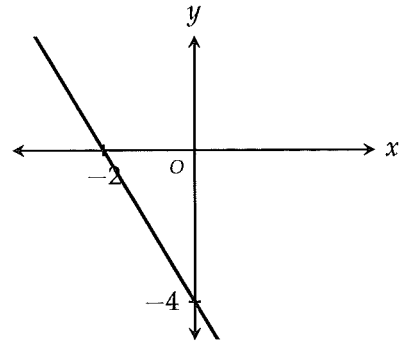
8. A Jonas bought the jacket for $0.8x$. Together, the two jackets cost $x + 0.8x = 1.8x$. After the 10 percent tax, the final price is $1.1(1.8x)$. Remember from the percent chapter that we multiply by 1.1 for a 10 percent increase.

9. B

$$p = at^3 - bt + c$$
$$p - at^3 - c = -bt$$
$$\frac{at^3 + c - p}{t} = b$$

10. C The number 16,000 is the y-intercept of the equation, Jake's total monthly revenue when he has no franchise locations. The 16,000 must be the monthly revenue generated by Jake's own restaurant.

11. [A] Draw a line from the x-intercept of -2 to the y-intercept of -4.



As you can see, it goes 4 units down for every 2 units to the right. The slope is $\frac{-4}{2} = -2$.

12. [B] Since the function is linear, the y must go up (or go down) by the same amount for each equal change in x. From $x = 5$ to $x = 6$, the y increases by 4. Therefore, m must be $-10 + 4 = -6$ and n must be $2 + 4 = 6$. $m + n = -6 + 6 = 0$.

13. [C]

$$c \sin\theta = c \times \frac{a}{c} = a$$

14. [C] Using the quadratic formula,

$$x = \frac{-3b \pm \sqrt{(3b)^2 - 4(1)(2b^2)}}{2(1)} = \frac{-3b \pm \sqrt{9b^2 - 8b^2}}{2} = \frac{-3b \pm b}{2}$$

So,

$$x = \frac{-3b - b}{2} = -2b \text{ or } x = \frac{-3b + b}{2} = -b$$

We also could've factored to get directly to the answer.

$$x^2 + 3bx + 2b^2 = (x + 2b)(x + b)$$

15. [C] The perimeter of a semicircle is half the circumference of a circle and two radii: $\pi r + 2r$

$$P = \pi r + 2r$$
$$P = r(\pi + 2)$$
$$\frac{P}{\pi + 2} = r$$

16. [800] Four printers of the same type can print $50 \times 4 = 200$ pages in 3 minutes.

$$12 \cancel{\text{ minutes}} \times \frac{200 \text{ pages}}{3 \cancel{\text{ minutes}}} = 800 \text{ pages}$$

17. $\boxed{4}$ Multiply the second equation by 2 and add to get $-y = -3$, which means $y = 3$. Plugging this value into the second equation,

$$\begin{aligned} -x + 3 &= -1 \\ -x &= -4 \\ x &= 4 \end{aligned}$$

18. $\boxed{5}$ Equate the exponents.

$$\begin{aligned} \left(x^{2a-3}\right)^2 &= x^{14} \\ 4a - 6 &= 14 \\ 4a &= 20 \\ a &= 5 \end{aligned}$$

19. $\boxed{\frac{9}{4}}$ Divide both sides by 4 to get $0.5x + 0.5y = \frac{9}{4}$

20. $\boxed{2}$ If $x + 1$ is a factor of $p(x)$, then the remainder is 0 when $p(x)$ is divided by $x + 1$. Using the remainder theorem,

$$\begin{aligned} p(-1) &= 0 \\ 4(-1)^3 - k(-1) + k &= 0 \\ -4 + 2k &= 0 \\ 2k &= 4 \\ k &= 2 \end{aligned}$$

Section 4

1. $\boxed{A}$

$$\frac{\text{Total} - \text{Sat} - \text{Sun}}{5} = \frac{27,615 - 6,230 - 5,695}{5} = 3,138$$

2. $\boxed{C}$

$$3 \cancel{\text{miles}} \times \frac{5280 \cancel{\text{feet}}}{1 \cancel{\text{mile}}} \times \frac{61 \text{ cm}}{2 \cancel{\text{feet}}} = 483,120 \text{ cm}$$

3. $\boxed{C}$ The peak of the graph occurs at around age 25.

4. $\boxed{D}$ If 37.5% think that new computers are a higher priority, then $100 - 37.5 = 62.5\%$ think new textbooks are a higher priority.

$$62.5\% \text{ of } 2,200 = (0.625)(2,200) = 1,375$$

5. [C] Let's do some trial and error with different numbers of apples:

apples	bananas	oranges	total
1	3	4	8
2	4	8	14
3	5	12	20
4	6	16	26

And we've arrived at an answer choice: 26. Notice that the total increases by 6 each time we increase the number of apples by 1.

6. [B] Bates: $\frac{40}{60} = \frac{2}{3}$. Bentley: $\frac{60}{80} = \frac{3}{4}$. Collins: $\frac{50}{75} = \frac{2}{3}$. Only Bates and Collins.

7. [A] In 2012, the total budget was $35 + 60 + 80 + 75 = 250$. In 2013, the total budget was $50 + 40 + 60 + 50 = 200$. The percent decrease is

$$\frac{200 - 250}{250} \times 100 = -20\%$$

8. [C] You have to do a little guessing and checking. There are two outputs for $f(x)$: $x + 2$ and $x - 2$. Let's try to get the output to be 1. For the output to be 1, x must equal -1 if we're looking at $x + 2$. However, this can't be possible because $x + 2$ is the output only if $x \geq 0$. In the second case, $x = 3$ if we're looking at $x - 2$. However, this also can't be possible because $x - 2$ is the output only if $x < 0$. Therefore, 1 can never be the output of $f(x)$. All the other answer choices are possible to obtain using valid values of x.

9. [A] The center of the circle is at $(0,3)$. Its radius is $\sqrt{25} = 5$. Therefore, the circle intersects the y-axis at $(0,3+5) = (0,8)$ and $(0,3-5) = (0,-2)$.

10. [D] The value of the house is always 0.75 of what it was the previous year. Because this rate is less than 1, it is exponential decay.

11. [D] There are two ways to do this question. We could expand everything out and complete the square, but the faster way is find the x-coordinate of the vertex by averaging the x-intercepts, -4 and 6, to get 1. The only answer choice that contains 1 as a constant is answer (D). It's also the only answer choice in vertex form.

12. [D] The customers who chose the sandwich themselves are probably not representative of all the customers of the restaurant. People who regularly buys salads, for example, would likely be excluded from the results.

13. [C] $800\left(1 + \frac{0.04}{2}\right)^{2 \cdot 5} = 800(1.02)^{10} \approx 975$

14. [B] At the official exchange rate, James would receive

$$800 \cancel{\text{U.S. dollars}} \times \frac{1 \text{ euro}}{1.40 \cancel{\text{U.S. dollars}}} \approx 571.54 \text{ euros}$$

At the airport rate, he would receive

$$800 \cancel{\text{U.S. dollars}} \times \frac{1 \text{ euro}}{1.55 \cancel{\text{U.S. dollars}}} \approx 516.13 \text{ euros}$$

That's a difference of $571.54 - 516.13 \approx 55$ euros.

15. $\boxed{C}$

$$\begin{aligned} f(k) &= g(k) \\ k^2 - 3k &= 2k + 14 \\ k^2 - 5k - 14 &= 0 \\ (k-7)(k+2) &= 0 \\ k &= 7, -2 \end{aligned}$$

There are two values of k for which $f(k) = g(k)$, which means f and g intersect two times.

16. $\boxed{B}$ Let d be the cost of a doll and c be the cost of a toy car. Based on the information, we can form the following two equations:

$$\begin{aligned} 2d + 3c &= 88 \\ 3d + 2c &= 62 \end{aligned}$$

Add the two equations to get $5d + 5c = 150$. Divide both sides by 5 to get $d + c = 30$.

17. $\boxed{B}$ The slope between the first and second points must be the same as the slope between the second and third points.

$$\begin{aligned} \frac{7-3}{-2-0} &= \frac{k-7}{5-(-2)} \\ -2 &= \frac{k-7}{7} \\ -14 &= k-7 \\ -7 &= k \end{aligned}$$

18. $\boxed{D}$ Answer (D) best expresses the meaning of a confidence interval, which merely suggests where the statistical mean is and does not say anything about the likelihood of the mean being there (like answers (A) and (B) do). Nor does a confidence interval say anything about the engineers themselves (like answer (C) does). Answer (B) is especially wrong because it goes beyond the scope of engineers in Silicon Valley and tries to conclude something about engineers in all of California.

19. $\boxed{A}$

$$\begin{aligned} T &= \frac{2m_1m_2}{m_1+m_2}g \\ T(m_1+m_2) &= 2m_1m_2g \\ \frac{T(m_1+m_2)}{2m_1m_2} &= g \end{aligned}$$

20. [C] The tension would be doubled.

$$T_{old} = \frac{2m_1m_2}{m_1+m_2}g$$

$$T_{new} = \frac{2(2m_1)(2m_2)}{2m_1+2m_2}g = \frac{4(2m_1m_2)}{2(m_1+m_2)}g = 2T_{old}$$

21. [C] For these types of questions, we must calculate the lower limit and the upper limit of the average.

$$\text{Lower Limit} = \frac{(30\times 2)+(60\times 4)+(90\times 3)+(120\times 1)+(150\times 5)}{15} = 96$$

$$\text{Upper Limit} = \frac{(60\times 2)+(90\times 4)+(120\times 3)+(150\times 1)+(180\times 5)}{15} = 126$$

The only answer choice between these two limits is 123.

22. [B]

$$f(5) = f(2+3) = f(2) - 3 = 10 - 3 = 7$$

23. [B] Expand.

$$\begin{aligned}(x^2+2xy+y^2)-(x^2-2xy+y^2) &= 60\\ 4xy &= 60\\ xy &= 15\end{aligned}$$

$x+y$ is 8 when $x=3$ and $y=5$.

24. [A] For marketing, the proportion is $\frac{6+7}{24} \approx 0.54$. For engineering, the proportion is $\frac{4+4}{25} = 0.32$. For accounting, the proportion is $\frac{1+15}{37} \approx 0.43$. For human resources, the proportion is $\frac{2+5}{14} \approx 0.50$. The department with the highest proportion is marketing.

25. [B] The area of triangle ABC is $\frac{1}{2}(s)(s\sqrt{3}) = \frac{s^2\sqrt{3}}{2}$

$$A_{new} = \frac{(1.40s)^2\sqrt{3}}{2} = (1.40)^2\left(\frac{s^2\sqrt{3}}{2}\right) = 1.96A_{ABC}$$

The new area is 1.96 times greater.

26. [B] We can factor the first equation into $(x+y)(x-y) = 48$. Since the second equation tells us that $x+y=12$, we can use this in the first equation: $12(x-y) = 48$, $x-y=4$. We now have the following two equations:

$$\begin{aligned}x+y &= 12\\ x-y &= 4\end{aligned}$$

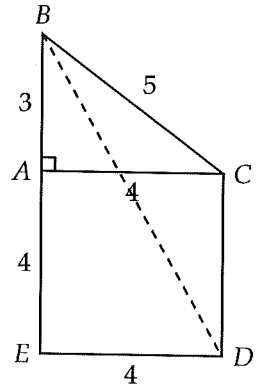
Subtracting the two equations to eliminate x, we get $2y=8$, $y=4$. From here, $x=8$ and $xy=32$.

27. [D] From the remainder theorem, $f(0)=3$ means that the remainder is 3 when $f(x)$ is divided by $x-0$, which is just x.

28. $\boxed{D}$ The minimum value of T is $60(1) + 80(6) = 540$ minutes, which is $540 \div 60 = 9$ hours. The maximum value of T is $60(5) + 80(12) = 1,260$ minutes, which is $1,260 \div 60 = 21$ hours. Therefore, $9 \leq T \leq 21$.

29. $\boxed{B}$ If the processing times are cut in half, then for the 60 orders, $0.5 \leq t \leq 2.5$, and for the 80 orders, $3 \leq t \leq 6$. Therefore, the processing time of an order cannot be between 2.5 minutes and 3 minutes. The only answer choice in this interval is (B). By the way, the processing time also can't be under 0.5 minutes or above 6 minutes, but none of the answer choices are outside these bounds.

30. $\boxed{D}$ $\triangle ABC$ is a $3-4-5$ triangle.



Using the pythagorean theorem to find BD,

$$\begin{aligned} BE^2 + ED^2 &= BD^2 \\ 7^2 + 4^2 &= BD^2 \\ 65 &= BD^2 \\ \sqrt{65} &= BD \end{aligned}$$

31. $\boxed{\frac{5}{4}}$ Substitute the first equation into the second:

$$\begin{aligned} \left(\frac{2}{3b}\right)x &= \frac{5}{6b} \\ \frac{2}{3}x &= \frac{5}{6} \\ x &= \frac{5}{6} \cdot \frac{3}{2} = \frac{5}{4} \end{aligned}$$

32. $\boxed{4}$ From the graph, 279 kelvin is equivalent to 6 degrees Celsius. This is $6 - 2 = 4$ degrees greater than what the student calculated.

33. $\boxed{8.75}$ The slope of the equation is $\frac{7}{4}$, or 1.75, which means the length of a garden snake increases by 1.75 inches each month. So over 5 months, the length increases by $5 \times 1.75 = 8.75$.

34. $\boxed{11}$ Alice bought $\frac{108}{12} = 9$ chairs. Since the store gives away a free chair for every four chairs purchased, she received an extra 2 chairs for a total of 11 chairs.

35. $\boxed{50}$

$$\begin{aligned} 5x + 4x &= 180 \\ 9x &= 180 \\ x &= 20 \end{aligned}$$

So, the measure of $\angle A$ is $2x = 2(20) = 40$. Using $\triangle ABC$,

$$y = 180 - 40 - 90 = 50$$

36. $\boxed{7}$ The maximum value (highest y-value) is 4. The minimum value (lowest y-value) is -3. The difference is $4 - (-3) = 7$.

37. $\boxed{90}$ $x = 36y = 36(2.5) = 90$ meters

38. $\boxed{5.7}$ The 36 in the denominator is the circumference of the circle.

$$2\pi r = 36$$

$$r = \frac{36}{2\pi} = 5.7$$

Practice Test 8 Answers

Question categories correspond to chapters in *The College Panda's SAT Math: The Advanced Guide and Workbook.* Note that for two part questions, the category of the first question is used for both questions.

Section 3

1. [D] Manipulating and Solving Equations
2. [A] Exponents & Radicals
3. [C] Lines
4. [D] Interpreting Linear Models
5. [B] Absolute Value
6. [B] Expressions
7. [B] Functions
8. [B] Rates
9. [C] Manipulating and Solving Equations
10. [A] Interpreting Linear Models
11. [C] Manipulating and Solving Equations
12. [D] Manipulating and Solving Equations
13. [A] Quadratics
14. [B] Manipulating and Solving Equations
15. [C] Synthetic Division
16. [19] Rates
17. [75] Manipulating and Solving Equations
18. [8] Systems of Equations
19. [1.2] Expressions
20. [$\frac{2}{5}$] Statistics I

Section 4

1. [D] Manipulating and Solving Equations
2. [B] Statistics II
3. [D] Percent
4. [A] Rates
5. [D] Reading Data
6. [C] Reading Data
7. [D] Probability
8. [B] Percent
9. [B] Inequalities
10. [D] Percent
11. [A] Exponential vs. Linear Growth
12. [D] Probability
13. [B] Lines
14. [C] Lines
15. [A] Manipulating and Solving Equations
16. [D] Percent
17. [B] Triangles
18. [A] Statistics I
19. [A] Quadratics
20. [B] Inequalities
21. [B] Circles
22. [D] Functions
23. [D] Functions
24. [C] Exponential vs. Linear Growth
25. [C] Inequalities
26. [A] Functions
27. [B] Circles
28. [B] Quadratics
29. [B] Statistics II
30. [C] Manipulating and Solving Equations
31. [48] Rates
32. [144] Angles
33. [20] Trigonometry
34. [1.2] Systems of Equations
35. [3] Functions
36. [36] Quadratics
37. [25.6] Manipulating and Solving Equations
38. [5] Manipulating and Solving Equations

Practice Test 8 Answer Explanations

Section 3

1. $\boxed{D}$

$$9x^2 = 40$$
$$x^2 = \frac{40}{9}$$
$$x = \sqrt{\frac{40}{9}}$$

2. $\boxed{A}$

$$\sqrt[3]{b^{\frac{1}{2}}} = (b^{\frac{1}{2}})^{\frac{1}{3}} = b^{\frac{1}{6}}$$

3. $\boxed{C}$ If line k has a negative slope, any line perpendicular to it will have a positive slope.

4. $\boxed{D}$ The number 500 is the y-intercept of the equation, the number of shirts left in inventory on days when no coupons are given out.

5. $\boxed{B}$ Test each of the answer choices, making sure to include the negative possibilities. For example, the answer is not (A) because when $x = 1$ or -1, $|x+3|$ is not less than 2. However, $|x+3|$ is less than 2 when $x = -4$.

6. $\boxed{B}$ $(a+b)^2 - (a-b)^2 = (a^2 + 2ab + b^2) - (a^2 - 2ab + b^2) = 4ab$

7. $\boxed{B}$ The best way to do this question is to plug $x+1$ into each of the answer choices and see which one gives $3x+2$. Looking at answer (B), for example, $f(x+1) = 3(x+1) - 1 = 3x + 3 - 1 = 3x + 2$.

8. $\boxed{B}$ Each pen costs $\frac{4}{x}$ dollars and each notebook costs $\frac{6}{y}$ dollars. So 9 pens and 7 notebooks will cost $9\left(\frac{4}{x}\right) + 7\left(\frac{6}{y}\right)$ dollars.

9. $\boxed{C}$

$$0.30 + 0.02a = 5$$
$$0.02a = 5 - 0.30$$
$$a = \frac{5 - 0.30}{0.02}$$

10. $\boxed{A}$ The solution $(5, 0)$ means that when $x = 5$, $y = 0$. In other words, there will be zero dollars left after 5 weekly withdrawals.

11. [C] Square both sides.

$$m^2 = \frac{1}{n}$$
$$nm^2 = 1$$
$$n = \frac{1}{m^2}$$

12. [D] Square both sides.

$$(\sqrt{4+\sqrt{x}})^2 = (1+\sqrt{3})^2$$
$$4+\sqrt{x} = 1^2 + 2\sqrt{3} + (\sqrt{3})^2$$
$$4+\sqrt{x} = 4+2\sqrt{3}$$
$$\sqrt{x} = 2\sqrt{3}$$
$$\sqrt{x} = \sqrt{12}$$
$$x = 12$$

13. [A] Substituting the first equation into the second,

$$3x-1 = (x+1)^2$$
$$3x-1 = x^2+2x+1$$
$$0 = x^2 - x + 2$$

The number of solutions to the equation above is equal to the number of solutions to the original system of equations. For example, if there is only one value of x that satisfies the equation above, there will be only one solution to the system. Using the discriminant,

$$b^2 - 4ac = (-1)^2 - 4(1)(2) = 1 - 8 = -7$$

Because the discriminant is negative, there are no solutions to the equation above, and therefore no solutions to the system of equations.

14. [B] The best way to handle this question is to plug in the answer choices. In doing so, you'll find that 8 is the only solution.

15. [C]

$$\begin{array}{r|l} & x - 2 \\ \hline 2x-1 & 2x^2 - 5x \\ & \underline{2x^2 - x} \\ & \quad -4x \\ & \quad \underline{-4x + 2} \\ & \qquad\quad -2 \end{array}$$

This result can be expressed as $x - 2 - \dfrac{2}{2x-1}$.

16. $\boxed{19}$ Maria took $11-7=4$ days to read $196-120=76$ pages. Therefore, $k=76\div 4=19$ pages.

17. $\boxed{75}$ Multiply both sides by 15 to get $10x=75-9y$. Then, $10x+9y=75$.

18. $\boxed{8}$ Multiply both sides of the second equation by 4 and subtract to get $-35y=35$, $y=-1$. Using this result in the second equation,

$$\begin{aligned} -x+5(-1) &= -13 \\ -x-5 &= -13 \\ -x &= -8 \\ x &= 8 \end{aligned}$$

19. $\boxed{1.2}$

$$\frac{3x+7}{5}-\frac{1-2x}{5}=\frac{3x+7-1+2x}{5}=\frac{5x+6}{5}=\frac{5x}{5}+\frac{6}{5}=x+1.2$$

This expression comes out to be 1.2 more than x.

20. $\boxed{\frac{2}{5}}$ Let the average population of the islands be x. Then the population of the mainland is $6x$ and the total population of the islands is $9x$.

$$\frac{\text{Mainland population}}{\text{Total population of the country}}=\frac{6x}{6x+9x}=\frac{6}{15}=\frac{2}{5}$$

Section 4

1. $\boxed{D}$ The ball will stop once it reaches the top of its upward motion, at which point the velocity v will equal 0.

$$\begin{aligned} 0 &= 550-9.8t \\ -550 &= -9.8t \\ 56.1 &\approx t \end{aligned}$$

2. $\boxed{B}$ Every year, the seal population hovers around 350, so it's reasonable to approximate the seal population in 2005 to also be around 350.

3. $\boxed{D}$ In Portuguese, vowels make up $\frac{14}{37}\approx 0.38=38\%$ of the alphabet.

4. $\boxed{A}$

$$25\ \cancel{\text{miles}}\times\frac{2.5\text{ hours}}{10\ \cancel{\text{miles}}}=6.25\text{ hours}=6\text{ hours and 15 minutes}$$

5. $\boxed{D}$ From 1950 to 1960, the number of patient visits increased from 200 to 400 million. This is a percent increase of $\frac{400-200}{200}=100\%$, not 50%.

6. $\boxed{C}$ In 1990, there were 700 million patient visits and 5,000 hospitals. $\frac{700,000,000}{5,000}=140,000$ patient visits per hospital.

7. $\boxed{D}$

$$\frac{\text{Lamb over rice orders during dinner}}{\text{Lamb over rice orders}} = \frac{108}{144} = \frac{3}{4}$$

8. $\boxed{B}$ $\dfrac{12-16}{16} = -\dfrac{4}{16} \approx -0.25 = 25\%$ decrease

9. $\boxed{B}$ Over the 2-week period, Amy works a total of $2x$ hours at \$60 per hour and earns a minimum of \$3,600.

$$\begin{aligned} 60(2x) &\geq 3,600 \\ 120x &\geq 3,600 \\ x &\geq 30 \end{aligned}$$

10. $\boxed{D}$ The answer is NOT 5,265 ($3,900 \times 1.35$). The second run producing 35 percent less is not the same as the first run producing 35 percent more.

$$\begin{aligned} \text{second run} &= (0.65)(\text{first run}) \\ 4,900 &= (0.65)(x) \\ 6,000 &= x \end{aligned}$$

11. $\boxed{A}$ A constant increase every month is linear growth, which should be represented by a straight line moving upward.

12. $\boxed{D}$ The station was correct when it forecasted rain and it actually rained and when it forecasted no rain and it didn't rain, a total of $75 + 220 = 295$ times out of 365.

$$\frac{295}{365} = \frac{59}{73}$$

13. $\boxed{B}$ After the first 50 square feet, $k + 75 - 50 = k + 25$ square feet remain.

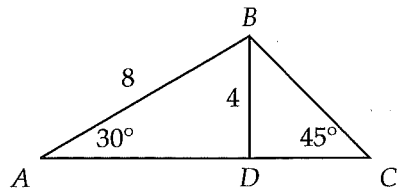
$$120(50) + 200(k + 25) = 6,000 + 200k + 5,000 = 200k + 11,000$$

14. $\boxed{C}$ The line should have a slope of 120 for the first 50 square feet and then a steeper slope of 200 thereafter. Graph (C) is the only one that shows a segment with a positive slope followed by another with an even more positive (steeper) slope.

15. $\boxed{A}$ $k = xy = (6)\left(\dfrac{1}{2}\right) = 3$. When $y = 9$, $x = \dfrac{k}{y} = \dfrac{3}{9} = \dfrac{1}{3}$.

16. $\boxed{D}$ After 8 weeks, the amount she has left in the account is $5,000(0.90)^8 = 2,152.34$, which means the amount she's withdrawn is $5,000 - 2,152.34 = 2,847.66$.

17. [B] Draw the height to B.



$\triangle ABD$ is $30-60-90$, which means $BD = \frac{1}{2}AB = \frac{1}{2}(8) = 4$. Because $\triangle BDC$ is $45-45-90$, $BC = 4\sqrt{2}$.

18. [A] The range does not change because the minimum and the maximum stay the same. Before the 18 is added, the median is represented by the 8th student (18) and the mean is 17. After the 18 is added, the median is represented by the average of the 8th and 9th students (still 18). However, the mean must change because we've added a number (18) that's different from the original mean (17).

19. [A] The minimum must occur at the midpoint of the two x-intercepts. The midpoint of -4 and 4 is 0. Plugging this into the equation, we get $y = -k$.

20. [B] Split the inequality up into two parts. In the first part,

$$-1 \leq x + y$$

$$-1 - x \leq y$$

In the second part,

$$x + y \leq 1$$

$$y \leq -x + 1$$

So, $y \geq -x - 1$ and $y \leq -x + 1$, which means the solution set (shaded region) must be in between those two lines. The graph in answer (B) correctly shows this.

21. [B] There are $360°$ in a circle and $60°$ is one-sixth of that. Therefore, the area of the sector is one-sixth the area of the circle. The area of the circle is then $6 \times 96\pi = 576\pi$. Solving for the radius,

$$\pi r^2 = 576\pi$$
$$r = 24$$

The circumference of the circle is $2\pi r = 2\pi(24) = 48\pi$. The arc AB is one-sixth of the circumference:

$$\frac{1}{6} \cdot 48\pi = 8\pi$$

22. [D] $f(5) = 2g(5) - 3 = 2(8) - 3 = 13$

23. [D] To stretch $g(x)$ vertically by a factor of 2, multiply $g(x)$ by 2. To shift $g(x)$ down by 3 units, subtract 3 from $g(x)$. Therefore, $f(x) = 2g(x) - 3$.

24. [C] Keep track of the greeting cards being sent at each stage in the scenario given by choice C: 3, 9, 27, ... Because it triples each time, the scenario is one of exponential growth.

25. [C] The number of medium refrigerators that can be delivered is $4a + 3b$, so $4a + 3b \geq 20$ (there may be extra capacity). The number of large refrigerators that can be delivered is $5a + 2b$, so $5a + 2b \geq 30$.

26. [A] Plugging in $(a, 7)$,

$$7 = a^2 + 3$$
$$4 = a^2$$
$$a = \pm 2$$

Plugging in $(b, 12)$,

$$12 = b^2 + 3$$
$$9 = b^2$$
$$b = \pm 3$$

The minimum value of $a + b$ occurs when $a = -2$ and $b = -3$. Therefore, $a + b = -5$.

27. [B] Complete the square for the terms with x:

$$(x-2)^2 - 4 + y^2 + 6y = 12$$

Now complete the square for the terms with y:

$$(x-2)^2 - 4 + (y+3)^2 - 9 = 12$$
$$(x-2)^2 + (y+3)^2 = 25$$

The radius is $\sqrt{25} = 5$. The circumference is $2\pi(5) = 10\pi$.

28. [B] The sum of the solutions is equal to $-\frac{b}{a} = -\frac{-10}{2} = 5$. Now we can set up two equations with m and n.

$$m + n = 5$$
$$m - n = 9$$

Add the two equations to get $2m = 14$, $m = 7$. Plug this result back into either of the equations to get $n = -2$.

29. [B] A mean recovery time of 3.5 days and a margin of error of 1.25 days imply a confidence interval of 2.25 to 4.75 days (3.5 ± 1.25). This means that the true mean recovery time is likely between 2.25 days and 4.75 days. Answer (A) is too definite. We don't know for sure. Answers (C) and (D) make statements that are too definite about all patients. No study can ever be that conclusive without surveying the entire population of patients suffering from disease X.

30. [C] For $(mx - 10)^2 = 0$, $mx - 10$ must equal 0. The equation $mx - 10 = 0$ has integer solutions when $m = 1, 2, 5$, and 10. That's four different values.

31. [48] The bus's morning route is $40 \times 3 = 120$ miles. To travel this distance in 2.5 hours, its average speed must be $120 \div 2.5 = 48$ miles per hour.

32. [144] The angles in a pentagon sum to $180(5-2) = 540$. In a regular pentagon, each angle is then $540 \div 5 = 108$. Line l splits the pentagon into a top part and a bottom part. The bottom part is a quadrilateral whose angles sum to 360. Therefore,

$$a + b = 360 - 108 - 108 = 144$$

33. $\boxed{20}$ Since $\sin x = \cos(90 - x)$, $\sin 24^\circ = \cos 66^\circ$. Setting up an equation,

$$\begin{aligned} \cos 66 &= \cos 3k + 6 \\ 66 &= 3k + 6 \\ 60 &= 3k \\ k &= 20 \end{aligned}$$

34. $\boxed{1.2}$ For this system to have no solution, the coefficients of x and y should be able to match, but not the constants. Comparing the coefficients of the y's, we see that we should multiply the first equation by 4 ($2.8 \div 0.7 = 4$) to make the coefficients match. The equations then look like this:

$$\begin{aligned} 1.2x - 2.8y &= 4 \\ kx - 2.8x &= 3 \end{aligned}$$

It's now easy to see that the constants are different and that $k = 1.2$.

35. $\boxed{3}$ $g(f(a)) = g(a^2 + 2) = 4(a^2 + 2) - 3 = 4a^2 + 8 - 3 = 4a^2 + 5$. Now,

$$\begin{aligned} 4a^2 + 5 &= 41 \\ 4a^2 &= 36 \\ a^2 &= 9 \\ a &= \pm 3 \end{aligned}$$

Since $a > 0$, $a = 3$.

36. $\boxed{36}$ Let the side of the square be x. Setting the areas of the square and the rectangle equal to each other,

$$\begin{aligned} x^2 &= (2x - 8)(x + 3) \\ x^2 &= 2x^2 + 6x - 8x - 24 \\ 0 &= x^2 - 2x - 24 \\ 0 &= (x - 6)(x + 4) \\ x &= 6, -4 \end{aligned}$$

Since it doesn't make sense for the side of a square to be a negative number, it must be 6. The area of the square is then $6^2 = 36$.

37. $\boxed{25.6}$ First, we need to solve for k.

$$\begin{aligned} 10 &= \frac{1}{2}k(0.05)^2 \\ 20 &= (0.05)^2 k \\ 8000 &= k \end{aligned}$$

Now, $P = \frac{1}{2}(8000)(0.08)^2 = 25.6$ joules

38. $\boxed{5}$ The spring currently has a potential energy of 10 joules. When this potential energy is transferred to the block as kinetic energy,

$$\frac{1}{2}mv^2 = 10$$
$$\frac{1}{2}(0.8)v^2 = 10$$
$$v^2 = 25$$
$$v = 5$$

Practice Test 9 Answers

Question categories correspond to chapters in *The College Panda's SAT Math: The Advanced Guide and Workbook*. Note that for two part questions, the category of the first question is used for both questions.

Section 3

1. [A] Rates
2. [B] Exponents & Radicals
3. [A] Manipulating and Solving Equations
4. [D] Expressions
5. [C] Interpreting Linear Models
6. [D] Manipulating and Solving Equations
7. [B] Expressions
8. [C] Functions
9. [A] Interpreting Linear Models
10. [B] Manipulating and Solving Equations
11. [C] Rates
12. [A] Trigonometry
13. [A] Manipulating and Solving Equations
14. [A] Synthetic Division
15. [A] Systems of Equations
16. [3] Manipulating and Solving Equations
17. [$\frac{1}{3}$] Manipulating and Solving Equations
18. [5] Lines
19. [1 or 6] Systems of Equations
20. [25] Word Problems

Section 4

1. [C] Rates
2. [B] Percent
3. [C] Statistics II
4. [B] Reading Data
5. [B] Exponential vs. Linear Growth
6. [B] Reading Data
7. [A] Reading Data
8. [B] Inequalities
9. [D] Statistics II
10. [C] Lines
11. [B] Percent
12. [C] Manipulating and Solving Equations
13. [B] Manipulating and Solving Equations
14. [C] Functions
15. [C] Reading Data
16. [D] Word Problems
17. [D] Probability
18. [A] Probability
19. [D] Inequalities
20. [C] Systems of Equations
21. [A] Statistics I
22. [A] Interpreting Linear Models
23. [B] Statistics II
24. [C] Functions
25. [A] Trigonometry
26. [B] Triangles
27. [D] Statistics II
28. [B] Volume
29. [A] Functions
30. [B] Quadratics
31. [25] Word Problems
32. [30] Word Problems
33. [14] Statistics I
34. [15] Circles
35. [11] Systems of Equations
36. [22] Quadratics
37. [.9] Percent
38. [27.1] Percent

Practice Test 9 Answer Explanations

Section 3

1. [A] The total number of chess pieces is $32a$, and the total number of checkers pieces is $24b$. The difference is $32a - 24b$.

2. [B] Subtracting the exponents,

$$\frac{2^{-5}}{2^{-3}} = 2^{-2} = \frac{1}{2^2} = \frac{1}{4}$$

3. [A] If $4b = 7$, then multiply both sides by 3 to get $12b = 21$. Then, $12b - 3 = 21 - 3 = 18$.

4. [D]

$$\frac{2a^2b - 3ab^2 + ab}{ab} = \frac{2a^2b}{ab} - \frac{3ab^2}{ab} + \frac{ab}{ab} = 2a - 3b + 1$$

5. [C] The number 16.8 refers to the slope of the equation, which means John increased his average number of points per game by 16.8 each year.

6. [D] Raise both sides to the -3 power.

$$(c^{-\frac{1}{3}})^{-3} = x^{-3}$$

$$c = \frac{1}{x^3}$$

7. [B] $\frac{3.50}{1,000}g + 12 = 0.0035g + 12$

8. [C] The graph is below the x-axis when $-2 < x < 0$ and $3 < x \leq 4$.

9. [A] The number 2 is the y-intercept of the equation: the weight of a shipment with no calculators. Well, if the weight of a shipment with no calculators is 2 pounds, something else must be part of the shipment. Of the answer choices, the box is the only one that makes sense.

10. [B]

$$8a^2 = 3(a^2 + b)$$

$$8a^2 = 3a^2 + 3b$$

$$5a^2 = 3b$$

$$\frac{a^2}{b} = \frac{3}{5}$$

11. [C]

$$y \text{ miles} \times \frac{a \text{ inches}}{x \text{ miles}} = \frac{ay}{x}$$

12. [A] From the coordinates, $BC = 4 - (-3) = 7$ and $AC = 7 - (-5) = 12$.

$$\tan A = \frac{BC}{AC} = \frac{7}{12}$$

13. [A] If Bob can paint a house in 4 days, then he paints $\frac{1}{4}$ of a house in one day. If Carl can paint a house in 6 days, then he paints $\frac{1}{6}$ of a house in one day. Working together, they would paint $\frac{1}{4} + \frac{1}{6}$ of a house in one day. If d is the number of days they would need to finish painting one house, then

$$\left(\frac{1}{4} + \frac{1}{6}\right) d = 1$$

14. [A] Realize that r is the remainder when $5x + 3$ is divided by $x + m$. Using the remainder theorem, we can simply plug in $x = -m$ to get the remainder:

$$r = 5(-m) + 3 = -5m + 3$$

This answer can also be found through synthetic division.

$$\begin{array}{r|rrr} & & 5 & \\ \hline x+m & 5x & + & 3 \\ & 5x & + & 5m \\ \hline & & & 3 \end{array} \quad - \quad 5m$$

And this result can be expressed as $5 + \frac{3 - 5m}{x + m}$, from which $r = 3 - 5m$.

15. [A] Divide the first equation by 2 to get $-x + 3y = 5$. Divide the second equation by 3 to get $-x + 3y = 6$. The coefficients of x and y match but the constants on the right side do not. Therefore, there is no solution.

16. [3]

$$\begin{aligned} 2(b-3) - 3(2b+5) &= -33 \\ 2b - 6 - 6b - 15 &= -33 \\ -4b - 21 &= -33 \\ -4b &= -12 \\ b &= 3 \end{aligned}$$

17. $\left[\frac{1}{3}\right]$

$$\begin{aligned} 5 - \frac{6}{k} &= -13 \\ -\frac{6}{k} &= -18 \\ 6 &= 18k \\ \frac{1}{3} &= k \end{aligned}$$

18. [5] The slope of the first line is $\frac{2-0}{1-0} = 2$. The slope of the second line is $\frac{2-0}{1-k}$. Since the two lines are perpendicular, the slope of the second line must be $-\frac{1}{2}$. Setting up an equation,

$$\frac{2}{1-k} = -\frac{1}{2}$$

Cross multiplying,

$$\begin{aligned} 4 &= -(1-k) \\ 4 &= -1+k \\ 5 &= k \end{aligned}$$

19. [1 or 6] We can factor the first equation to get $(x+y)^2 = 25$. Taking the square root of both sides, $x+y = \pm 5$. If $x+y = 5$, then we add this equation to the second equation to get $2x = 12$, $x = 6$. If $x+y = -5$, then we add this equation to the second equation to get $2x = 2$, $x = 1$.

20. [25] If b is the number of blue ties, then the number of red ties is $3b - 40$.

$$\begin{aligned} (3b-40) - b &= 10 \\ 2b - 40 &= 10 \\ 2b &= 50 \\ b &= 25 \end{aligned}$$

Section 4

1. [C] If he edits at the slowest pace, he'll finish $15 \times 7 = 105$ essays. If he edits at the fastest pace, he'll finish $18 \times 7 = 126$ essays. The only answer between 105 and 126 is 112.

2. [B] $\frac{94-84}{84} = \frac{10}{84} \approx .119 = 11.9\%$

3. [C] If the margin of error is 2.8%, the confidence interval is 8.7% to 14.3% (11.5% $\pm$ 2.8%). Only answer (C) is within this interval.

4. [B] The line representing Minnesota has two data points that are higher than the respective ones for Missouri.

5. [B] Graph B is the one that reflects exponential decay.

6. [B] Let's pretend the D battery lasts 1 hour. Then the C battery lasts 2 hours, the B battery lasts 4 hours, and the A battery lasts 8 hours. Using these numbers, we can see that the A battery lasts 8 times as long as the D battery.

7. [A] Let's pretend the D battery lasts 1 hour. Then the C battery lasts 2 hours, the B battery lasts 4 hours, and the A battery lasts 8 hours. Using these numbers, we can set up an equation, where b is the number of B batteries, c is the number of C batteries, and d is the number of D batteries.

$$\begin{aligned} 2c &= 4b + d \\ 2c &= 4(3) + 4 \\ 2c &= 16 \\ c &= 8 \end{aligned}$$

8. [B] If x tickets are for reserved seats, then $1,200 - x$ tickets are for general admission seats. Ticket sales are $40x$ for the reserved seats and $15(1,200 - x)$ for the general admission seats. Setting up the inequality,

$$\begin{aligned} 40x + 15(1,200 - x) &\geq 30,000 \\ 40x + 18,000 - 15x &\geq 30,000 \\ 25x &\geq 12,000 \\ x &\geq 480 \end{aligned}$$

9. [D] Using proportions, the number of subscribers for whom football is the favorite sport to watch is

$$\frac{150}{400} \times 2,000,000 = 750,000$$

The other answers do not conform to the proportions set by the survey.

10. [C] The y-intercept is 8. By setting $y = 0$ and solving for x, we find that the x-intercept is -6. Using the pythagorean theorem,

$$\begin{aligned} AO^2 + BO^2 &= AB^2 \\ 6^2 + 8^2 &= AB^2 \\ 100 &= AB^2 \\ 10 &= AB \end{aligned}$$

11. [B] The expected number of balls he hits is $(0.25)n$. Using that result, the expected number of home runs he hits is $(0.05)(0.25)n$. Answer B is the equivalent.

12. [C] Based on the pattern, when $x = 5$, $y = \dfrac{(4)(6)}{10} = 2.4$

13. [B] The numerator is the product of the numbers on either side of x and the denominator is 2 times the value of x. Therefore, $y = \dfrac{(x-1)(x+1)}{2x}$.

14. [C] $p(3) = -3^2 + 16(3) + k = -9 + 48 + k = 39 + k$. So we're looking for another day when the price of the stock was also $39 + k$. We could plug in the answer choices and test each one out, but we'll do it algebraically here. Let that other day be day number c.

$$\begin{aligned} f(c) &= 39 + k \\ -c^2 + 16c + k &= 39 + k \\ -c^2 + 16c - 39 &= 0 \\ c^2 - 16c + 39 &= 0 \\ (c - 13)(c - 3) &= 0 \\ c &= 3, 13 \end{aligned}$$

The stock price was the same on day number 13.

15. $\boxed{C}$

$$A: \quad \frac{2,000}{600} \approx 3.33$$
$$B: \quad \frac{5,000}{800} = 6.25$$
$$C: \quad \frac{7,000}{1,000} = 7$$
$$D: \quad \frac{9,000}{1,300} \approx 6.92$$

Flight C is the one with the greatest ratio.

16. $\boxed{D}$ Let x be the number of weeks that pass.

$$\begin{aligned} 650 - 16x &= 100 + 6x \\ -22x &= -550 \\ x &= 25 \end{aligned}$$

17. $\boxed{D}$ $\dfrac{2+3+6}{20} = \dfrac{11}{20} = 0.55$

18. $\boxed{A}$ $\dfrac{1(4)+2(5)+3(2)+4(3)+5(6)}{20} = \dfrac{62}{20} = 3.1$

19. $\boxed{D}$ We could solve like so,

$$\begin{aligned} \frac{4}{2x-7} &> 3 \\ 4 &> 3(2x-7) \\ 4 &> 6x - 21 \\ 25 &> 6x \\ 4\frac{1}{6} &> x \end{aligned}$$

But this seems to suggest that all of the answer choices could be possible values of x! Did we do something wrong? When variables are in the denominator, weird things can happen, especially in inequalities. Beware of these situations. Looking back at the answer choices, we can simply plug them in to see that answers (A), (B), and (C) give us negative values that do not satisfy the inequality. Answer (D) is the only one that works.

20. [C] Let the price of a puppy be p and the price of a kitten be k. We can then make two equations:

$$\begin{cases} 3p + 2k = 240 \\ p + 5k = 210 \end{cases}$$

From the second equation, we can get $p = 210 - 5k$. Substituting this into the first equation,

$$\begin{aligned} 3(210 - 5k) + 2k &= 240 \\ 630 - 15k + 2k &= 240 \\ -13k &= -390 \\ k &= 30 \end{aligned}$$

The price of a kitten is \$30. Then $p = 210 - 5(30) = 60$. The price of a puppy is \$60.

21. [A] Notice that the dots have the same distribution except for one dot at the far right for Factory A and one dot at the far left for Factory B. That means Factory A must have a higher mean than Factory B.

22. [A] Because this question is asking for the change in "x" for each change in "y" (the reverse of slope), we need to rearrange the equation to get a in terms of w.

$$w = \frac{5}{7}(2a + 1)$$

$$7w = 5(2a + 1)$$

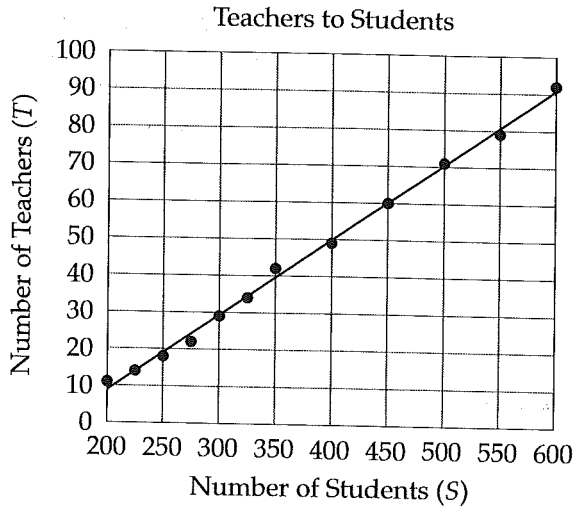
$$7w = 10a + 5$$

$$10a = 7w - 5$$

$$a = \frac{7}{10}w - \frac{5}{10}$$

The slope here is 0.7, which means each additional inch in wingspan takes 0.7 years.

23. [B] Drawing a line of best fit, we can establish a linear model from the grid points.



The line of best fit passes through $(400,50)$ and $(500,70)$. These are examples of points you would estimate from your line.

$$\text{Slope} = \frac{70-50}{500-400} = \frac{20}{100} = 0.2$$

So the line has an equation in the form of

$$T = 0.2S + b$$

Using the point $(400,50)$, we can solve for b to get

$$T = 0.2S - 30$$

Another way to solve this problem is to test the two points with each of the answer choices. Only answer (B) gives accurate results.

24. [C] A horizontal line at $y = -3$ intersects f at 2 points (2 solutions). A horizontal line at $y = 0$ intersects f at 3 points (3 solutions). A horizontal line at $y = 2.5$ intersects f at 2 points (2 solutions). I and III only.

25. [A] To convert from degrees to radians, multiply by $\frac{\pi}{180}$.

$$\frac{180(n-2)}{n} \times \frac{\pi}{180} = \frac{\pi(n-2)}{n}$$

26. [B] $\triangle ABC$ is a $45-45-90$ triangle so $BC = 5$. Using the pythagorean theorem to find CD,

$$BC^2 + CD^2 = BD^2$$
$$5^2 + CD^2 = 10^2$$
$$CD^2 = 75$$
$$CD = \sqrt{75}$$
$$CD = 5\sqrt{3}$$

Note that $\triangle BCD$ is a $30-60-90$ triangle.

27. $\boxed{D}$ No conclusion about cause and effect can be made about the reduction in mosquito bites for Anne and her family (or anyone else for that matter). There are numerous problems with this experiment. First, Anne and her family are not a random sample of people and not enough of a sample size. Second, individual members weren't randomly assigned to use the new repellent or the old repellent. This opens the experiment up to other factors such as the temperature during Week 2 or whether they wore different clothes during Week 2. The purpose of random sampling and random assignment is to "average out," or "cancel out," all these factors.

28. $\boxed{B}$

$$\text{Volume of wedge} = \text{Area of base} \times \text{Height}$$
$$V = \frac{30^\circ}{360^\circ}\pi(6)^2 \times 2$$
$$V = 6\pi$$

29. $\boxed{A}$ Plugging in $(a,3)$,

$$f(a) = \frac{1}{2}a + a$$
$$3 = \frac{3}{2}a$$
$$6 = 3a$$
$$a = 2$$

So, $f(x) = \frac{1}{2}x + 2$, and $f(8) = \frac{1}{2}(8) + 2 = 6$.

30. $\boxed{B}$ One of the x-intercepts is -2. Because the x-coordinate of the vertex is the midpoint of the two x-intercepts, the other x-intercept is 8. So the equation of the parabola is of the form

$$y = a(x+2)(x-8)$$

where a is a constant. We can plug in the vertex $(3,25)$ to find a.

$$25 = a(3+2)(3-8)$$
$$25 = -25a$$
$$a = -1$$

The final equation is $y = -(x+2)(x-8)$.

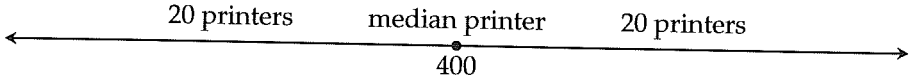
31. $\boxed{25}$ Let t be the number of seconds it takes to slow down to the residential speed limit. Then,

$$80 - 2t = 30$$
$$-2t = -50$$
$$t = 25$$

32. $\boxed{30}$ Over the 42 day period, Dave had pizza $\frac{3}{7}$ of the time and a sandwich $\frac{4}{7}$ of the time. That comes out to $\frac{3}{7}(42) = 18$ pizzas and $\frac{4}{7}(42) = 24$ sandwiches. Over the next x days, Dave had pizza $\frac{3}{5}$ of the time and a sandwich $\frac{2}{5}$ of the time.

$$\begin{aligned} 18 + \frac{3}{5}x &= 24 + \frac{2}{5}x \\ 90 + 3x &= 120 + 2x \\ x &= 30 \end{aligned}$$

33. $\boxed{14}$ There are 20 printers with an input capacity greater than 400, so if 400 is to remain the median, there can be a maximum of 20 printers with an input capacity less than or equal to 400. Since there are already 7 printers with an input capacity below 400, we can have 13 more printers with an input capacity less than or equal to 400, plus one more at 400 to be the median. That's a total of 14 for x.



34. $\boxed{15}$ Each wedge is $\frac{20}{360} = \frac{1}{18}$ of the disk. Therefore, each wedge weighs $\frac{1}{18} \times 270 = 15$ grams.

35. $\boxed{11}$ Substituting the second equation into the first,

$$\begin{aligned} \frac{1}{2}(-4y)^2 - 3y^2 &= 55 \\ \frac{1}{2}(16y^2) - 3y^2 &= 55 \\ 8y^2 - 3y^2 &= 55 \\ 5y^2 &= 55 \\ y^2 &= 11 \end{aligned}$$

36. $\boxed{22}$ The x-coordinate of the vertex is the average of the two x-intercepts, $(3 + 15) \div 2 = 9$. Since the line passes through the vertex, the y-coordinate can be found by using the equation of the line, $y = 3(9) - 5 = 22$.

37. $\boxed{.9}$ Every time the price is reduced by 10 percent, 90 percent remains.

38. $\boxed{27.1}$ After 3 months, $P = a(0.9)^3 = 0.729a$. This translates to a percent decrease of $1 - 0.729 = 0.271 = 27.1\%$. Note that the percent decrease is the same after any 3 month period, not just after the first 3 months. It doesn't matter what the starting value of P is.

Practice Test 10 Answers

Question categories correspond to chapters in *The College Panda's SAT Math: The Advanced Guide and Workbook*. Note that for two part questions, the category of the first question is used for both questions.

Section 3

1. [B] Manipulating and Solving Equations
2. [C] Rates
3. [C] Lines
4. [A] Exponents & Radicals
5. [C] Manipulating and Solving Equations
6. [B] Functions
7. [D] Interpreting Linear Models
8. [A] Manipulating and Solving Equations
9. [D] Inequalities
10. [B] Manipulating and Solving Equations
11. [B] Systems of Equations
12. [A] Expressions
13. [D] Systems of Equations
14. [A] Lines
15. [C] Triangles
16. [8] Manipulating and Solving Equations
17. [6] Word Problems
18. [9] Systems of Equations
19. [10] Word Problems
20. [3 or 4] Systems of Equations

Section 4

1. [B] Rates
2. [A] Percent
3. [C] Statistics I
4. [D] Reading Data
5. [B] Expressions
6. [B] Reading Data
7. [D] Reading Data
8. [C] Statistics II
9. [B] Inequalities
10. [C] Reading Data
11. [A] Functions
12. [C] Probability
13. [A] Statistics II
14. [B] Inequalities
15. [B] Exponential vs. Linear Growth
16. [C] Interpreting Linear Models
17. [D] Reading Data
18. [C] Circles
19. [B] Quadratics
20. [D] Inequalities
21. [C] Percent
22. [D] Statistics I
23. [C] Statistics I
24. [C] Percent
25. [D] Manipulating and Solving Equations
26. [D] Manipulating and Solving Equations
27. [B] Functions
28. [B] Synthetic Division
29. [D] Volume
30. [D] Quadratics
31. [120] Word Problems
32. [21] Systems of Equations
33. [160] Angles
34. [18] Statistics I
35. [71] Functions
36. [.6] Trigonometry
37. [2.4] Manipulating and Solving Equations
38. [$\frac{2}{3}$] Manipulating and Solving Equations

Practice Test 10 Answer Explanations

Section 3

1. $\boxed{B}$ $y = \frac{27}{35} - \frac{3}{5} = \frac{27}{35} - \frac{21}{35} = \frac{6}{35}$

2. $\boxed{C}$

$$15 \cancel{\text{dollars}} \times \frac{8 \text{ magazines}}{d \cancel{\text{dollars}}} = \frac{120}{d} \text{ magazines}$$

3. $\boxed{C}$ When $x = 0, y = \frac{5}{6}$. Therefore, the y-intercept is $\frac{5}{6}$. When $y = 0, x = \frac{5}{2}$. Therefore, the x-intercept is $\frac{5}{2}$. Note that the slope is $-\frac{1}{3}$.

4. $\boxed{A}$ We could square both sides, but I'll move the 3 back inside the square root to show you the result is the same:

$$\begin{aligned} 3\sqrt{x^3} &= \sqrt{72} \\ \sqrt{9x^3} &= \sqrt{72} \\ 9x^3 &= 72 \\ x^3 &= 8 \\ x &= 2 \end{aligned}$$

5. $\boxed{C}$ The best way to do this question is to try out the answer choices and see if they work. Only 1 and 6 work.

6. $\boxed{B}$ The graph has a y-value of -2 when x is between -1 and 0. Answer (B) is the only choice between -1 and 0.

7. $\boxed{D}$ The number 120 refers to the y-intercept of the equation, when no checks have been written. Therefore, 120 is the initial number of checks in Anna's checkbook.

8. $\boxed{A}$

$$\begin{aligned} \sqrt{\frac{1}{2x}} - 2 &= 3 \\ \sqrt{\frac{1}{2x}} &= 5 \\ \frac{1}{2x} &= 25 \\ 1 &= 50x \\ \frac{1}{50} &= x \end{aligned}$$

9. [D] The total price of John's order will be np. To qualify for free shipping,

$$np \geq 75$$
$$n \geq \frac{75}{p}$$

10. [B] Expand and cross multiply.

$$\frac{3(-h+3)+2}{4} = \frac{5-(1-2h)}{10}$$
$$\frac{-3h+11}{4} = \frac{4+2h}{10}$$
$$10(-3h+11) = 4(4+2h)$$
$$-30h+110 = 16+8h$$
$$-38h = -94$$
$$h = \frac{47}{19}$$

11. [B] Multiply the second equation by 3 and add the equations to get $8y = 16$, $y = 2$. Plug this result back into the second equation (the original one) to get $x = 0$.

12. [A] First, combine the fractions on the right. yz is the common denominator.

$$\frac{1}{y} - \frac{1}{z} = \frac{z-y}{yz}$$

Now,

$$\left(\frac{1}{z-y}\right)\left(\frac{z-y}{yz}\right) = \frac{1}{yz}$$

13. [D] The constant a cannot be 3. Otherwise, the second equation's coefficients would be twice the first equation's coefficients, which would allow them to match. This results in a system with either zero or infinite solutions. Answer (D) is the only one where a is not set to 3.

14. [A] The length of the base is 4. Since the area of the rectangle is 20, the height must be 5. From A to B, the line segment goes 4 units to the right and 5 units up, which means the slope is $\frac{5}{4}$.

15. [C] $\triangle BDE$ is similar to $\triangle BAC$. The ratio of their sides is $1:2$. Therefore, the ratio of their areas is $1^2 : 2^2 = 1:4$. If we let the area of $\triangle BDE$ be x, then the area of $\triangle BAC$ would be $4x$. The area of the trapezoid would then be $4x - x = 3x$. Therefore, the area of trapezoid $ADEC$ is 3 times the area of triangle DBE.

16. [8] Multiply both sides by x to get $3 = 12x$ and $x = \frac{1}{4}$. Then, $\frac{2}{x} = \frac{2}{\frac{1}{4}} = 8$.

17. [6] Let the number of boys be x. The number of girls is then $2x$.

$$\begin{aligned} 2x + 30 &= 7x \\ 30 &= 5x \\ 6 &= x \end{aligned}$$

18. [9] The system has infinitely many solutions if the two equations can be made to be the same. Multiply the first equation by 3 to get

$$\begin{aligned} 9x - 6y &= 18 \\ 9x - 6y &= 2a \end{aligned}$$

Upon comparison, we can see that $2a = 18$, $a = 9$.

19. [10]

$$\frac{20 - x}{50 - x} = \frac{1}{4}$$

Cross multiplying,

$$\begin{aligned} 4(20 - x) &= 50 - x \\ 80 - 4x &= 50 - x \\ -3x &= -30 \\ x &= 10 \end{aligned}$$

20. [3 or 4] In the first equation, we can shift things around to get $y = x + 2$. Substituting this into the second equation,

$$\begin{aligned} y^2 - 7y + 25 &= 4y - 5 \\ y^2 - 11y + 30 &= 0 \\ (y - 6)(y - 5) &= 0 \end{aligned}$$

y can be either 5 or 6. Therefore, x can be either 3 or 4.

Section 4

1. [B] If 4 out of every 15 pose a safety hazard, that means 11 out of 15 do not. $6 \times \frac{11}{15} = 4.4$ million dolls.

2. [A] If Rachel discarded 45%, she kept $100 - 45 = 55\%$, which can be expressed as $\frac{55}{100}$ or $\frac{11}{20}$. That means she kept 11 pens out of every 20. The total number of pens she kept must be a multiple of 11. After all, the assumption is that you can't keep half a pen (or any other fraction). The only multiple of 11 in the answer choices is 22.

3. [C] The median atomic mass is represented by the 8th element in the table, going from left to right. The 8th element has an atomic mass of 16 amu.

4. [D] The points at 2003 and 2010 are at the same level along the y-axis.

5. [B] Because $\sqrt{x} \geq 0$, $\sqrt{x} + 1$ can never equal 0. The other answer choices are equal to 0 when $x = -1$.

6. [B] $40(30,000) - 20(40,000) = \$400,000$

7. [D] As the price increases, the projected number of toys sold decreases and then stays the same. Only graph (D) exhibits this correctly.

8. [C] Answer (C) is the only choice that gives a valid conclusion supported by the study. Answers (A) and (B) give reasons for the results, but these reasons are mere conjectures that are not supported at all by the study. Answer (D) is wrong because the study did not deal with the specific types of reading the students did.

9. [B]

$$\begin{aligned} 1,100x + 150x &> 180,000 \\ 1,250x &> 180,000 \\ x &> 144 \end{aligned}$$

10. [C] From 10 to 15 minutes, the temperature increases from $-4°$F to $1°$F, a change of 5 degrees.

11. [A] From the graph, the y-value is -4 when $x = 3$.

12. [C] Let x be the number of employees who commute by car. The number of employees who commute by train is then $x + 50$.

$$\begin{aligned} x + (x + 50) &= 260 \\ 2x + 50 &= 260 \\ 2x &= 210 \\ x &= 105 \end{aligned}$$

Filling in the table,

	Car	Train	Total
Late	20	15	35
On time	85	140	225
Total	105	155	260

$$\frac{\text{On time and took the train}}{\text{On time}} = \frac{140}{225} = \frac{28}{45}$$

13. [A] The most that we can conclude is that there is a negative association between water pollution levels and the number of fish for rivers in China (as one goes up, the other goes down). We CANNOT conclude that there is a cause and effect relationship between the two. We can't say that one causes the other. Nor can we generalize to all rivers.

14. [B] The shaded regions cover all x values greater than 3 and all x values less than -3. The y-values are irrelevant. The only inequality that reflects this is $|x| \geq 3$.

15. [B] The number of criminal cases decreases by 50 each year. This is linear decay (decreasing linear).

16. [C] The solution $(9,0)$ means $s = 0$ when $a = 9$. So when 9 milliliters of sulfuric acid are used in the reaction, no sugar is left afterwards. Because the block of sugar is 27 grams (as indicated by the y-intercept), it takes 9 milliliters of sulfuric acid to react with 27 grams of sugar.

17. [D] The line is at its steepest from 3:30 P.M. to 4:00 P.M., which means Amy traveled the fastest during that time. In other words, the slope, distance over time, is at its greatest (in absolute value) from 3:30 P.M. to 4:00 P.M.

18. [C] The circumference of the circle is $2\pi r = 2\pi(6) = 12\pi$. The arc is $\frac{4\pi}{12\pi} = \frac{1}{3}$ of the circle. This means that central angle ACB must be $\frac{1}{3}$ of 360° (360° $= 2\pi$ radians).

$$\frac{1}{3} \times 2\pi = \frac{2\pi}{3} \text{ radians}$$

19. [B] This question is asking for vertex form, since the vertex is where the maximum is. To get vertex form, we need to complete the square. First, divide everything by -6 to get 1 as the coefficient of t.

$$\frac{h}{-6} = t^2 - 6t - 2$$

Then divide the middle term by 2 to get -3 and square that result to get 9. We put the -3 inside the parentheses with x and subtract the 9 at the end.

$$\frac{h}{-6} = (t-3)^2 - 2 - 9$$
$$\frac{h}{-6} = (t-3)^2 - 11$$
$$h = -6(t-3)^2 + 66$$

20. [D] Total sales are $5m$ for the milk chocolate bars and $7d$ for the dark chocolate bars. So, $5m + 7d \geq 5,000$. Total costs are $2m$ for the milk chocolate bars and $5d$ for the dark chocolate bars. So, $2m + 5d \leq 2,800$.

21. [C] $500(0.92)^{\frac{30}{5}} \approx 303$

22. [D] The mode is the number that shows up the most often. In this case, it's 30 since it shows up 5 times (the most).

23. [C] It should be obvious that the mean will increase since we're removing the two lowest data points. The range will decrease because the minimum will be higher. Before the data points are removed, the median is represented by the 6th soft drink (25 grams). After the data points are removed, the median is represented by the 5th soft drink (30 grams). Therefore, only the mean and median will increase.

24. [C] After 5 years, the total amount in the account was $10,000(1.06)^5 = 13,382.26$, for an earnings of $13,382.26 - 10,000 = 3,382.26$. After the withdrawal, the total amount left was $13,382.26 - 4,000 = 9,382.26$. The earnings on this amount after the remaining 5 years were $9,382.26(1.06)^5 - 9,382.26 = 3,173.32$. The total earnings were $3,382.26 + 3,173.32 = 6,555.58 \approx \$6,556$

25. [D] $\$2.00 + 2.5 \text{ miles} \times \frac{\$1.00}{0.25 \text{ miles}} = \$2.00 + \$10.00 = \$12.00$

26. $\boxed{D}$ Let x be the number of miles traveled. Solving for x in City D,

$$\begin{aligned} 11.50 &= 2.50 + \frac{0.75}{0.25}x \\ 9 &= 3x \\ 3 &= x \end{aligned}$$

There are 12 quarter miles in 3 miles. So, a 3-mile taxicab ride would cost $1.25(12) = \$15$ in City A, $1.50 + 1(12) = \$13.50$ in City B, $2.00 + 1(12) = \$14$ in City C, and $3.00 + 0.50(12) = \$9.00$ in City E. The answer is City E.

27. $\boxed{B}$ To find the intersection point, we equate the two functions and solve for the x-coordinate.

$$\begin{aligned} f(x) &= g(x) \\ x^2 - 2x + 1 &= x^2 - 10x + 25 \\ 8x &= 24 \\ x &= 3 \end{aligned}$$

At $x = 3$, the y-coordinate is $f(3) = 3^2 - 2(3) + 1 = 4$. So $h = 3$ and $k = 4$. $h + k = 3 + 4 = 7$.

28. $\boxed{B}$ From the remainder theorem, $p(2) = 0$ and $p(-1) = 0$ if $x - 2$ and $x + 1$ are both factors of $p(x)$. Testing each answer choice, only choice (B) results in 0 when $x = 2$ and when $x = -1$.

29. $\boxed{D}$ Let r_a and r_b be the radii of cylinders A and B, respectively. Similarly, let h_a and h_b be the heights of cylinders A and B, respectively.

$$\begin{aligned} \text{Volume of cylinder A} &= \text{Volume of cylinder B} \\ \pi(r_a)^2(h_a) &= \pi(r_b)^2(h_b) \\ \pi(1.2r_b)^2(h_a) &= \pi(r_b)^2(h_b) \\ \pi(1.2)^2(r_b)^2(h_a) &= \pi(r_b)^2(h_b) \\ 1.44h_a &= h_b \end{aligned}$$

The result above indicates that the height of cylinder B is 44% greater than the height of cylinder A.

30. $\boxed{D}$ The equation of the line is $y = 4x$. Based on the vertex, the equation of the parabola is

$$y = a(x-2)^2 - 8$$

where a is a constant. Since the parabola passes through the origin, we can solve for a by plugging in the point $(0,0)$,

$$\begin{aligned} 0 &= a(0-2)^2 - 8 \\ 0 &= 4a - 8 \\ a &= 2 \end{aligned}$$

Now that we have both equations (shown below), we can find where they intersect.

$$\begin{aligned} y &= 4x \\ y &= 2(x-2)^2 - 8 \end{aligned}$$

Substituting the first equation into the second,

$$\begin{aligned} 4x &= 2(x-2)^2 - 8 \\ 4x &= 2(x^2 - 4x + 4) - 8 \\ 4x &= 2x^2 - 8x + 8 - 8 \\ 0 &= 2x^2 - 12x \\ 0 &= x^2 - 6x \\ 0 &= x(x-6) \end{aligned}$$

So 6 must be the x-coordinate of the other point of intersection. Plugging this value into the first equation, $y = 4(6) = 24$.

31. $\boxed{120}$ This problem is very tricky. The two numbers are NOT x and $1.2x$ because x being "20% less than the other number" is not the same as the other number being "20% more than x". In the first case, the 20% is based off of the other number, whereas 20% more than x is based off of x. Let's have the other number be y. The two numbers are then x and y, but $x = 0.8y$ (20% less than y).

$$\begin{aligned} y - x &= 30 \\ y - 0.8y &= 30 \\ 0.2y &= 30 \\ y &= 150 \end{aligned}$$

Finally, $x = 0.8(150) = 120$.

32. $\boxed{21}$ Let r be the number of red cards she drew and b be the number of black cards she drew. Based on the information, we can form the following two equations:

$$\begin{aligned} r &= 7b \\ 5r - 10b &= 75 \end{aligned}$$

Plugging the first equation into the second, we get

$$\begin{aligned} 5(7b) - 10b &= 75 \\ 35b - 10b &= 75 \\ 25b &= 75 \\ b &= 3 \end{aligned}$$

Finally, $r = 7(3) = 21$.

33. $\boxed{160}$ From the triangle with points A and B,

$$y = 180 - 40 - 30 = 110$$

The top-most triangle with point B has angles with degree measures 40, 80, and 60. Using the right-most triangle with point E,

$$x = 180 - 60 - 70 = 50$$

Therefore, $x + y = 110 + 50 = 160$

34. $\boxed{18}$ Setting up an equation,

$$\begin{aligned} \frac{(30 \times 10) + (60 \times 4) + 90x + (120 \times 3)}{10 + 4 + x + 3} &= 72 \\ \frac{900 + 90x}{17 + x} &= 72 \\ 900 + 90x &= 72(17 + x) \\ 900 + 90x &= 1,224 + 72x \\ 18x &= 324 \\ x &= 18 \end{aligned}$$

35. $\boxed{71}$ The function is undefined when the denominator is equal to zero.

$$\begin{aligned} \sqrt{x + 10} - 9 &= 0 \\ \sqrt{x + 10} &= 9 \\ x + 10 &= 81 \\ x &= 71 \end{aligned}$$

36. $\boxed{.6}$ The two triangles are similar. Using the pythagorean theorem, $BD = 10$. Therefore,

$$\sin A = \sin \angle DBE = \frac{6}{10} = 0.6$$

37. $\boxed{2.4}$

$$\begin{aligned}\frac{1}{R} &= \frac{1}{6} + \frac{1}{4} \\ \frac{1}{R} &= \frac{2}{12} + \frac{3}{12} \\ \frac{1}{R} &= \frac{5}{12} \\ 5R &= 12 \\ R &= 2.4\end{aligned}$$

38. $\boxed{\frac{2}{3}}$ Let the resistance of the second resistor be x. Then the resistance of the first resistor is $2x$. Finding the total resistance,

$$\begin{aligned}\frac{1}{R} &= \frac{1}{x} + \frac{1}{2x} \\ \frac{1}{R} &= \frac{2}{2x} + \frac{1}{2x} \\ \frac{1}{R} &= \frac{3}{2x} \\ 3R &= 2x \\ R &= \frac{2}{3}x\end{aligned}$$

The total resistance is two-thirds the resistance of the second resistor.

Questions by Category

Categories correspond to chapters in *The College Panda's SAT Math: The Advanced Guide and Workbook*. Note that for two part questions, the category of the first question is used for both questions.

Exponents & Radicals

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Test 8	1, 9, 11, 12, 14, 17	1, 15, 30, 37, 38
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