



Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

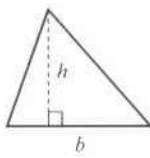
DIRECTIONS

Questions **1-15** ask you to solve a problem, select the best answer among four choices, and fill in the corresponding circle on your answer sheet. Questions **16-20** ask you to solve a problem and enter your answer in a grid provided on your answer sheet. There are detailed instructions on entering answers into the grid before question 16. You may use your test booklet for scratch work.

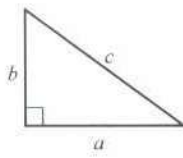
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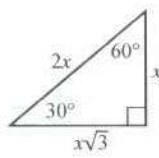
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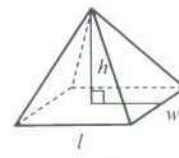
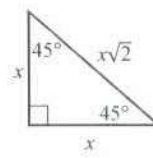
$$A = \frac{1}{2}bh$$



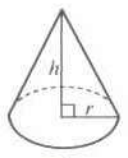
$$a^2 + b^2 = c^2$$



Special Triangles



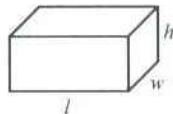
$$V = \frac{1}{3}lwh$$



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



$$A = lw$$



$$V = lwh$$



$$V = \pi r^2 h$$



$$A = \pi r^2$$

$$C = 2\pi r$$



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

There are 360° in a circle.

The sum of the angles in a triangle is 180° .

The number of radians of arc in a circle is 2π .

CONTINUE



1

If $42 = 3(x - 4)$, what is the value of x ?

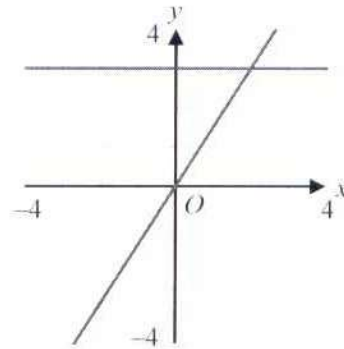
- A) 4
- B) 10
- C) 18
- D) 20

2

For what value of k does $x^2 + kx + 9 = (x + 3)^2$?

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

3



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

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

4

A barrel of crude oil is extracted from shale at a cost of \$51, and then transported to and from the refinery at a cost of \$6 each direction. Oil is processed three times at the refinery plant, at a cost of \$9 each time. What is the profit, in dollars per barrel, if one barrel is sold for \$93? (Profit is equal to revenue minus expenses.)

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

CONTINUE



5

If $c - 1 = 3$, what is the value of $c^2 - 1$?

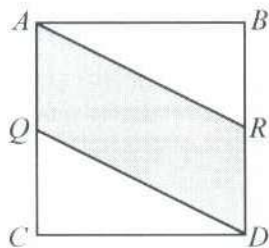
- A) 3
- B) 8
- C) 10
- D) 15

7

If $2(3a - b) = 4b$ and $b = 6$, what is the value of a ?

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

6



The square above has an area of 100. If Q is the midpoint of \overline{AC} and R is the midpoint of \overline{BD} , what is the area of the shaded area?

- A) 40
- B) 50
- C) 60
- D) 75

8

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

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

- A) $-\frac{x}{x^2-1}$
- B) $\frac{5x-x^2}{x^2-1}$
- C) $-\frac{x}{x-1}$
- D) $-\frac{6x}{x^2-1}$

CONTINUE



9

Joel is a years older than Luca. In b years, Joel will be twice as old as Luca. What is Joel's present age, in terms of a and b ?

- A) $-2(a - b)$
- B) $-2a - b$
- C) $2a - b$
- D) $a - b$

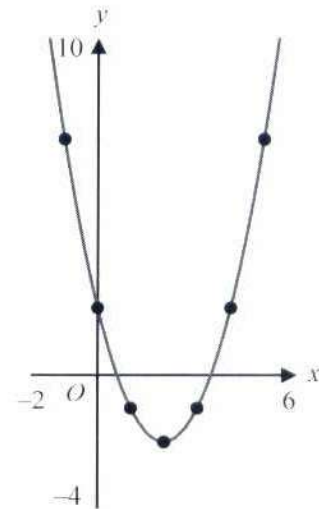
10

$$|x - 3| \leq 5$$

Which of the following inequalities is equivalent to the absolute value inequality above?

- A) $-2 \leq x \leq 8$
- B) $-8 \leq x \leq 2$
- C) $x \leq -2$ or $x \geq 8$
- D) $x \leq -8$ or $x \geq 2$

11



The figure above shows the graph of a quadratic function f with a minimum point at $(2, -2)$. If $f(5) = n$, what is a possible value for n ?

- A) $f(-2)$
- B) $f(-1)$
- C) $f(0)$
- D) $f(1)$

CONTINUE



12

$$\frac{16^x}{4^a + 4^a + 4^a + 4^a} = \frac{1}{4}$$

Which equation best represents the value of x in terms of a ?

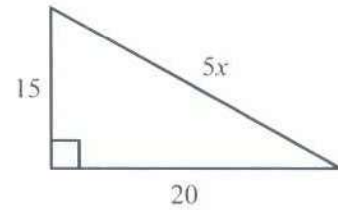
- A) $\frac{a}{4} = x$
- B) $\frac{a}{2} = x$
- C) $a = x$
- D) $2a = x$

13

The sum of a and b is 132. If a is the square of b and the product of a and b is negative, what is a ?

- A) -12
- B) 11
- C) 121
- D) 144

14



What is the value of x in the triangle above?

- A) 5
- B) 10
- C) 25
- D) 31

15

$$y = 5x^2 - 3x - 1$$

$$y + 6 = 7x$$

In the system of equations above, what is the value of y in terms of x ?

- A) $-x$
- B) x
- C) $2x$
- D) $3x$

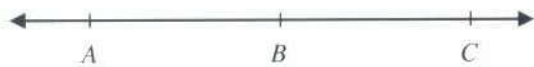
CONTINUE



16

A stone is dropped from a height of 9 meters above the ground. If the height function can be modelled by the equation $h(t) = a - t^2$, where t is time in seconds and h is height in meters, how many seconds does it take for the stone to hit the ground?

17



A , B and C lie on a line, as shown above. The length of \overline{AB} is $x - 4$ and the length of \overline{AC} is $x + 6$. What is the length of \overline{BC} ?

18

If $f(x) = 8x + 1$ and $g(x) = 3x - 1$, what is the value of $\frac{f(2)}{g(f(0))}$?

19

$$\frac{d}{y} = \frac{12}{d}$$

$$y^2 = 6y - 9$$

If d is positive, what is the value of d in the series of equations above?

20

The imaginary number i is defined such that $i^2 = -1$. What is the value of $(1 - i\sqrt{5})(1 + i\sqrt{5})$?

STOP

If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.



Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

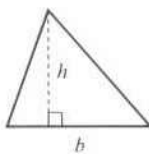
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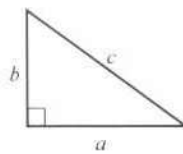
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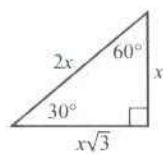
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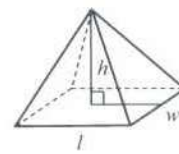
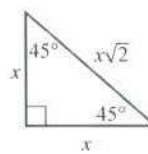
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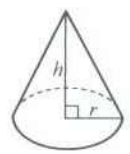
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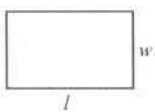
Special Triangles



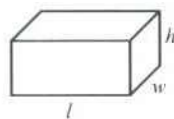
$$V = \frac{1}{3}lwh$$



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



$$A = lw$$



$$V = lwh$$

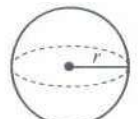


$$V = \pi r^2 h$$



$$A = \pi r^2$$

$$C = 2\pi r$$



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

There are 360° in a circle.

The sum of the angles in a triangle is 180° .

The number of radians of arc in a circle is 2π .

CONTINUE



1

If $y = x - 2$, and $x = 2y + 4$, what is the value of x ?

- A) 1
- B) 0
- C) -2
- D) -6

2

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

Which of the following expressions defines $f(x)$ in the table above?

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

3

If a farmer in Kansas purchases 8 pigs for every 1.5 acres of land and has 6 acres of land set aside for pigs, how many pigs will she purchase?

- A) 20
- B) 32
- C) 40
- D) 48

4

$$\frac{x-1}{3} = \frac{2x-6}{4}$$

What is the value of x that satisfies the equation above?

- A) 5
- B) 7
- C) 8
- D) 16

5

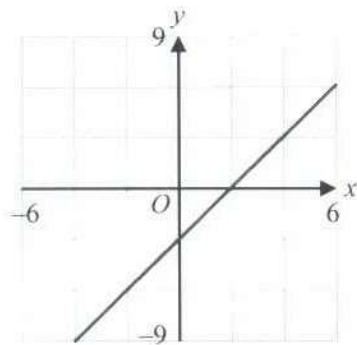
If $8x + 4 = 48$, what is $2x + 1$?

- A) 9
- B) 10
- C) 11
- D) 12

CONTINUE



6



What is the slope of the function in the graph above?

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

7

The population of an invasive species of moth doubles every 5 years. If the initial population is 300, what will be the population after 15 years?

- A) 900
- B) 1200
- C) 2000
- D) 2400

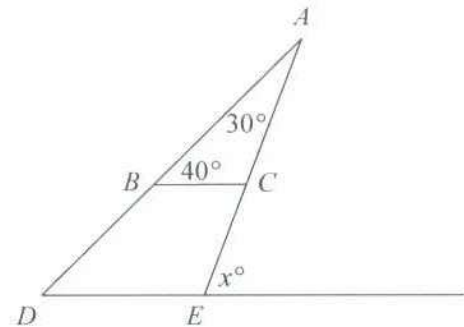
8

John fills his bag with five cent candies, v , and ten cent candies, t . If he has a total of 54 candies and his candies are worth \$3.10, which of the following is true?

- I. $\$0.05v + \$0.10t = \$3.10$
- II. $54 = v + t$
- III. $\$0.05 \times (54 - v) + \$0.10v = \$3.10$

- A) I only
- B) I and II only
- C) I, II, and III
- D) None of the above

9



In the figure above, if $\overline{BC} \parallel \overline{DE}$, what is the value of x ?

- A) 30
- B) 40
- C) 70
- D) 110

CONTINUE



10

Ali buys 10 burgers and 7 chocolate milkshakes for \$50.95. If the price of a chocolate milkshake is \$0.25 cheaper than the price of a burger, what is the price of a chocolate milkshake?

- A) \$2.85
- B) \$3.10
- C) \$4.05
- D) \$5.09

11

The acute angles of a right triangle have a ratio of 12 to 3. What is the difference between the two angle measures?

- A) 42 degrees
- B) 54 degrees
- C) 64 degrees
- D) 72 degrees

12

A number is a palindrome if it is the same written backwards and forwards (6336 is an example of a palindrome). What number divides into every 4 digit palindrome?

- A) 2
- B) 3
- C) 7
- D) 11

13

Day	Number of books
Monday	x
Tuesday	$2x$
Wednesday	$0.5x$
Thursday	x
Friday	$3.5x$

The above table outlines how many books Anthony reads per day in terms of x . What is the average daily number of books that Anthony reads, in terms of x ?

- A) $\frac{5x}{8}$
- B) x
- C) $\frac{8x}{5}$
- D) $8x$

14

$$x^2 - 1 < x^3$$

For which of the following values is the above inequality true?

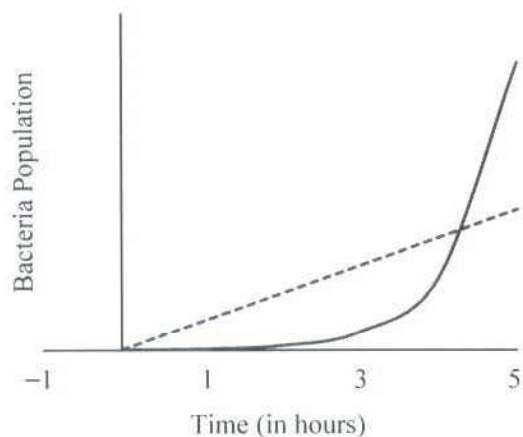
- A) $x = -3$
- B) $x = -2$
- C) $x = -1$
- D) $x = 0$

CONTINUE



15

Growth of Bacteria Populations



Bacteria A is represented by the solid line and Bacteria B is represented by the dotted line in the graph shown above. Which of the following statements is TRUE?

- A) Bacteria A is growing at a linear rate.
- B) Bacteria B is growing at an exponential rate.
- C) Neither Bacteria A nor Bacteria B is growing at a linear rate.
- D) Bacteria B is growing linearly, but Bacteria A is growing exponentially.

16

Which of the following values of x results in the largest value of y in the equation $y = -(x - 2)^2 + 4$?

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

17

$$x = 12$$

$$3x = 4y^2$$

In the system of equations above, if $y > 0$, what is the value of x^2y ?

- A) 36
- B) 108
- C) 432
- D) 1296

18

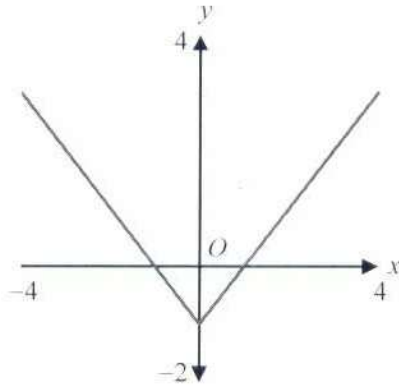
The product of two positive consecutive even numbers is 168. What is the smaller of the two numbers?

- A) 24
- B) 21
- C) 14
- D) 12

CONTINUE



19



The function $f(x)$ is graphed above. If $g(x) = f(x) - 1$, which of the following statements is true?

- A) $g(x)$ is greater than or equal to zero.
- B) $g(x)$ is greater than or equal to negative one.
- C) $g(x)$ is greater than or equal to negative two.
- D) $g(x)$ is greater than negative one, but smaller than five.

20

Three different integers are randomly selected from a group of five unique integers consisting of 1 through 5. What is the probability that these numbers are 1, 2, and 3?

- A) One in five
- B) One in ten
- C) One in twenty
- D) One in sixty

21

The ratio of $d:c$ is 3:1. If the sum of d and c is s , what is the value for d , in terms of s ?

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

CONTINUE



Questions 22 and 23 refer to the following information.

A survey on coffee consumption was conducted among a random sample of students at a university. A total of 200 students were surveyed. The table below displays a summary of the results.

Cups of Coffee (Per Day)				
Student Year	0	1	2 or more	Total
Freshman	25	9	16	50
Sophomore	5	19	26	50
Junior	10	6	50	66
Senior	0	2	32	34
Total	40	36	124	200

22

Based on the information in the table, who would be least likely to drink any cups of coffee during the day?

- A) a freshman
- B) a sophomore
- C) a junior
- D) a senior

23

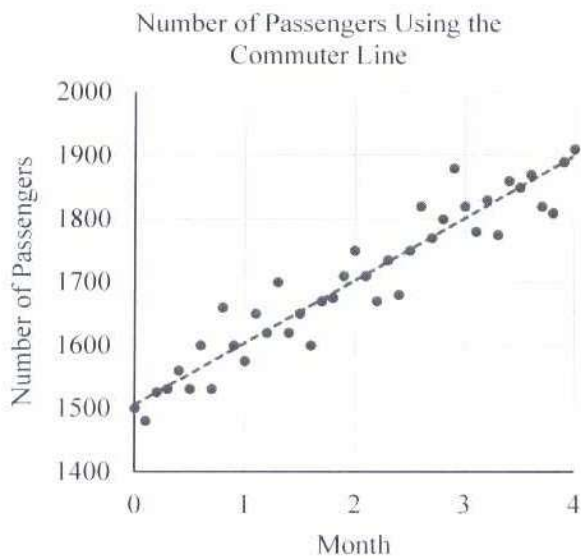
Which of the following statements about the students surveyed is not supported by the table above?

- A) A higher percentage of juniors than sophomores drink 2 or more cups of coffee per day.
- B) A higher percentage of juniors than seniors drink 2 or more cups of coffee per day.
- C) 20% of all students surveyed do not drink coffee.
- D) 50% of the freshmen do not drink coffee.

CONTINUE



24



The graph above shows the number of passengers on a train line over 4 months. If m is the number of months, which of the following functions best represents the graph's line of best fit?

- A) $f(m) = 200 + 1500m$
- B) $f(m) = 150 + 100m$
- C) $f(m) = 1500 + 100m$
- D) $f(m) = 150m + 1500$

25

Produce at the Farmer's Market	
Fruit	Price
Apples	3 for 2 dollars
Peaches	1 for 1 dollar
Oranges	4 for 3 dollars

The chart above shows the prices for fruit at a farmer's market. Claire spends 4 dollars on apples, 2 dollars on peaches, and 3 dollars on oranges and puts all of her fruits in a brown bag. If she randomly selects a fruit from her bag, what is the probability she grabs an apple?

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

26

j is equal to 925 and k is equal to 5,550. A number, n , is added to j , such that the ratio of $j + n$ to k is 1:3. What is the ratio of n to $j + n$, expressed as a percentage of $j + n$?

- A) 30%
- B) 40%
- C) 50%
- D) 60%

CONTINUE



27

When Amelia goes cliff diving in Bali, her height above the water can be modelled by the function $f(t) = -2t^2 + 4t + 30$, where t represents time in seconds. How long, in seconds, does it take for Amelia to hit the water?

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

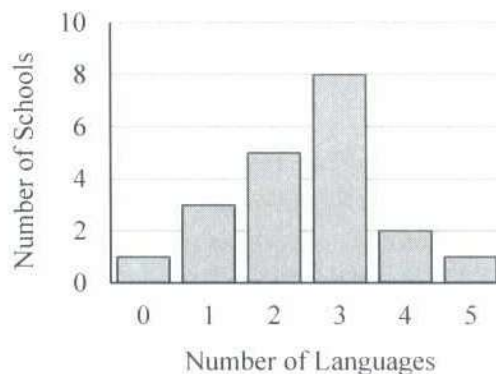
28

The average of 5 positive numbers is 85. If the highest of these numbers is 100, which of the following statements cannot be true?

- A) The lowest score is 20.
- B) The highest range possible is 75.
- C) The median is greater than 25.
- D) The mode is 85.

29

Number of Foreign Languages Offered in a High School Curriculum



20 high schools were surveyed on the number of languages offered in their curriculum. The results are shown in the chart above. How many schools offer fewer languages than average across the 20 schools?

- A) 9
- B) 10
- C) 11
- D) 17

30

A city wants to replace 10% of its bus fleet with hydrogen-powered buses. Each hydrogen-powered bus costs \$200,000. If there are 180 buses in the city, how much money, in dollars, will it cost for the city to meet its goal?

- A) 1,800,000
- B) 2,000,000
- C) 3,600,000
- D) 4,000,000

CONTINUE



31

If $2x$ is equal to the sum of 11, 12, and 13, what is the value of x ?

32

$$-15(2+n) = -16(n-7)$$

What is the value of n in the equation above?

33

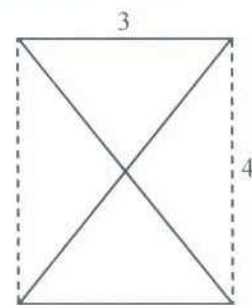
If x is 60% of y , and y is 30% of z , x is what percent of z ?

34

$$8^{3x-1} = \frac{1}{4^{3x-21}}$$

What is the value of x in the equation above?

35



A rectangle has side lengths 3 and 4 as shown in the figure above. What is the total length of the solid lines?

36

What is the radius of the circle with the equation $x^2 + y^2 - 7 = 9$?

CONTINUE



Questions 37 and 38 refer to the following information.

Susan is training for a marathon. To track her progress, she has been keeping a record of her recent practice runs. The table below summarizes her training progress.

Time For Practice Runs		
Week	Distance (in miles)	Time (in minutes)
1	10	100
2	12	108
3	8	68
4	10	87
5	12	105

37

How much faster, in seconds, did Susan run each mile in Week 3 compared to Week 4?

38

Susan would like to run 26 miles in 3 hours and 54 minutes. Currently, she can run 26 miles at a pace of 11 minutes/mile. If she plans on improving her pace by 15 seconds/mile every week, how many weeks will it take Susan to reach her goal?

STOP

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PRACTICE TEST 1 ANSWERS

PART 1

SECTION 1

- | | | | |
|-------|-------|-------|-------|
| 1. C | 14. D | 27. A | 40. C |
| 2. B | 15. B | 28. C | 41. A |
| 3. A | 16. A | 29. B | 42. B |
| 4. A | 17. A | 30. B | 43. B |
| 5. D | 18. C | 31. C | 44. B |
| 6. B | 19. B | 32. D | 45. A |
| 7. C | 20. D | 33. D | 46. C |
| 8. D | 21. D | 34. D | 47. A |
| 9. C | 22. B | 35. A | 48. B |
| 10. D | 23. B | 36. B | 49. C |
| 11. A | 24. B | 37. A | 50. D |
| 12. B | 25. C | 38. B | 51. D |
| 13. B | 26. A | 39. C | 52. C |

SECTION 2

- | | | | |
|-------|-------|-------|-------|
| 1. A | 12. C | 23. B | 34. B |
| 2. C | 13. C | 24. C | 35. A |
| 3. B | 14. B | 25. C | 36. C |
| 4. C | 15. C | 26. B | 37. D |
| 5. D | 16. A | 27. D | 38. C |
| 6. B | 17. D | 28. A | 39. A |
| 7. B | 18. C | 29. D | 40. D |
| 8. B | 19. C | 30. B | 41. D |
| 9. C | 20. D | 31. A | 42. C |
| 10. C | 21. D | 32. B | 43. B |
| 11. D | 22. A | 33. B | 44. B |

SECTION 3

- | | | | |
|------|-------|-------|------------|
| 1. C | 6. B | 11. B | 16. 3 |
| 2. C | 7. A | 12. B | 17. 10 |
| 3. B | 8. B | 13. D | 18. $17/2$ |
| 4. C | 9. C | 14. A | 19. 6 |
| 5. D | 10. A | 15. B | 20. 6 |

SECTION 4

- | | | | |
|-------|-------|-------|---------|
| 1. B | 11. B | 21. B | 31. 18 |
| 2. B | 12. D | 22. A | 32. 142 |
| 3. B | 13. C | 23. B | 33. 18 |
| 4. B | 14. D | 24. C | 34. 3 |
| 5. D | 15. D | 25. C | 35. 16 |
| 6. B | 16. C | 26. C | 36. 4 |
| 7. D | 17. C | 27. C | 37. 12 |
| 8. B | 18. D | 28. A | 38. 8 |
| 9. C | 19. C | 29. A | |
| 10. A | 20. B | 30. C | |



Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

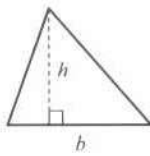
DIRECTIONS

Questions **1-15** ask you to solve a problem, select the best answer among four choices, and fill in the corresponding circle on your answer sheet. Questions **16-20** ask you to solve a problem and enter your answer in a grid provided on your answer sheet. There are detailed instructions on entering answers into the grid before question 16. You may use your test booklet for scratch work.

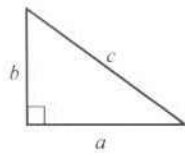
NOTES

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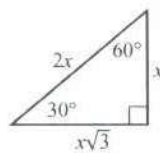
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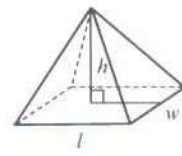
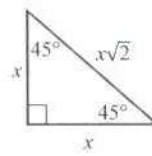
$$A = \frac{1}{2}bh$$



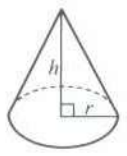
$$a^2 + b^2 = c^2$$



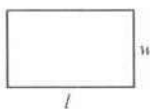
Special Triangles



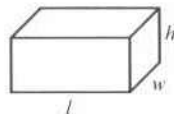
$$V = \frac{1}{3}lwh$$



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



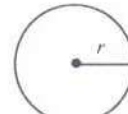
$$A = lw$$



$$V = lwh$$

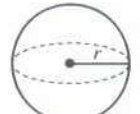


$$V = \pi r^2 h$$



$$A = \pi r^2$$

$$C = 2\pi r$$



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

There are 360° in a circle.

The sum of the angles in a triangle is 180° .

The number of radians of arc in a circle is 2π .

CONTINUE



1

$$x + 6 + 2x = 5x$$

What is the value of x in the above equation?

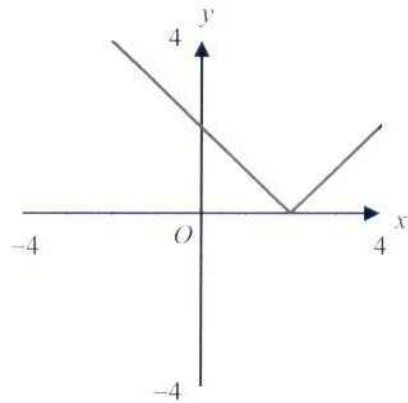
- A) 2
- B) 3
- C) 4
- D) 5

2

If $a^2 + 3a + 1 = c$ and $-4a + 5 = d$, which of the following is equal to $c + d$?

- A) $a^2 + a + 6$
- B) $a^2 - a + 6$
- C) $a^2 + 7a - 4$
- D) 6

3



Which inequality is represented by the graph above?

- A) $y \geq |x - 2|$
- B) $y \geq |x + 2|$
- C) $y \leq |x - 2|$
- D) $y \leq |x + 2|$

4

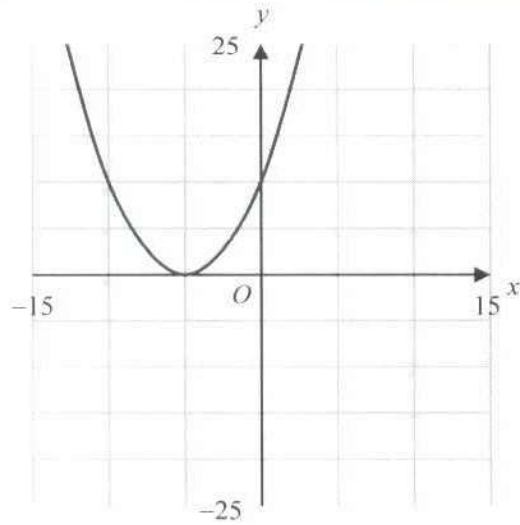
Sophie and Jazmin have the same amount of money to invest in the stock market. If Sophie lends \$15,000 to Jazmin, Jazmin has twice as much money as Sophie. How much money did Jazmin have originally?

- A) \$10,000
- B) \$30,000
- C) \$45,000
- D) \$60,000

CONTINUE



5



Which function best represents the parabola above?

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

6

Luca pays \$1195 per month for rent plus 10 cents per kilowatt hour (kWh) used for electricity. If Luca used x kWh in one month, which expression best represents the amount of money in dollars Luca needs to pay for his apartment?

- A) $1195 + 0.1x$
 B) $(1195 + 0.1)x$
 C) $1195 + 10x$
 D) $(1195 + 1)x$

7

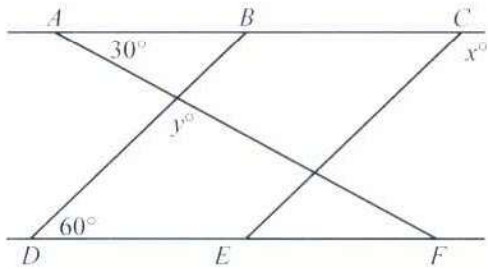
Which of the following equations has the same slope as $2y + 6x = 5$?

- A) $x + 3y = 1$
 B) $3x = -y + 5$
 C) $y - 3x = 4$
 D) $6y = 2x - 1$

CONTINUE



8



Note: figure is not drawn to scale.

In the figure above, $\overline{AC} \parallel \overline{DF}$ and $\overline{BD} \parallel \overline{CE}$. What is the value of $x - y$?

- A) 30
- B) 60
- C) 90
- D) 12

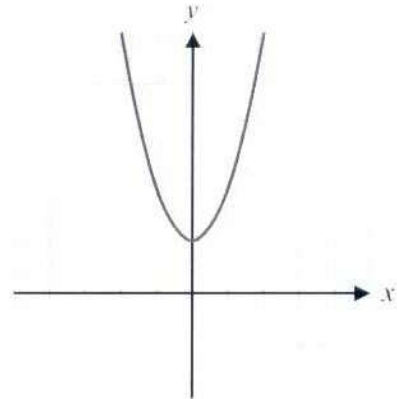
9

$$8x + y = 36 = 2y + 4x$$

In the above equation, what is the value of $x + y$?

- A) 3
- B) 10
- C) 12
- D) 15

10



The graph above is a parabola whose equation is $y = ax^2 + b$. If $y = -ax^2 + b$ were drawn on the same graph, how many x -intercepts would the resulting graph have?

- A) 0
- B) 1
- C) 2
- D) Need more information

11

$$\frac{(x^2 - 1)(x - 1)}{x + 1}$$

Which of the following is equivalent to the expression above?

- A) $x^2 - 1$
- B) $(x - 1)^2$
- C) $(x + 1)^2$
- D) $x^2 + 1$

CONTINUE



12

Grace kicks a soccer ball into the air, where the height of the ball follows the function $h(t) = 8t - t^2$. After how many seconds does the ball return to the ground?

- A) 0
- B) 4
- C) 6
- D) 8

13

What is the solution for x in the quadratic equation $y = x^2 - 4x + 6$?

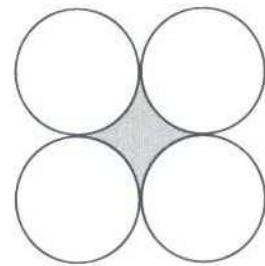
- A) $x = 2 \pm \sqrt{2}$
- B) $x = -2 \pm \sqrt{2}$
- C) $x = 2 \pm 2\sqrt{2}$
- D) No real solution

14

The square of a negative number is decreased by 14. The resulting number is 5 times the original number. What is the reciprocal of the original number?

- A) $-\frac{1}{2}$
- B) $-\frac{1}{4}$
- C) $-\frac{1}{5}$
- D) $-\frac{1}{7}$

15



A landscape architect is creating four identical circular gardens so that each circular garden is touching two other gardens, as shown in the figure above. If each circular garden has an area of π , what is the area of the shaded region between the gardens?

- A) $64 - \pi$
- B) $4 - \pi$
- C) π
- D) $2 + \pi$

CONTINUE



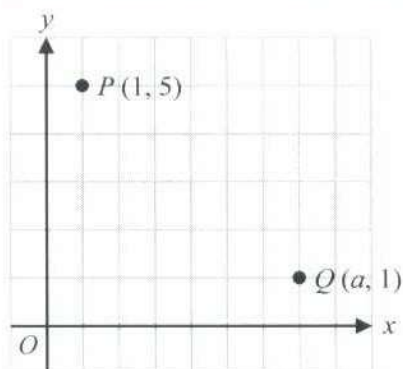
16

What is the value of $(\sqrt{3} - \sqrt{2})(\sqrt{3} + \sqrt{2})$?

17

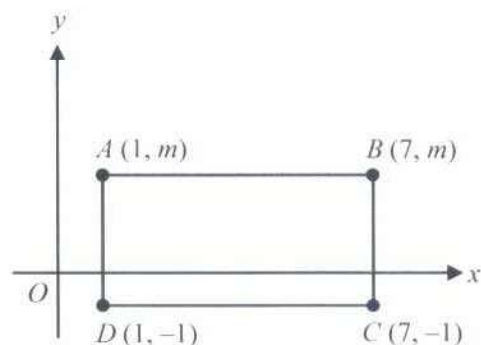
If $|3x - 1| \leq 2x$, where $x > 0$, what is a possible value of x ?

18



The slope of PQ is $-\frac{2}{3}$. What is the value of a ?

19



The rectangle $ABCD$ is placed on top of a coordinate grid as shown in the figure above. If the area of the rectangle is 24, what is the value of m ?

20

If $x + \frac{9}{x} = -6$, what is the value of $x^2 + \frac{81}{x^2}$?

STOP

If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.



Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

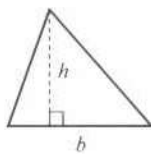
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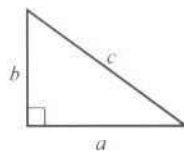
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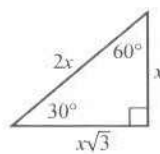
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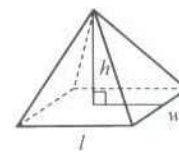
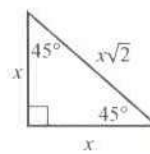
$$A = \frac{1}{2}bh$$



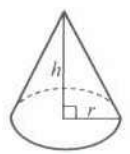
$$a^2 + b^2 = c^2$$



Special Triangles



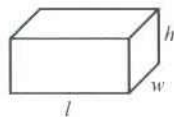
$$V = \frac{1}{3}lwh$$



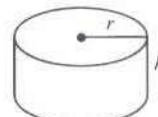
$$V = \frac{1}{3}\pi r^2 h$$



$$A = lw$$



$$V = lwh$$

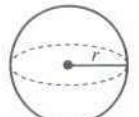


$$V = \pi r^2 h$$



$$A = \pi r^2$$

$$C = 2\pi r$$



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

There are 360° in a circle.

The sum of the angles in a triangle is 180° .

The number of radians of arc in a circle is 2π .

CONTINUE



1

If $a + 4 = 12$, what is $4a$?

- A) 8
- B) 32
- C) 48
- D) 64

2

Package	Price
1-hr session	\$100
2-hr session	\$190
Five 1-hr sessions	\$450
Five 2-hr sessions	\$850

The table above shows various packages offered by a tutoring company. How much cheaper is it, in dollars per hour, to buy a 2-hr session than a 1-hr session?

- A) 5
- B) 10
- C) 20
- D) 90

3

If $f(x) = 2x$ and $g(x) = 5x + 1$, what is $g(f(c))$?

- A) $2c$
- B) $10c + 1$
- C) $10c + 2$
- D) $20c + 2$

4

U is 75% of T . If V is 5% of U , what percentage of T is V ?

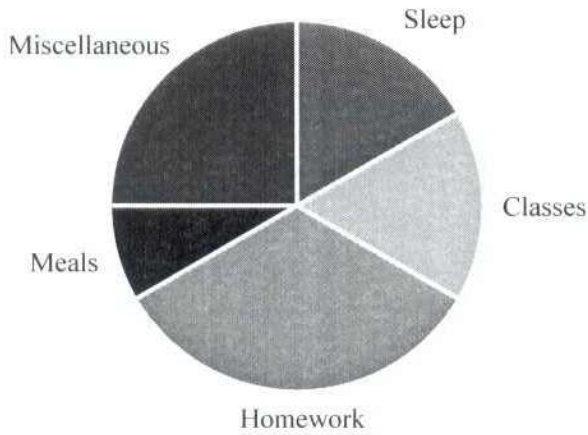
- A) 1%
- B) 3.75%
- C) 10%
- D) 75%

CONTINUE



5

Activities over 24 Hours



The pie chart above shows how a student spends his time in a 24-hour period. According to this chart, what fraction of his day does he spend sleeping and going to classes?

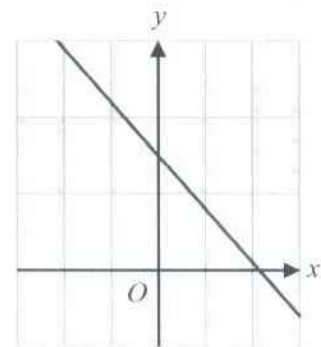
- A) $\frac{1}{4}$
 B) $\frac{1}{3}$
 C) $\frac{1}{2}$
 D) $\frac{2}{3}$

6

If $f(x) = 2x + 2$ is a linear function, which of the following is true for $4f(x)$?

- A) The slope is four times steeper than $f(x)$.
 B) The slope is four times less steep than $f(x)$.
 C) All values of x are four times greater than $f(x)$ for the same values of y .
 D) The slope changes, but the y -intercept remains the same as $f(x)$.

7



What is a possible equation for the linear function above?

- A) $y = -\frac{10}{7x} - 3$
 B) $y = -\frac{10}{7x} + 3$
 C) $y = \frac{10}{7x} - 3$
 D) $y = \frac{10}{7x} + 3$

CONTINUE



8

An object measures 3 cm by 9 cm by 4 cm and weighs 54 grams. If another object made from the same material measures 6 cm by 2 cm by 3 cm, what would be the weight of the second object in terms of the first object?

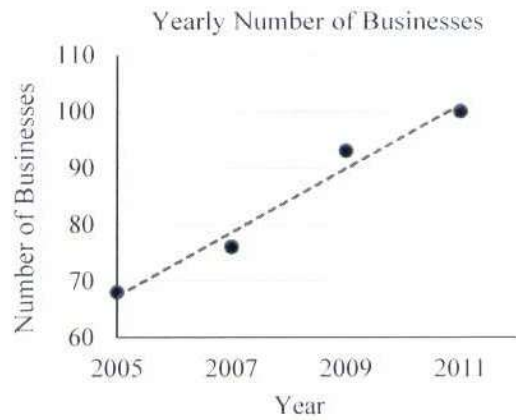
- A) 3 times heavier
- B) 2 times heavier
- C) The same weight
- D) 3 times lighter

9

A set of five integers includes 30, 45, 75, 75, and 100. When a sixth integer is added, the mean of the integers does not change. Which of the following is the sixth integer?

- A) 45
- B) 50
- C) 65
- D) 75

10



City planners in Beaufort, South Carolina want to estimate the number of businesses in 2015 from data collected from 2005 to 2011. The number of businesses in the city during this period is graphed above. Using the line of best fit, what is the best estimate for the number of businesses in Beaufort operating in 2015?

- A) 120
- B) 125
- C) 130
- D) 140

11

If $x = a + 2b$, $y = 2a - b$ and $z = -2b$, what is $x - y + 2z$?

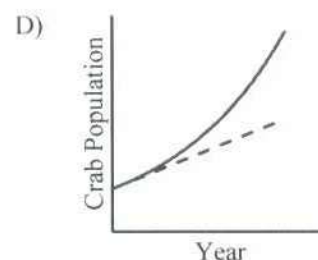
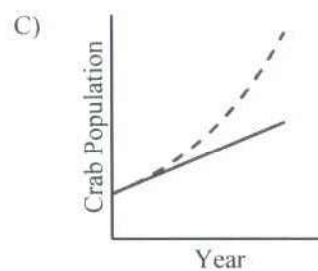
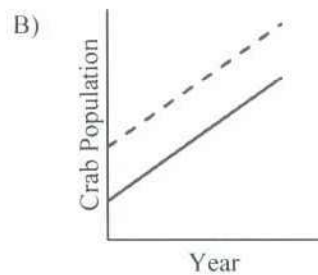
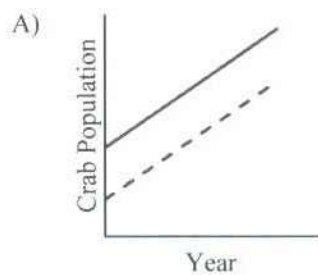
- A) $-a - b$
- B) $a - b$
- C) $-a + b$
- D) $-a - 3b$

CONTINUE



12

Dungess crab and Horseshoe crab populations are observed and compared by marine researchers. Researchers notice that the Dungess population increases by 10% each year, and the Horseshoe population increases by 100 each year. If the Dungess crab population is represented by the solid line, and the Horseshoe crab population is represented by the dotted line, which of the following graphs best represents Dungess crab and Horseshoe crab populations?



13

Isabella and Tom drive from the same location at 9:46 AM. Isabella drives north with a constant speed of 65 km/h, and Tom drives south with a constant speed of 77 km/h. At what time will Isabella and Tom be 639 km apart?

- A) 1:16 PM
- B) 2:16 PM
- C) 3:30 PM
- D) 4:30 PM

14

If $L + 11 = A$ and $L + A = 93$, what is product of L and A ?

- A) 1230
- B) 2132
- C) 2150
- D) 3276

CONTINUE

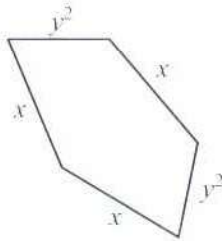
15

x	0	1	2	3
$f(x)$	-3	-4	-7	-12

The table above gives values of the quadratic function f for selected values of x . Which of the following expressions defines $f(x)$?

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

16



Note: figure is not drawn to scale.

The perimeter of the figure above is 333. If $x = 15$, what is the value of y ?

- A) 12
- B) 30
- C) 144
- D) 159

17

p	$N(p)$
0	1250
1	2500
2	5000
3	10000
4	20000

A number, $N(p)$, increases according to a defined period, p , as shown in the chart above. What equation best represents the relationship between the number and the period?

- A) $N(p) = 1250 \times (2)^p$
- B) $N(p) = 1250 + 2p$
- C) $N(p) = 1250 + 2p^2$
- D) $N(p) = 1250p^2$

18

A company wants to create a solution of pure ethanol and distilled water. The density of ethanol is 0.789 g/cm^3 and the density of the water is 1 g/cm^3 . If the company combines 8 cm^3 of ethanol with 4 cm^3 of water, what is the resulting density of the solution, to the nearest one thousandth of a gram? (Density is mass divided by volume.)

- A) 0.789 g/cm^3
- B) 0.842 g/cm^3
- C) 0.859 g/cm^3
- D) 0.895 g/cm^3

CONTINUE



19

If $\frac{x+1}{x+5} = \frac{1}{x-1}$, what are the values of x ?

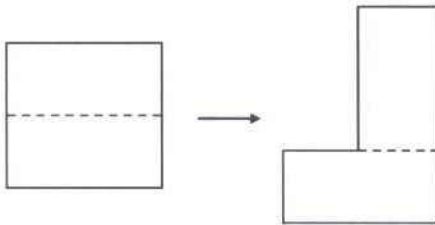
- A) 1 and -5
- B) 2 and -3
- C) 3 and -2
- D) -1 and 2

21

If $(3^x)(9^y) = 2187$, what is the value of $x + 2y$?

- A) 5
- B) 6
- C) 7
- D) 8

20



A square with an area of A is cut in half, and arranged as in the diagram above. What is the perimeter of the resulting figure, in terms of A ?

- A) $\frac{5}{2}A$
- B) $4A^2$
- C) $4\sqrt{A}$
- D) $5\sqrt{A}$

22

Number
72
90
87
84
x

Four known numbers and one unknown number are shown in the table above. If the median number of the five numbers is 85, which of the following statements is NOT true?

- A) The value for x is equal to the median of the five numbers.
- B) The mean of the five numbers is greater than the median.
- C) The value for x is greater than the mean of the five numbers.
- D) In order to calculate the median, the numbers must be arranged in order.

CONTINUE

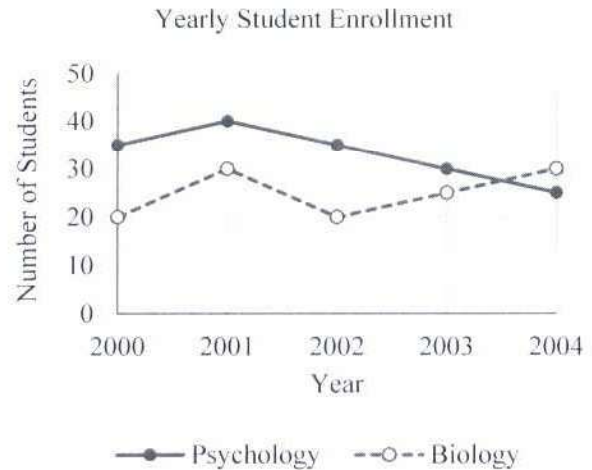
23

A group of 11 people are travelling together. Two people are from France, seven are from England, and two are from China. Unfortunately, their travel agent only booked 9 tickets, and two people have to leave the group. The group decides to pick two people at random by drawing lots. If the first person chosen is from England, what is the percent probability that the second person will also be from England?

- A) 30
- B) 40
- C) 50
- D) 60

Questions 24, 25 and 26 refer to the following information.

The graph below shows student enrollment for a psychology class and biology class in the years 2000-2004.



24

What is the total number of students who enrolled in psychology class during the period from 2000 to 2002?

- A) 110
- B) 130
- C) 140
- D) 170

CONTINUE



25

Which of the following statements is NOT true for the period from 2000-2004?

- A) The median is equal to the mean for the number of students enrolled in biology.
- B) Both the median and the mean number of students is greater in psychology than in biology.
- C) There are approximately 32% more students enrolled in psychology than in biology on average.
- D) The mean is greater than the median for the number of students enrolled in psychology.

26

Which of the following statements is supported by the graph?

- A) In 2001, there were twice as many students in the biology class than the psychology class.
- B) During the years 2001-2004, enrollment in the psychology class on average decreased by 5 students per year.
- C) During the years 2002-2004, enrollment in the biology class on average increased by 10 students per year.
- D) In 2003, there were more students in the biology class than in the psychology class.

27

If $x \leq 9$ and $x \geq 1$, which of the following statements are true?

- I. $-1 \leq x \leq 9$
- II. $1 \leq x \leq 9$
- III. $|x - 5| \leq 4$

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

28

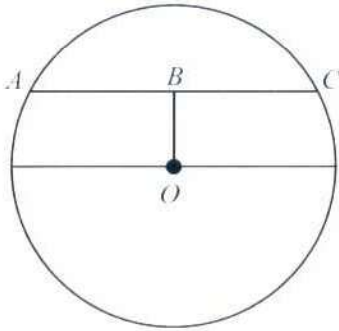
Expression	Value
$A + B$	2.50
$A + C$	2.62
$B + C$	2.12

The table above displays the values of different expressions. What is the value of $A + B + C$?

- A) 3.42
- B) 3.62
- C) 4.62
- D) 7.24

CONTINUE

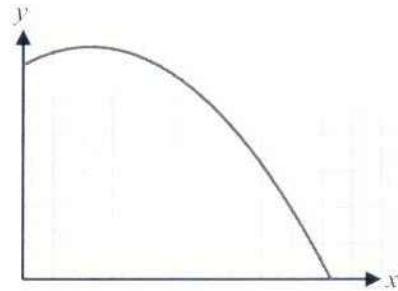
29



The figure above shows a circle with center O and a diameter of 10. If the chord \overline{AC} is equal to 8, what is the value of \overline{BO} ?

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

30



A class of physics students at Seaton high school tests how long it will take a ball to reach a height of ten meters when thrown off the top of a very tall building. Their result is graphed above. The class calculates that the ball follows the function $h(t) = -2t^2 + 10t + 100$, where h is the function of the height of the ball in meters, and t is the time in seconds. How long does it take, in seconds, for the ball to reach the ground?

- A) 10
- B) 11
- C) 12
- D) 13

CONTINUE



31

What is the difference between $2x + 7$ and $2x - 1$?

32

$$3(x - 4) - 2(8 - x) = 4(x + 1)$$

What is the value of x in the equation above?

33

Four times b is equal to ten. If b is reduced by 20 percent, what is the value of three times b ?

34

$$\sqrt{2x + 10} = x + 5$$

What is the product of the solutions for x in the equation above?

35

Career Preference	Number of Students
Healthcare	
Education	
Finance	
Retail	
Unsure	

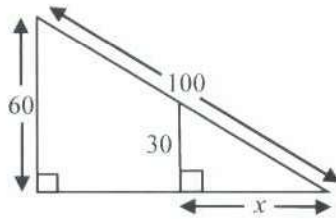
= 2 students

The chart above shows career preferences for students in a class. If two different students are randomly chosen, what is the probability they both want to enter finance?

CONTINUE



36



What is the value of x in the figure above?

38

The animal supplies company offers the student a deal that will reduce the cost of maintaining each cage by half. Taking this opportunity, the student decides to conduct a multi-day experiment. If she wants to test 102 mice and has a budget of 225 dollars for cage maintenance, what is the maximum number of days she can conduct her experiment? (Round your answer to the nearest day.)

Questions 37 and 38 refer to the following information.

A student is conducting a series of experiments to study the effects of a drug on mouse behavior. For the duration of the experiments, she keeps the mice in cages. One cage can house up to five mice. Each cage costs a flat rate of \$1.25 per day to maintain.

37

For her first experiment, the student has six cages of mice at maximum capacity. If there are twice as many female mice as male mice, how many male mice does she have?

STOP

If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.

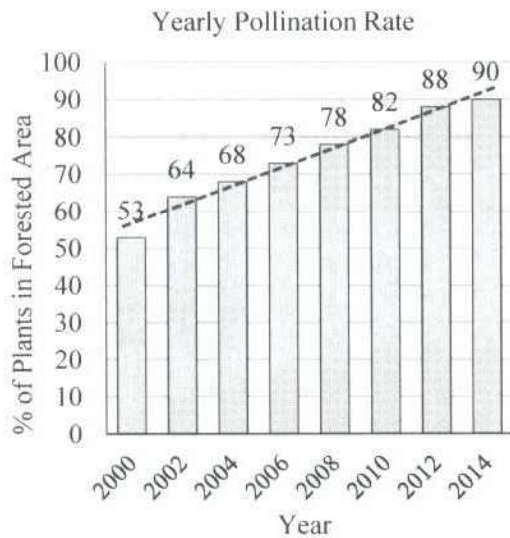


19

If x , y , a , and b are all positive integers, which of the following expressions is NOT equivalent to $(x^a)^b \times (xy)^{ab}$?

- A) $(x^2y)^{ab}$
- B) $(x^{2a})^b y^{ab}$
- C) $x^b x^a x^b x^b y^a$
- D) $(x^a)^b (x^b)^a (y^a)^b$

20



The graph above shows the pollination rate of plants in a forested area every two years. Based on the trend line, what is the average annual increase in the pollination rate?

- A) 5%
- B) 3.8%
- C) 2.5%
- D) 1.5%

21

If $y = 3x^2 + 10x - 8$, what is one possible value of x when $y = 0$?

- A) -4
- B) 0
- C) 4
- D) 8

22

$$\begin{aligned} y - x &= 8 \\ x^2 - xy &= -4 \end{aligned}$$

According to the system of equations above, what is the value of x ?

- A) $-\frac{17}{2}$
- B) $-\frac{1}{2}$
- C) $\frac{1}{2}$
- D) $\frac{17}{2}$

CONTINUE



Questions 23, 24, and 25 refer to the following information.

The table below shows the number of new apartments that were completed and rented in a 3-month period in 2009. The number, cost, and regional geographic location of each apartment is summarized, according to the U.S. Census Bureau.

Rent for the Year 2009	Number of Apartments Completed and Rented in 3 Months (1000s)				
	U.S.	Northeast	Midwest	South	West
Total Apartments Rented (1000s)	163,000	10,000	17,200	93,300	42,400
Less than \$950	57,300	2,700	10,200	35,700	8,800
\$950 to \$1,049	22,300	400	2,900	15,100	4,000
\$1,050 to \$1,149	13,300	1,100	1,000	7,300	3,900
\$1,150 to \$1,249	16,700	800	700	10,200	5,000
\$1,250 to \$1,349	53,300	5,000	2,500	25,000	20,700
Median Monthly Asking Rent (dollars)	1,063	1,250	857	1,022	1,240

23

Which region of the U.S. had the greatest number of apartments that were rented for less than \$950?

- A) The Northeast
- B) The Midwest
- C) The South
- D) The West

24

Which of the following statements is true for the year 2009?

- A) Since the median rent for newly completed apartments in the U.S. was greater than the median rent in the Midwest, the mean price for these apartments is also greater in the U.S. than in the Midwest.
- B) At least 50 percent of the newly completed apartments rented in the South cost less than the U.S. median for newly completed apartments.
- C) Apartments that cost between \$1,050 and \$1,149 make up a greater percentage of newly constructed apartments in the Midwest than they do in the West.
- D) With 25,000 thousand newly completed and rented apartments costing between \$1,250 and \$1,349, the South was the most expensive location to rent new apartments in the U.S.

CONTINUE



Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

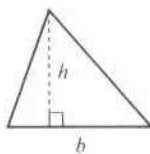
DIRECTIONS

Questions **1-15** ask you to solve a problem, select the best answer among four choices, and fill in the corresponding circle on your answer sheet. Questions **16-20** ask you to solve a problem and enter your answer in the grid provided on your answer sheet. There are detailed instructions on entering answers into the grid before question 16. You may use your test booklet for scratch work.

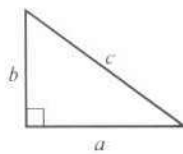
NOTES

1. You **may not** use a calculator.
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3. Figures are drawn to scale unless stated otherwise.
4. Figures lie in a plane unless stated otherwise.
5. The domain of a function f is defined as the set of all real numbers x for which $f(x)$ is also a real number, unless stated otherwise.

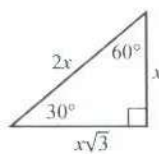
REFERENCE



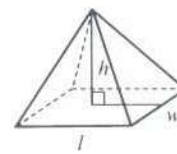
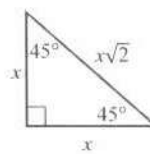
$$A = \frac{1}{2}bh$$



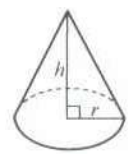
$$a^2 + b^2 = c^2$$



Special Triangles



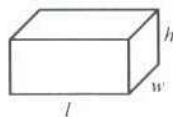
$$V = \frac{1}{3}lwh$$



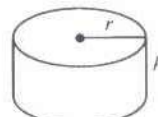
$$V = \frac{1}{3}\pi r^2 h$$



$$A = lw$$



$$V = lwh$$

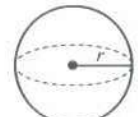


$$V = \pi r^2 h$$



$$A = \pi r^2$$

$$C = 2\pi r$$



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

There are 360° in a circle.

The sum of the angles in a triangle is 180° .

The number of radians of arc in a circle is 2π .

CONTINUE



1

If $3x = 15$ and $2y = 10$, then which of the following values is equal to $6x + 4y$?

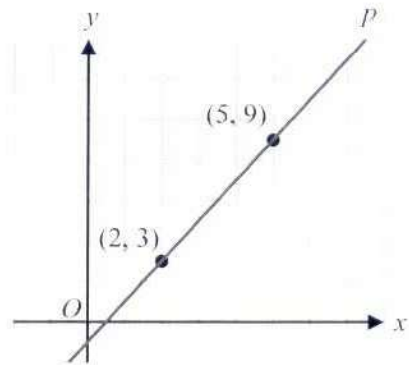
- A) 35
- B) 50
- C) 65
- D) 70

2

For which value of x is $f(x) = 2x^2 - 8x + 6$ less than 0?

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

3



What is the equation that represents the line p in the xy -coordinate plane above?

- A) $y = \frac{1}{4}x + 1$
- B) $y = \frac{1}{2}x - 1$
- C) $y = x + 1$
- D) $y = 2x - 1$

4

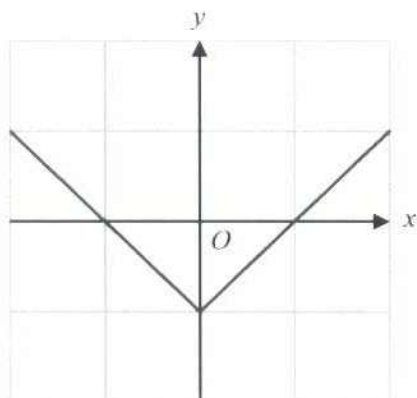
A T-shirt printer can produce 40 tank tops with logos in 5 hours. At this rate, how many tank tops with logos can the printer produce in 7 hours?

- A) 48
- B) 56
- C) 64
- D) 70

CONTINUE



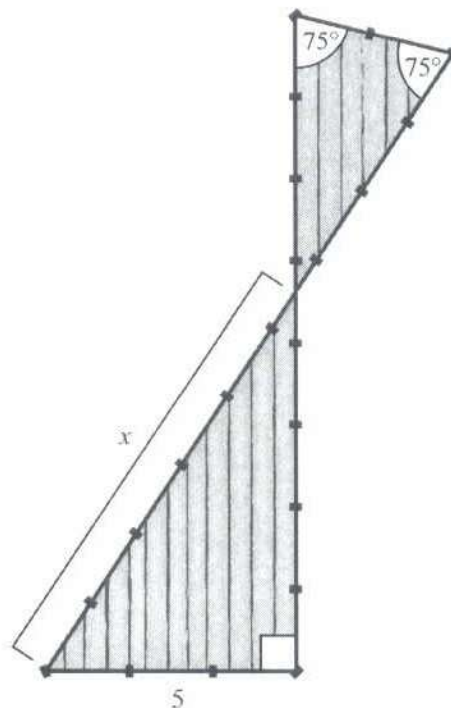
5



Which equation produces the graph above?

- A) $y = |x| - 1$
- B) $y = |x - 1|$
- C) $y = |x + 1|$
- D) $|y| = x + 1$

6



If a landscape architect sketched a plan for two triangular gardens in the diagram above, what is the length x ?

- A) 8.7
- B) 9.6
- C) 10
- D) 11.2

CONTINUE



7

As the positive integer x increases, which function increases at the greatest rate?

- A) $f(x) = 100x$
- B) $f(x) = 100^x$
- C) $f(x) = x^{-100}$
- D) $f(x) = 100 + x$

8

If $f(x) = 3x + 7$, what is the value of $f(-1) + f(3)$?

- A) 12
- B) 16
- C) 20
- D) 24

9

The expression $(2i + 3)(i + 4)$ is equivalent to which of the following? (Note: $i = \sqrt{-1}$.)

- A) $12i$
- B) $9 + 10i$
- C) $10 + 11i$
- D) $12 + 13i$

10

Which of the following values of x makes the equation $2x + \frac{x}{3} = 5x$ true?

- A) -3
- B) 0
- C) 1
- D) 2

11

x	y
0	6
1	8
2	14
3	32

Which expression fits the above values?

- A) $y = x^3 + 6$
- B) $y = 2^x + 6$
- C) $y = 3^x + 5$
- D) $y = 4x + 4$

CONTINUE



12

Consider the equation $\sqrt{5x-5} = \sqrt{y^2+1}$. Which of the following are possible values for the coordinates (x, y) ?

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

13

If $f(x) = x^2 + 2x + 3$ and $g(x) = f(3x)$, what is the value of $g(5) - f(5)$?

- A) 220
- B) 258
- C) 278
- D) 296

14

$$2x + y = 10$$

$$x + 2y = 35$$

According to the system of equations above, what is the value of y ?

- A) 20
- B) 25
- C) 30
- D) 35

15

What is the next value in the sequence 1, 2, 4, 7, 11...?

- A) 15
- B) 16
- C) 17
- D) 18

CONTINUE



16

Jeff and Liz are purchasing 5 chickens for every 1.5 acres of land. If they have 3 acres of land set aside for chickens, how many chickens do they purchase?

17

$$\begin{aligned}x^2 - y^2 &= 20 \\x - y &= 4\end{aligned}$$

What is the value of $x + y$ for the equations above?

18

If $x = 2y + 6$ and $y = -2x - 3$, what is the value of xy ?

19

$$F = G \frac{m_1 \times m_2}{d^2}$$

The gravitational force between two stars is inversely proportional to the square of the distance between the two stars, as represented by Newton's Universal Gravitation Equation shown above. G is the universal gravitation constant, d is the distance in light-years, m_1 is the mass of the first star, and m_2 is the mass of the second star. If the force of gravity between two stars that are 4 light-years apart is 64 exanewtons, what is the force, in exanewtons, between the stars if they are 8 light-years apart?

20

What is the perimeter of the triangle bordered by the lines $y = -\frac{4}{3}x + 16$, $x = 0$, and $y = 0$?

STOP

If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.



Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

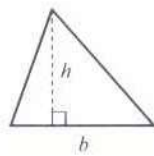
DIRECTIONS

Questions **1-30** ask you to solve a problem, select the best answer among four choices, and fill in the corresponding circle on your answer sheet. Questions **31-38** ask you to solve a problem and enter your answer in the grid provided on your answer sheet. There are detailed instructions on entering answers into the grid before question 31. You may use your test booklet for scratch work.

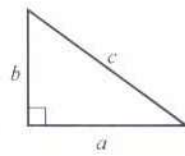
NOTES

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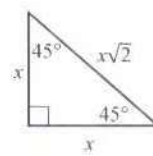
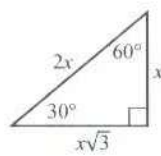
REFERENCE



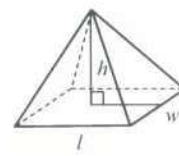
$$A = \frac{1}{2}bh$$



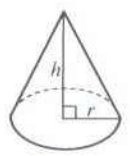
$$a^2 + b^2 = c^2$$



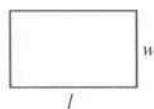
Special Triangles



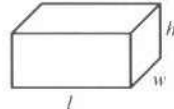
$$V = \frac{1}{3}lwh$$



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



$$A = lw$$



$$V = lwh$$

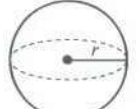


$$V = \pi r^2 h$$



$$A = \pi r^2$$

$$C = 2\pi r$$



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

There are 360° in a circle.

The sum of the angles in a triangle is 180° .

The number of radians of arc in a circle is 2π .

CONTINUE



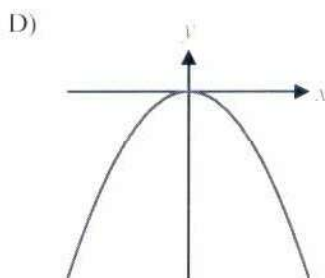
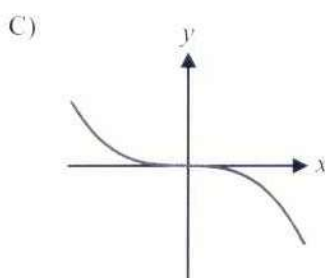
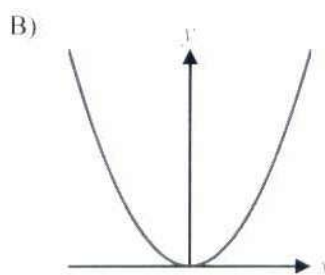
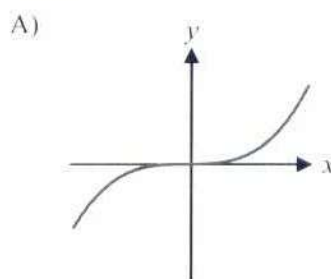
1

A chemist is investigating a new reaction to synthesize barite crystals. She finds that eight grams are synthesized every five minutes. If there are 111 grams of barite after an hour, how many grams of barite did the chemist start with?

- A) 0
- B) 8
- C) 15
- D) 71

2

Which of the following graphs could represent the equation $y = 2x^3$?



CONTINUE



3

A recipe that makes c cupcakes requires e eggs. If Grant wants to make 40 cupcakes, how many eggs will he need, in terms of c and e ?

- A) $\frac{40 \times e}{c}$
- B) $\frac{40}{e}$
- C) $\frac{e}{40 \times c}$
- D) $\frac{1}{40 \times e}$

4

A linear function has two coordinates: $(-2, -5)$ and $(-5, -3)$. What is the slope of this function?

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

5

A chessboard has 64 squares. If one grain of sand is placed on the first square, two on the second, four on the third, and so on, with the number of grains doubling each time, how many grains of sand will be on the 64th square?

- A) 64
- B) 64^2
- C) 2^{63}
- D) 2^{64}

6

In 2014, shoppers spent \$31 billion on gift cards, 13.9% of which were for coffee shops. If 27% of coffee shop gift cards go unused, what is the approximate value of these unused cards?

- A) \$1.16 billion
- B) \$4.31 billion
- C) \$6.55 billion
- D) \$8.37 billion

CONTINUE



7

A bakery uses the equation $3b - c = p$ to determine its profits in dollars, p , based on the number of loaves of bread, b , that they produce, and c , their fixed cost. Which of the following correctly explains this equation?

- A) The more bread the company produces, the less profit it can expect to make.
- B) Fixed cost increases with every loaf of bread that the company produces.
- C) Every loaf of bread produced increases the company's profit by three dollars.
- D) Profit remains the same regardless of how much bread the company produces.

8

$$\frac{1}{4}x + \frac{1}{3}y = \frac{1}{2}z$$

Which of the following equations is not equal to the equation above?

- A) $3x + 4y = 6z$
- B) $\frac{1}{2}x + \frac{2}{3}y = z$
- C) $x + \frac{4}{3}y = 2z$
- D) $x + y = \frac{3}{2}z$

9



The total sales of films are compared to their total budgets in the graph above. What was the budget of the film with the median total ticket sales?

- A) \$125 million
- B) \$190 million
- C) \$195 million
- D) \$200 million

10

$$f(z) = \frac{2}{z} + z \times 3$$

According to the equation above, what is the value of $f\left(\frac{2}{3}\right)$?

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

CONTINUE



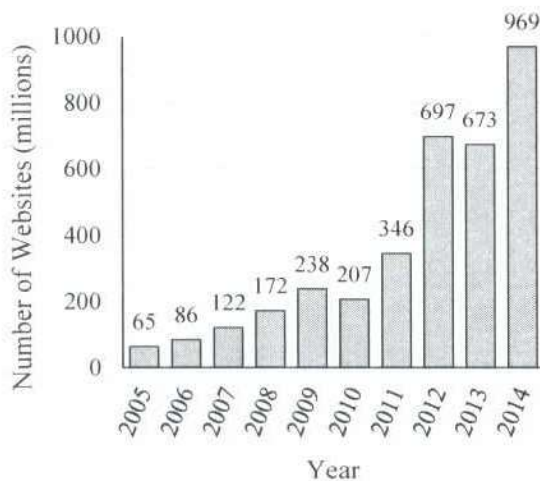
11

Snails travel at a speed of about 13 mm per second. How many minutes would it take for a snail to climb the 169 m tall Washington Monument?

- A) 36
- B) 77
- C) 130
- D) 217

12

Number of Websites on the Internet



The chart above displays the growth of the number websites on the Internet from 2005 to 2014. Which of the following periods had the greatest percentage growth in number of websites?

- A) 2005-2007
- B) 2006-2008
- C) 2007-2009
- D) 2008-2010

13

If the percent increase of the length of a rectangle is L , and the percent increase of the width of the same rectangle is W , which of the following expressions represents the percent increase in the area of the rectangle?

- A) $L \times W$
- B) $\frac{W}{L}$
- C) $L(W+1) + W$
- D) $L(W+1)$

14

$$\begin{aligned} -5x - 3 + b &= 0 \\ x + 3 + 2b &= 0 \end{aligned}$$

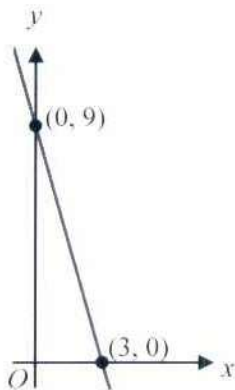
Which of the following is a possible value of b , in terms of x , that satisfies the system of equations above?

- A) $b = -\left(\frac{x}{2} - \frac{3}{2}\right)$
- B) $b = -\left(\frac{1}{2}\right)(x + 3)$
- C) $b = -5x + 3$
- D) $b = -6(x - 6)$

CONTINUE



15



A linear function is graphed above. What is the value of a at the point $(a, 3)$ for this function?

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

16

A function is defined by the expression $f(x) = ax - c$. If $f(-1) = -5$, and $f(1) = -1$, what is the value of a ?

- A) -2
- B) 0
- C) 2
- D) 3

17

The value a is 40% of b , and is smaller than c . If c is 2 times smaller than d , which of the following is NOT true?

- A) $a < d$
- B) $a < \frac{d}{2}$
- C) $\frac{a}{b} = \frac{2}{5}$
- D) $\frac{a}{b} = \frac{5}{2}$

18

$$\begin{aligned} b &\leq 2a - 1 \\ 8 &> a - b \end{aligned}$$

According to the system of inequalities above, which of the following could be a value for a ?

- A) -12
- B) -8
- C) -7
- D) -6

CONTINUE

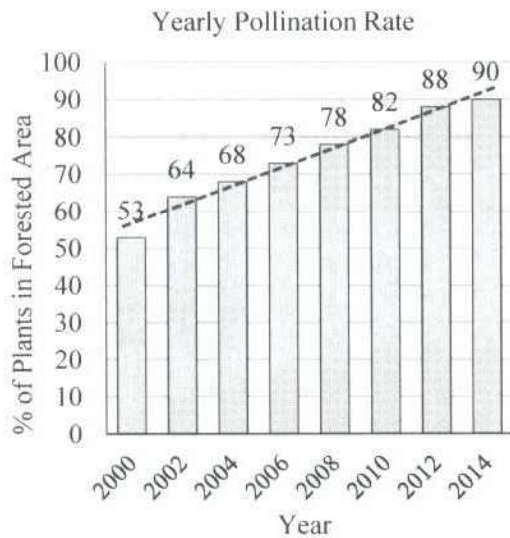


19

If x , y , a , and b are all positive integers, which of the following expressions is NOT equivalent to $(x^a)^b \times (xy)^{ab}$?

- A) $(x^2y)^{ab}$
- B) $(x^{2a})^b y^{ab}$
- C) $x^b x^a x^b x^b y^a$
- D) $(x^a)^b (x^b)^a (y^a)^b$

20



The graph above shows the pollination rate of plants in a forested area every two years. Based on the trend line, what is the average annual increase in the pollination rate?

- A) 5%
- B) 3.8%
- C) 2.5%
- D) 1.5%

21

If $y = 3x^2 + 10x - 8$, what is one possible value of x when $y = 0$?

- A) -4
- B) 0
- C) 4
- D) 8

22

$$\begin{aligned} y - x &= 8 \\ x^2 - xy &= -4 \end{aligned}$$

According to the system of equations above, what is the value of x ?

- A) $-\frac{17}{2}$
- B) $-\frac{1}{2}$
- C) $\frac{1}{2}$
- D) $\frac{17}{2}$

CONTINUE



Questions 23, 24, and 25 refer to the following information.

The table below shows the number of new apartments that were completed and rented in a 3-month period in 2009. The number, cost, and regional geographic location of each apartment is summarized, according to the U.S. Census Bureau.

Rent for the Year 2009	Number of Apartments Completed and Rented in 3 Months (1000s)				
	U.S.	Northeast	Midwest	South	West
Total Apartments Rented (1000s)	163,000	10,000	17,200	93,300	42,400
Less than \$950	57,300	2,700	10,200	35,700	8,800
\$950 to \$1,049	22,300	400	2,900	15,100	4,000
\$1,050 to \$1,149	13,300	1,100	1,000	7,300	3,900
\$1,150 to \$1,249	16,700	800	700	10,200	5,000
\$1,250 to \$1,349	53,300	5,000	2,500	25,000	20,700
Median Monthly Asking Rent (dollars)	1,063	1,250	857	1,022	1,240

23

Which region of the U.S. had the greatest number of apartments that were rented for less than \$950?

- A) The Northeast
- B) The Midwest
- C) The South
- D) The West

24

Which of the following statements is true for the year 2009?

- A) Since the median rent for newly completed apartments in the U.S. was greater than the median rent in the Midwest, the mean price for these apartments is also greater in the U.S. than in the Midwest.
- B) At least 50 percent of the newly completed apartments rented in the South cost less than the U.S. median for newly completed apartments.
- C) Apartments that cost between \$1,050 and \$1,149 make up a greater percentage of newly constructed apartments in the Midwest than they do in the West.
- D) With 25,000 thousand newly completed and rented apartments costing between \$1,250 and \$1,349, the South was the most expensive location to rent new apartments in the U.S.

CONTINUE



25

In 2009, John moved from Georgia to an apartment in the Midwest. In Georgia, John paid a monthly rent of \$1,200. If his new apartment in the Midwest had the median monthly rate for that region given in the chart above, how much did John save in annual rental costs?

- A) \$343
- B) \$1,686
- C) \$3,255
- D) \$4,116

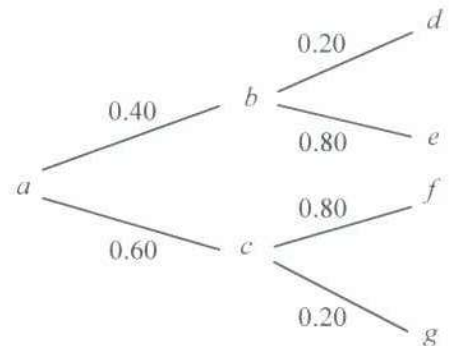
26

A bowl contains a mix of apples and oranges. After 6 oranges are eaten, there are 3 times as many apples as oranges. A short time later, 11 apples are eaten, resulting in a ratio of 4:1 of oranges to apples. How many oranges were originally in the bowl?

- A) 4
- B) 10
- C) 11
- D) 12

27

Probability Tree of Genetic Traits



A biologist wants to predict the probability of developing genetic traits in an experiment. The probability tree above represents the probability of outcome of two experiments, the second experiment dependent on the results of the first experiment. As an example, the first experiment, which begins with trait *a*, has a 40% probability of generating feature *b*, which in turn has a 80% probability of developing trait *e*. What is the probability that the biologist's experiment will develop trait *g*?

- A) 12%
- B) 20%
- C) 48%
- D) 60%

CONTINUE

28

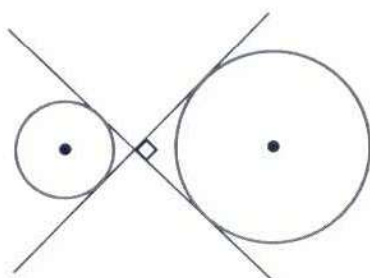
$$\frac{3y}{x-2} = 2x + 5$$

$$y = \frac{2x^2 + x - 10}{3}$$

Which of the following is a solution to the system of equations above?

- A) No solutions
- B) $(-2.5, 2)$
- C) $(2, -2.5)$
- D) Infinitely many solutions

29



The tangents of two circles intersect at a 90° angle, as shown above. If the radius of the small circle is 1 cm and the radius of the large circle is 3 cm, what is the minimum distance, in cm, between the two circles?

- A) $4\sqrt{2}$
- B) $3(\sqrt{2} - 1)$
- C) $4(\sqrt{2} - 1)$
- D) $6(\sqrt{2} - 1)$

30

A city inspector wishes to determine whether a neighborhood of 5,000 residents desires a new sewer system. She surveys 100 residents to see whether they would approve of the new sewers. 70 of the residents agree that the sewers are a good idea. Since she decides to evaluate her results using a 95% confidence level, she determines that her residents' responses represent the neighborhood population, with a confidence interval of 9.7%. Based on this information, she decides to build the sewers, but receives almost 1,700 angry calls from the neighborhood at her call center. What is a possible explanation for these results?

- A) A 95% confidence level is not 100% accurate, so the data are not valid.
- B) The inspector should have asked fewer people to get clearer results, with a potentially higher percentage of residents approving of the sewers.
- C) The confidence interval of 9.7% is too low for the survey to give accurate results about residents' desires.
- D) One thousand and seven hundred residents disapproving of the sewers, or 34% of the population, fall within the confidence interval, and is therefore predicted by the survey.

CONTINUE

31

$$h:j = 6:7$$

The ratio of h to j is shown above. If j is 21, what is the value of h ?

32

Nanna has two sisters, Laurel and Jennifer. Jennifer is twice as old as Laurel, who is 4 years younger than Nanna. If Nanna is two years younger than Jennifer, what is Nanna's age in years?

33

Rahil notices an invasive species of weed in his yard, which has an area of 243 square feet. The weed initially covers an area of 32 square feet and increases in size by 50% each week. How many weeks will it take the weed to cover the entire yard?

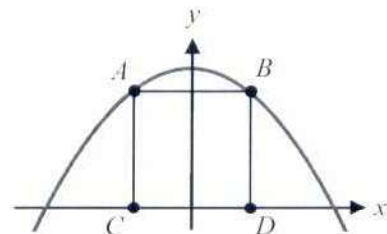
34

When a silo is 40% empty it holds 9 more tons of grain than when it is 40% full. How many tons of grain does the silo hold when it is full?

35

A carrier pigeon flies at an average speed of 75 km per hour, while a Cessna 152 propeller plane travels at an average speed of 180 km per hour. A pigeon and a Cessna set off at the same time from Paris to London, a distance of 500 km. How many minutes earlier will the Cessna arrive in London than the pigeon if both fly the same route? (Round your answer to the nearest minute.)

36



Note: figure is not drawn to scale

The rectangle $ABCD$ has the side CD along the x -axis, and the points A and B touching the function $y = -x^2 + 6$, as shown above. If the point D is at $(1, 0)$, what is the area of the rectangle $ABCD$?

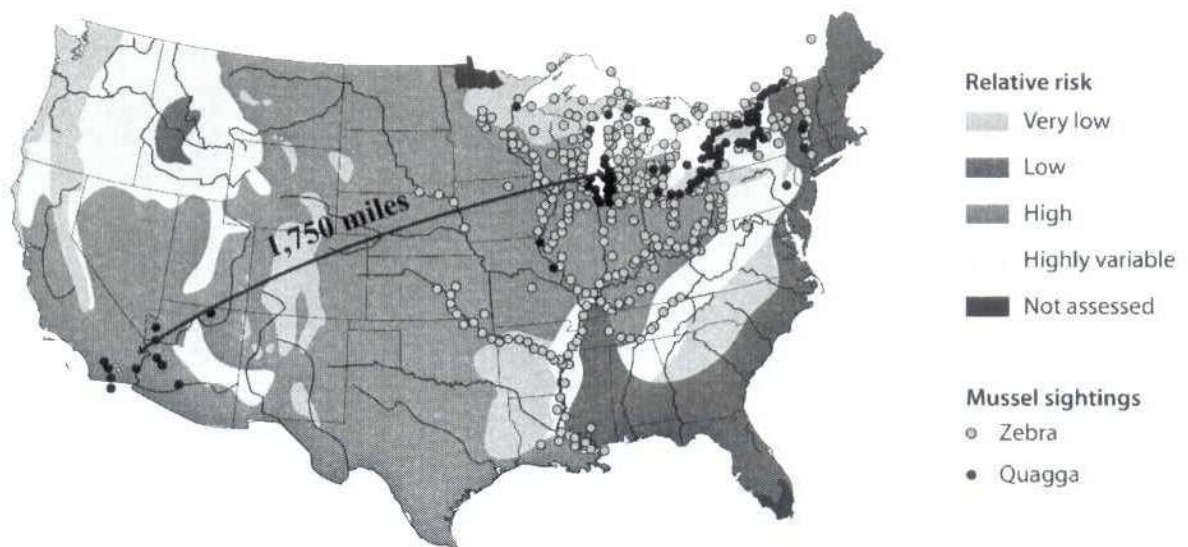
CONTINUE



Questions 37 and 38 refer to the following information.

Zebra and quagga mussels are a major concern, damaging the fresh waterways of the United States and Canada as they spread, destroying ecosystems and infrastructure along the waterways. According to the United States Geological Survey, a fully mature female mussel is capable of producing up to one million eggs per season, and the National Oceanic and Atmospheric Administration (N.O.A.A.) states that as many as 700,000 mussels may be found in one square yard.

Mussel sightings, which began with the discovery of zebra mussels in 1988, have increased dramatically. The map below, which details mussel sightings in 2007, outlines their expansion, from the East to the West of the United States, since their first discovery.



CONTINUE

37

The map on the previous page shows the distance covered by a boat travelling from Lake Michigan to the waterways of California. When it leaves Lake Michigan, the bottom of the boat has 100,000 zebra mussels. If 10% of the original mussel population dies for every 250 miles that the boat travels, how many thousands of mussels will remain when the boat reaches California?

38

The surface area of Lake Michigan is approximately 6.94×10^{10} square yards and Lake Michigan contains 1.75×10^5 mussels per square yard. Statisticians determine that the probability that a boat will spread the mussels to nearby states increases by 1 percent for every quadrillion (10^{15}) mussels in the lake. What is the percent probability that a boat from Lake Michigan will transport mussels to a nearby state's waterways? (Round your answer to the nearest percent.)

STOP

If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.

PRACTICE TEST 3 ANSWERS

PART 3

SECTION 1

- | | | | |
|-------|-------|-------|-------|
| 1. B | 14. A | 27. A | 40. B |
| 2. C | 15. D | 28. B | 41. A |
| 3. A | 16. D | 29. A | 42. B |
| 4. D | 17. A | 30. D | 43. C |
| 5. D | 18. C | 31. C | 44. A |
| 6. A | 19. D | 32. C | 45. C |
| 7. B | 20. A | 33. C | 46. D |
| 8. D | 21. A | 34. C | 47. A |
| 9. C | 22. C | 35. D | 48. B |
| 10. B | 23. B | 36. C | 49. B |
| 11. C | 24. B | 37. C | 50. D |
| 12. D | 25. D | 38. B | 51. A |
| 13. D | 26. A | 39. B | 52. C |

SECTION 2

- | | | | |
|-------|-------|-------|-------|
| 1. C | 12. C | 23. D | 34. D |
| 2. D | 13. A | 24. A | 35. B |
| 3. A | 14. B | 25. C | 36. A |
| 4. D | 15. D | 26. D | 37. C |
| 5. B | 16. D | 27. B | 38. A |
| 6. D | 17. C | 28. D | 39. D |
| 7. B | 18. C | 29. C | 40. C |
| 8. C | 19. B | 30. B | 41. B |
| 9. A | 20. C | 31. D | 42. C |
| 10. D | 21. A | 32. C | 43. C |
| 11. B | 22. C | 33. D | 44. D |

SECTION 3

- | | | | |
|------|-------|-------|--------|
| 1. B | 6. C | 11. C | 16. 10 |
| 2. D | 7. B | 12. C | 17. 5 |
| 3. D | 8. C | 13. A | 18. 0 |
| 4. B | 9. C | 14. A | 19. 16 |
| 5. A | 10. B | 15. B | 20. 48 |

SECTION 4

- | | | | |
|-------|-------|-------|---------|
| 1. C | 11. D | 21. A | 31. 18 |
| 2. A | 12. B | 22. C | 32. 10 |
| 3. A | 13. C | 23. C | 33. 5 |
| 4. B | 14. B | 24. B | 34. 45 |
| 5. C | 15. B | 25. D | 35. 233 |
| 6. A | 16. C | 26. B | 36. 10 |
| 7. C | 17. D | 27. A | 37. 30 |
| 8. D | 18. D | 28. D | 38. 12 |
| 9. A | 19. C | 29. C | |
| 10. C | 20. C | 30. D | |



Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

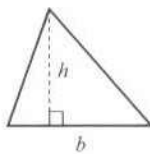
DIRECTIONS

Questions **1-15** ask you to solve a problem, select the best answer among four choices, and fill in the corresponding circle on your answer sheet. Questions **16-20** ask you to solve a problem and enter your answer in the grid provided on your answer sheet. There are detailed instructions on entering answers into the grid before question 16. You may use your test booklet for scratch work.

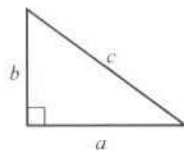
NOTES

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4. Figures lie in a plane unless stated otherwise.
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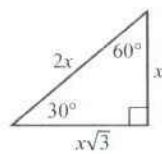
REFERENCE



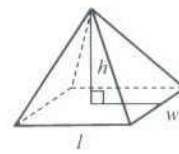
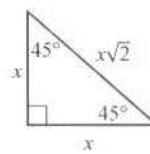
$$A = \frac{1}{2}bh$$



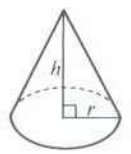
$$a^2 + b^2 = c^2$$



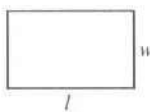
Special Triangles



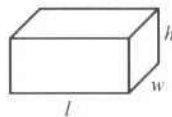
$$V = \frac{1}{3}lwh$$



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



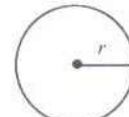
$$A = lw$$



$$V = lwh$$

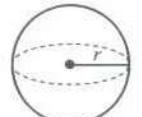


$$V = \pi r^2 h$$



$$A = \pi r^2$$

$$C = 2\pi r$$



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

There are 360° in a circle.

The sum of the angles in a triangle is 180° .

The number of radians of arc in a circle is 2π .

CONTINUE



1

If 20 less than $3x$ is 40, then what is the value of x ?

- A) 3
- B) 20
- C) 30
- D) 40

2

$$y = 5n + 6$$

$$y = n^2 - 2n - 24$$

For which value of n are the equations above equivalent?

- A) 0
- B) 5
- C) 10
- D) 15

3

If $\frac{x-5}{4} = y$ and $y = 6$, what is the value of x ?

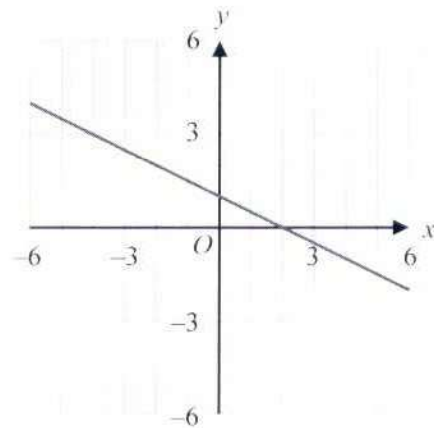
- A) 5
- B) 10
- C) 29
- D) 36

4

An anthropologist proposes that the change in a certain population can be modeled by the expression $\sqrt{9x^2} - 7x$. If x is positive, this expression is equivalent to which of the following?

- A) $2x$
- B) $-4x$
- C) $3x^2 - 7x$
- D) $3x - \sqrt{7x}$

5



What is the slope of the function in the graph above?

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

CONTINUE



6

A line in the xy -plane passes through the point $(1, 1)$ and has a slope of $\frac{1}{3}$. Which of the following points lies on the line?

- A) $(0, 0)$
- B) $(4, 3)$
- C) $(6, 3)$
- D) $(7, 3)$

7

What is the value of i^8 ? (Note: $i = \sqrt{-1}$.)

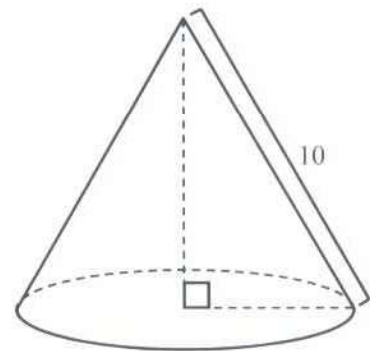
- A) -1
- B) $-i$
- C) 1
- D) i

8

A computer programmer can write 3 pages of HTML code in 5 hours and 2 pages of JavaScript code in 3 hours. How long will it take her to create 6 new websites, each consisting of one page of HTML code and one page of JavaScript?

- A) 18 hours
- B) 19 hours
- C) 20 hours
- D) 21 hours

9



Note: figure is not drawn to scale.

What is the volume of the cone in the diagram above if the diameter of the base is 16?

- A) 32π
- B) 96π
- C) 128π
- D) 192π

CONTINUE



10

The expression $(n^3 - 3n^2 + 5)(n^2 - n)$ is equivalent to which of the following?

- A) $n^5 - 4n^4 + 3n^3 + 5n^2 - 5n$
- B) $n^5 - n^4 - 3n^3 + 8n^2 - 5n$
- C) $n^5 - 3n^4 + 5n^2$
- D) $n^5 - 4n^4 + 3n^3$

11

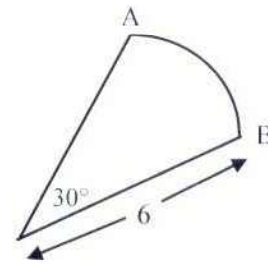
$$\frac{2x}{y} = 12$$

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

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

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

12



Note: figure is not drawn to scale.

What is length of arc AB in the figure above?

- A) 180
- B) 90
- C) π
- D) $\frac{\pi}{2}$

13

Carlos bought an iPad online at 15 percent off the original price. The total amount he paid was d dollars including a 6 percent sales tax on the discounted price. Which of the following expressions represents the original price of the iPad in terms of d ?

- A) $\frac{d}{(1.06)(0.85)}$
- B) $\frac{d(1.06)}{0.85}$
- C) $\frac{d}{0.85 + 1.06}$
- D) $\frac{d}{0.85}$

CONTINUE



14

A certain subatomic particle's energy, e , increases as its distance, d , from a set point increases. Which of the following expressions could model this behavior?

- A) $e = d - 12^d + 12$
- B) $e = -d^2 + 100d + 9$
- C) $e = 5d^3 + 50d - 20$
- D) $e = 10d^2 - 10^d + 80$

15

The force of gravity between two objects, F , can be modeled by the equation $F = G \frac{m_1 m_2}{d^2}$, where G is a constant, m_1 and m_2 are the masses of the two objects, and d is the distance between them. If the distance between the two objects were to double, what would happen to the force of gravity between them?

- A) It would double
- B) It would decrease by half
- C) It would quadruple
- D) It would decrease by three quarters

CONTINUE



16

In the xy -plane, lines k and j are perpendicular.

Line k is represented by $y = -\frac{2}{3}x + 1$. What is the slope of line j ?

17

Amelie leaves her house and runs south at a constant speed of 5 miles per hour. If her brother leaves the same house two hours later and skateboards south at a constant speed of 15 miles per hour, how long will it take him, in hours, to reach Amelie?

18

If $f(x) = x^3 - 10x + 1$ and $g(x) = f(2x)$, what is $g(3)$?

19

Charlie lives 15 miles downhill from the summit of the dormant Haleakala volcano. Charlie leaves his home, bikes to the top of Haleakala, and then bikes back. If Charlie ascends at 12 miles per hour and descends at 36 miles per hour, how many minutes will it take Charlie to make a round trip from his home to the volcano and back?

20

Sarah has 15 pairs of shoes, and the size of her collection doubles every 5 years. If Sarah decides to donate 10 percent of her shoes after 15 years, how many pairs of shoes will she have left after the donation?

STOP

If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.



Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

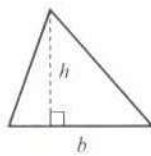
DIRECTIONS

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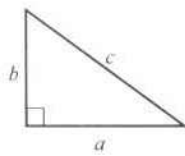
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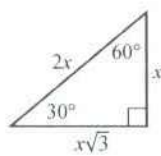
REFERENCE



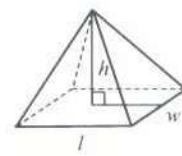
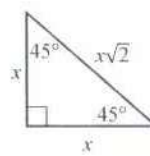
$$A = \frac{1}{2}bh$$



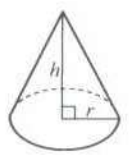
$$a^2 + b^2 = c^2$$



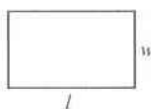
Special Triangles



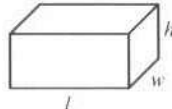
$$V = \frac{1}{3}lwh$$



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



$$A = lw$$



$$V = lwh$$

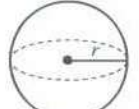


$$V = \pi r^2 h$$



$$A = \pi r^2$$

$$C = 2\pi r$$



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

There are 360° in a circle.

The sum of the angles in a triangle is 180° .

The number of radians of arc in a circle is 2π .

CONTINUE



1

Every thirty minutes the mass of a substance increases by forty-eight grams. If the substance weighs 111 grams after an hour, how many grams did it originally weigh?

- A) 0
- B) 8
- C) 15
- D) 71

2

Day	Number of Manuscripts Edited
Tuesday	x
Wednesday	$2.5x$
Thursday	$3.5x$
Friday	$4x$

Bartleby edits manuscripts at a rate according to x , as defined in the chart above. If he works every day, begins editing on Tuesday, and edits 33 manuscripts by the end of the day on Friday, what is the value of x ?

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

3

Skye spends \$1.75 per day on her online newspaper subscriptions. How much does she spend for the months of July, August, and September? (July and August each have 31 days and September has 30 days.)

- A) \$52.50
- B) \$108.50
- C) \$161.00
- D) \$161.50

4

If $\frac{x}{y} = 4$, what is the value of $\frac{6x}{y}$?

- A) 6
- B) 16
- C) 24
- D) 36

CONTINUE



5

Which of the expressions shown below is equivalent to $5x^2 + 13x - 6$?

- I. $(5x - 2)(x + 3)$
- II. $(x - 2)(5x + 3)$
- III. $5(x - 2)(x + 3)$

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

6

Age	Support	Oppose	Total
18-34	24	53	77
35-54	62	32	94
55-74	71	32	103
75 and older	44	18	62
Total	201	135	336

A city is considering a new traffic regulation. City planners conducted a survey of a random sample of adult residents about their position on the new regulation. The results of the survey are summarized in the chart above. Which of the following statements is supported by the chart's data?

- A) A person between 35 and 54 years old is less likely to oppose the regulation than a person between 55 and 74 years old.
- B) A person between 35 and 54 years old is equally likely to oppose the regulation as a person between 55 and 74 years old.
- C) A person between 18 and 34 years old is more likely to oppose the regulation than a person between 55 and 74 years old.
- D) The data is insufficient to support any of the statements above.

CONTINUE



7

$$\begin{aligned}y &= x^2 + 5x - 4 \\y &= 6x + 2\end{aligned}$$

If (x, y) is the solution to the system of equations above, which of the following is a possible value of the product xy ?

- A) -200
- B) -20
- C) 6
- D) 60

8

In the xy -plane, the line $mx - 6y = 24$ passes through the point $(3, 6)$. What is the value of m ?

- A) 6
- B) 12
- C) 20
- D) 60

9

$$3(x + 5) + 7 = 22$$

What is the value of x in the equation above?

- A) 0
- B) $\frac{3}{7}$
- C) $\frac{7}{3}$
- D) 11

10

$$|x - 4| \leq 6$$

Which of the following inequalities is equivalent to the inequality above?

- A) $-2 \leq x \leq 10$
- B) $-4 \leq x \leq 10$
- C) $x \leq 4$ or $x \geq 10$
- D) $x \leq -10$ or $x \geq 2$

CONTINUE



11

x	0	3	6	9
$f(x)$	2	6	10	14

Which of the following equations defines $f(x)$ in the table above?

- A) $f(x) = \frac{4}{3}x + 2$
 B) $f(x) = \frac{3}{4}x + 1$
 C) $f(x) = -\frac{4}{3}x$
 D) $f(x) = 4x + 2$

12

Which of the following scenarios could be modeled by y in the equation $y = t^2 + 4t + 10$, where t represents time?

- A) A population of ladybugs that doubles every four weeks
 B) The height of a rock that is dropped off a ten-foot cliff
 C) The height of a hot air balloon that accelerates as it rises
 D) The value of an investment that increases by 5% every quarter

13

Education Level	Employed	Unemployed or Not in Labor Force	Total
Less than High School Diploma	198	164	362
High School Graduate	510	318	828
Some College	367	153	520
College Graduate	707	216	923
Total	1782	851	2633

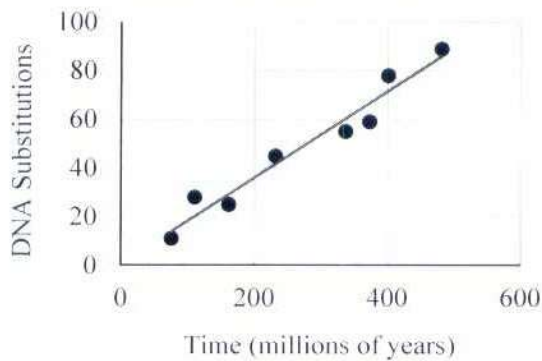
The table above shows data from a survey of the employment status of residents in Franklin County. The participants were randomly selected from all residents over the age of 25 years old. Based on the given data, what is the likelihood that an employed worker over the age of 25 has not attended college?

- A) 28.6%
 B) 39.7%
 C) 54.7%
 D) 59.5%

CONTINUE

14

Genetic Divergence of Species



The number of differences in two species' DNA sequences can be used to estimate when those species branched off from a common ancestor. The plot above shows the number of substitutions, S , in the DNA sequence of certain animals compared to the human DNA sequence. The time, T , since the species shared a common ancestor is measured in millions of years. Which of the following equations is the best estimate for the plot's line of best fit?

- A) $S = 0.2T$
- B) $S = 0.2T + 10$
- C) $S = 5.5T$
- D) $S = 5.5T + 10$

15

$$\begin{aligned} x^2 + 2x - 2 \\ 3x^2 - x - 1 \end{aligned}$$

What is the product of the expressions above?

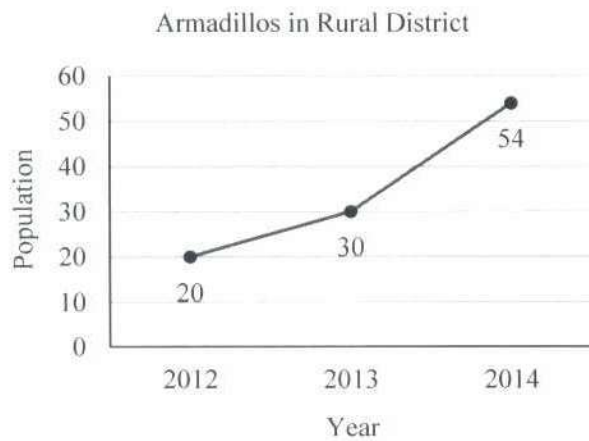
- A) $3x^4 + 5x^3 - 9x^2 + 2$
- B) $3x^4 + 5x^3 - 9x^2 + 2x$
- C) $3x^4 + 5x^3 - 8x^2 + 2x$
- D) $3x^4 + 5x^3 - 8x^2 + 2x + 2$

CONTINUE



Questions 16 and 17 refer to the following information.

The nine-banded armadillo, frequently found in the southern United States, eats about 500 different kinds of food. Around 10% of its daily intake consists of plants. Female armadillos over 1 year of age commonly give birth to quadruplets and may give birth to over 50 young in a lifetime. The chart below shows the population of the nine-banded armadillo in a rural district from 2012-2014. The population counts were taken at the beginning of each year.



16

If the average nine-banded armadillo eats 3 lbs of food per day, what is the approximate weight of plant matter, in pounds, consumed by three armadillos in one week?

- A) 2.1
- B) 6.3
- C) 21
- D) 63

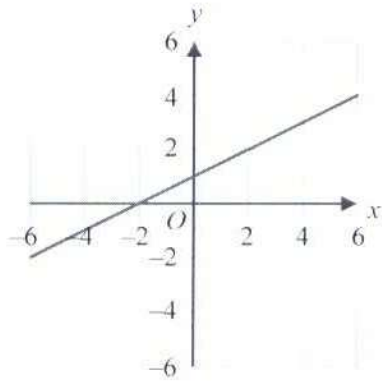
17

Five females had litters in 2012, and 12 females had litters in 2013. Assuming that four baby armadillos were born with every litter, how many armadillos did not survive between 2012 and 2014?

- A) 24
- B) 34
- C) 40
- D) 54

CONTINUE

18



Which of the following functions represents the graph above?

- A) $f(x) = \frac{1}{2}x + 1$
- B) $f(x) = -\frac{1}{2}x + 1$
- C) $f(x) = 2x - 1$
- D) $f(x) = -\frac{1}{2}x - 1$

19

Data Set A: 1, 1, 2, 4, 4, 6

Data Set B: 2, 2, 3, 3, 5

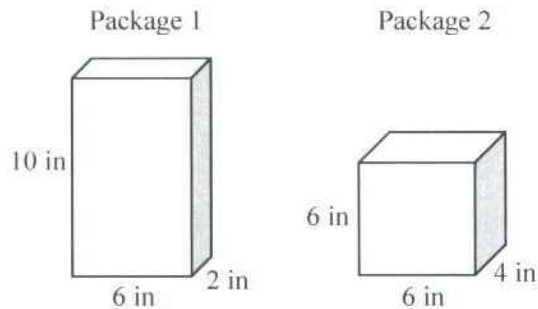
Which of the following statements is supported by the information provided above?

- A) Data Set A has a larger mean than Data Set B; Data Set A has a larger standard deviation than Data Set B.
- B) Data Set A has a larger mean than Data Set B; Data Set A has a smaller standard deviation than Data Set B.
- C) Data Set A and Data Set B have the same mean; Data Set A has a larger standard deviation than Data Set B.
- D) Data Set A and Data Set B have the same mean; Data Set A has a smaller standard deviation than Data Set B.

CONTINUE



20



The figures above show two options for packaging. The material required for Package 1 is 184 in^2 , and the material required for Package 2 is 168 in^2 . A company measures package efficiency as package volume per square inch of packaging material. If both packages are filled completely with a uniform liquid, which of the following statements is true?

- A) Package 1 is more efficient than Package 2 by approximately 0.20 in^3 per in^2 .
- B) Package 1 is more efficient than Package 2 by approximately 0.37 in^3 per in^2 .
- C) Package 2 is more efficient than Package 1 by approximately 0.20 in^3 per in^2 .
- D) Package 2 is more efficient than Package 1 by approximately 0.37 in^3 per in^2 .

21

An auto dealership is offering a deal on used cars. The final sale price of each car is 5% off the pre-sale price, plus an additional 1% off the pre-sale price for every 10,000 miles on the car's odometer.

Kara is considering two cars at the dealership. Car 1 has a pre-sale price of \$4,500 with 80,000 miles on its odometer and Car 2 has a pre-sale price of \$5,200 with 20,000 miles on its odometer. What is the difference, rounded to the nearest dollar, between the sale prices of Car 1 and Car 2?

- A) \$903
- B) \$908
- C) \$921
- D) \$926

22

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

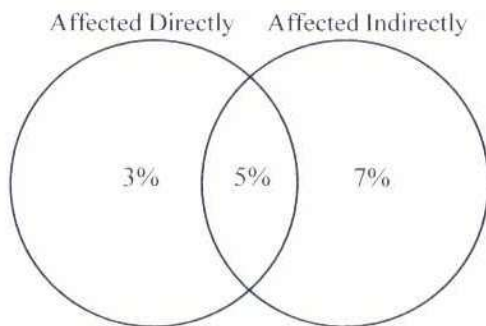
$$y = \frac{2x + 8}{3}$$

What is the solution of the system of equations above?

- A) No solutions
- B) $\left(-\frac{95}{17}, -\frac{18}{17}\right)$
- C) $\left(-\frac{85}{19}, -\frac{18}{19}\right)$
- D) Infinitely many solutions

CONTINUE

23



The chart above shows data on how an increase in the number of school music programs affects students in schools. At Shelby High School, 56 students, 8% of the total student population, have indicated that they are directly affected by an increase in the school's music programs. Based on the data above, what is the best estimate for the number of students who are only affected indirectly by an increase in the school's music programs?

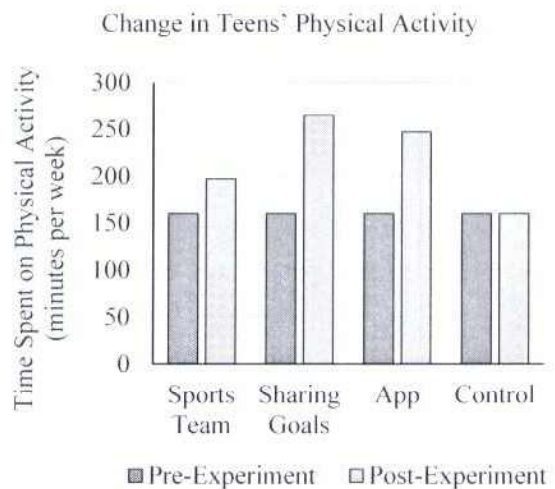
- A) 49
- B) 79
- C) 84
- D) 141

24

If $f(x) = 5x^2 + 8x - 4$ and $g(x) = x + 2$, what is $\frac{f(n)}{g(n)}$ when $n = 3$?

- A) 65
- B) 26
- C) 15
- D) 13

25



A psychologist conducted a study to compare different methods of encouraging teenagers to participate in physical activities. The three methods studied were obligatory participation on a sports team, sharing personal goals with a friend, and recording physical activity on an interactive smartphone app. Participants were randomly assigned to one of these methods or a control group. The study measured the participants' increase in physical activity one month after the experiment. The results are shown in the bar graph above.

Which of the following statements is supported by the data?

- A) Participation on a sports team was the most effective of the studied methods for increasing physical activity.
- B) Every method that was studied increased teens' physical activity at the time of the post-study measurement.
- C) Teens' physical activity will decline over time if no method is employed to encourage it.
- D) Joining a sports team helped teens find time for physical activity.

CONTINUE



Questions 26 and 27 refer to the following information.

Results from the 2007 census for the Mining, Quarrying, and Oil and Gas Extracting sector of the U.S. economy are compared to census results from 1997 and 2002. The comparison of the sector based on establishments with more than one employee is summarized in the table below.

Mining, Quarry, and Oil and Gas Extracting Economic Sector for the U.S.			
	1997	2002	2007
Number of Establishments	25,000	24,087	22,667
Value of Shipments (\$ Millions)	173,985	182,911	413,525
Annual Payroll (\$ Millions)	20,798	21,174	40,687
Total Employment	509,006	477,840	730,433
Payroll Per Employee (\$)	40,861	44,312	55,703
US Total Population	272,646,925	287,625,193	301,231,207
US Population Per Establishment	10,906	11,941	13,289

26

Which of the following statements is true for the period from 2002 to 2007?

- A) Fewer establishments resulted in lower shipment values for the sector.
- B) Overall, the value of shipments in the sector per U.S. person more than doubled.
- C) With a greater number of people employed in the sector, the average person was paid less.
- D) With fewer establishments, there were fewer people employed in the sector.

27

An analyst compared the ratio of the value of shipments to annual payroll from 1997 to 2007. What is the approximate percentage growth, to the nearest tenth of a percent, of this ratio during this period?

- A) 21.5%
- B) 95.6%
- C) 237.7%
- D) 836.5%

CONTINUE

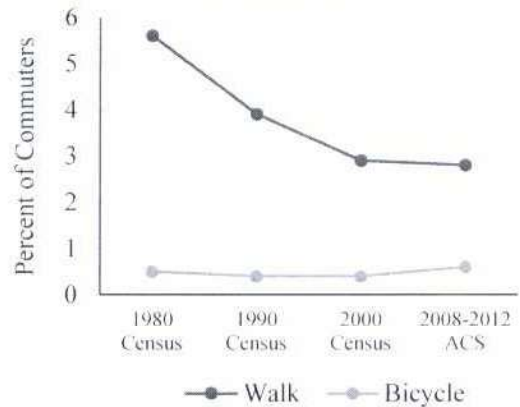
28

Salbutamol, a chemical used to treat asthma, has a biological half-life of 1.6 hours, which means that after 1.6 hours in the body, salbutamol loses half of its therapeutic activity. If salbutamol's therapeutic activity starts at a value of 480, what is its value of therapeutic activity after the chemical has been in the body for 480 minutes?

- A) 7
- B) 15
- C) 30
- D) 60

29

Walking and Bicycling to Work: 1980 to 2008-2012



Sources: U.S. Census Bureau, Decennial Census, 1980, 1990, 2000; American Community Survey, 2008-2012.

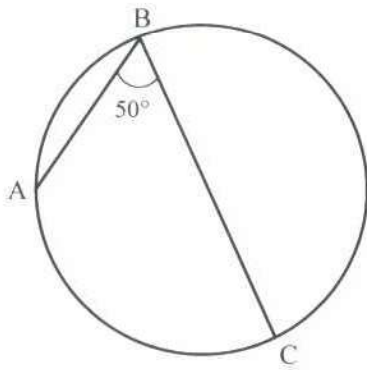
Researchers conducted a study on commuters' choice of transportation to work. The chart above displays some of the data they collected. Which of the following statements is supported by the chart?

- A) Walking was the most popular mode of transportation for commuters between 1980 and 2012.
- B) The number of commuters who bicycled to work decreased from 1980 to 2000.
- C) The percentage of commuters who walked to work decreased more slowly between 1980 and 1990 than between 1990 and 2000.
- D) In 2000, about 6 times as many commuters walked to work as biked to work.

CONTINUE



30



Note: figure is not drawn to scale.

In the diagram above, what is the length, in radians, of arc AC if the radius of the circle is 10 and BC is the diameter?

- A) $\frac{25\pi}{18}$
- B) $\frac{25\pi}{9}$
- C) $\frac{50\pi}{9}$
- D) $\frac{100\pi}{9}$

CONTINUE

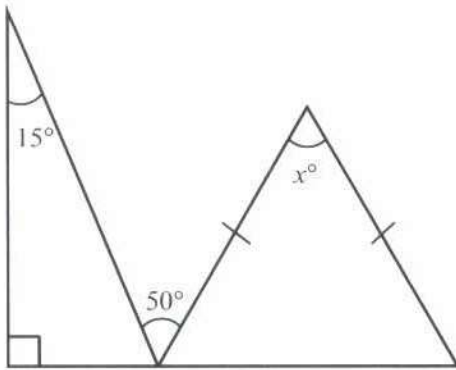


31

$$y = 0.25x + 5$$

In the equation above, what is the value of x if $y = 6$?

32



Note: figure is not drawn to scale.

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

33

A farmer transports oranges in crates that each contain 5 pounds of oranges. The farmer can fit 16 crates in her truck, and the total revenue from one truckload of oranges is \$96. What is the price of the oranges in dollars per pound?

34

If $f(x) = 6x + 1$ and $g(x) = 2x - 1$, what is the value of $\frac{f(3)}{g(f(0))}$?

35

The Earth's speed of rotation is slowly decreasing. 900 million years ago, one day was 18 hours long, whereas today it is 24 hours long, and there are 365 days in a year. Assuming the Earth took the same amount of time to orbit the sun as it does today, how many days did one year contain 900 million years ago? Round your answer to the nearest whole number.

36

An object's mass in kilograms, m , is represented by the equation $3\sqrt{m} - \sqrt{162} = 0$. What is the object's mass in kilograms?

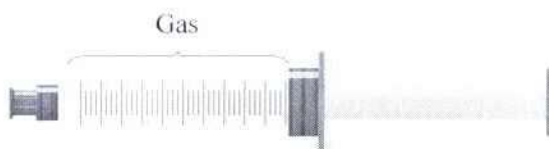


Questions 37 and 38 refer to the following information.

Boyle's law asserts that at a constant temperature, the pressure and volume of any gas are inversely proportional. The law is written according to the equation $PV = k$, where P is the pressure of a gas, V is the volume of a gas, and k is a constant.

37

A gas is contained within a cylindrical syringe with a rubber stopper, as shown in the diagram below. The gas in the syringe initially has a pressure of 78 kilopascals, and takes up 30 cm^3 . If the stopper is then pushed down so that the gas takes up 20 cm^3 what is the new pressure of the gas in kilopascals?

**38**

A second gas is held in a separate container with a pressure of 15.6 kilopascals and an initial volume of 50 cm^3 . If the volume of the gas's container is decreased by 40%, what is the new pressure of the gas, in kilopascals?

STOP

If you complete this section before the end of your allotted time, check your work on this section only. Do NOT use the time to work on another section.

PRACTICE TEST 4 ANSWERS

PART 4

SECTION 1

- | | | | |
|-------|-------|-------|-------|
| 1. B | 14. B | 27. A | 40. C |
| 2. C | 15. A | 28. C | 41. B |
| 3. A | 16. A | 29. D | 42. B |
| 4. A | 17. B | 30. B | 43. C |
| 5. B | 18. D | 31. C | 44. C |
| 6. B | 19. C | 32. B | 45. A |
| 7. D | 20. B | 33. C | 46. C |
| 8. B | 21. C | 34. A | 47. D |
| 9. A | 22. A | 35. B | 48. C |
| 10. B | 23. A | 36. D | 49. D |
| 11. B | 24. B | 37. C | 50. B |
| 12. C | 25. A | 38. C | 51. A |
| 13. D | 26. D | 39. D | 52. D |

SECTION 2

- | | | | |
|-------|-------|-------|-------|
| 1. D | 12. A | 23. B | 34. B |
| 2. B | 13. D | 24. B | 35. D |
| 3. A | 14. C | 25. D | 36. C |
| 4. C | 15. A | 26. C | 37. D |
| 5. B | 16. C | 27. C | 38. A |
| 6. B | 17. B | 28. B | 39. D |
| 7. A | 18. D | 29. B | 40. C |
| 8. B | 19. D | 30. C | 41. D |
| 9. A | 20. C | 31. C | 42. B |
| 10. D | 21. B | 32. C | 43. A |
| 11. A | 22. B | 33. C | 44. A |

SECTION 3

- | | | | |
|------|-------|-------|-------------------|
| 1. B | 6. D | 11. D | 16. $\frac{3}{2}$ |
| 2. C | 7. C | 12. C | 17. 1 |
| 3. C | 8. B | 13. A | 18. 157 |
| 4. B | 9. C | 14. C | 19. 100 |
| 5. A | 10. A | 15. D | 20. 108 |

SECTION 4

- | | | | |
|-------|-------|-------|---------|
| 1. C | 11. A | 21. C | 31. 4 |
| 2. B | 12. C | 22. B | 32. 70 |
| 3. C | 13. B | 23. A | 33. 1.2 |
| 4. C | 14. A | 24. D | 34. 19 |
| 5. A | 15. A | 25. B | 35. 487 |
| 6. C | 16. B | 26. B | 36. 18 |
| 7. D | 17. B | 27. A | 37. 117 |
| 8. C | 18. A | 28. B | 38. 26 |
| 9. A | 19. C | 29. D | |
| 10. A | 20. C | 30. C | |