SAT®

STUDY GUIDE

Your ultimate resource for the redesigned SAT — direct from the test experts!

Includes

6 Complete SAT tests

with strategy lessons to help you master every section

FOR 2016 & BEYOND

PRACTICE TEST 1

Test Reminders

1. A #2 pencil is required.
2. Follow the time restrictions for each section.
3. You are allowed to write on the test.
4. Circle your answers to ensure accuracy when filling in the answer sheet, provided on page 317.
5. Calculate your estimated score by using the conversion chart on page 319.

Math Test

25 MINUTES, 20 QUESTIONS

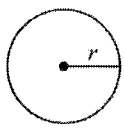
Turn to Section 3 of your answer sheet to answer the questions in this section.

3

For questions 1-20, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16-20**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

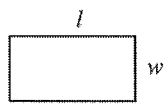
Notes:

1. The use of a calculator **is not permitted.**
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

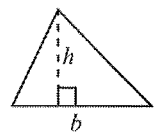


$A = \pi r^2$

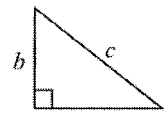
$C = 2\pi r$



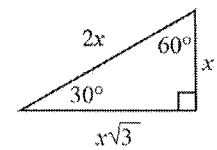
$A = lw$

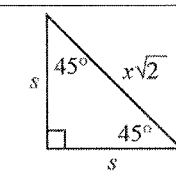


$A = \frac{1}{2}bh$

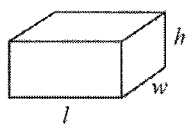


$c^2 = a^2 + b^2$

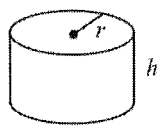




Special Right Triangles

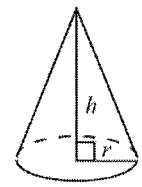


$V = lwh$

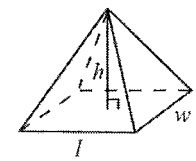


$V = \pi r^2 h$

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



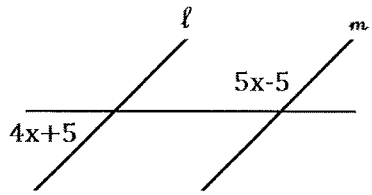
$V = \frac{1}{3}\pi r^2 h$



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

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

1



If line l is parallel to line m, then what must the value of x be?

A) 10
B) 5
C) 20
D) 1

2

What is the y-intercept of the following linear equation?

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

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

3

A drive-in theater charges \$8 per truck and \$5 per car. Last weekend there was a total of 176 vehicles and the theater made \$1,051. Which of the following systems of equations properly describes the situation, assuming x is the number of cars and t is the number of trucks?

A) $1{,}051 = (8 + 5)(x + t)$
$5x + 8t = 176$

B) $1{,}051 = 5x + 8t$
$x + t = 176$

C) $1{,}051 = 5t + 8x$
$x + t = 176$

D) $1{,}051 + 5t = 8x$
$5x + 8t = 176$

4

$$4x + 6 = 10y - 6$$
$$x + 1 = 2y$$

Using the system of equations above, what is the value of $2xy$?

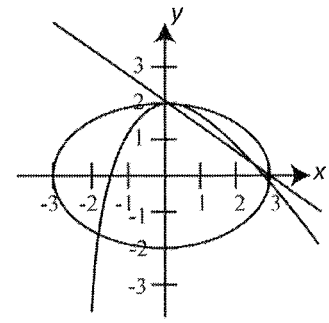
A) 28
B) 56
C) 14
D) 7

5

$y = -\frac{2}{9}x^2 + 2$

$\frac{x^2}{9} + \frac{y^2}{4} = 1$

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



Based upon the system of equations above and their respective graphs, how many unique solutions does the system contain?

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

6

If $f(x) = 3x - 3$ and $g(x) = x^2 - 1$, what is the value of $g(f(2))$?

A) 6
B) 12
C) 9
D) 8

CONTINUE

7

Function f is defined by $f(x) = x^3 - 4x^2 + x + 6$. If the function has a root at $x = 2$, what are the other roots of $f(x)$?

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

8

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

Based on the equation above, what is one possible value of x ?

A) $\frac{19}{5}$
B) $\frac{13}{7}$
C) $\frac{5}{19}$
D) 19

9

If the rational expression $\frac{3x^2}{3x-1}$ is rewritten

in the equivalent form $\frac{\frac{1}{3}}{3x-1} + A$,

what must expression A be in terms of x ?

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

10

When one rents a motorboat, there is an initial cost of \$30 and a follow-up fee of \$5 per gallon of gas used. If the motorboat gets 34 nautical miles to the gallon, which of the following functions models the cost with respect to x, the distance travelled?

A) $f(x) = 34 + \frac{5x}{30}$
B) $f(x) = 34 + \frac{30x}{5}$
C) $f(x) = 5 + \frac{34x}{30}$
D) $f(x) = 30 + \frac{5x}{34}$

11

If sphere O has a great circle with circumference 6π, what is the volume of sphere O? The equation for the volume of a sphere with radius r is as follows:

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

A) 24π
B) 12π
C) 36π
D) 144π

12

If $-\frac{4}{3} < 3x - 4 \leq \frac{6}{7}$, what is one possible value of $12 - 9x$?

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

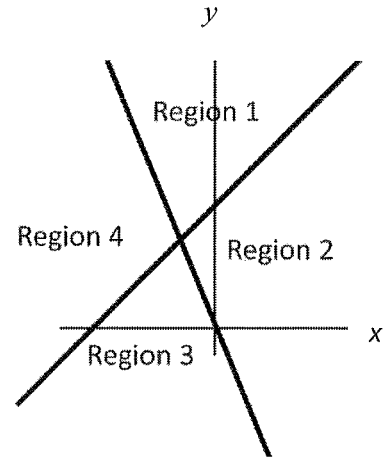
13

$$x^2 + y^2 = 250$$
$$y - 3 = -3(x + 1)$$

If the ordered pair (x, y) is a solution to the system of equations above, what is the value of $x^2 - x$?

A) -20
B) -210
C) 240
D) 30

14



$$y \geq -2x$$

$$-y > -x - 3$$

Which of the following areas contains the solutions to both sets of equations?

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

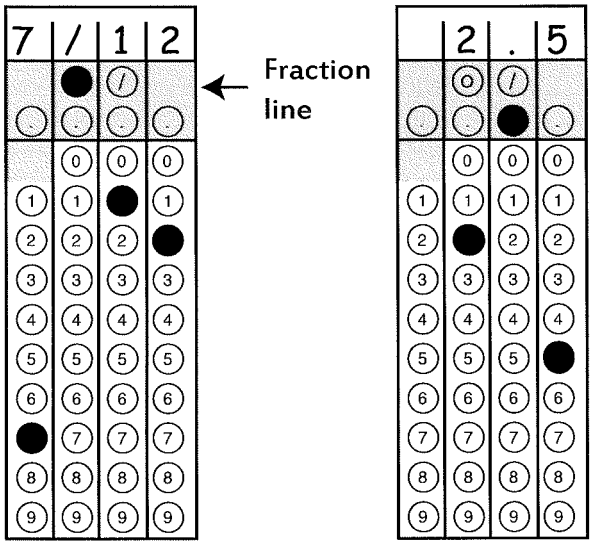
15

If p is a natural number and $p^2 = 11p + 60$, then which of the following represents the possible value(s) of p ?

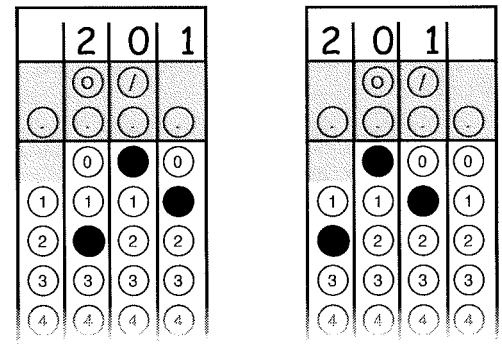
A) $p = -15, 4$
B) $p = -4, 15$
C) $p = 15$
D) $p = -4$

CONTINUE

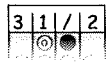
Each of the remaining questions requires you to solve the problem and enter your answer by marking the circles in the special grid, as shown in the examples below. You may use any available space for scratch work.



Answer: 201
Either position is correct

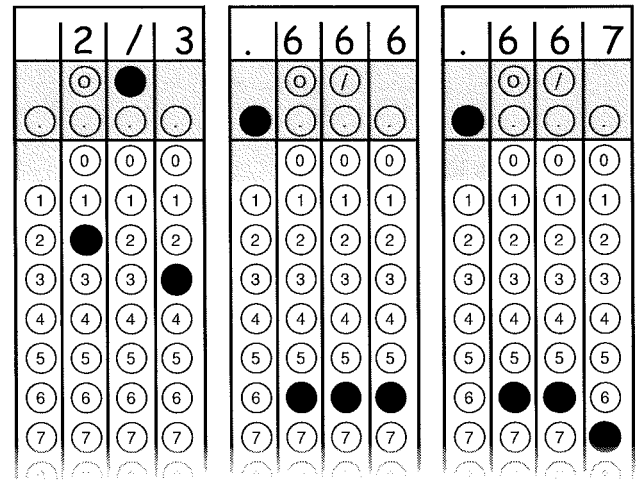


- Mark no more than one circle in any column.
- Because the answer sheet will be machine-scored, you will receive credit only if the circles are filled in correctly.
- Although not required it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- Mixed numbers such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2.

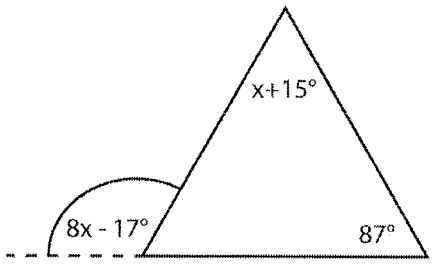
(If  is gridded, it will be interpreted as $\frac{31}{2}$ not $3\frac{1}{2}$.)

Decimal Answers: If you obtain a decimal answer with more digits than the grid can accomodate, it may be either rounded or truncated, but it must fill the entire grid. For example, if you obtain an answer such as 0.6666... you should record your result as .666 or .667. A less accurate value such as .66 or .67 will be scored as incorrect.

Acceptable ways to grid 2/3 are:



16



Using the provided triangle (not drawn to scale), what is the value of x ?

17

If x is a real, positive integer and $x^2 + 8x = 65$, what is the value of x ?

18

$$\frac{3-3x}{x-1} = x(x-4)$$

What is the value of x ?

19

If $x \neq 0$, then what is the value of the expression:

$$\frac{\frac{1}{3}(3x)^2}{(4x^4)^{\frac{1}{2}}}$$

20

Function g is defined by $g(x) = -3x^3 - 4x^2 + kx - 4$, where k is a constant. If the x-intercepts lie at (-2, 0), $(p, 0)$, $(q, 0)$, what is one possible value of k ?

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS SECTION ONLY. DO NOT TURN TO ANY OTHER SECTION IN THE TEST.

Math Test

55 MINUTES, 38 QUESTIONS

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

4

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

Notes:

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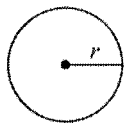
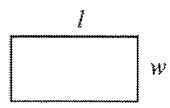
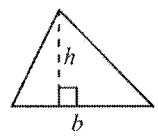


$A = \pi r^2$

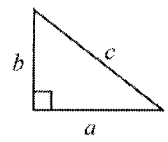
$C = 2\pi r$



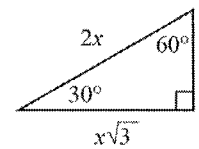
$A = lw$

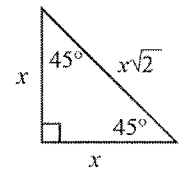


$A = \frac{1}{2}bh$

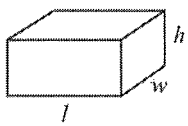


$c^2 = a^2 + b^2$

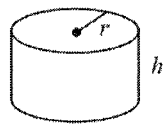




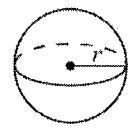
Special Right Triangles



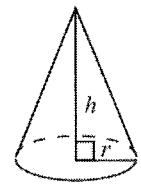
$V = lwh$



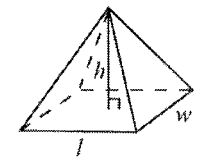
$V = \pi r^2 h$



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



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



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

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

1

A den of mice had an exact 45% increase in population in the last year. How many total mice could there have been before the increase?

A) 19
B) 20
C) 21
D) 22

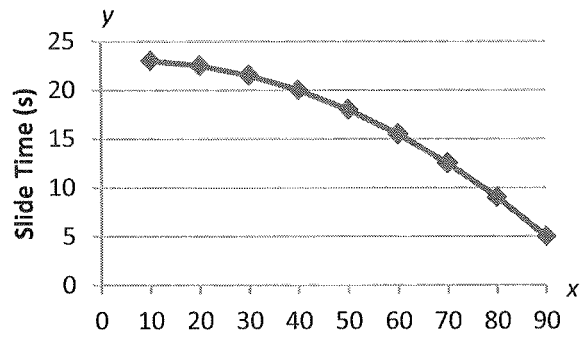
2

If $4^x = 32$, what is the value of x^2 ?

A) 5
B) 6.25
C) 25
D) $2\sqrt{2}$

CONTINUE

3



A physics student places a block on a 10 m long ramp covered in sandpaper. She then lifts the ramp up so that it forms an angle, $\angle C$, with the ground and then measures how long it takes a smooth block to slide down the ramp. She then calculates the average velocity of the block by taking the distance traveled and dividing by the travel time. Which table below shows the results of her calculations, based on the graph of the data above?

A)

Angle	Velocity
40°	.5 m/s
77°	1 m/s

B)

Angle	Velocity
40°	2 m/s
77°	4 m/s

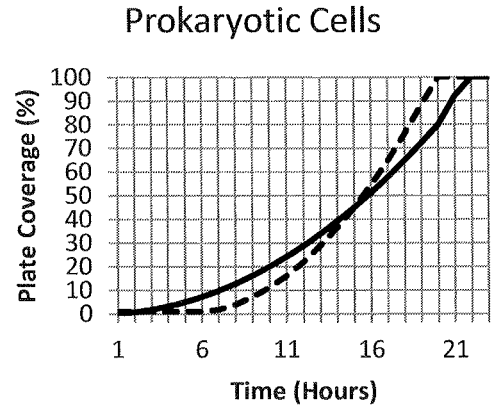
C)

Angle	Velocity
40°	1 m/s
77°	.5 m/s

D)

Angle	Velocity
40°	1 m/s
77°	2 m/s

4



A biology student places two types of prokaryotes into two separate petri dishes at the same time. He then measures the surface of the petri dish covered by each type of prokaryote and graphs each. Based upon the graphed results, which of the following is true?

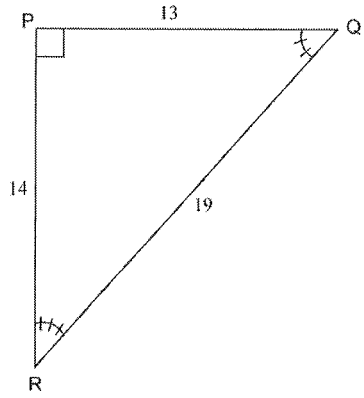
A) Both groups of cells started at 10% coverage.
B) Neither group could fully colonize a petri dish due to competition.
C) Both prokaryotes occupied the same amount of their respective dishes at 15 hours.
D) Both groups of prokaryotes will indefinitely expand at an exponential rate.

5

If $3|z-4| \leq 9$, what is the greatest possible value for z ?

A) 7
B) 8
C) 9
D) 12

6



What is the area of the triangle above?

A) 91
B) 133
C) 182
D) 266

7

In an election, candidates are allowed to fund raise while campaigning. Candidate A started off with \$1,000,000, and was able to raise funds at a rate of \$20,000 per day. Candidate B started off with \$750,000, and was able to raise \$35,000 per day. Which of the following functions of time in days, t, models the difference in total funds between the two candidates?

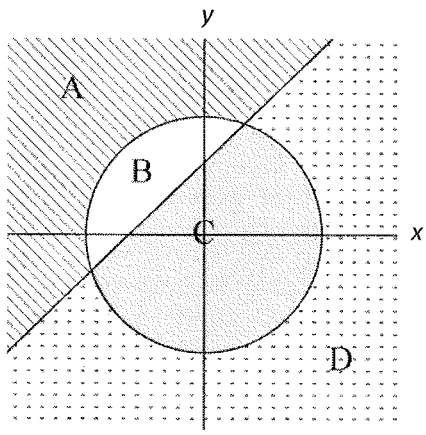
A) $f(t) = 1{,}000{,}000 + 35{,}000t$
B) $f(t) = 750{,}000 - 20{,}000t$
C) $f(t) = 250{,}000 + 15{,}000t$
D) $f(t) = 250{,}000 - 15{,}000t$

8

If p is an even integer and $2p^2 = 2p + 4$, then which of the following represents the possible value(s) of p ?

A) $p = -1, 2$
B) $p = 1$
C) $p = 2$
D) $p = -2, 1$

9



$$y^2 \leq 4 - x^2$$
$$3y - 2x > x + 3$$

Which of the following areas contains the solutions to both sets of equations?

A) A and B
B) B
C) C
D) C and D

10

$$2x(3x - 1) = 6x(x + 2) + 7$$

What is the value of x ?

A) $-\frac{10}{7}$
B) -2
C) $-\frac{1}{2}$
D) $-\frac{3}{8}$

11

$$\frac{1}{4}x - \frac{1}{6}y = 15$$
$$\frac{1}{17}y + \frac{1}{13}x = -1$$

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

A) (26, -51)
B) (1, -3)
C) (4, 17)
D) (-21, 11)

12

	Sugar Saturation in Tea	
Teaspoons of sugar	Dissolved (%)	Un-dissolved teaspoons
0.5	2	0
1	4	0
1.5	6	0
2	8	0
2.5	10	0
3	11	0.25
3.5	11.5	0.5
4	12	1
4.5	12.5	1.5
5	12.5	2

The saturation limit of a liquid is defined as the point at which the solvent (the liquid) no longer dissolves the solute (the solid being dissolved). In the chart above, at how many teaspoons of sugar is the saturation limit reached?

A) 3
B) 3.5
C) 4
D) 4.5

13

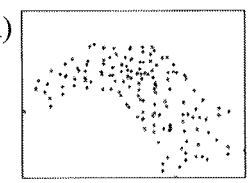
If $\frac{1}{5}x + \frac{2}{7}y = 2$, what is the value of the expression $7x + 10y$?

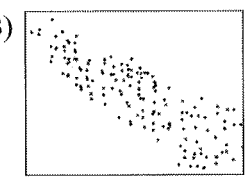
A) 140
B) 50
C) 70
D) 20

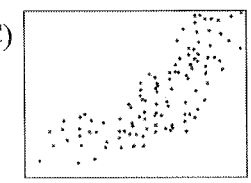
14

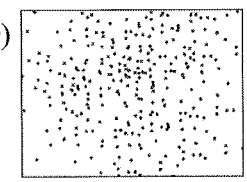
Which of the following scatterplot graphs represents data that has a linear, positive correlation?

Note: A positive correlation between two variables means that as one value increases, the other value increases as well.

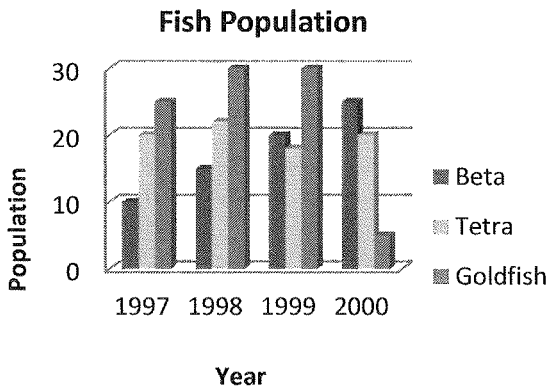
A) 

B) 

C) 

D) 

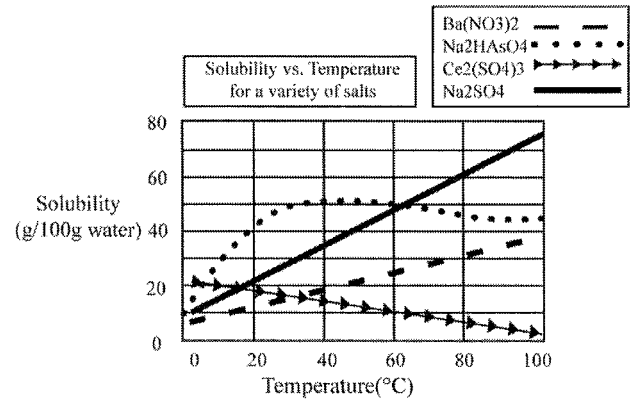
15



A group of scientists studied the population of three fish species in a pond from 1997 to 2000, with their results summed up in the above graph. In which year did a disease devastate the goldfish population?

A) 1997
B) 1998
C) 1999
D) 2000

16



According to the graph above, which of the salts does not have a linear solubility?

A) $Ba(NO_3)_2$
B) Na_2HAsO_4
C) $Ce_2(SO_4)_3$
D) Na_2SO_4

17

A shipping pallet can hold 223 boxes of cornflakes. If a factory can create two boxes of cereal every minute and the factory runs for 7 hours a day, how many full pallets can the factory produce in a day?

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

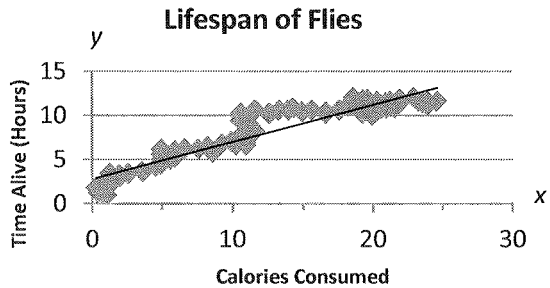
18

$$5(x + 2y) = 3y$$

If the point (x, y) is a solution to the above equation, and $y \neq 0$, what must the ratio $\frac{x}{y}$ be equal to?

A) $-\frac{7}{5}$
B) $\frac{1}{5}$
C) 1
D) $\frac{13}{5}$

19



A researcher bred one hundred fruit flies, each of which had identical diets but of varying quantities, in order to see the effects diet has on lifespan. Using the above graph determine the lifespan of a fly that consumed 17 calories.

A) 5 Hours
B) 7 Hours
C) 10 Hours
D) 14 Hours

20

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

If a and b are solutions to the equation above, which of the following is the value of $a - b$?

A) 1.5
B) 2
C) 2.5
D) 1

21

If the quadratic equation $y = ax^2 + bx + c$ has the solution $(-1, -2)$, which of the following are possible values for a, b, and c?

A) $a = -3, b = 1, c = 1$
B) $a = -2, b = 0, c = 0$
C) $a = 2, b = 1, c = 4$
D) $a = 1, b = 0, c = 2$

22

If right triangle ABC has sides $b = 7$ and $c = 24$, then which of the following is a possible value for the perimeter of triangle ABC ?

A) 50
B) 25
C) 56
D) 84

23

A small oil field is able to produce 10 gallons of crude oil per day. At the processing plant nearby it takes 5 gallons of crude oil to produce 3 gallons of gasoline and 1.5 gallons of motor oil. If 225 gallons of motor oil were produced in the last year, how many days was the oil field operational?

A) 15 days
B) 225 days
C) 38 days
D) 75 days

24

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

A) 16
B) 27
C) 8
D) 24

25

$$\frac{1}{x}+\frac{3}{x}=\frac{1}{7}$$

Bob owns a cereal factory that produces cereal. Recently he purchased a new machine that produces cereal at a rate three times greater than his original machine. On an average day Bob has to run both machines for a total of 7 hours in order to meet his customers demand. Which of the following appropriately describes the meaning of the expression $\frac{3}{x}$ in the equation above?

A) The amount of time it takes to make one box of cereal
B) The portion of the job completed by the quicker machine in one hour
C) The amount of cereal produced by the fast machine in a day
D) The amount of cereal produced by the slow machine in a day

26

	Mallard			Muscovy		
Year	1992	1997	2002	1992	1997	2002
Population	328	309	274	181	197	218

Every five years, a group of ornithologists studies the populations of various duck species in the wild. Which of the following species had the largest change in population, based on time periods?

A) Mallard 1992-1997
B) Mallard 1997-2002
C) Muscovy 1992-1997
D) Muscovy 1997-2002

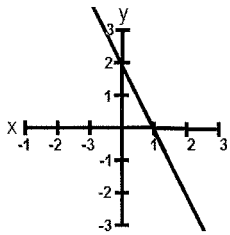
CONTINUE

27

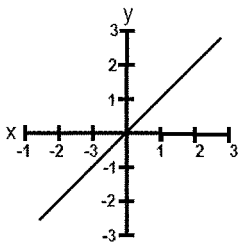
$x - y = c(x + y) - 1$, where $c > 1$,

Which of the following graphs could describe the above equation?

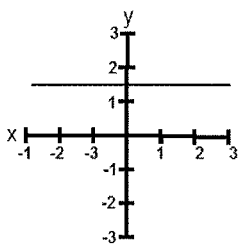
A)



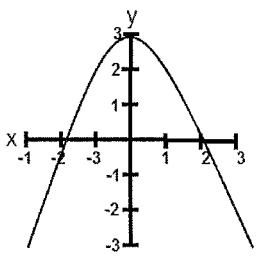
B)



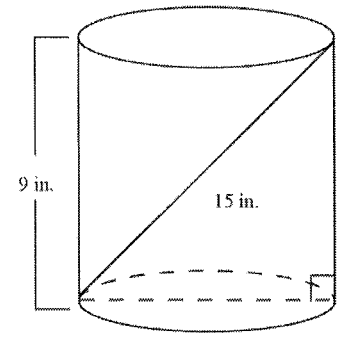
C)



D)

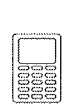


28



What is the volume of the figure above?

A) $216\ \pi$
B) $135\ \pi$
C) $324\ \pi$
D) $1{,}296\ \pi$



Questions 29 and 30 refer to the following information.

A marketing firm conducted an online survey among their target demographics about their interest in a new product. The table below contains the results of their survey.

	Would Buy	Would Not Buy	No Response	Total
12-14 Years Old	23,245	8,955	6,432	38,632
14-17 Years Old	18,983	12,244	9,883	41,110
18-24 Years Old	22,245	24,567	19,042	65,854
24+ Years Old	14,245	19,827	23,456	57,528
Total	78,718	65,593	58,813	203124

29

Which group had the largest percentage of non-respondents?

A) 12-14 Years Old
B) 14-17 Years Old
C) 18-24 Years Old
D) 24+ Years Old

30

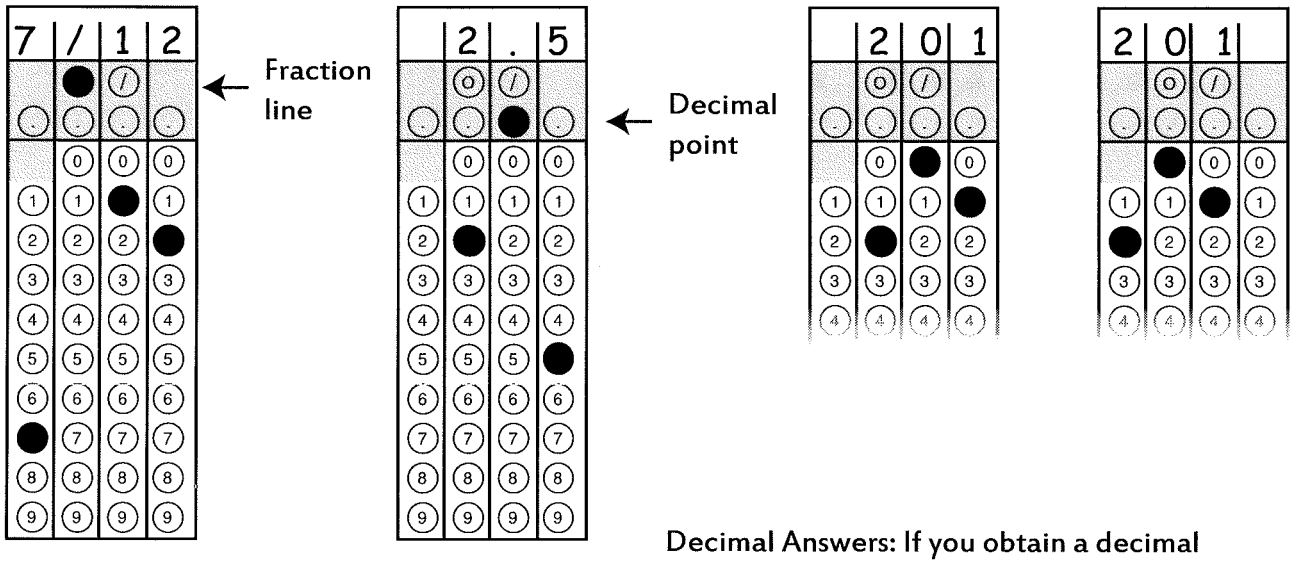
A follow-up survey was emailed to 350 of the 18-24 year olds who said they would not purchase the product. The follow-up survey asked if the price of the product were dropped by 20%, would they change their purchasing decision. Of the 350 emailed, everyone responded, of whom 164 said they would purchase the product if it were 20% cheaper. Based upon this information and the table above, if the product were sold for 20% less how many 18-24 year olds in the respondent demographic would purchase it?

A) 30,897 people
B) 27,158 people
C) 33,756 people
D) 31,861 people

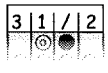
CONTINUE

Each of the remaining questions requires you to solve the problem and enter your answer by marking the circles in the special grid, as shown in the examples below. You may use any available space for scratch work.

Answer: 201
Either position is correct

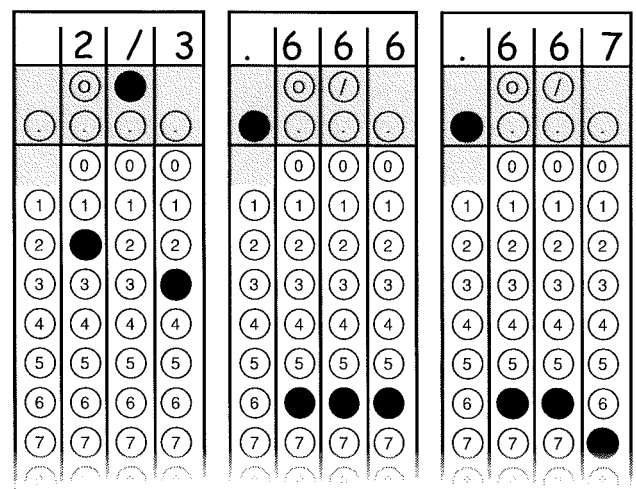


- Mark no more than one circle in any column.
- Because the answer sheet will be machine-scored, you will receive credit only if the circles are filled in correctly.
- Although not required it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- Mixed numbers such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2.

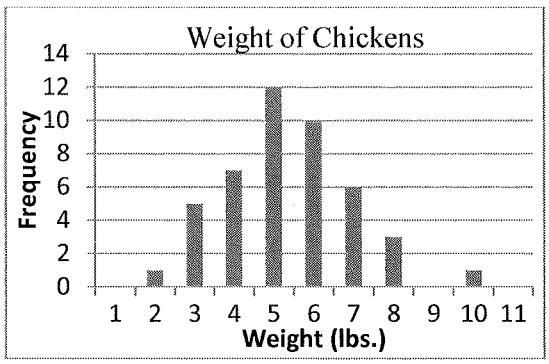
(If  is gridded, it will be interpreted as $\frac{31}{2}$ not $3\frac{1}{2}$.)

Decimal Answers: If you obtain a decimal answer with more digits than the grid can accomodate, it may be either rounded or truncated, but it must fill the entire grid. For example, if you obtain an answer such as 0.6666... you should record your result as .666 or .667. A less accurate value such as .66 or .67 will be scored as incorrect.

Acceptable ways to grid 2/3 are:



31



A statistician purchased several cooked chickens from a store and weighed them. If the graph above summarizes the results of his purchase, what is the median weight?

32

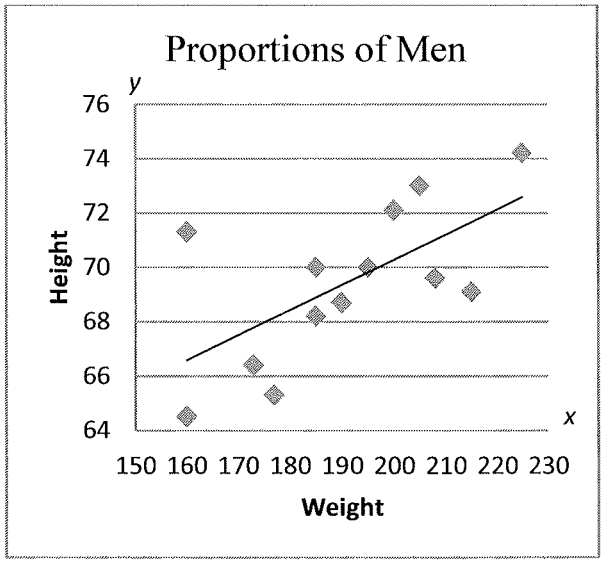
If $x + 2$ is a factor of the expression $x^2 + cx + c$, where c is a constant, what is the value of c ?

33

A small rocket fuel processing plant was built in order to provide the fuel for a special asteroid mining mission. The plant can produce 15 gallons of fuel per hour, and has 75 days until the mission. If the mission will require 7,875 gallons of rocket fuel, how many hours a day will the plant need to be open in order for the mission to launch?

CONTINUE

34



For a clinical trial 14 men were weighed in pounds and measured in inches. What is the weight, in pounds, of the man who is furthest from the trend line?

35

If $\frac{48}{x+1} - \frac{24}{x-1} = 2$, what is one possible value of x ?

36

$$\frac{1}{8}x - \frac{1}{6}y = 17$$
$$3x - py = 34$$

If the above system of equations has no solution and if p is a constant, what is the value of p ?

Questions 37 and 38 refer to the following information.

Tom and Luke are going to open a new bank account. Tom has $500 and opens an account with a bank that has an annual simple interest rate of 5%. Luke has $750 and opens an account with a bank that has a semiannual compound interest rate of 4%.

37

In 4 years, what is the amount of money in Tom's account? Round to the nearest whole dollar.

38

In 1 year, what is the amount of money in Luke's account? Round to the nearest whole dollar.

STOP

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS SECTION ONLY. DO NOT TURN TO ANY OTHER SECTION IN THE TEST.

Section 1, Reading	Section 2, Writing & Language	Section 3, Math, No Calculator	Section 4, Math, Calculator
1 C	1 B	1 C	1 B
2 B	2 A	2 A	2 B
3 B	3 D	3 B	3 A
4 D	4 B	4 B	4 C
5 C	5 D	5 C	5 A
6 A	6 B	6 D	6 A
7 C	7 C	7 A	7 D
8 D	8 A	8 A	8 C
9 B	9 D	9 A	9 B
10 A	10 B	10 D	10 C
11 B	11 C	11 C	11 A
12 D	12 C	12 A	12 D
13 C	13 D	13 D	13 C
14 A	14 D	14 B	14 C
15 D	15 A	15 C	15 D
16 C	16 D	16 17	16 B
17 C	17 A	17 5	17 A
18 D	18 B	18 3	18 A
19 A	19 A	19 1.5 or 3/2	19 C
20 D	20 A	20 2	20 A
21 A	21 C		21 B
22 C	22 C		22 C
23 A	23 A		23 D
24 A	24 A		24 A
25 D	25 A		25 B
26 D	26 B		26 B
27 B	27 B		27 A
28 C	28 A		28 C
29 A	29 C		29 D
30 C	30 B		30 C
31 B	31 D		31 5
32 B	32 B		32 4
33 D	33 B		33 7
34 C	34 B		34 160
35 B	35 C		35 5 or 7
36 A	36 D		36 4
37 B	37 C		37 600
38 A	38 C		38 780
39 D	39 A		
40 A	40 D		
41 B	41 B		
42 B	42 D		
43 C	43 D		
44 B	44 B		
45 B			
46 C			
47 C			
48 D			
49 B			
50 C			
51 A			
52 A			

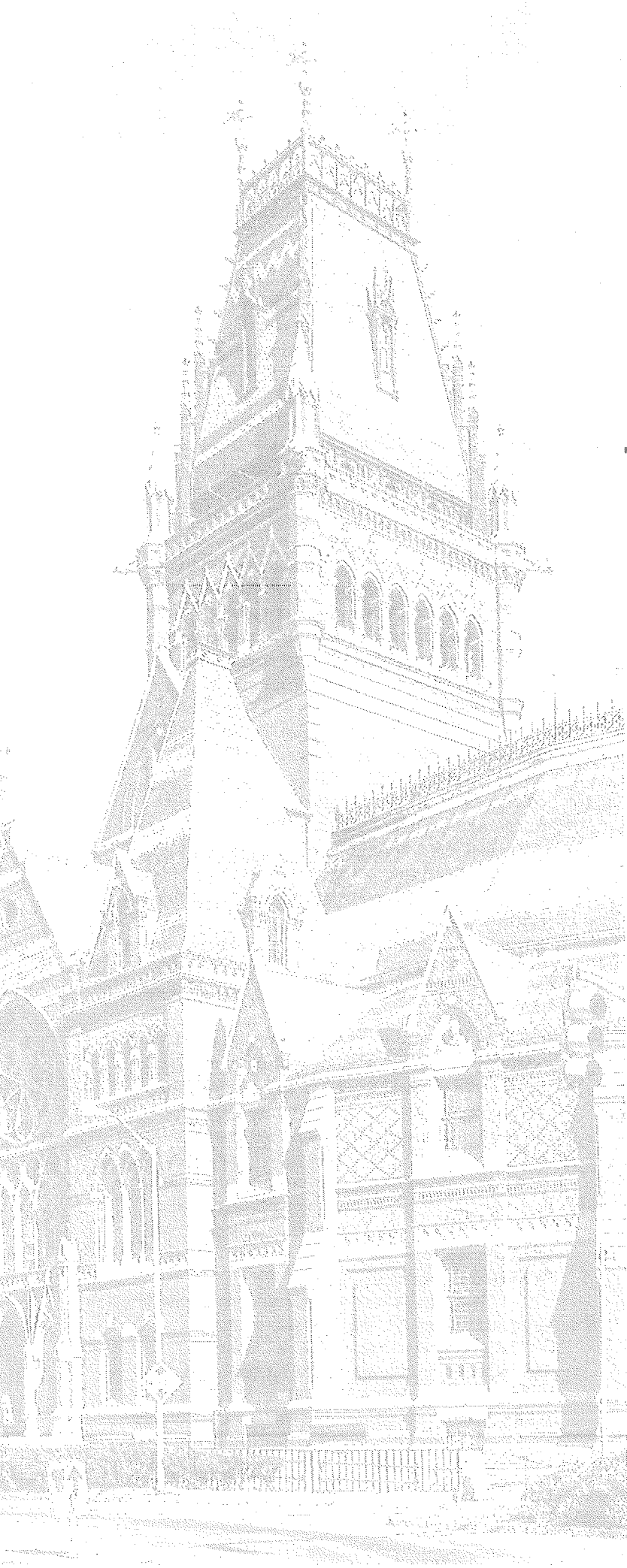
Calculate your estimated score by using the conversion chart on page 319.

Section 1 Raw Score (Total Correct) _____

Section 2 Raw Score (Total Correct) _____

Section 3 Raw Score (Total Correct) _____

Section 4 Raw Score (Total Correct) _____



PRACTICE TEST 2

Test Reminders

1. A #2 pencil is required.
2. Follow the time restrictions for each section.
3. You are allowed to write on the test.
4. Circle your answers to ensure accuracy when filling in the answer sheet, provided on page 317.
5. Calculate your estimated score by using the conversion chart on page 319.

Math Test

25 MINUTES, 20 QUESTIONS

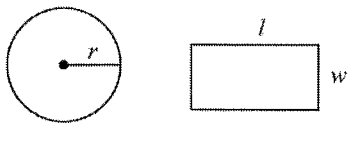
Turn to Section 3 of your answer sheet to answer the questions in this section.

3

For questions 1-20, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16-20,** solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

Notes:

1. The use of a calculator **is not permitted.**
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.



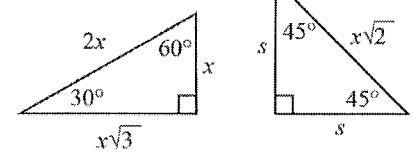
$A = \pi r^2$

$C = 2\pi r$

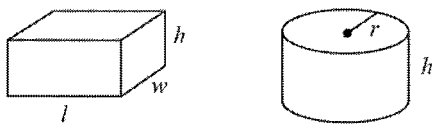
$A = lw$

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

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



Special Right Triangles



$V = lwh$

$V = \pi r^2 h$

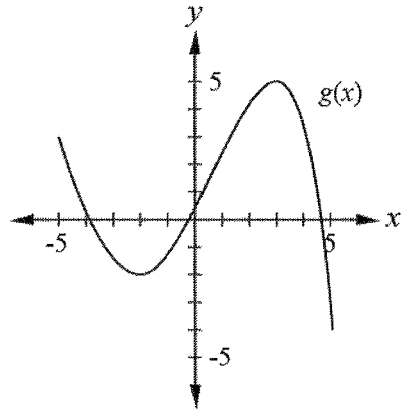
$V = \frac{4}{3}\pi r^3$

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

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

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

1



The figure above shows the graph of $g(x)$. Which value of x is the maximum of $g(x)$ within the interval [-5,5] ?

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

2

$$f(x) = (x - a)(x + a)$$

For the quadratic expression above, what is the coefficient of x ?

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

3

To clean a house, Bob charges a fee of \$20 for his equipment and \$8.75 per hour spent cleaning. Ryan charges a fee of \$16 for his equipment and \$9.75 per hour spent cleaning. If x represents the number of hours spent cleaning, what are all the values of x for which Ryan's total charge is greater than Bob's total charge?

A) $x > 4$
B) $3 \leq x \leq 4$
C) $4 \leq x \leq 5$
D) $x < 3$

4

$$2x - 5y = 10$$

$$kx + 20y = -40$$

If the system of linear equations above has an infinite number of solutions and k is a constant, what is the value of k ?

A) -2
B) -4
C) -8
D) -16

CONTINUE

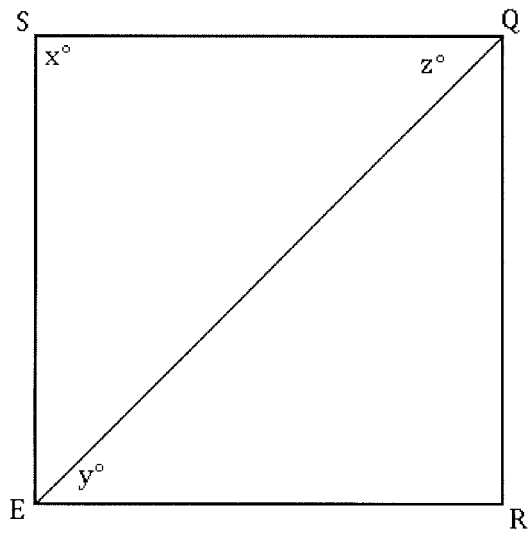
5

$$I = \frac{|E|^2}{2\eta}$$

The equation above shows the relationship between the intensity, I, of a light and the electric field E of that light. The symbol η is called natural impedance and is a constant. Which of the following is the correct expression for the value of E ?

A) $E = (2I\eta)^2$
B) $E = 2\sqrt{I\eta}$
C) $E = \sqrt{\frac{I}{2\eta}}$
D) $E = \sqrt{2I\eta}$

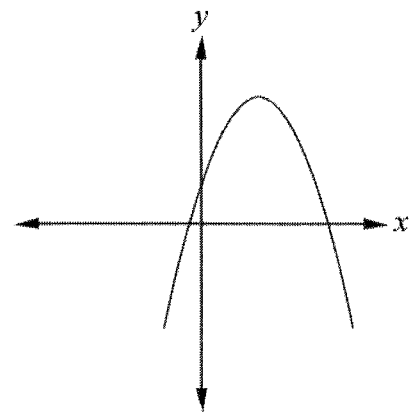
6



In the above square $SQRE$, what is the average of x, y, and z ?

A) 180
B) 90
C) 60
D) 45

7



If the graph above represents

$y = ax^2 + bx + c$,

which of the following is true?

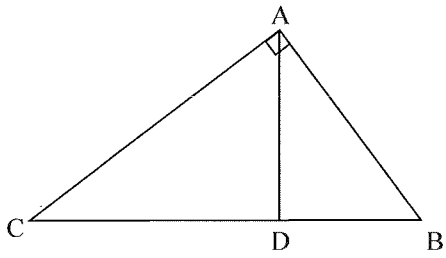
A) $a < 0, c > 0$
B) $a < 0, c < 0$
C) $a > 0, c > 0$
D) $a > 0, c < 0$

8

An exponential function has two positive, real roots and a 0 root. Which of the following expressions could be the function described above?

A) $f(x) = ax^2 + bx + c$
B) $f(x) = ax^2 - bx + c$
C) $f(x) = ax^2 + bx^2 + cx$
D) $f(x) = ax^3 - bx^2 + cx$

9



In the figure above, ΔABC is a right triangle with the right angle at A. Line segment $\overline{AD}$ is an altitude, $AB = 15$ and $AC = 20$. What is the area of ΔABD ?

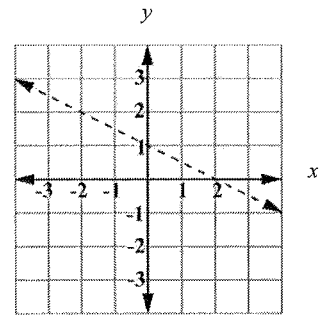
A) 25
B) 150
C) 96
D) 54

10

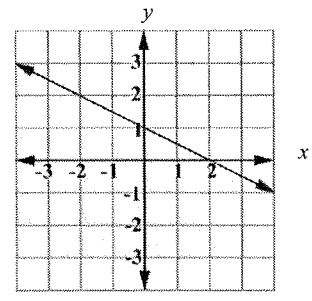
Which graph represents the inequality below?

$$3x + 6y > 6$$

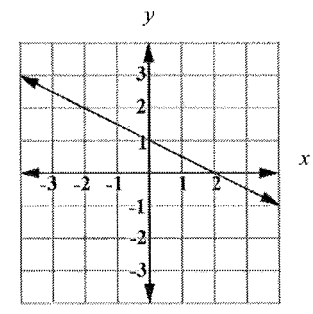
A)



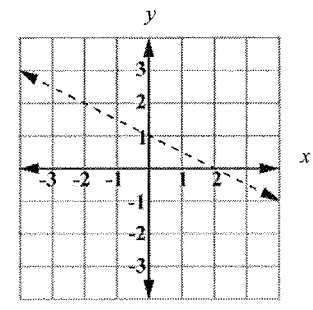
B)



C)



D)



CONTINUE

11

$h(x) = 3(x^2 + 5x + 4) - 4(x - c)$

In the polynomial $h(x)$ defined above, c is a constant. If $h(x)$ is divisible by x, what is the value of c ?

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

12

If $x - y = 7$ and $x^2 - y^2 = -70$, then what is the value of x ?

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

13

While participating in a triathlon, Marcus is able to run the marathon portion at a rate of one mile per 10 minutes. A marathon is equal to 26 miles. If Marcus runs for h hours, where h is less than 4.3, how much farther must Marcus run at time t ?

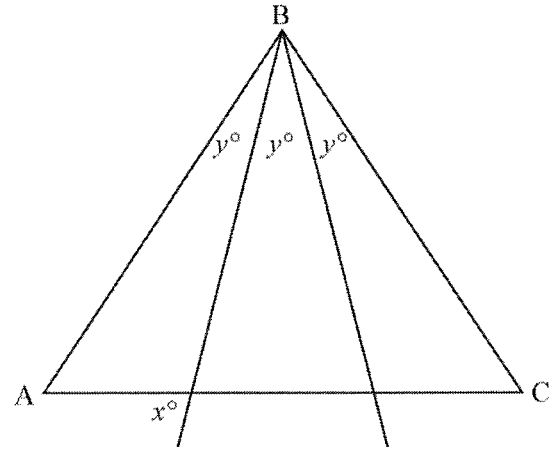
A) $43 - 6h$
B) $26 - 6h$
C) $6h - 26$
D) $6h - 43$

14

Given $f(x) = 3x^2 - 1$ and $g(x) = 2x$, which of the following expressions is $f(g(x))$?

A) $12x^2 - 1$
B) $6x^2 - 2$
C) $6x^3 - 2x$
D) 11

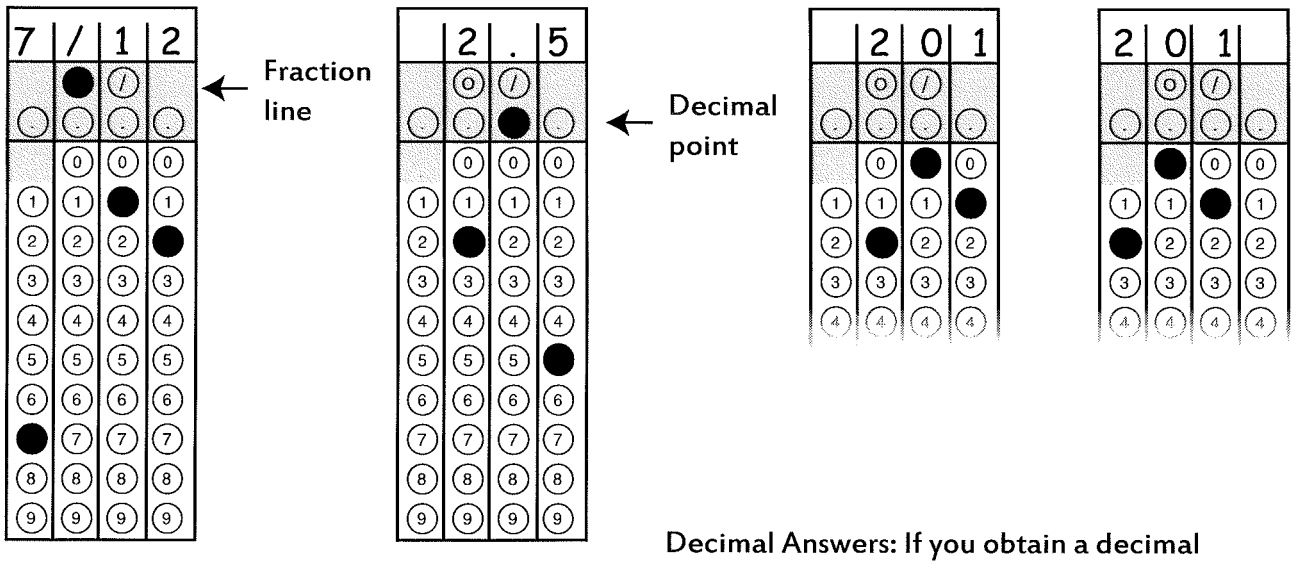
15



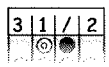
In the figure above $\overline{AB} = \overline{BC}$ and the angle of C is 54°. What is the value of x ?

A) 24
B) 54
C) 78
D) 108

Each of the remaining questions requires you to solve the problem and enter your answer by marking the circles in the special grid, as shown in the examples below. You may use any available space for scratch work.

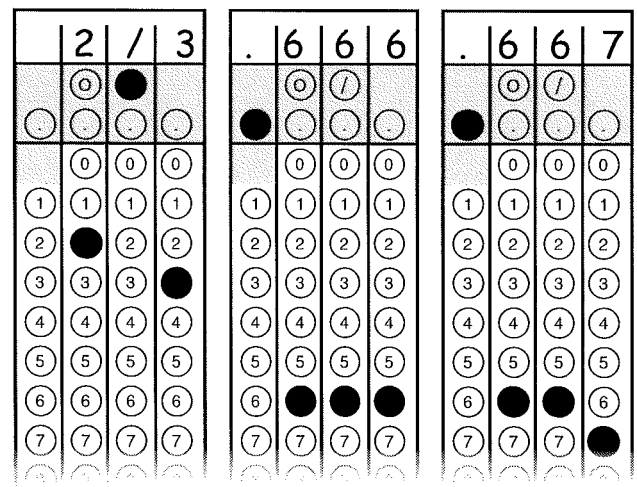


- Mark no more than one circle in any column.
- Because the answer sheet will be machine-scored, you will receive credit only if the circles are filled in correctly.
- Although not required it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- Mixed numbers such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2.

(If  is gridded, it will be interpreted as $\frac{31}{2}$ not $3\frac{1}{2}$.)

Decimal Answers: If you obtain a decimal answer with more digits than the grid can accomodate, it may be either rounded or truncated, but it must fill the entire grid. For example, if you obtain an answer such as 0.6666... you should record your result as .666 or .667. A less accurate value such as .66 or .67 will be scored as incorrect.

Acceptable ways to grid 2/3 are:



16

Simplify the following expression:

$$\frac{3\sqrt{25x^{\frac{3}{4}}}}{\frac{1}{2}x^{\frac{3}{8}}}$$

17

Given $g(x) = 3x^2 - 2x + 1$, what is the value of $g(4) - g(3)$?

18

Given $(x + ia)(x - ia) = 10$ and $x^2 = 1$, then what is the value of a ?

19

Let the function $g(x)$ be defined for all values of x by $g(x) = x(x - 1)$. If m is a positive number and $g(m + 2) = 12$, what is the value of m ?

20

An opera house charges \$152 per box seat and \$87 per normal seat. Last opening night there was a total of 110 attendees and the opera house made \$10,675. How many of the patrons were in box seats?

STOP

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS SECTION ONLY. DO NOT TURN TO ANY OTHER SECTION IN THE TEST.

Math Test

55 MINUTES, 38 QUESTIONS

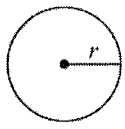
Turn to Section 4 of your answer sheet to answer the questions in this section.

4

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

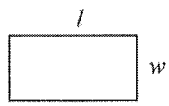
Notes:

1. The use of a calculator **is permitted.**
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

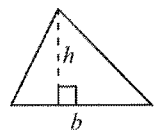


$A = \pi r^2$

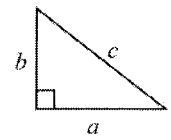
$C = 2\pi r$



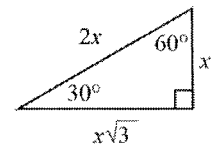
$A = lw$

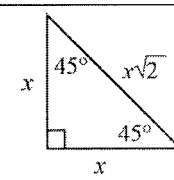


$A = \frac{1}{2}bh$

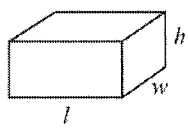


$c^2 = a^2 + b^2$

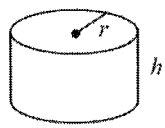




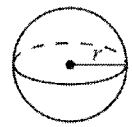
Special Right Triangles



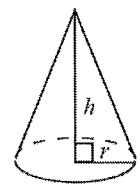
$V = lwh$



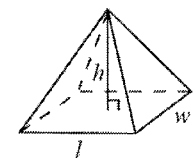
$V = \pi r^2 h$



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



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



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

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

1

Perform the following operation:

$$\frac{x^2-2x-35}{x^2-4x-21} \div \frac{(x^2+9x+20)}{x^2-x-12} =$$

A) $\frac{x^4+3x^3-5x^2+2x-1}{x^4-6x^3+3x^2-7x-14}$

B) $\frac{x^3-3x}{(x+3)}$

C) $\frac{(x+5)^2}{(x+3)^2}$

D) $\frac{x-4}{x+4}$

2

$$\frac{x^3+ax^2+bx+c}{x+d} = x^2-kx+k$$

In the above equation d and k are positive integers. Which of the following could be all of the roots of x^3+ax^2+bx+c ?

A) $d, -k$

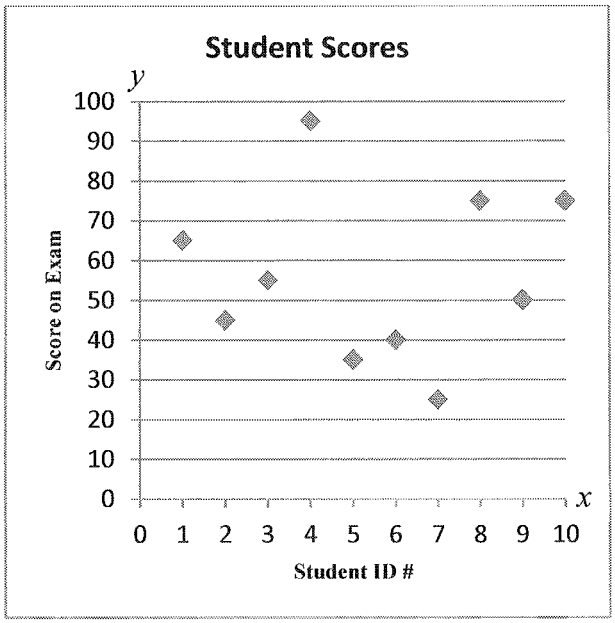
B) d, k

C) $-d, 2$

D) $-1, -2$

Questions 3 and 4 refer to the following information.

Professor Lynn teaches advanced quantum particle theory at the local learning annex. She recently gave her class their first exam and graphed their scores.



3

What is the mode score for this exam?

A) 45
B) 50
C) 75
D) There is no discernible mode.

4

What is the outlier score?

A) 25
B) 35
C) 75
D) 95

5

$$y = mx + b$$

In the equation above m is negative and b is positive. If the n intercept is where an equation crosses the n axis, which of the following must be true?

A) The x intercept is negative.

B) The x intercept is positive.

C) The x intercept occurs at $x = \frac{b}{m}$.

D) The x intercept occurs at $x = \frac{m}{b}$.

6

If $f(x + 1) = 2x - 3$ for all values of x, what is the value of $f(3)$?

A) 1
B) 3
C) 5
D) 7

7

Two men go on a hunting trip in order to supply their cabin with fresh venison for the upcoming winter. Each man is capable of hunting between 3 to 5 bucks, each of which weighs between 187 lbs. to 348 lbs. If the average buck is 80% usable meat by mass, which of the following systems of inequalities models the range of the mass of meat, m, the men will bring back for winter?

A) $2 \times .8 \times (5 \times 187) \leq m$
$m \leq 2 \times .8 \times (3 \times 348)$

B) $.8(3 + 2) \times 187 \leq m$
$m \leq .8(5 + 2) \times 348$

C) $2 \times .8(3 \times 187) \leq m$
$m \leq 2 \times .8(5 \times 348)$

D) $2 \times .8(3 + 187) \leq m$
$m \leq 2 \times .8(5 + 348)$

CONTINUE

8

When purchasing a used car, a car dealership can finance your sale through the bank or through its own financing program. When purchasing with a bank loan there is a flat fee of f dollars with a monthly payment of m dollars for 30 months. When financing through the car dealership there is a flat fee of f-240 dollars and a monthly rate of k dollars per month for 36 months. If the two plans cost the same amount in the long run, what must be the value of m in dollars?

A) 40

B) $\frac{6k-40}{5}$

C) $1.2k$

D) $15 - \frac{k}{2}$

9

Two cars are racing each other across the city. One car drives along a highway shaped like a semicircle across the top of the city. The other car takes a straight path, the diameter of the semicircle, across the city. Despite their different paths, the race ends in a tie. If the slower car is going 20 mph, what is the approximate speed of the faster car in mph?

A) 62.8 mph
B) 52.7 mph
C) 39.5mph
D) 31.4 mph

10

A tutor earns \$15 an hour for tutoring *two* children and an additional \$5 tip when both children get an A on a test. If the two children both get an A, what expression could be used to determine how much the tutor earned?

A) $15x + 5$, where x is the number of hours.
B) $5x + 15$, where x is the number of hours.
C) $x(15 + 2) + 5$, where x is the number of children.
D) $5x + (15 + 2)$, where x is the number of children.

11

$$4(x + y) = y$$

If (x, y) is a solution to the equation above and $y \neq 0$, what is the ratio $\frac{x}{y}$?

A) $-\frac{5}{4}$

B) $-\frac{3}{4}$

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

D) $\frac{3}{4}$

12

$$-\frac{1}{4}x+\frac{1}{2}y=10$$

$$\frac{1}{8}x-\frac{1}{8}y=19$$

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

A) $(344, 192)$
B) $(259, 104)$
C) $(418, 229)$
D) $(129, \frac{169}{2})$

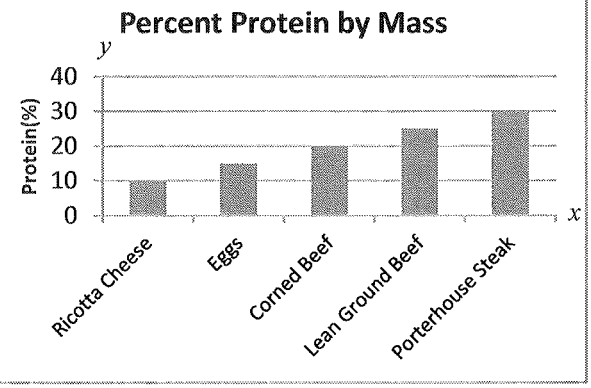
13

$$x^2+6x-40=0$$

If u and v are two solutions of the equation above and $u > v$, which of the following is the value of $u - v$?

A) 16
B) 14
C) 12
D) 4

14



The graph above shows the amount of protein supplied by five different food products- ricotta cheese, eggs, corned beef, lean ground beef, and porterhouse steak- as a percentage of their total weights. The costs of 10 grams of each product are \$3.00, \$3.30, \$3.75, \$6.00, and \$7.50, respectively. Which of the following four food products supplies the most protein per dollar?

A) Ricotta Cheese
B) Eggs
C) Corned Beef
D) Lean Ground Beef

15

Lloyd grows only potatoes and corn in his garden. Last year, he grew 280 pounds of potatoes and 120 pounds of corn. This year, the production (by weight) of potatoes declined by 10 percent, and the production (by weight) of corn declined by 25 percent. By what percentage did the total yield, by weight, of Lloyd's garden decline?

A) 14.5 percent
B) 15 percent
C) 17.5 percent
D) 35 percent

CONTINUE

16

$$y = x^2 - 5x - 14$$

The equation above represents a parabola in the xy-plane. Which of the following is an equivalent form of the equation that has the x-intercepts of the parabola as constants?

A) $y = (x - 2)(x + 7)$
B) $y = x(x - 5) - 14$
C) $y + 14 = x^2 - 5x$
D) $y = (x + 2)(x - 7)$

Questions 17 and 18 refer to the following information.

Einstein's theory of special relativity states that as an object accelerates towards the speed of light, distances observed in the direction of velocity appear to shrink. This phenomenon is known as length contraction and can be described with the following equation: $l_{moving} = l_{rest}\sqrt{1 - \beta^2}$, where β is the ratio of the velocity to the speed of light, $\beta = \frac{v}{c}$.

17

Tom and Jerry are racing toward the Casper galaxy in their own spaceships. While flying to their destination they each pass the same nebula that is 10 parsecs long. If Tom sees the nebula as 6 parsecs long while Jerry views the nebula as 4 parsecs long, who is traveling more quickly?

A) Tom, because as you travel at speeds closer to the speed of light, apparent lengths get shorter.
B) Tom, because as you travel at speeds closer to the speed of light, apparent lengths get longer.
C) Jerry, because as you travel at speeds closer to the speed of light, apparent lengths get shorter.
D) Jerry, because as you travel at speeds closer to the speed of light, apparent lengths get longer.

18

Vanessa is in a spaceship moving extremely quickly through the cosmos. If the observed distances before her are half as long as they were when before she started moving, what is β ?

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

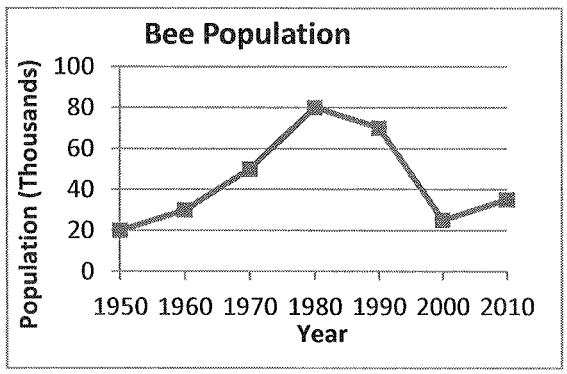
19

A ball is accelerating down a ramp at a rate of $a = 5.9\frac{m}{s}$. If the acceleration down the ramp is $a = 9.8\sin(\angle C)$, what is the angle of the ramp, $\angle C$, in radians?

A) .37
B) .646
C) 3.7
D) $\pi/2$

20

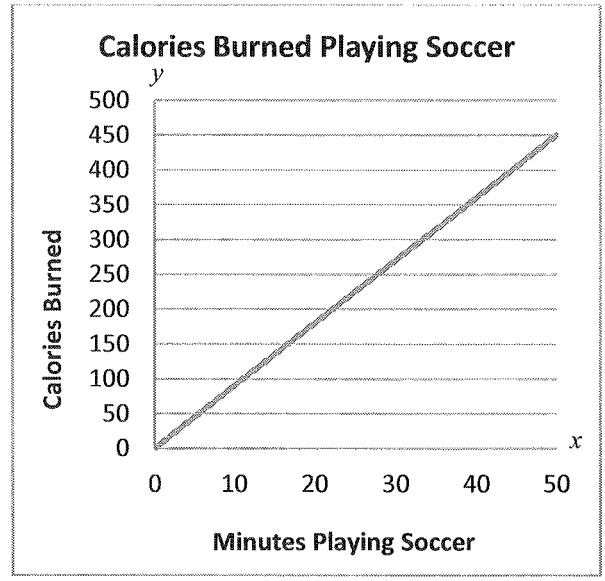
The population of bees in a certain region was monitored over the course of several decades.



Which of the following time periods had the largest change to the bee population?

A) 1950-1960
B) 1960-1970
C) 1980-1990
D) 1990-2000

Questions 21 and 22 refer to the following chart.



21

Approximately how many calories are burned in 25 minutes of playtime?

A) 180 calories
B) 225 calories
C) 270 calories
D) 360 calories

22

Which equation represents the graph? c is calories, and m is minutes.

A) $c = 9m$

B) $c = 90m$

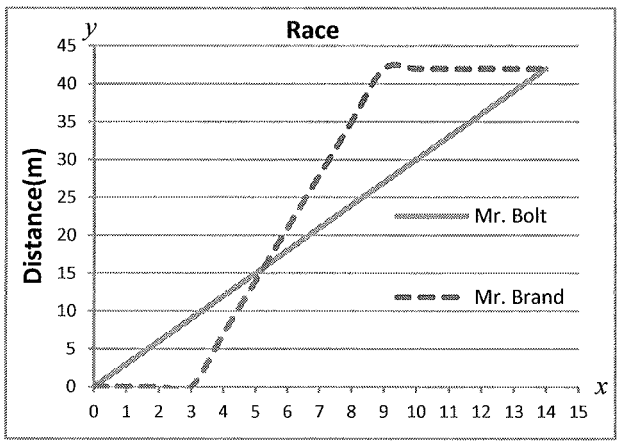
C) $c = m + 80$

D) $m = 9c$

CONTINUE

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

Mr. Brand and Mr. Bolt are running a friendly foot race. The two agree to run as fast as they can to prove who is faster. The graph of their race follows.



23

What were both contestants doing from 10s to 14s ?

A) Mr. Brand was resting and Mr. Bolt was sprinting.
B) Mr. Bolt was resting and Mr. Brand was sprinting.
C) Both were sprinting.
D) Both were resting.

24

What was Mr. Brand's average velocity for all 14 seconds of the race?

A) 9 m/s
B) 7 m/s
C) 5 m/s
D) 3 m/s

25

If Mr. Brand were to run at full speed for a total of 28 seconds, how far would he travel?

A) 84 m
B) 168 m
C) 196 m
D) 280 m

26

Which of the following statements best describe the inequality?

$$3 \leq x \leq 8$$

A) A number x is fewer than 8 or no less than 3.
B) A number x is less than or equal to 3 or more than 8.
C) A number x is more than 3 and less than 8.
D) A number x is greater than or equal to 3 and no more than 8.

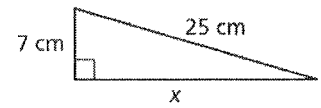
27

A system of two linear equations has no solution. What can you conclude about the graphs of the two equations?

A) The lines have the same slope and the same y-intercept.
B) The lines have the same slope and a different y-intercept.
C) The lines have different slopes and the same y-intercept.
D) The lines have different slopes and different y-intercepts.

28

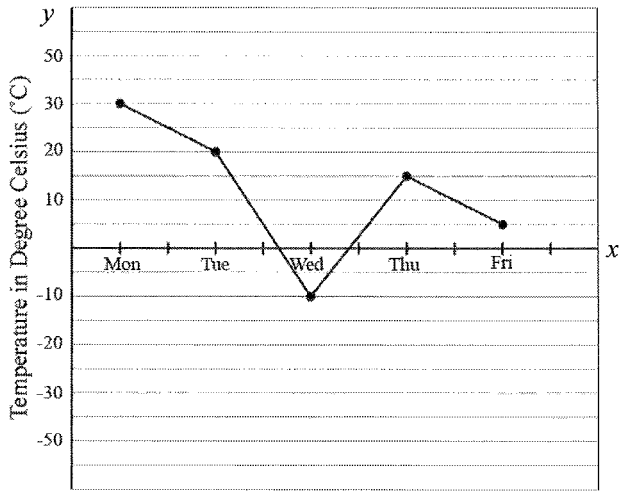
The perimeter of the triangle shown below is greater than 50 centimeters. Which inequality represents this algebraically?



A) $\frac{1}{2}(7x) < 50$
B) $x + 32 < 50$
C) $\frac{1}{2}(7x) > 50$
D) $x + 32 > 50$

CONTINUE

29



The figure above shows the variation of temperature in a certain area between Monday and Friday. Between which two days do the temperatures change most dramatically?

A) Mon and Tue

B) Tue and Wed

C) Wed and Thu

D) Thu and Fri

30

A bird starts gliding and drops 2 meters in elevation for every 50 meters it travels horizontally. The bird is at 1,350 meters elevation when it starts gliding, and the bird is traveling at 12 meters per second horizontally. What is the elevation of the bird, in meters, at the point where the bird passes t seconds after starting to glide?

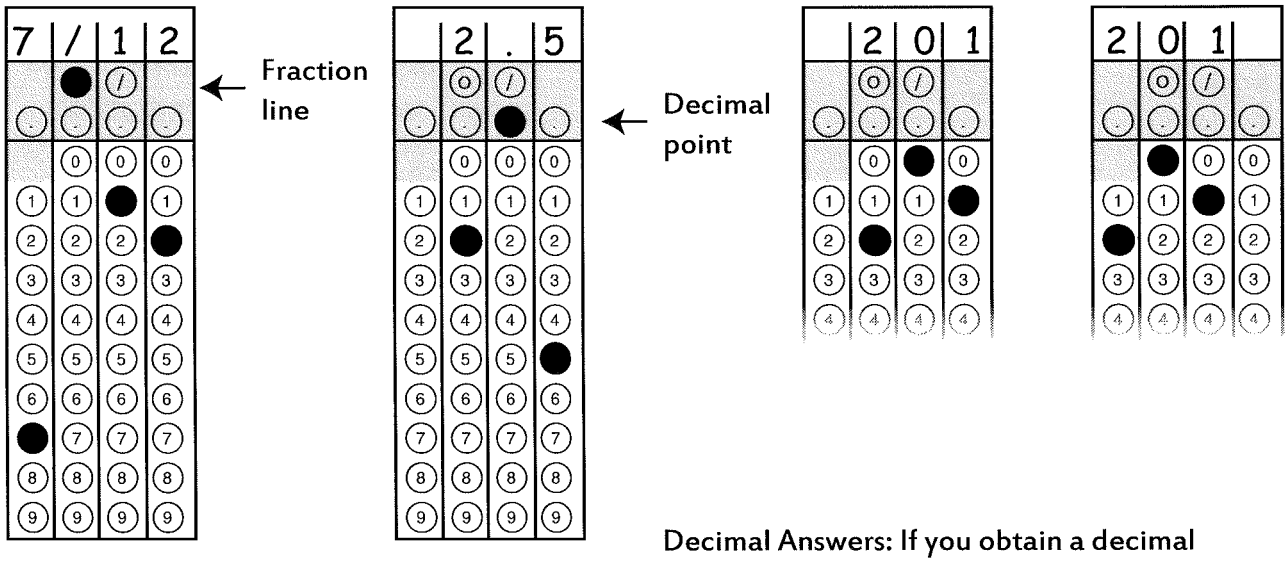
A) $1{,}350 - 0.02t$

B) $1{,}350 - 0.48t$

C) $1{,}350 - 2t$

D) $1{,}350 - 12t$

Each of the remaining questions requires you to solve the problem and enter your answer by marking the circles in the special grid, as shown in the examples below. You may use any available space for scratch work.



- Mark no more than one circle in any column.
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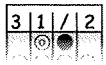
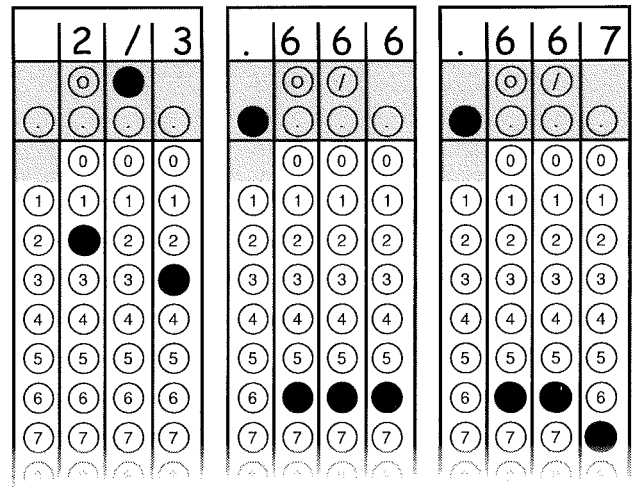
- No question has a negative answer.
- Mixed numbers such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2.

(If  is gridded, it will be interpreted as $\frac{31}{2}$ not $3\frac{1}{2}$.)

Decimal Answers: If you obtain a decimal answer with more digits than the grid can accomodate, it may be either rounded or truncated, but it must fill the entire grid. For example, if you obtain an answer such as 0.6666... you should record your result as .666 or .667. A less accurate value such as .66 or .67 will be scored as incorrect.

Acceptable ways to grid 2/3 are:



CONTINUE

31

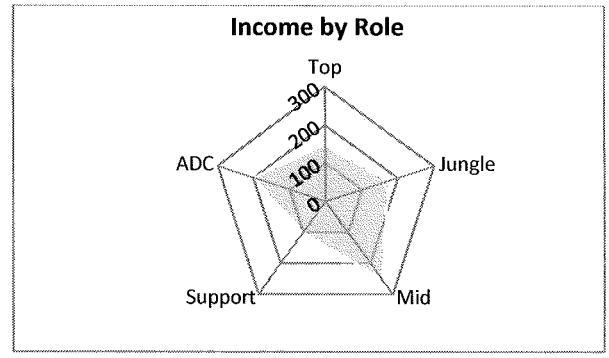
In chemistry class, a student adds a 70% peroxide solution to 3 mL of a solution that is 15% peroxide. The function

$f(x) = \frac{3(0.15)+x(0.70)}{3+x}$ represents the percent of peroxide in the resolution solution, where x is the amount of 70% solution that is added. How many mL of the 70% peroxide solution should be added to create a solution that is 40% peroxide?

32

Find a positive root of the following expression: $x^3 + x^2 - 12x$

33



The above chart shows the annual income of members of a competitive gaming team by role. If the mid player makes $250,000 per year, what is the annual income of the ADC player in thousands of dollars?

34

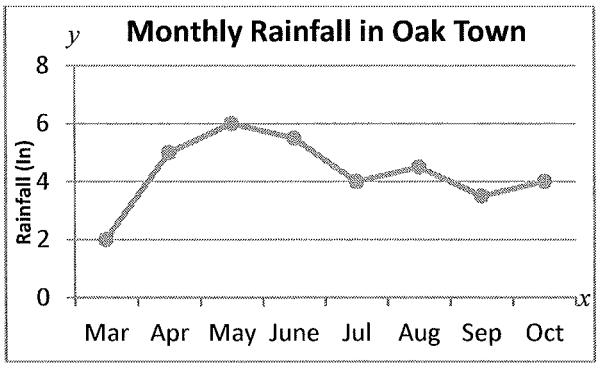
The sum of one-third of a number and 10 is equal to 13. What is the number?

35

$$x^2 - 12x - 64$$

From the above expression, what is one real root?

36



The line graph above shows the monthly rainfall from March to October last year in Oak Town. According to the graph, what was the greatest change in inches (absolute value) in the monthly rainfall between consecutive months?

37

If the volume of the sphere with radius r is V, and the volume of a sphere with radius $2r$ is aV. What is the value of a ?

38

A juice company is filling bottles of juice from a tank that contains 75 gallons of pure juice. At most, how many 20-ounce bottles can be filled from the tank?

(1 gallon = 128 ounces)

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS SECTION ONLY. DO NOT TURN TO ANY OTHER SECTION IN THE TEST.

Section 1, Reading	Section 2, Writing & Language	Section 3, Math, No Calculator	Section 4, Math, Calculator
1 C	1 D	1 C	1 D
2 A	2 B	2 A	2 C
3 C	3 B	3 A	3 C
4 A	4 B	4 C	4 D
5 D	5 C	5 D	5 B
6 C	6 A	6 C	6 A
7 C	7 C	7 A	7 C
8 C	8 C	8 D	8 B
9 D	9 A	9 D	9 D
10 B	10 D	10 A	10 A
11 C	11 C	11 A	11 B
12 B	12 C	12 B	12 A
13 C	13 C	13 B	13 B
14 D	14 B	14 A	14 C
15 B	15 C	15 C	15 A
16 C	16 A	16 30	16 D
17 D	17 C	17 19	17 C
18 C	18 B	18 3	18 A
19 A	19 D	19 2	19 B
20 D	20 B	20 17	20 D
21 B	21 B		21 B
22 A	22 D		22 A
23 B	23 B		23 A
24 B	24 D		24 D
25 A	25 B		25 C
26 D	26 C		26 D
27 B	27 B		27 B
28 D	28 C		28 D
29 D	29 A		29 B
30 C	30 B		30 B
31 D	31 D		31 2.5
32 B	32 C		32 3
33 A	33 D		33 200
34 D	34 A		34 9
35 C	35 B		35 16 or -4
36 D	36 B		36 3
37 C	37 B		37 8
38 B	38 C		38 480
39 A	39 D		
40 D	40 B		
41 C	41 D		
42 C	42 D		
43 B	43 C		
44 A	44 D		
45 B			
46 B			
47 C			
48 D			
49 B			
50 C			
51 A			
52 B			

Calculate your estimated score by using the conversion chart on page 319.

Section 1 Raw Score (Total Correct)	Section 2 Raw Score (Total Correct)	Section 3 Raw Score (Total Correct)	Section 4 Raw Score (Total Correct)
_____	_____	_____	_____

PRACTICE TEST 3

Test Reminders

1. A #2 pencil is required.
2. Follow the time restrictions for each section.
3. You are allowed to write on the test.
4. Circle your answers to ensure accuracy when filling in the answer sheet, provided on page 317.
5. Calculate your estimated score by using the conversion chart on page 319.

Math Test

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

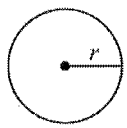
3

25 MINUTES, 20 QUESTIONS

For questions 1-20, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16-20**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

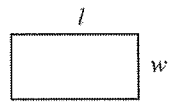
Notes:

1. The use of a calculator **is not permitted.**
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

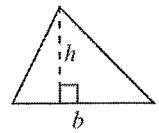


$A = \pi r^2$

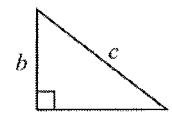
$C = 2\pi r$



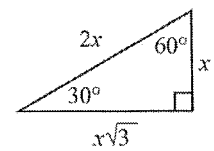
$A = lw$

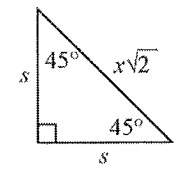


$A = \frac{1}{2}bh$

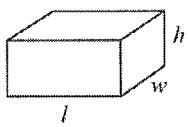


$c^2 = a^2 + b^2$

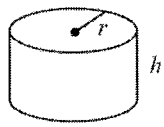




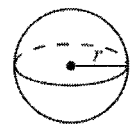
Special Right Triangles



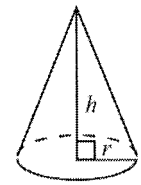
$V = lwh$



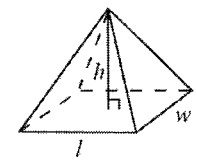
$V = \pi r^2 h$



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



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



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

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

1

Which of the following expressions is equivalent to 1 ?

A) $\frac{sin\frac{\pi}{6}}{cos\frac{\pi}{6}}$

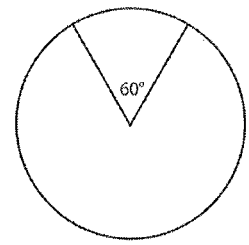
B) $\frac{cos\frac{\pi}{6}}{sin\frac{\pi}{3}}$

C) $\frac{cos\frac{\pi}{6}}{cos\frac{\pi}{3}}$

D) $sin\frac{\pi}{6} + cos\frac{\pi}{6}$

2

What is the arc length of the arc whose measure is 60° in a circle of radius 2 ? The formula for arc length is $s = r\angle C$, where r is the radius of the circle and θ is the measure of the central angle.



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

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

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

D) $\frac{\pi}{6}$

3

A computer factory uses a function g to relate the number of person-hours p to the number of computer boards c assembled. What must be true about the *domain* and *range*?

A) They are both integers.
B) Each value in the domain is inversely related to each corresponding value in the range.
C) Each value in the domain is greater than the corresponding value in the range.
D) They are both whole numbers.

4

Which of the following can the compound inequality given below be simplified into?

$(-2x - 3 \leq 5$ and $x + 2 \leq 1)$

A) $-4 \leq x \leq -1$

B) $-3 < x \leq -1$

C) $x \geq -4$

D) $x \leq -3$ or $x \geq -1$

5

$$3x^2 + 11x + 6$$

Which of the following is a factor of the above quadratic?

A) $x + 3$
B) $x + 2$
C) $x + 6$
D) $3x + 1$

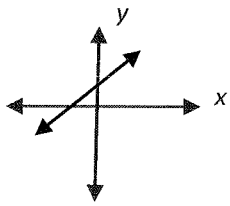
6

If the graph of the function $y = -3x^2 + 6x - 5$ opens downward, in what direction does the graph of the function $x = -3y^2 + 6y - 5$ open?

A) Upward
B) Downward
C) To the left
D) To the right

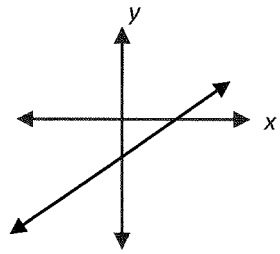
7

The graph of $ax + b$ is shown below.

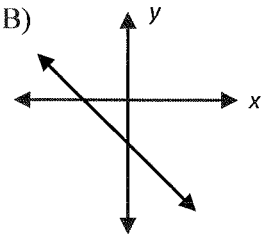


What is the graph of $y = -ax + b$?

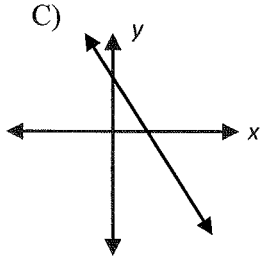
A)



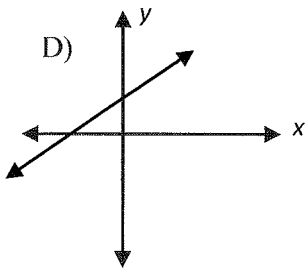
B)



C)



D)



Graphs are not drawn to scale.

8

Which of the following equations has an extraneous root?

A) $x^2 - 6x = 0$

B) $5x^2 + 17x - 12 = 0$

C) $(x^2 - 5) + (y^2 + 2) = 6$

D) $\sqrt{x + 4} = x - 2$

9

Which of the following expressions is equivalent to $\sqrt[6]{x^3}\ \sqrt[3]{x}\ \sqrt{81x}$?

A) $9x\ \sqrt[3]{x}$

B) $\sqrt[6]{81x^3}$

C) $9\ \sqrt[3]{x^2}$

D) $9x\ \sqrt[3]{3x^2}$

10

Divide $2x^4 - 5x^3y + 6x^2y^2 - 4xy^3 + y^4$ by $x^2 - xy + y^2$. What is the quotient?

A) $2x^2 - 3xy + y^2$

B) $2x^2 - 7xy + 15y^2$

C) $2x^2 - 7xy - 3y^2$

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

11

Let $8y = 4r + 1$ and $4x = 2r + 3$. What is x in terms of y ?

A) $x = 2y - 5$

B) $x = y - \frac{5}{8}$

C) $x = y + \frac{5}{8}$

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

12

Determined not to reveal too much of his financial situation, Jake stated that it can be modeled by the inequality $|2x - 300| > 500$. What was Jake implying about his financial situation?

A) He has less than $800.

B) He has more than $400.

C) It is somewhere between owing less than $100 and having less than $400.

D) He either owes more than $100 or has more than $400.

13

An electric company offers its customers a residential plan containing 4-tier pricing which can be the most cost effective plan. The table below displays how much the cost is in each tier corresponding with the number of KWh used. KWh is a unit of energy, equal to the energy used in one hour by one KW of power.

Avg. Cost Per KWh	Number of KWh
\$0.14	0 - 386
\$0.19	387 - 501
\$0.28	502 - 771
\$0.32	772 -

What is the formula that the company uses for calculating how many KWh are consumed by a customer having the 4-tier pricing and using between 502 and 771 KWh inclusive?

A) $f(x) = 0.14(386) + 0.19(115) + 0.28(x - 501)$

B) $f(x) = 0.14(x - 501) + 0.19(115) + 0.28(386)$

C) $f(x) = 0.19(501) + 0.28(x - 502)$

D) $f(x) = 0.14(386) + 0.19(501) + 0.28(x - 502)$

14

The vertex form of a parabola's equation is $y = (x - h)^2 + k$, where point (h,k) is the vertex of the parabola. What is the vertex form of the parabola represented by the standard form equation $y = x^2 - 2x + 8$?

A) $y = (x - 4)^2$
B) $y = (x - 1)^2 + 8$
C) $y = (x + 1)^2 + 11$
D) $y = (x - 1)^2 + 7$

15

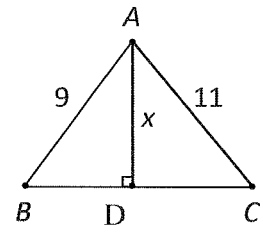


Figure is not drawn to scale.

If $AB = 9$, $AC = 11$, and $AD = x$, what is $Tan\ B$ in terms of x ?

A) $\frac{x}{9}$

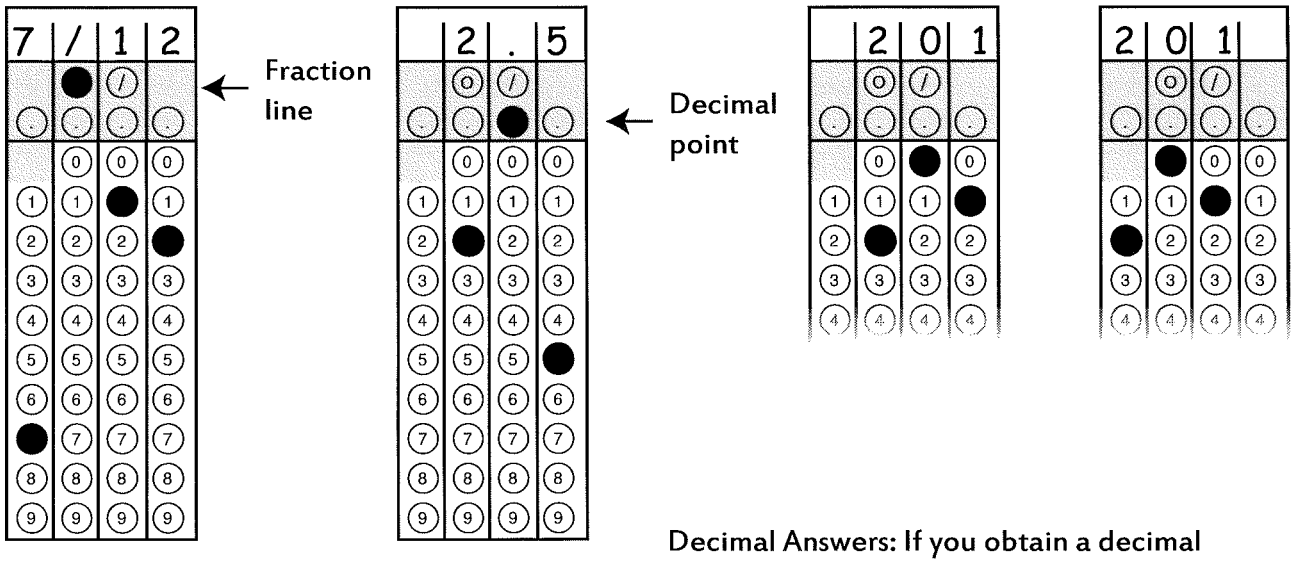
B) $\frac{\sqrt{81-x^2}}{9}$

C) $\frac{x}{\sqrt{81-x^2}}$

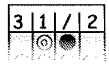
D) $\frac{\sqrt{81-2x^2}}{x}$

CONTINUE

Each of the remaining questions requires you to solve the problem and enter your answer by marking the circles in the special grid, as shown in the examples below. You may use any available space for scratch work.

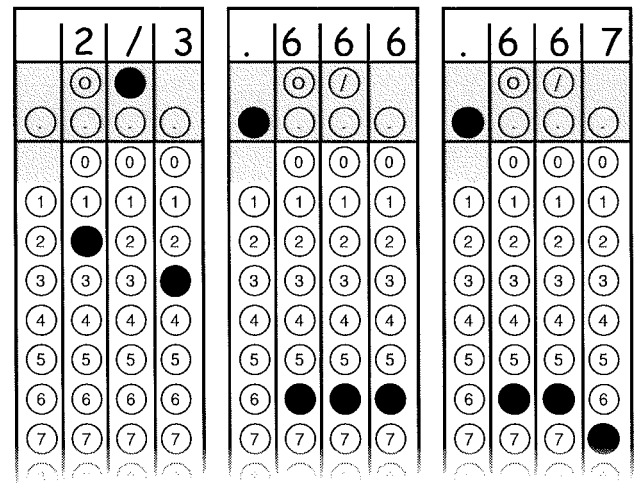


- Mark no more than one circle in any column.
- Because the answer sheet will be machine-scored, you will receive credit only if the circles are filled in correctly.
- Although not required it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- Mixed numbers such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2.

(If  is gridded, it will be interpreted as $\frac{31}{2}$ not $3\frac{1}{2}$.)

Decimal Answers: If you obtain a decimal answer with more digits than the grid can accomodate, it may be either rounded or truncated, but it must fill the entire grid. For example, if you obtain an answer such as 0.6666... you should record your result as .666 or .667. A less accurate value such as .66 or .67 will be scored as incorrect.

Acceptable ways to grid 2/3 are:



CONTINUE

16

$\frac{4}{3}x^2 - 3x + 2$ $\frac{2}{3}x^2 + \frac{1}{2}x - \frac{1}{2}$

The difference of the expressions above has the form $ax^2 + bx + c$. What is $|b|$?

17

What is c so that the system of equations has infinitely many solutions?

$2x - c - 15y = 2x - 23 + 10x$

$4x + 6y - 2 = 6$

18

Lauren's father is four times as old as Lauren. Five years ago, he was seven times as old. How old is Lauren's father now?

19

If $a(x + y) = 12$ and $2(x + y) = 24b$, then when solving for b in terms of a, what is the coefficient of a ?

20

Three points on a graph are $(-1,0)$, $(2,0)$, and $(3,2)$.

What is a in the equation of the quadratic function?

$$f(x) = a(x - b)(x - c)$$

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS SECTION ONLY. DO NOT TURN TO ANY OTHER SECTION IN THE TEST.

Math Test

55 MINUTES, 38 QUESTIONS

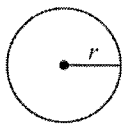
Turn to Section 4 of your answer sheet to answer the questions in this section.

4

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

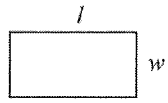
Notes:

1. The use of a calculator **is permitted.**
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

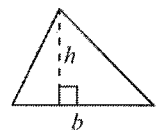


$A = \pi r^2$

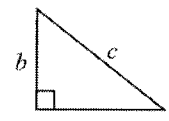
$C = 2\pi r$



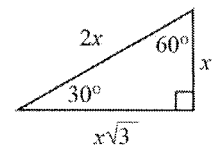
$A = lw$

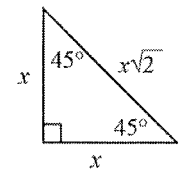


$A = \frac{1}{2}bh$

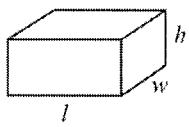


$c^2 = a^2 + b^2$

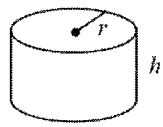




Special Right Triangles

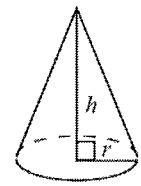


$V = lwh$

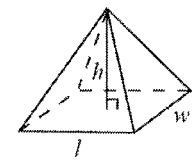


$V = \pi r^2 h$

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



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



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

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

1

Sam and Jorge began a business selling computers and put in $75,000 in capital. If Sam provided half as much capital as Jorge, how much capital did Sam put in, in thousands of dollars?

A) 15
B) 20
C) 25
D) 30

2

In a coordinate plane, if points *C(3, 7)*, *D(-1, 3)*, and *E(x, y)* lie on line *L*, which of the following could be the coordinates of point *E* ?

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

CONTINUE

3

The cost of bowling for one day at Bowl X equals the cost of renting a pair of shoes, \$3.50, plus the cost per game, \$2.00, times the number of games, g. Which function represents the cost of bowling at Bowl X ?

A) $C(g) = 5.50$
B) $C(g) = 3.50 + 2.00g$
C) $C(g) = 3.50g + 2.00$
D) $C(g) = 5.50g$

4

Chocolate	Size of bar (grams)	Amount of sugar (grams)
Chocolate A	43	23
Chocolate B	40.8	19
Chocolate C	25	14.3
Chocolate D	41.1	24

From the chart above, which bar has the highest amount of sugar per size?

A) Chocolate A
B) Chocolate B
C) Chocolate C
D) Chocolate D

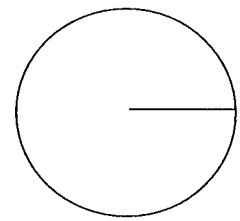
5

Thirty times which of the following equals $\frac{1}{30}$?

A) $\frac{1}{2\times3}$
B) $\frac{1}{2\times3\times5}$
C) $\frac{1}{2\times2\times3\times3\times5}$
D) $\frac{1}{2\times2\times3\times3\times5\times5}$

6

A chord inside of a circle is 1 inch from the center of the circle at its point closest to the center. If the circle has a 2-inch radius, what is the length of the chord?



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

7

A 39″ TV costs $74 less than five times the cost of a Blu-Ray player. If the TV and the Blu-Ray player together cost $400, how much more does the TV cost than the Blu-Ray player? Neglect taxes.

A) $179
B) $242
C) $262
D) $400

8

If 125% of m is equal to 80% of n and $n \neq 0$, what is the value of $\frac{m}{n}$?

A) $\frac{16}{25}$
B) $\frac{4}{5}$
C) $\frac{5}{4}$
D) $\frac{25}{16}$

9

Betty Cookie prepared cookies by placing chocolate bar pieces in the dough. She asserted that each one of her cookies had 2 ounces of chocolate plus or minus less than 0.1 oz. A tester collected the following data on the amount of chocolate each cookie contained in 1 batch of 12 cookies.

Ounces of Chocolate	1.0	1.8	1.9	2.0	2.1	2.2
Frequency	1	4	1	1	3	2

To make her assertion true, the best description of the average would be the:

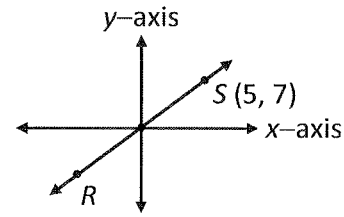
A) Mean
B) Median
C) Mode
D) Mean and Median

10

If $a^2 - 55 = b^2$ and $2a = 16$, which of the following could be a value for b ?

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

11



Note: Figure not drawn to scale

In the figure above, $\overleftrightarrow{RS}$ passes through the origin. If the x-coordinate of point R is -15, what is the y-coordinate of R ?

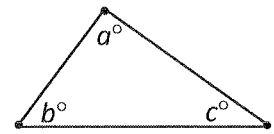
A) -25
B) -22
C) -21
D) -20

12

At a taxi company, an employee gets paid \$0.50/min. for driving people, has an average expense of \$0.05/min. for gas and insurance, and figures a flat income tax rate of \$200/wk. Which inequality below shows the number of hours that the employee needs to work per week, n, to get an income of at least \$1,000/wk.?

A) $60n \geq 66.67$
B) $n \geq 1.5$
C) $n \geq 1200/27$
D) $n \geq 1200/33$

13



Note: Figure not drawn to scale

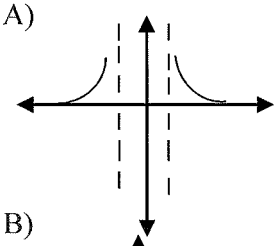
In the triangle above, $a + b = 70$ and $b + c = 150$. What is the value of b ?

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

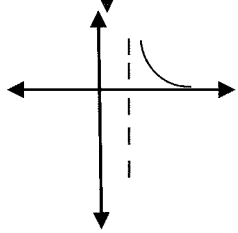
14

Which of the following is a correct graph of the equation $|x - 1| = \frac{1}{y}$?

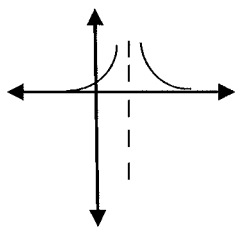
A)



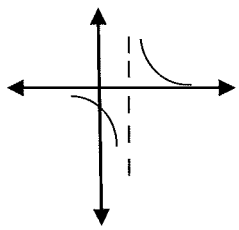
B)



C)



D)



Note: Figures not drawn to scale

15

	Brand X (mg)	Brand Y (mg)	Daily Tolerable Upper Intake Level (mg)
B_3	10	10	30
B_6	40	20	80
C	800	600	1800

Denise, a 40-year-old, wanted to intake the maximum daily tolerable amount of the water soluble vitamin B6 to get a lot of energy. She bought 2 brands of vitamins that contained vitamins B3, B6 and C, as well as other water soluble vitamins that had no intake limit. What is one feasible solution for the number of pills that Denise could take daily to get her maximum tolerable intake level of Vitamin B6 while not going over the tolerable upper intake level on vitamins B3 and C ?

A) 1 Brand X and 1 Brand Y
B) 2 Brand X and 1 Brand Y
C) 1 Brand X and 2 Brand Y
D) 2 Brand X and 0 Brand Y

16

When selecting a hat pattern to crochet, Diane will only use a pattern that requires at least 480 rows and no more than 520 rows. If r represents a number of rows that she will not crochet, an inequality that represents all possible values of r is:

A) $|r - 500| < 20$

B) $|r - 20| > 20$

C) $|r - 100| > 20$

D) $|r - 500| > 20$

Questions 17 and 18 refer to the following information.

According to scientists, a woman's average stride length (the heel of one foot when walking to the heel of the same foot) is 52" and a man's, 62".

17

How many times shorter is a woman's stride length than a man's?

A) 26/31
B) 24/31
C) 20/31
D) 15/31

18

Studies report that there are approximately 1,000 strides of an average male in a mile. Approximately how many strides would an average female take to reach 1 mile? Round to the nearest whole number.

A) 819
B) 1,048
C) 1,152
D) 1,192

19

If x is increased by 25% and y is decreased by 10%, the resulting numbers will be equal. What is the ratio of $3x$ to y?

A) $\frac{54}{25}$

B) $\frac{25}{6}$

C) $\frac{25}{54}$

D) $\frac{15}{2}$

20

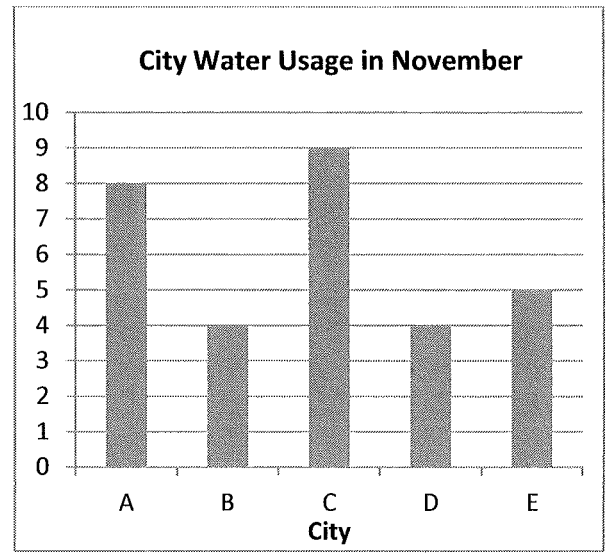
Solve the set of quadratic equations below. What is one possible solution of $x + y$?

$y = 2(x + 3)^2 - 2$
$y - 12 = 4(x - 5)^2$

A) 12
B) 25
C) 48
D) 50

21

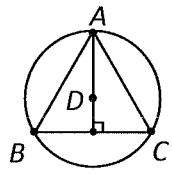
The bar graph below shows how much water five different cities used in November.



If the amount of water all five cities used in November is 30,000 gallons, what is an appropriate label for the vertical axis of the graph?

A) Number of gallons (thousands)
B) Number of gallons (hundreds)
C) Month
D) Cost of water used

22



In the figure above, equilateral triangle *ABC* is inscribed in circle *D*. If the altitude of triangle *ABC* is 15, what is the length of the circle's radius?

A) 12
B) 10
C) 8.7
D) 7.5

23

Tina paid $86 for a new outfit and didn't have to pay taxes. If the outfit was discounted at 20% off, and she had a store coupon for 30% off of her purchase price, what was the original price of her outfit?

A) $138.67
B) $149.42
C) $153.57
D) $614.29

24

$f(x) = 2x + 5$ and $g(x) = x^2 - c$.
What is c if
$g(2f(x)) = 16x^2 + 80x + 97$?

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

25

The energy of a particular packet of energy E is equal to Planck's constant h times the frequency of the photon under study ν. The formula is written as $E = h\nu$, where $h = 6.6260755 \times 10^{-34}$ J * s.

Also, the frequency of the photon under study ν is equal to the speed of light in a vacuum c divided by the wavelength λ. The formula is written as $\nu = c / \lambda$, where $c = 3.0 \cdot 10^8$ m/s.

How many Joules of energy E are contained in one photon with a wavelength λ equal to 495 nm (1 nm = 10^{-9} m) ?

A) 4.02×10^{-19} J
B) 9.84×10^{-19} J
C) 1.61×10^{-20} J
D) 0.984 J

CONTINUE

26

Marty wants to retire when he is 65, and currently he is 35. How much money will he have to put in the bank at 8% interest compounded quarterly to get 300,000 in 30 years?

A) 27,867.67
B) 35,414.67
C) 38,420.20
D) 40,888.92

27

$$y = \frac{1}{2}(x-3)^2 + 2$$
$$y = ax - \frac{3}{2}$$

Which one of the following values of a would yield two rational solutions for the system of equations above?

A) - 2
B) - 4
C) - 6
D) - 8

28

In a set of 24 cubes, each cube has pictures on two sides and letters on the remaining sides. How many sides of the entire set have letters?

A) 24
B) 48
C) 72
D) 96

29

A group of 96 college students take 23 cars on a field trip. If each car will be occupied by 4 or 5 students, what is the number of cars occupied by 5 students?

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

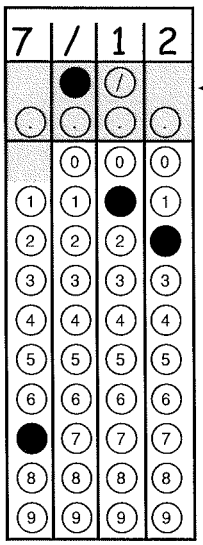
30

What is the maximum value of y if a point (x, y) is a possible solution of the system of inequalities?

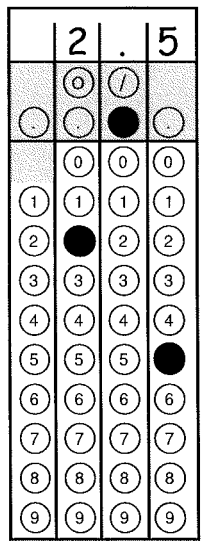
$y \leq -4x + 16$
$y \leq 3x + 9$

A) 10
B) 13
C) 12
D) 19

Each of the remaining questions requires you to solve the problem and enter your answer by marking the circles in the special grid, as shown in the examples below. You may use any available space for scratch work.

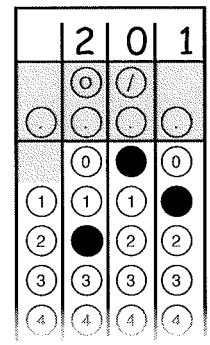


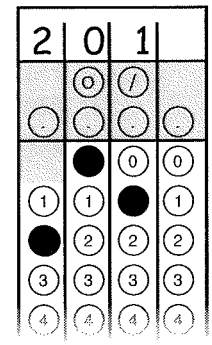
Fraction line



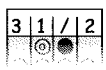
Decimal point

Answer: 201
Either position is correct



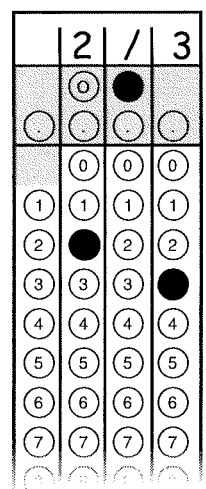


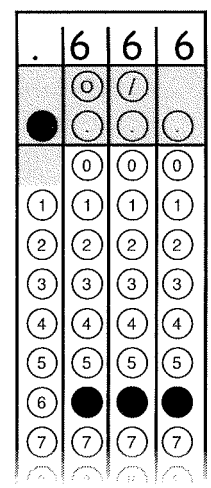
- Mark no more than one circle in any column.
- Because the answer sheet will be machine-scored, you will receive credit only if the circles are filled in correctly.
- Although not required it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- Mixed numbers such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2.

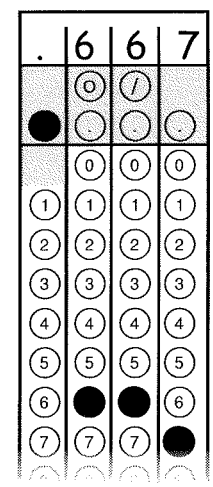
(If  is gridded, it will be interpreted as $\frac{31}{2}$ not $3\frac{1}{2}$.)

Decimal Answers: If you obtain a decimal answer with more digits than the grid can accomodate, it may be either rounded or truncated, but it must fill the entire grid. For example, if you obtain an answer such as 0.6666... you should record your result as .666 or .667. A less accurate value such as .66 or .67 will be scored as incorrect.

Acceptable ways to grid 2/3 are:





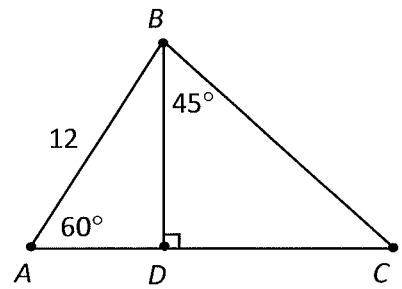


CONTINUE

31

Three rubber stoppers of various sizes weigh a total of 10 oz. and are to be mailed by the First Class package service. The cost to mail is \$2.32 for up to 3 oz. and \$0.18/ oz. after that, up to 13 oz. What is the cheapest cost in dollars and cents to mail the stoppers?

32



Note: Figure not drawn to scale

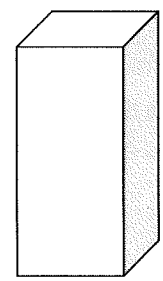
In the figure above, the length of AB is 12. What is the length of BC ?

33

A pig squeals at approximately 110 dB and the average conversation level is 60 dB. Intensity is a measure of loudness and is defined as $10^{\text{number of dB} / 10}$. Approximately how many thousands of times more intense is the squeal of a pig than the loudness of normal conversation?

34

The weight of salt water is 8.6 lbs. / gallon, and 231 in.^3 is equivalent to one gallon. Maya bought a new aquarium with dimensions 2 ft. x 1.5 ft. x 5 ft. and filled it 4/5 full of salt water for her new fish. She needs a stand to support the weight of the water, but first she needs to determine the water's weight. How much did the salt water in the tank weigh (in lbs.) to the nearest whole number?



35

$4cx + 2y = \frac{2}{3}y - 1$

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

If $x = -\frac{1}{2}$, then what is $|c|$?

Questions 36 and 37 refer to the following information.

The ratio of the screen dimensions of a standard-screen TV is 4:3, while that of a wide-screen TV is 16:9. The TV size is the length in inches of the diagonal.

36

What is the longest dimension of a 37" wide-screen TV in tenths of an inch?

37

If Mary wants to display the 16:9 ratio on a 32" standard-screen TV and maximize and center the viewing size, how much black space in square inches (to the nearest tenth) would be shown at the top? Note that a black screen will be shown where there is no picture.

38

What is the value of $x + 2$ if $\frac{5(x+2)}{3} = 10$?

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS SECTION ONLY. DO NOT TURN TO ANY OTHER SECTION IN THE TEST.

Section 1, Reading	Section 2, Writing & Language	Section 3, Math, No Calculator	Section 4, Math, Calculator
1 A	1 B	1 B	1 C
2 A	2 C	2 B	2 D
3 C	3 C	3 D	3 B
4 B	4 B	4 A	4 D
5 D	5 C	5 A	5 D
6 A	6 D	6 C	6 D
7 D	7 B	7 C	7 B
8 C	8 D	8 D	8 A
9 C	9 C	9 A	9 B
10 C	10 A	10 A	10 D
11 D	11 A	11 C	11 C
12 A	12 B	12 D	12 C
13 C	13 B	13 A	13 A
14 B	14 B	14 D	14 C
15 B	15 D	15 C	15 D
16 A	16 D	16 3.5	16 D
17 B	17 D	17 3	17 A
18 D	18 D	18 40	18 D
19 D	19 A	19 1	19 A
20 C	20 D	20 0.5	20 D
21 B	21 B		21 A
22 C	22 C		22 B
23 B	23 C		23 C
24 D	24 B		24 C
25 C	25 C		25 A
26 D	26 D		26 A
27 D	27 C		27 D
28 A	28 B		28 D
29 D	29 B		29 D
30 C	30 D		30 C
31 D	31 B		31 3.58
32 B	32 C		32 14.7
33 C	33 A		33 100
34 B	34 C		34 772
35 B	35 B		35 2
36 C	36 C		36 32.3
37 D	37 B		37 61.4
38 C	38 B		38 6
39 D	39 B		
40 A	40 C		
41 A	41 B		
42 C	42 A		
43 D	43 A		
44 B	44 D		
45 C			
46 D			
47 C			
48 C			
49 B			
50 D			
51 D			
52 B			

Calculate your estimated score by using the conversion chart on page 319.

Section 1 Raw Score (Total Correct)	Section 2 Raw Score (Total Correct)	Section 3 Raw Score (Total Correct)	Section 4 Raw Score (Total Correct)
_____	_____	_____	_____

PRACTICE TEST 4

Test Reminders

1. A #2 pencil is required.
2. Follow the time restrictions for each section.
3. You are allowed to write on the test.
4. Circle your answers to ensure accuracy when filling in the answer sheet, provided on page 317.
5. Calculate your estimated score by using the conversion chart on page 319.

Math Test

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

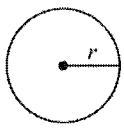
3

25 MINUTES, 20 QUESTIONS

For questions 1-20, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16-20**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

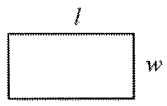
Notes:

1. The use of a calculator **is not permitted.**
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

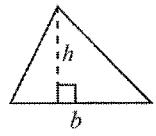


$A = \pi r^2$

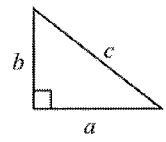
$C = 2\pi r$



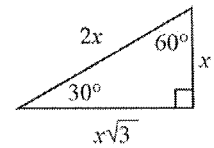
$A = lw$

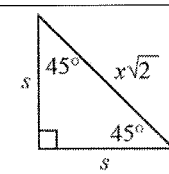


$A = \frac{1}{2}bh$

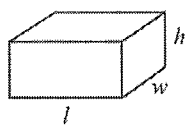


$c^2 = a^2 + b^2$

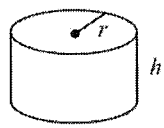




Special Right Triangles

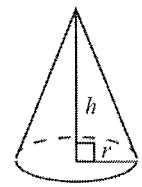


$V = lwh$

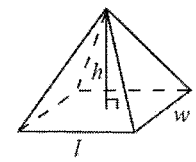


$V = \pi r^2 h$

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



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



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

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

1

Let $g(x) = -f(x)$ and $h(x) = f(-x)$. For which of the following functions is $g(x) = h(x)$?

A) $f(x) = x^2$
B) $f(x) = x$
C) $f(x) = |x|$
D) $f(x) = \sqrt[3]{x^4}$

2

The range of the function $y = 6x - 8$ is all real numbers from 1 to 10. What is the domain of the function?

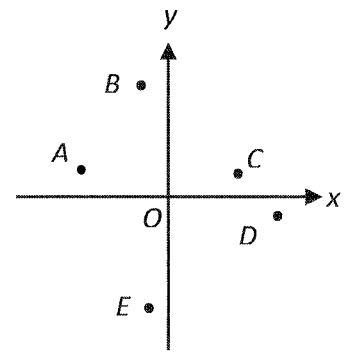
A) all real numbers from 1.5 to 3.
B) all real numbers from -2 to 52.
C) all integers from -2 to 52.
D) all real numbers.

3

If the rational expression $\frac{-3x^2}{-x+2}$ is rewritten in the equivalent form $-\frac{12}{-x+2} + A$, what must expression A be in terms of x ?

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

4



In the figure above, if four lines are drawn by connecting the labeled points with the origin, which of the lines would have the greatest slope?

A) AO
B) BO
C) CO
D) EO

5

$$x + 4y = 4$$
$$xy + y^2 = -20$$

In the system shown above, what is a possible value for y ?

A) $\pm\frac{10}{3}$

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

C) $-\frac{10}{3}$

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

6

When solving the two equations below, which of the following numbers substituted for w results in no solution?

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

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

7

Which of the following is another form of $f(x)$ given that $f(x) = 3x^2 - 4x + 2$?

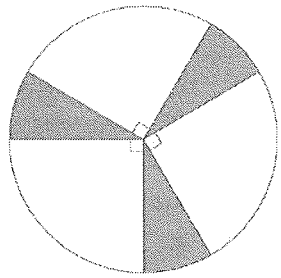
A) $f(x) = 3x^2 - 4x + 4 - 4 + 2x$

B) $f(x) = 3(x - \frac{2}{3})^2 + \frac{2}{3}$

C) $f(x) = 3(x - \frac{4}{3})^2 + \frac{2}{3}$

D) $f(x) = 3(x - \frac{2}{3})^2 + 2$

8



In the circle above, three right angles have vertices at the center of the circle. If the radius of the circle is 8, what is the combined area of the shaded regions?

A) 8π
B) 9π
C) 12π
D) 16π

9

$$x^2 + y^2 = 40$$
$$y + 3 = 3(x + 1)$$

If the ordered pair (x, y) is a solution to the system of equations above, what is the value of $x^2 + x$?

A) $2, 6$
B) $-2, 4$
C) $-2, 2$
D) $0, 0$

10

What kind of roots are in the function $f(x) = (x^2 + 2x - 8)(x^2 + 4)$?

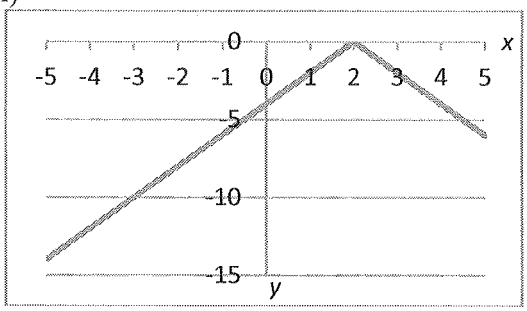
A) 4 imaginary
B) 4 real
C) 2 real and 2 imaginary
D) 3 real and 1 imaginary

CONTINUE

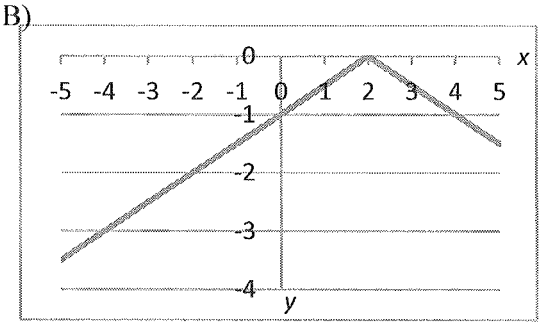
11

Given $0 < a < 1 < b$ and $y = -a|x - b|$, which of the following could be a graph of y ?

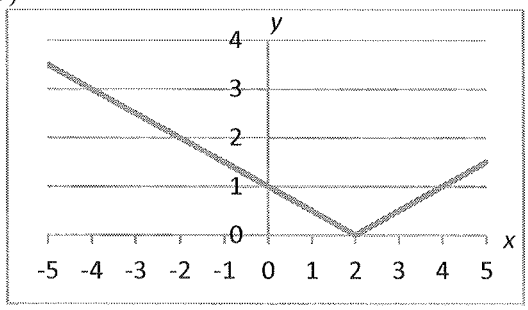
A)



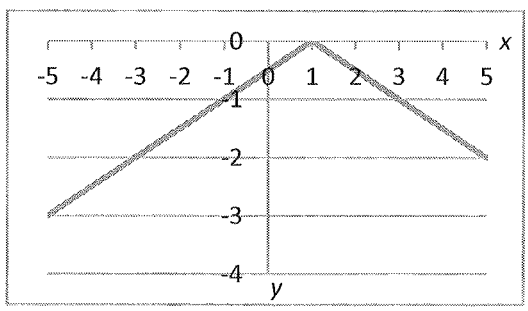
B)



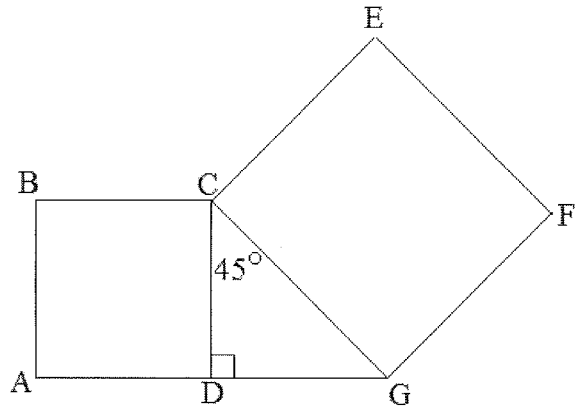
C)



D)



12



In the figure above, $ABCD$ and $CEFG$ are squares. If the area of $CEFG$ is 36, what is the area of $ABCD$?

A) 6
B) $6\sqrt{2}$
C) 9
D) 18

13

If a function has a domain of all real numbers and a range of $y \geq 3$, which of the following is a possible function describing y ?

A) $g(x) = 7x^2 + 3$
B) $g(x) = -2|x + 4| + 3$
C) $g(x) = \frac{2}{3}|x - 2| - 3$
D) $g(x) = -5x + 3$

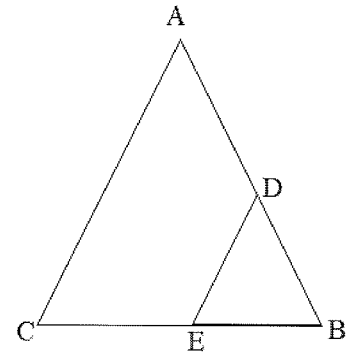
CONTINUE

14

If a varies directly with b and if $a = 4$ when $b = 5$, what is the value of a when $b = 10$? If one value increases, and the other increases linearly, then the two values have direct variation.

A) 4
B) 5
C) 6
D) 8

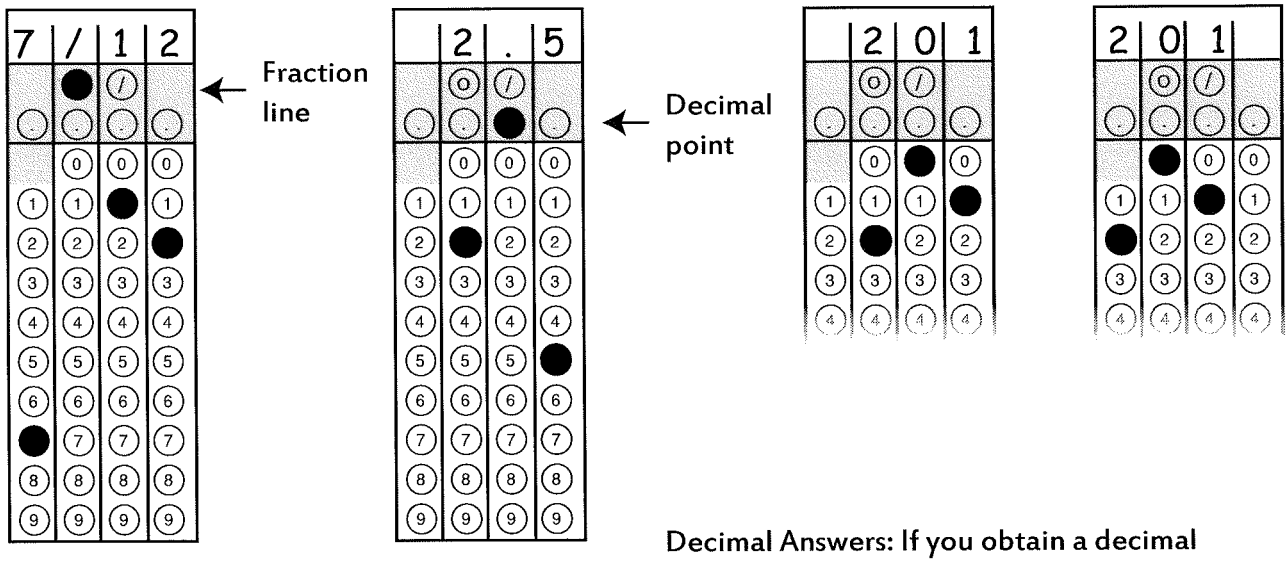
15



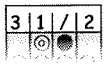
In the figure shown, ΔABC is an equilateral triangle. Also, $AC = 3$ and $DB = BE = 1$. Find the perimeter of quadrilateral $ACED$.

A) 4
B) 5
C) 6
D) 8

Each of the remaining questions requires you to solve the problem and enter your answer by marking the circles in the special grid, as shown in the examples below. You may use any available space for scratch work.

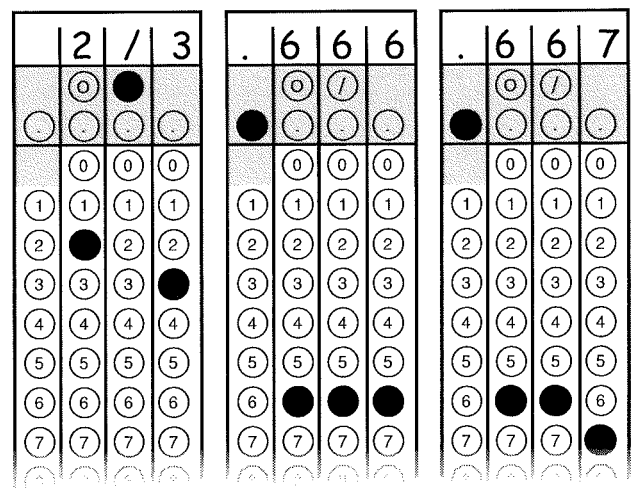


- Mark no more than one circle in any column.
- Because the answer sheet will be machine-scored, you will receive credit only if the circles are filled in correctly.
- Although not required it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- Mixed numbers such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2.

(If  is gridded, it will be interpreted as $\frac{31}{2}$ not $3\frac{1}{2}$.)

Decimal Answers: If you obtain a decimal answer with more digits than the grid can accomodate, it may be either rounded or truncated, but it must fill the entire grid. For example, if you obtain an answer such as 0.6666... you should record your result as .666 or .667. A less accurate value such as .66 or .67 will be scored as incorrect.

Acceptable ways to grid 2/3 are:



CONTINUE

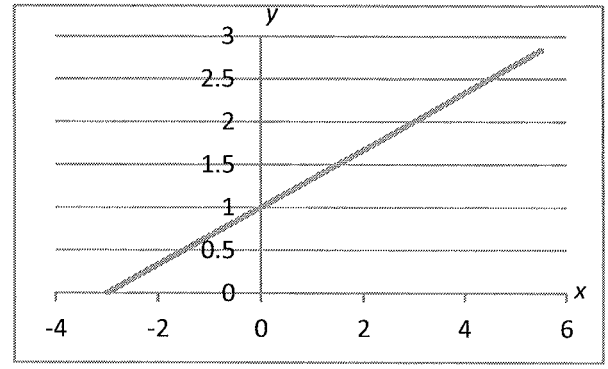
16

What is the simplified value of $\left(-\frac{1}{8}\right)^{-\frac{2}{3}}$?

17

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

18



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

Number of Puppies					
Month	January	February	March	April	May
Number of Puppies	26	23	20	17	14

Questions 19 and 20 refer to the following information and the above chart.

In January, Mr. Finch opened up his mobile petting zoo with only puppies. However, Mr. Finch did not carefully consider this plan because puppies eventually become adult dogs. As a result, each month a certain number of puppies becomes too mature to be part of the petting zoo.

19

What is the magnitude of the slope of the graph modeling the number of puppies in his business?

20

Assuming Mr. Finch continues to steadily lose puppies at the rate above, which month will be his last in business? Use standard month conversion (1 = January, 2 = February, 3 = March, etc.).

STOP

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS SECTION ONLY. DO NOT TURN TO ANY OTHER SECTION IN THE TEST.

Math Test

55 MINUTES, 38 QUESTIONS

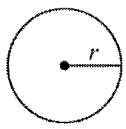
Turn to Section 4 of your answer sheet to answer the questions in this section.

4

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38,** solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

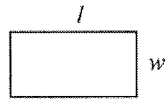
Notes:

1. The use of a calculator **is permitted.**
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

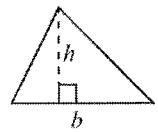


$A = \pi r^2$

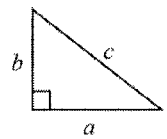
$C = 2\pi r$



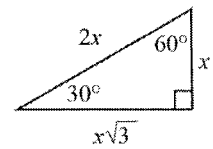
$A = lw$

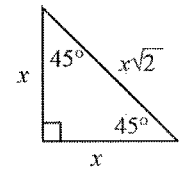


$A = \frac{1}{2}bh$

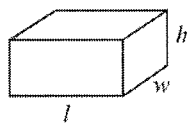


$c^2 = a^2 + b^2$

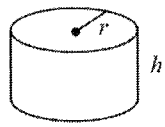




Special Right Triangles

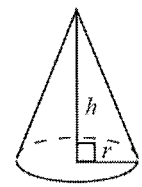


$V = lwh$

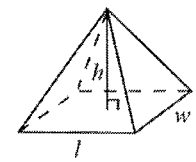


$V = \pi r^2 h$

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



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



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

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

1

The number of employees and the number of toys made are shown in the graph below.

Employees	Toys Manufactured
10	20
20	35
30	45
40	50
50	50

Which of the following pieces of information can be drawn from the graph?

A) As the number of employees doubled, the number of toys manufactured also doubled.
B) Each employee made 2 toys.
C) After a certain point, an increase in employees did not result in an increase in toy production.
D) Extra employees decreased the number of toys made.

2

Hydrocarbons		
Fraction	Typical number of carbon atoms per molecule	Approximate boiling range (°C)
Natural Gas	1-4	<20
Gasoline	5-12	40-200
Kerosene	12-16	200-300
Fuel Oil	15-18	250-350
Lubricating Oil	16-24	300-400

Based on the data above, a fraction containing a mixture of hydrocarbons ranging in size from 8 to 14 carbon atoms per molecule would most likely have a boiling range:

A) below 20°C.
B) between 20°C and 100°C.
C) between 100°C and 250°C.
D) above 250°C.

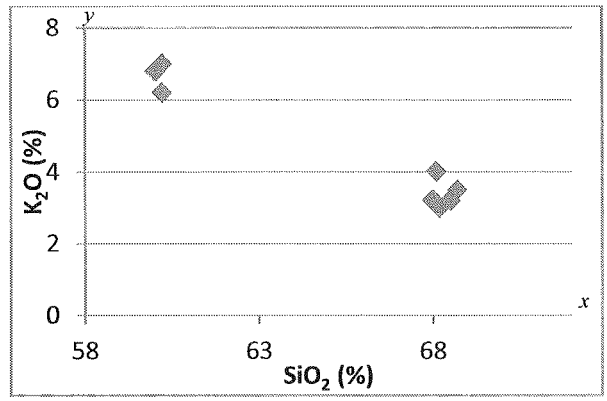
3

The equation $6x - 5y = 14$ is written in standard form. Which point lies on the graph of this equation?

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

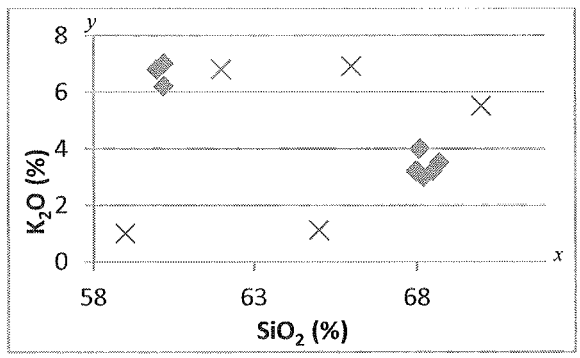
4

To determine whether one or more lava sources feed volcanic vents in the study area, scientists plotted the SiO_2 content of ash samples from 8 of the volcanoes versus the respective K_2O content of those samples. The SiO_2 and K_2O contents of the ash derived from a given lava source will fall within a narrow range of values. The 8 ash samples are shown in the figure below.

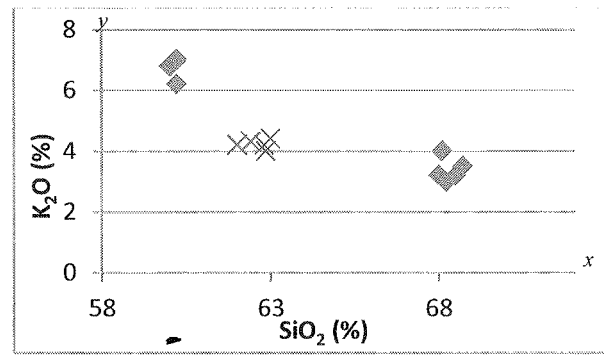


If ash samples from volcanoes fed by a previously undiscovered magma source in the study area were analyzed, and their SiO_2 and K_2O contents were also plotted on Figure 2, which of the following figures would most likely result? The new ash sample contents are represented by the symbol: x

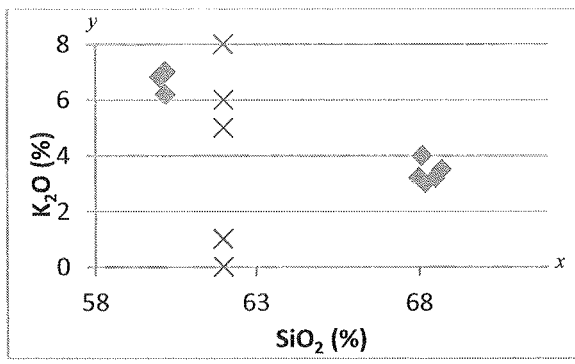
A)



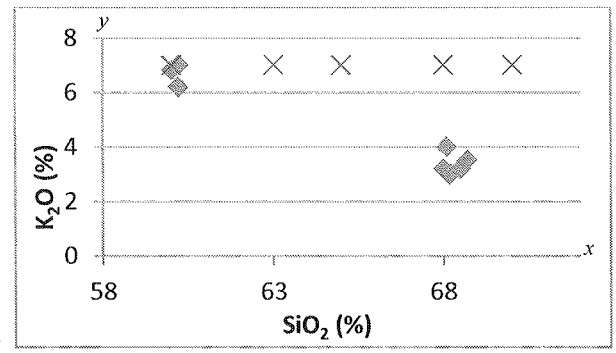
B)



C)



D)



Questions 5 and 6 refer to the following information.

A survey asked male and female students whether they prefer Sign Language class or French class. The table shows the results of the survey.

		Class		
		Sign Language	French	Total
Gender	Female	33	19	52
	Male	21	22	43
	Total	54	41	95

5

What is the probability that a randomly selected student is male and prefers French class?

A) $\frac{19}{52}$

B) $\frac{22}{43}$

C) $\frac{41}{95}$

D) $\frac{22}{95}$

6

What is the probability that a randomly selected female student prefers sign language?

A) $\frac{33}{52}$

B) $\frac{21}{43}$

C) $\frac{33}{95}$

D) $\frac{54}{95}$

7

What is $(-10 + 3i) - (-2 - 5i)$ if $i^2 = -1$?

A) $-12 - 2i$

B) $-8 + 8i$

C) $5 + 44i$

D) $35 + 44i$

8

$L = (2,3)$ $H = (3,0)$

What is the slope of the linear equation connecting points L and H ?

A) -3

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

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

D) $-\frac{1}{3}$

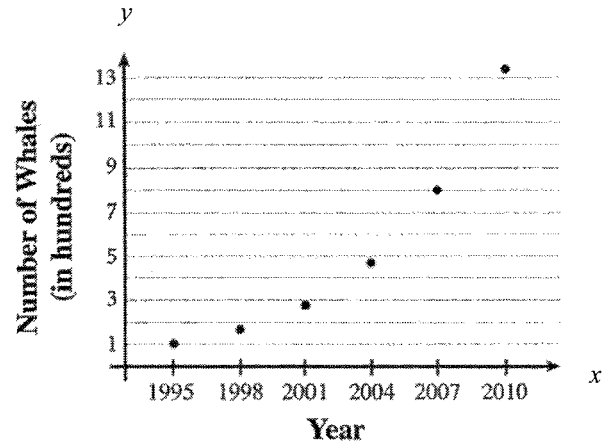
9

What is the x-intercept of the following linear equation?

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

A) -3/11
B) 3/4
C) 5/4
D) 8/11

10



The hump back whale is a mellow giant found in the Pacific Ocean. A marine biologist surveyed the hump back population in Long Beach every three years between 1995 and 2010. The figure above shows his result. Which of the following equation types best describes the situation?

A) Linear
B) Quadratic
C) Exponential
D) Radical

Questions 11 and 12 refer to the following information.

A man started jogging in order to get in shape before attending a friend's wedding. Each day he would jog a certain distance, and each week that distance would increase by . 5 miles. The wedding will occur at the end of his fifth week of jogging.

11

If this man started jogging 2 miles a day in his first week, how many miles will he be jogging in a day on the week of the wedding?

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

12

If this man burns 100 calories every mile, how many calories will he burn in the first week of training due to jogging?

A) 1,400
B) 1,200
C) 1,000
D) 800

13

An accountant charges a one-time evaluation fee to estimate a potential job. If he accepts the job, he charges an hourly rate plus the cost of any additional resources to complete the task. The accountant also charges a city tax on both resources used and his hourly rate. If the total cost of completing a job that takes h hours is given by the function

$C(h) = (1.0675)36h + (1.0675)155 + 200$

then the term$(1.0675)155$ represents:

A) the hourly rate with tax.
B) the cost of hourly rate, without tax.
C) the evaluation fee.
D) the cost of the resources, including tax.

14

Given that the equation for a circle is $(x-a)^2 + (y-b)^2 = r^2$, which of the following points lie on the circle centered at the origin and containing the point $(-2, 0)$?

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

15

A flock of chickens is able to lay 2.25 cartons of eggs per day. At the diner that purchases the eggs, it takes 1 carton of eggs to cook 4 omelets and it also takes 2 cartons of eggs to produce 5 tins of quiche. If the diner served 56 omelets and 10 tins of quiche, how many days did it take for the flock to lay the eggs?

A) 18
B) 8
C) 14
D) 16

16

Which of the rational expressions *cannot* be simplified?

A) $\frac{2x^2+5x-3}{x^2-2x-15}$

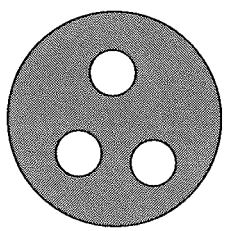
B) $\frac{2x^3+2x^2-24x}{x^2-36x}$

C) $\frac{x^3-10x^2-24x}{x^2-3x-10}$

D) $\frac{x^3-8}{x^2+2x-4}$

17

In the figure, the radius of the large circle is R and the radius of each smaller circle is r. Which formula may be used to find the area (A) of the shaded portion?



A) $A = \pi R^2 - \pi r^2$
B) $A = \pi R^2 - 3\pi r^2$
C) $A = \pi R - \pi r$
D) $A = 3\pi R^2 - \pi r$

Questions 18 and 19 refer to the following information.

The function $P(k,t) = 18e^{kt}$ models the population (in millions) of a country t years after 2015. A recent change in the economy has made the k-value, or rate of change in population, 0.231.

18

Which of the following functions models the population of the country after this change?

A) $P(t) = 8e^{0.231t}$
B) $P(t) = 18e^{0.231}$
C) $P(t) = 18e^{-0.231t}$
D) $P(t) = 18e^{0.231t}$

19

Assuming that the population grows at the steady rate $k = .231$ from 2016 to 2026, estimate the population of the country in 2026. Round your answer to the nearest million.

A) 181 million
B) 362 million
C) 3,653 million
D) 396,476 million

20

If $f(x) = 5x - 3$ and $f(t) = 7$, then t must equal:

A) 0
B) 1
C) 2
D) 32

21

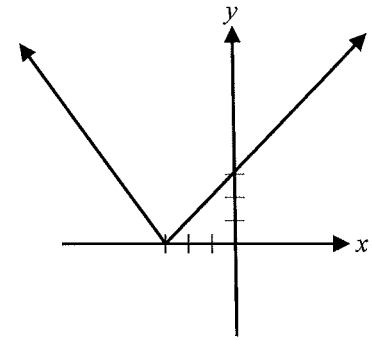
A home builder builds the exact same model of a home in two different cities in two different states. The table shows the value of each house, v_1 and v_2, for t years after 2000.

Time (years), *t*	2	4	6	8	10
Value, V1 (thousands of dollars)	360	367	373	381	387
Value, V2 (thousands of dollars)	310	350	400	461	520

What types of functions will best model each set of data?

A) A linear model for v_1 and an exponential model for v_2.
B) A linear model for v_1 and a linear model for v_2.
C) An exponential model for v_1 and a linear model for v_2.
D) An exponential model for v_1 and an exponential model for v_2.

22



If $f(x) = x + 3$, then the equation of the graph in the figure above is:

A) $y = f(x)$
B) $y = |f(x)|$
C) $y = f(|x|)$
D) $y = -|f(x)|$

23

Thelma and Julio are driving away from their home town at a rate of 60 miles an hour. They drive for 5 hours until they reach the Grand Canyon and then turn around and drive home at 50 miles an hour. How much longer did they have to spend driving back than driving there?

A) 30 minutes
B) 1 hour
C) 1 hour 30 minutes
D) 1 hour 45 minutes

24

To make strong coffee, 3 scoops of coffee beans make 15 cups. To make weak coffee, the amount of beans used should be $\frac{5}{8}$ the amount used for strong coffee. About how many scoops should be used to make 30 cups of medium coffee?

A) 2
B) 3
C) 5
D) 6

25

$$y = x^2 + 2x - 8$$

$$y = 5x + 2$$

Which *best* describes the solutions of the system of equations above?

A) Their graphs intersect at one point, $(-2, -8)$. There is one solution.
B) Their graphs intersect at two point, $(-2, -8)$and $(5, 27)$. There are two solutions.
C) Their graphs do not intersect. There is no solution.
D) The graph of $y = x^2 + 2x - 8$ has two x-intercepts. There are two solutions.

26

Simplify the following rational expression.

$$\frac{5}{3x} - \frac{3}{4x}$$

A) $-\frac{2}{x}$
B) $\frac{2}{3x}$
C) $\frac{2}{x}$
D) $\frac{11}{12x}$

CONTINUE

Questions 27, 28, and 29 refer to the following information.

Your local sports team decides to have a dunk tank at the Fall Festival to raise money for team competitions. There is no fee for the water, but the rental fee for the dunk tank is $105. The table shows the profits p (in dollars) when t tickets are sold for the dunk tank.

Tickets	30	70	110	150	190
Profit ($)	-30	70	170	270	370

27

In the table above what is the cost per ticket?

A) $1.50
B) $1.75
C) $2.50
D) $3.25

28

The team expects 150 tickets to be sold and finds another dunk tank that rents for only $55. How much should the sports team charge per ticket to still make the same profit?

A) $2.17
B) $2.39
C) $2.53
D) $2.89

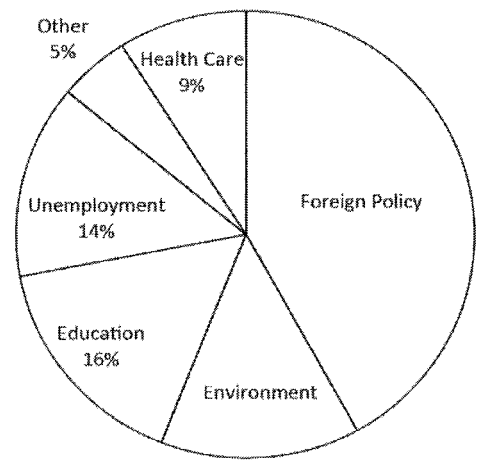
29

The sports team decides to charge $2.50 per ticket and use a dunk tank that costs $55. How much money will the team raise if 130 tickets are sold?

A) $220.00
B) $245.00
C) $255.50
D) $270.00

30

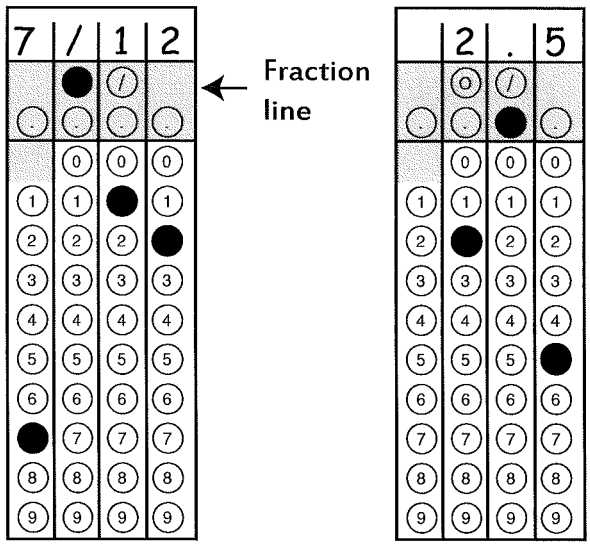
National Government Concerns



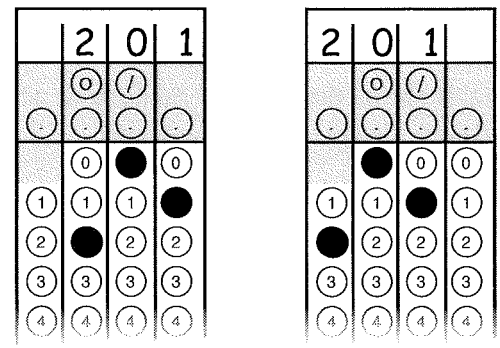
A senior surveyed 200 students in the humanities classes at her school to see what they thought should be the most important concern of a national government. If the ratio of students who answered "Foreign Policy" to those who answered "Environment" was 6:2, how many students answered "Environment"?

A) 7
B) 14
C) 21
D) 28

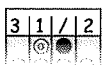
Each of the remaining questions requires you to solve the problem and enter your answer by marking the circles in the special grid, as shown in the examples below. You may use any available space for scratch work.



Answer: 201
Either position is correct

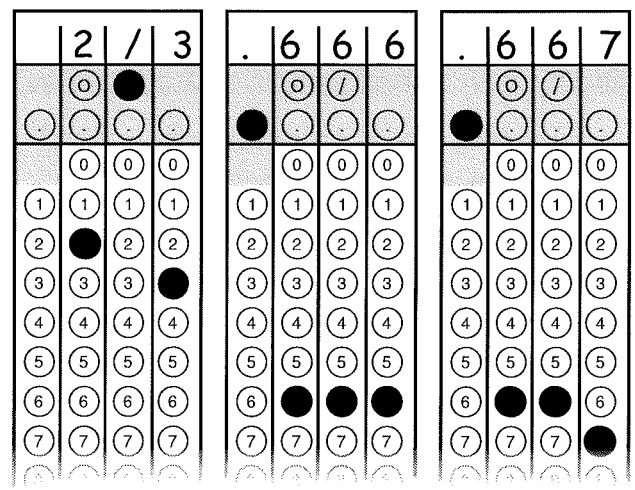


- Mark no more than one circle in any column.
- Because the answer sheet will be machine-scored, you will receive credit only if the circles are filled in correctly.
- Although not required it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- Mixed numbers such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2.

(If  is gridded, it will be interpreted as $\frac{31}{2}$ not $3\frac{1}{2}$.)

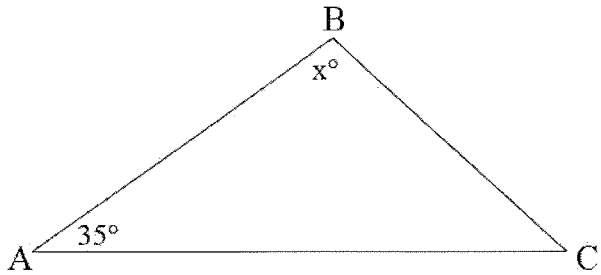
Decimal Answers: If you obtain a decimal answer with more digits than the grid can accomodate, it may be either rounded or truncated, but it must fill the entire grid. For example, if you obtain an answer such as 0.6666... you should record your result as .666 or .667. A less accurate value such as .66 or .67 will be scored as incorrect.

Acceptable ways to grid 2/3 are:



CONTINUE

31



In ΔABC above, if $AB = BC$, then $x =$

32

If $\frac{5}{b+8} = \frac{3}{b+4}$, then $b =$

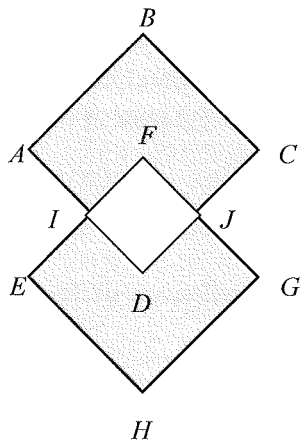
33

A survey was conducted among a random group of adults in San Francisco. The following list is the ages of the adults who were surveyed:

26, 58, 63, 53, 23, 33, 48, 45, 46, 35, 41

What is the median age of the adults who were surveyed?

34



In the figure above, square $ABCD$ and square $EFGH$ overlap to form square $IFJD$. If $AD = 4$ and if $EH = 4$ and if I is the midpoint of AD and EF, what is the area of the shaded region?

35

What is the slope of the following linear equation?

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

36

$$6x^2 - 7x + 2 = 0$$

Find one value of x that satisfies the equation above.

CONTINUE

Questions 37 and 38 refer to the following information.

An international cruise company offers its guests traveler credit cards when they are aboard. When a customer makes a purchase using his traveler card in a currency other than dollars, the bank converts the purchase price at the daily foreign exchange rate and then charges a 3.5% fee on the converted cost. Mr. Jabar is on a cruise off the coast of Peru. He used his traveler card for a purchase that cost 950 céntimos (Peruvian currency). The bank posted a charge of $14.23 to his account that included the 3.5% fee.

37

What foreign exchange rate, in Peruvian céntimos per one U.S. dollar, did the bank use for Mr. Jabar charge? Round your answer to the nearest tenth of a céntimo.

38

A bank in Peru sells a prepaid credit card worth 1,800 céntimos. Mr. Jabar can buy the prepaid card using dollars at the daily exchange rate with no fee, but he will lose any money left unspent on the prepaid card. What is the least amount of the 1,800 céntimos on the prepaid card Mr. Jabar must spend for the prepaid card to be cheaper than charging the same purchases on the traveler card? Round your answer to the nearest whole number of céntimo.

Section 1, Reading	Section 2, Writing & Language	Section 3, Math, No Calculator	Section 4, Math, Calculator
1 B	1 B	1 B	1 C
2 D	2 C	2 A	2 C
3 A	3 D	3 A	3 B
4 B	4 B	4 D	4 B
5 A	5 D	5 B	5 D
6 C	6 B	6 D	6 A
7 C	7 A	7 B	7 B
8 D	8 C	8 D	8 A
9 D	9 A	9 A	9 B
10 A	10 C	10 C	10 C
11 A	11 C	11 B	11 B
12 C	12 B	12 D	12 A
13 C	13 D	13 A	13 D
14 C	14 C	14 D	14 A
15 B	15 C	15 D	15 B
16 A	16 A	16 4	16 D
17 B	17 B	17 1 or 2/3 .666 or .667	17 B
18 D	18 B	18 1/3	18 D
19 D	19 D	19 3	19 A
20 A	20 A	20 9	20 C
21 D	21 B		21 A
22 A	22 A		22 B
23 B	23 B		23 B
24 B	24 D		24 C
25 A	25 A		25 B
26 B	26 C		26 D
27 B	27 C		27 C
28 D	28 C		28 A
29 C	29 B		29 D
30 A	30 C		30 D
31 C	31 C		31 110
32 A	32 A		32 2
33 B	33 A		33 45
34 C	34 B		34 24
35 A	35 D		35 1
36 C	36 C		36 2/3 or 1/2 .666 or .667 or .5
37 B	37 B		37 69.1
38 B	38 A		38 1739
39 B	39 C		
40 C	40 B		
41 D	41 D		
42 B	42 C		
43 A	43 C		
44 B	44 D		
45 B			
46 D			
47 B			
48 D			
49 C			
50 D			
51 D			
52 A			

Calculate your estimated score by using the conversion chart on page 319.

Section 1 Raw Score (Total Correct)	Section 2 Raw Score (Total Correct)	Section 3 Raw Score (Total Correct)	Section 4 Raw Score (Total Correct)
_____	_____	_____	_____

PRACTICE TEST 5

Test Reminders

1. A #2 pencil is required.
2. Follow the time restrictions for each section.
3. You are allowed to write on the test.
4. Circle your answers to ensure accuracy when filling in the answer sheet, provided on page 317.
5. Calculate your estimated score by using the conversion chart on page 319.

Math Test

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

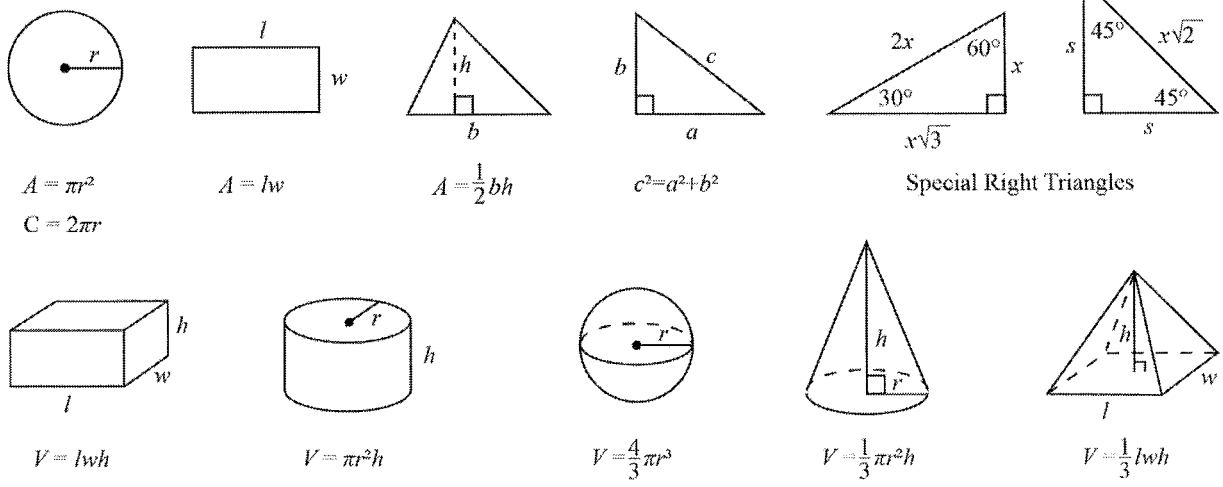
3

25 MINUTES, 20 QUESTIONS

For questions 1-20, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16-20,** solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

Notes:

1. The use of a calculator **is not permitted.**
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.



$A = \pi r^2$ $C = 2\pi r$ $A = lw$ $A = \frac{1}{2}bh$ $c^2 = a^2 + b^2$ Special Right Triangles

$V = lwh$ $V = \pi r^2 h$ $V = \frac{4}{3}\pi r^3$ $V = \frac{1}{3}\pi r^2 h$ $V = \frac{1}{3}lwh$

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

Questions 1 and 2 refer to the following information.

At a seafood restaurant, the signature food is the salmon sandwich. The sandwich can be purchased as a combo for \$7.00, or by itself for \$5.00. The combo comes with fries and a drink.

1

Which of the following functions model the total cost for making one combo? T is the total cost, S is the cost to make the sandwich, F is the cost of the fries, and D is the cost of the drink.

A) $T = SFD$

B) $T = S + F + D$

C) $T = -S - F - D$

D) $T = \frac{SF}{D}$

2

If the cost of making the sandwich is \$2.50, the cost of making fries is \$0.75, and the cost of the drink \$0.25, what is the margin of profit for every combo sold?

A) \$2.00
B) \$2.50
C) \$3.00
D) \$3.50

3

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

What are the roots of the quadratic equation above?

A) $x = -1, \frac{3}{2}$

B) $x = -\frac{1}{2}, 1$

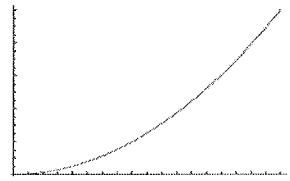
C) $x = \frac{1}{2}, -\frac{1}{6}$

D) $x = -\frac{1}{8}, \frac{1}{3}$

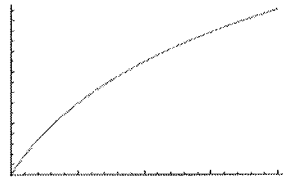
4

A search engine compiles results of sites by positively correlating their clicks with their relative position on the list, with a higher position on the list coming earlier. A positive correlation occurs when, as one value increases, the other does as well. If the number of clicks has a logarithmic decay of impact on the ranking, which of the following graphs properly demonstrates this relationship?

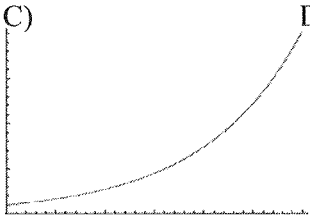
A)



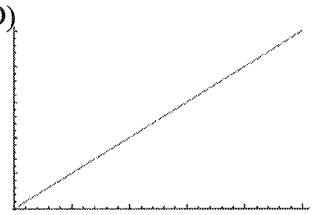
B)



C)



D)



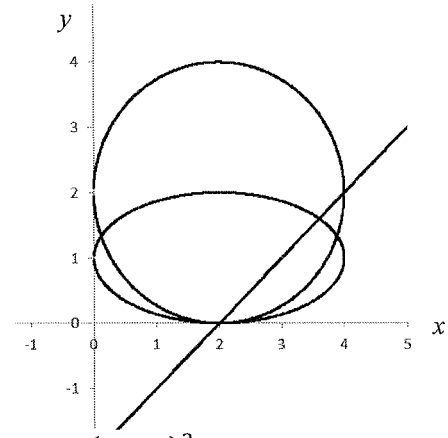
5

$$f(x) = (x-1)(x-3)$$
$$g(x) = x^2 - 1$$

Based upon the equation above, what is the value of $f(g(-2))$?

A) 0
B) 3
C) 24
D) 224

6



$$\frac{(x-2)^2}{2^2} + (y-1)^2 = 1$$
$$(x-2)^2 + (y-2)^2 = 4$$
$$y = x - 2$$

Given the graph provided is of the functions above, how many solutions are there to all three equations?

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

7

A 30°-30°-120° triangle has two sides measuring 6. What is the area of the triangle?

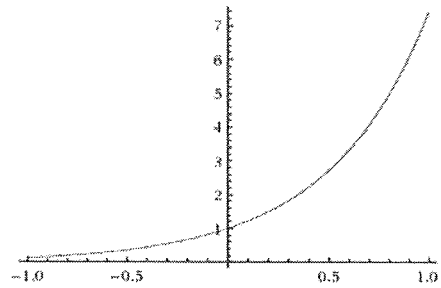
A) $6\sqrt{3}$
B) $9\sqrt{3}$
C) $18\sqrt{3}$
D) $36\sqrt{3}$

8

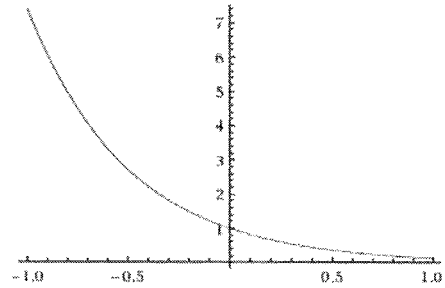
$$f(x,t) = e^{\frac{kx}{t}}$$

If k and t are negative in the function above, which of the following could be the graph of f?

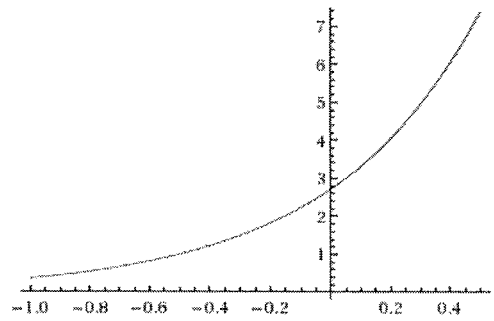
A)



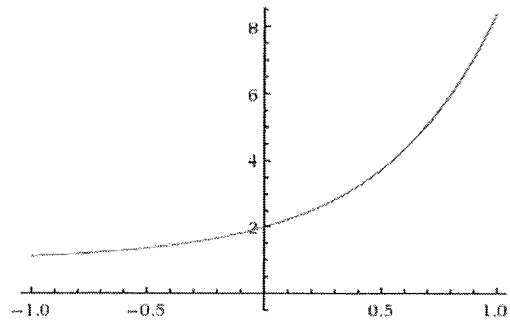
B)



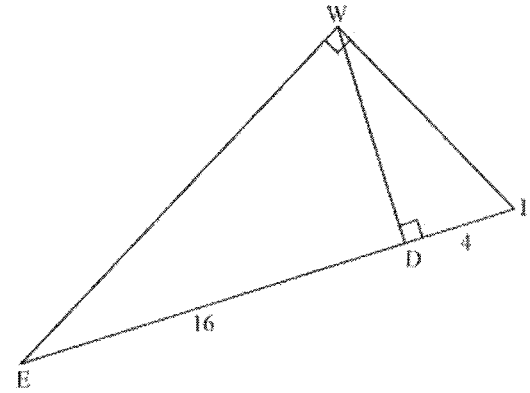
C)



D)



9



In the figure above $\overline{DE} = 16$ and $\overline{DI} = 4$. Which of the following is the measure of $\overline{WD}$?

A) $4\sqrt{2}$
B) $4\sqrt{3}$
C) 8
D) $8\sqrt{2}$

10

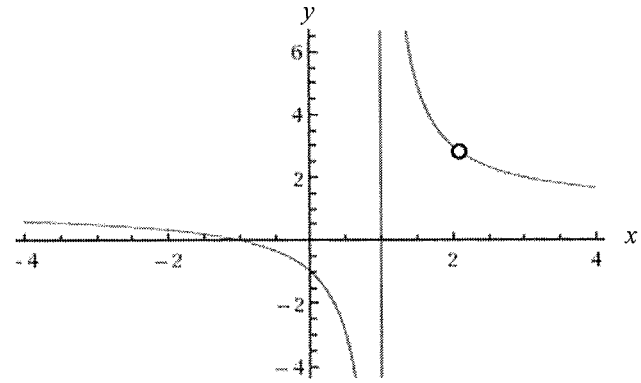
Two men purchased a damaged car with hopes of repairing it. The two of them together can fix it in 57 hours, even though they work at different rates. On average, the faster worker can work three times as fast as his slower friend.

$$\frac{1}{3x}+\frac{1}{x}=\frac{1}{19}$$

In the equation above, what does the expression $\frac{1}{3x}$ represent?

A) The work done by the faster friend in one hour.
B) The amount of work remaining after 38 hours of work.
C) The amount of work accomplished by both in one hour.
D) The work accomplished by the slower friend in the span of three hours.

11



Which of the following functions could be the one graphed above?

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

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

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

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

12

What is the minimum number of points of intersection between a circle and an ellipse with the same center point?

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

13

Two lines share both their x and y intercepts with each other. If this is true, which of the following statements must also be true?

A) The lines must be either perpendicular or parallel to each other.
B) Both lines are identical.
C) The lines may intersect at only one point.
D) The lines must intersect at exactly two points.

14

$$\left(\frac{x^2+x-2}{x^2+2x-3} \div \frac{x^2-x}{x^2+5x+6}\right)+1$$

Which of the following is a simplified version of the rational expression above?

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

B) $\frac{x^2+4x+5}{x^2-x}$

C) $\frac{2x^2+3x+4}{x^2-x}$

D) $\frac{x(x-1)}{(x+3)^2}$

15

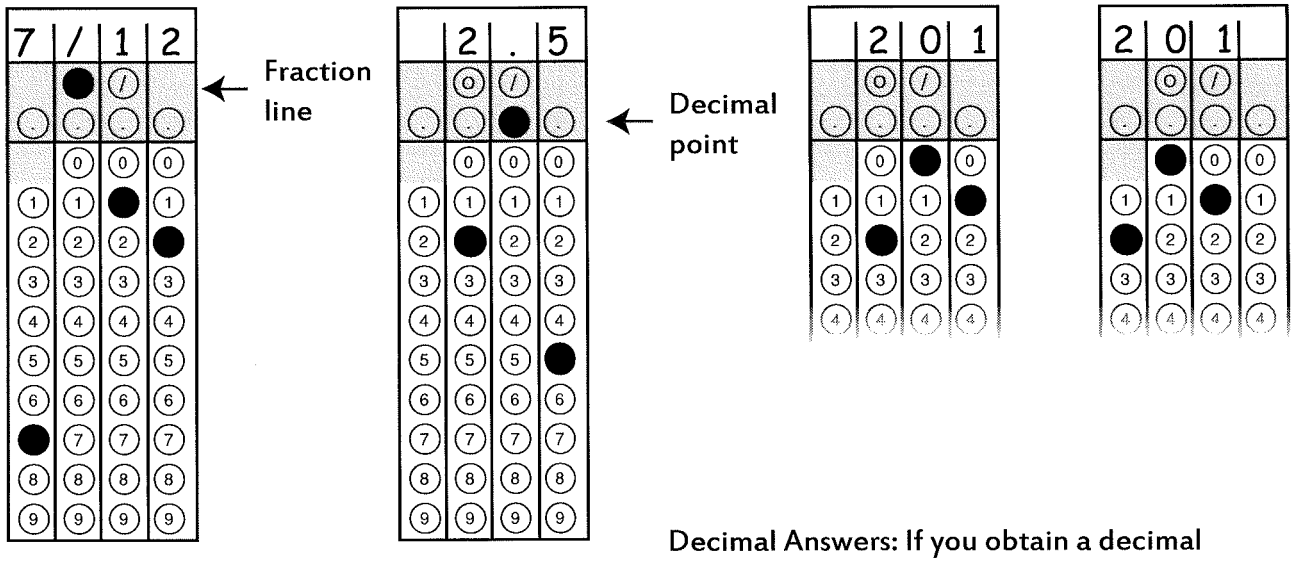
$$y = \frac{3}{108}x + 1$$
$$4x + 3y + 8 = 7x - 2y - 17$$
$$9y - 4 = \frac{1}{3}x - 3y + 8$$

How many solutions does the system of equations above have?

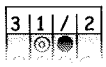
A) 0
B) 1
C) 2
D) Infinitely many solutions

CONTINUE

Each of the remaining questions requires you to solve the problem and enter your answer by marking the circles in the special grid, as shown in the examples below. You may use any available space for scratch work.

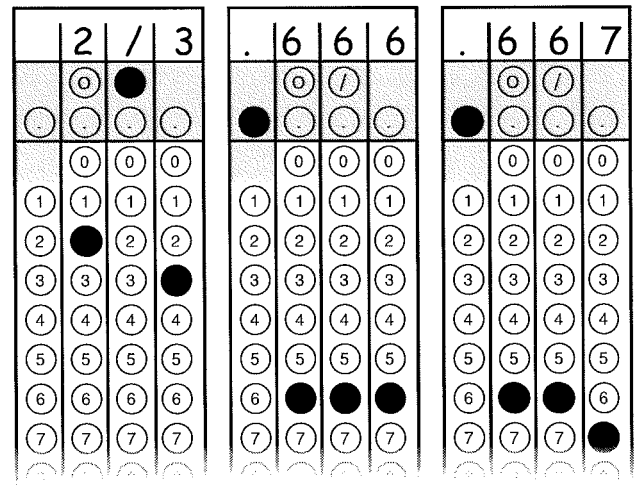


- Mark no more than one circle in any column.
- Because the answer sheet will be machine-scored, you will receive credit only if the circles are filled in correctly.
- Although not required it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- Mixed numbers such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2.

(If  is gridded, it will be interpreted as $\frac{31}{2}$ not $3\frac{1}{2}$.)

Decimal Answers: If you obtain a decimal answer with more digits than the grid can accomodate, it may be either rounded or truncated, but it must fill the entire grid. For example, if you obtain an answer such as 0.6666... you should record your result as .666 or .667. A less accurate value such as .66 or .67 will be scored as incorrect.

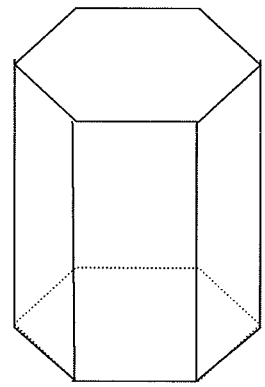
Acceptable ways to grid 2/3 are:



16

What is the real number part of the following complex number after simplification? $\frac{3-i}{1+i}$

17



If the height of the prism above is 8, and the volume is $432\sqrt{3}$, what is the length of one of the regular edges of the base? For most prisms, the volume can be determined by multiplying the base and the height. The area of a regular hexagon is $A = \frac{3\sqrt{3}}{2}s^2$, where s is one of the sides.

CONTINUE

18

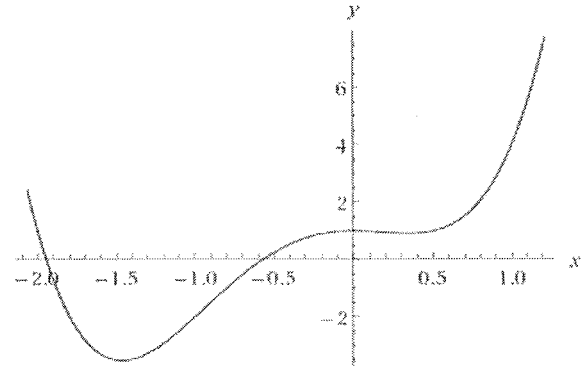
$$f(t) = -2t^2 + 3$$
$$g(t) = 2t + 4$$

The functions above show the rate of production of two different machines at a factory over the course of an hour. If the machines start at time $t = 0$, then what is the earliest time at which machine g has a greater rate of production?

19

It took 7 hours for Sarah to clean up 168 broken dishes after an earthquake struck her town. If she works at the same pace at her restaurant as she did at home, how many minutes will it take her to clean up the broken 416 dishes at her restaurant?

20



How many real roots does the polynomial above contain?

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS SECTION ONLY. DO NOT TURN TO ANY OTHER SECTION IN THE TEST.

Math Test

55 MINUTES, 38 QUESTIONS

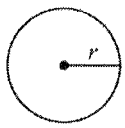
Turn to Section 4 of your answer sheet to answer the questions in this section.

4

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38,** solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

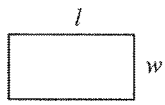
Notes:

1. The use of a calculator **is permitted.**
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

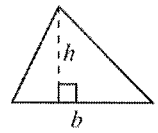


$A = \pi r^2$

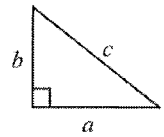
$C = 2\pi r$



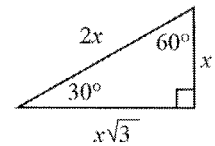
$A = lw$

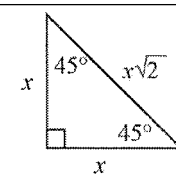


$A = \frac{1}{2}bh$

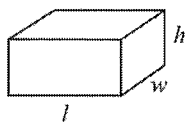


$c^2 = a^2 + b^2$

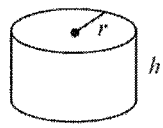




Special Right Triangles

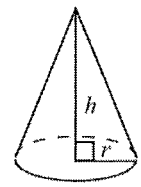


$V = lwh$

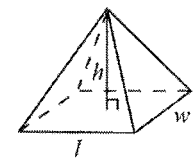


$V = \pi r^2 h$

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



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



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

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

1

A theme park cost 12 billion dollars to run for a year. If a theme park charges 100 for each adult ticket and 75 for each child ticket, what is the minimum amount of attendees needed to break even?

A) 70 million
B) 120 million
C) 160 million
D) 200 million

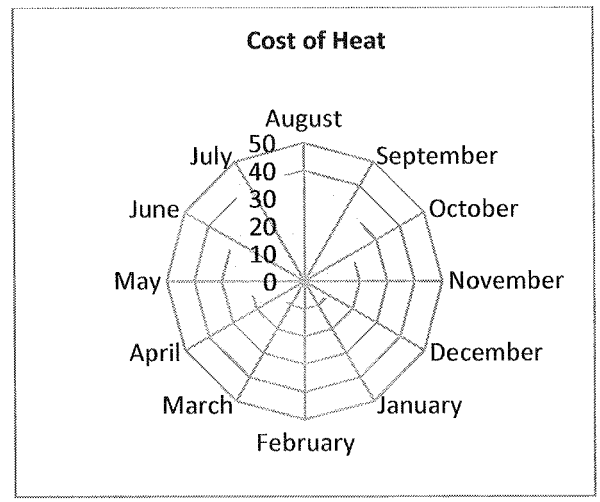
2

$$f(x) = x^4 - (a^2 + b^2)x^2 + a^2b^2$$

Which of the following are the roots to the function above?

A) a, b
B) $\pm a, \pm b$
C) $-a, -b$
D) $\pm(a + b)$

3



The figure above shows the heating cost of an average apartment in Buenos Aires throughout the year. During which months does the winter season occur according to the chart above?

A) June, July, August
B) September, October, November
C) December, January, February
D) March, April, May

4

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

What is the slope of the equation above?

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

CONTINUE

5

A fever is the reaction of an individual infected by a pathogen. In general, fevers are an effective way of reducing the population of the pathogen by a consistent percentage. A patient has a fever that reduces the number of pathogens by one third every two hours. Which of the following function models the number of pathogens, p, after h hours if the population was n initially?

A) $p(h) = \frac{1}{3}(n)^{\frac{h}{2}}$

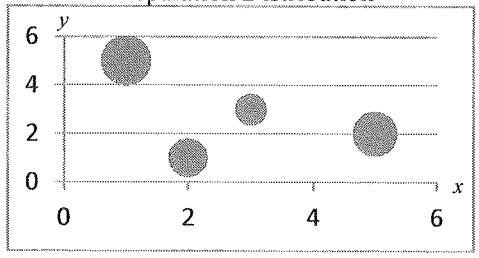
B) $p(h) = n\left(\frac{1}{3}\right)^{\frac{h}{2}}$

C) $p(h) = \left(\frac{1}{3}n\right)^{2h}$

D) $p(h) = n\left(\frac{2}{3}\right)^{\frac{h}{2}}$

6

Population Distribution



What is the y coordinate of the second largest population shown in the bubble graph above?

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

7

If coffee needs 2 cups of beans for every 12 cups of water, how many cups of beans is needed for 4 cups of water? Assume a linear ratio.

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

B) 2

C) 4

D) 12

8

The volume of a tank is 144. If the height was 12 and the width is 3, what is the length?

A) 144
B) 12
C) 3
D) 4

CONTINUE

Questions 9, 10, and 11 refer to the following information and charts.

Big Bucks	
Payout	Odds of Winning
0x	90%
2x	9%
8x	0.90%
32x	0.10%

Just For Fun	
Payout	Odds of Winning
0x	65%
1x	25%
2x	8%
4x	2%

The payout tables for both types of tickets at the local library raffle, the Big Bucks ticket and the Just For Fun ticket, are shown above.

9

Which of the following functions represents the payout (P) per dollar (d) of the ticket Just For Fun?

A) $P(d) = d(1 \times .25 + 2 \times .08 + 4 \times .02)$

B) $P(d) = d(0 \times .65 + 2 \times .09 + 8 \times .009 + 32 \times .021)$

C) $P(d) = d(.65 + .25 + .08 + .02)(0 + 1 + 2 + 4)$

D) $P(d) = (0 \times .65d + 1 \times .25d + 2d \times .08 + 4 \times .02)$

10

Which of the tickets has a better average payout?

A) Big Bucks
B) Just For Fun
C) They have the same average payout.
D) It varies depending on the amount invested.

11

If the library sold a total of 100 of each type of ticket at $1 per ticket, and each ticket paid out the average amount, how much money was raised to help fund the library for the next year?

A) $200
B) $182.50
C) $167.32
D) $122.60

12

$$y = 3x + 4$$

$$2y - 2 + x = 7x - 4$$

Which of the following statements is true about the system of linear equations above?

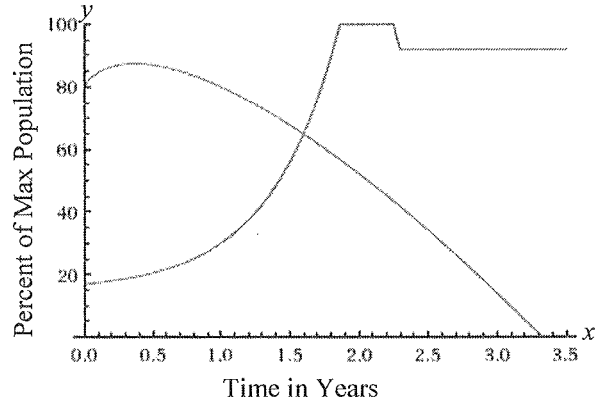
A) They are parallel and never intersect.
B) They are perpendicular to each other.
C) They intersect at infinitely many points.
D) They intersect at one point.

13

For the following problem one ton is exactly two thousand pounds.
An ore salesman sells raw iron ore to refineries for $\frac{\$226.15}{ton}$ plus an additional $325 for delivery. If the salesman earned $3,133.70 from a particular sale, how much ore (in pounds) did he sell?

A) 17,893
B) 24,840
C) 30,588
D) 27,714

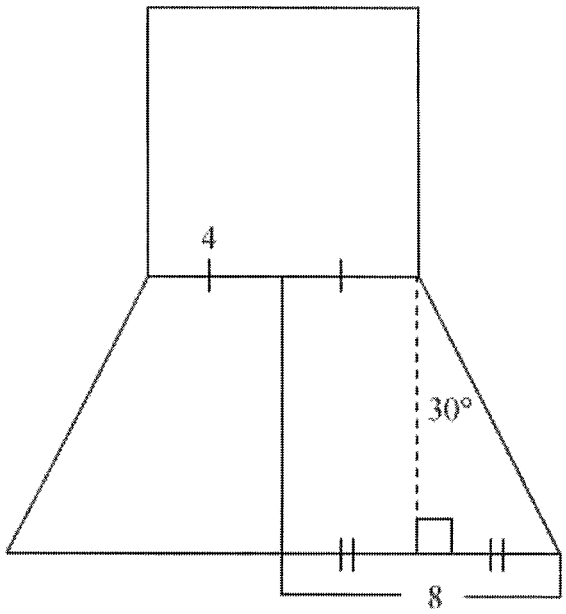
14



The graph above shows the process of secondary succession, in which one species replaces another species in a biome. According the graph above, how many years into secondary succession is there exactly the same number of individuals of each species?

A) .5 years
B) 1.72 years
C) 2.5 years
D) It is unknown; the graph only shows percent of maximum population, not absolute population.

15



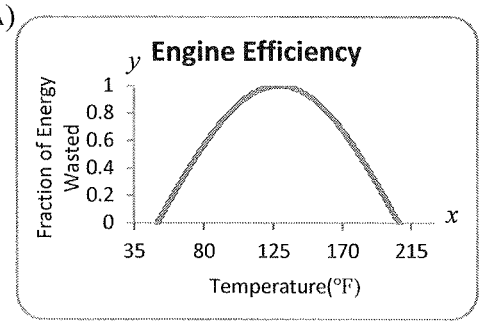
In the figure above, the top quadrilateral is regular while the bottom one is an isosceles trapezoid. What is the combined area of both shapes?

A) $112\sqrt{3}$
B) 112
C) $64\sqrt{3} + 48$
D) $64 + 48\sqrt{3}$

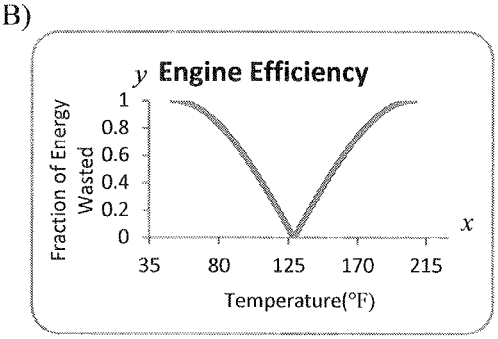
16

Which of the following graphs depicts an engine that is efficient at high temperatures?

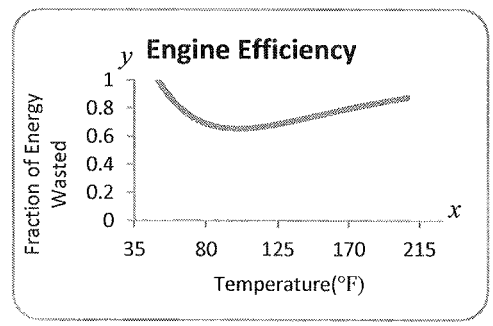
A)



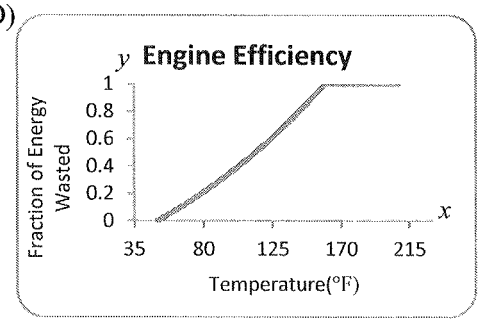
B)



C)



D)



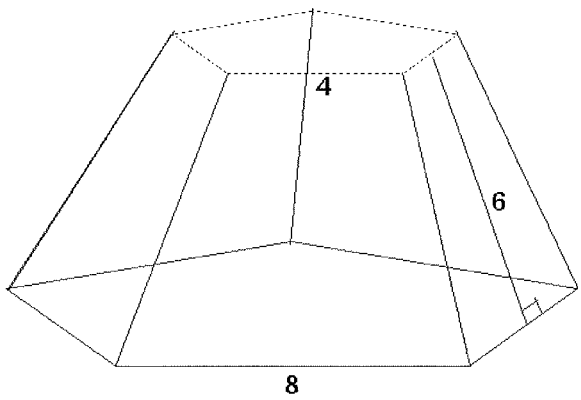
17

$$f(x) = e^{5x^2}$$
$$g(x) = \ln(x^{\frac{1}{10}})$$

What is the value of $g(f(2))$?

A) 1.35
B) 2
C) 4
D) 200

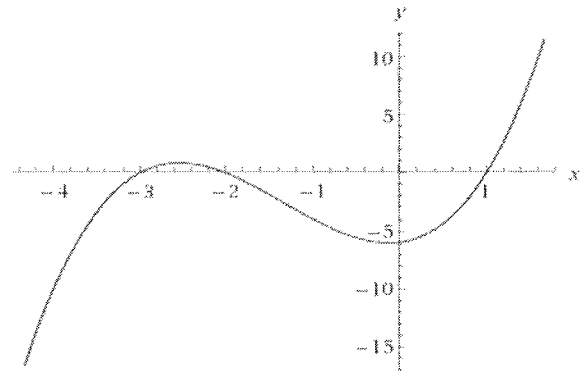
18



What is the surface area of the figure above? Assume the pentagons are regular. The area for a regular pentagon is $A = \frac{1}{4}\sqrt{5(5+2\sqrt{5})} * s^2$, where s is a side. The area for a trapezoid is $A = \frac{b_1+b_2}{2}h$, where b_1 and b_2 are the bases.

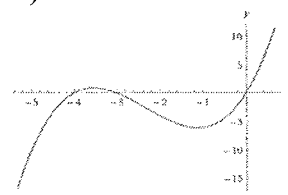
A) 206.58
B) 235.56
C) 273.1
D) 317.64

19

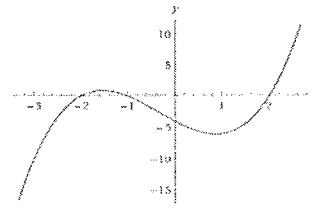


The graph above is $f(x)$. Which of the following graphs is $f(x+1)$?

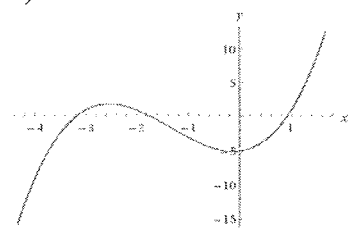
A)



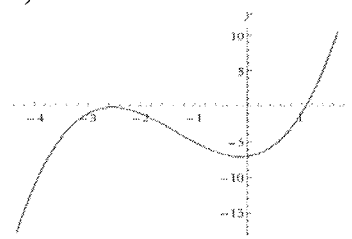
B)



C)

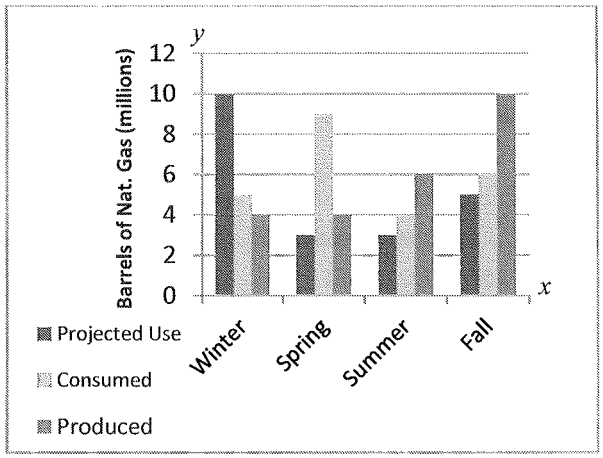


D)



CONTINUE

Questions 20, 21, and 22 refer to the following information and graph.



The Republic of Czetnio nationalized its heating industry. The reason for this was that in previous years there were massive shortages of natural gas, so changes were made in an effort to create a surplus. Consumer demand was predicted based upon the reports of the privatized industries, and the graph above shows the subsequent findings after the first year.

20

What was the surplus of natural gas in the first year?

A) None
B) 2 million barrels
C) 3 million barrels
D) 8 million barrels

21

During what season was there the largest discrepancy between the projected use of natural gas versus the actual amount consumed?

A) Winter
B) Spring
C) Fall
D) Summer

22

On average, how many barrels of natural gas are used each month for heating?

A) 6 million barrels
B) 4 million barrels
C) 2 million barrels
D) 1 million barrels

23

In order to cure an aggressive infection, a doctor is giving her patient an initial dose of 325mg of penicillin and a follow up dose of 125mg every two hours after. If it took her 9 hours to cure the infection, how many mg of penicillin were used?

A) 325
B) 625
C) 825
D) 950

24

Mr. Hinkley lives 5 miles away from the store. He walks for half a mile in the opposite direction to reach the bus stop and then takes the bus to the store. On the way home the bus driver drops him off in front of his house due to his advanced age. Which of the following expressions describes the distance traveled by Mr. Hinkley?

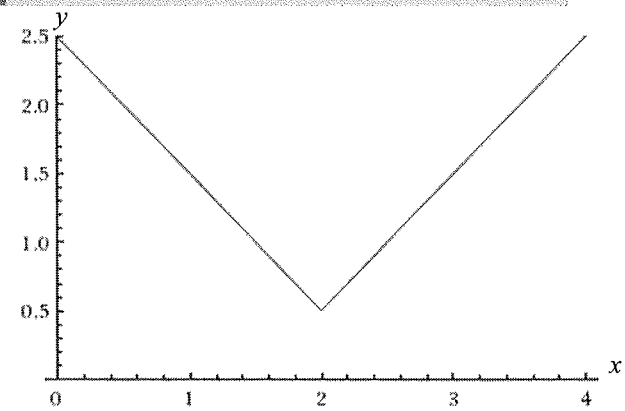
A) $d = 5.5 - .5 + 5$
B) $d = 10.5$
C) $d = 5.5 - 5 - .5$
D) $d = .5 + 5.5 + 5$

25

The energy levels for electrons orbiting a nucleus are quantized. Quantization is the process of arranging data in non-continuous, discrete groups. Which of the following types of functions would be most appropriate to model these energy levels?

A) Linear Function
B) Quadratic Function
C) Step Function
D) Exponential Function

26



Which of the following functions is that of the graph above?

A) $y = 2\left|\frac{1}{2}x - 1\right| + \frac{1}{2}$
B) $y = \frac{1}{2}|x - 1|$
C) $y = |x| + \frac{5}{2}$
D) $y = |x + 2| + \frac{1}{2}$

CONTINUE

Questions 27 and 28 refer to the following chart.

Month	Profit	Month	Profit
January	$225.75	July	$285.63
February	$137.25	August	$246.56
March	$193.50	September	$149.22
April	$224.24	October	$219.15
May	$347.37	November	$147.61
June	$118.39	December	$295.24

27

An expense report for a 3-month stretch has no labeling for the dates involved. If the total profit over those three months was $690, which three month stretch could this be?

A) January, February, March
B) April, May, June
C) July, August, September
D) October, November, December

28

This business considers summer to be from the start of May to the end of August. What is the average profit per month over the course of summer?

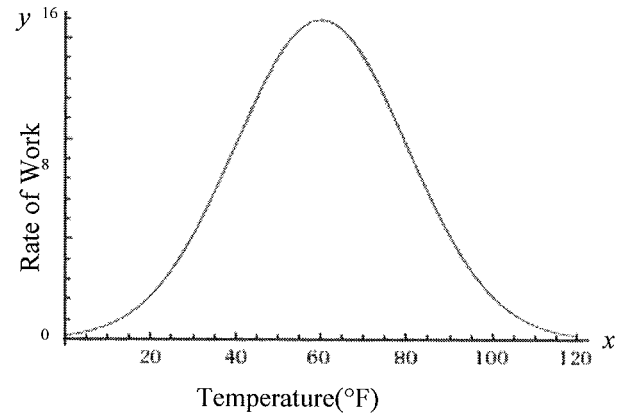
A) 215.83
B) 216.86
C) 249.49
D) 250.46

29

The Von Claus Cycle begins with a kilogram of humid air, which is pressurized through 3 catalytic layers. Each layer captures 5% of the total mass hydrogen peroxide, and 1.5% free hydrogen. If a total of 29 kilograms of hydrogen peroxide and free hydrogen were formed, how many kilograms of humid air were processed?

A) 193.33
B) 148.72
C) 644.44
D) 446.15

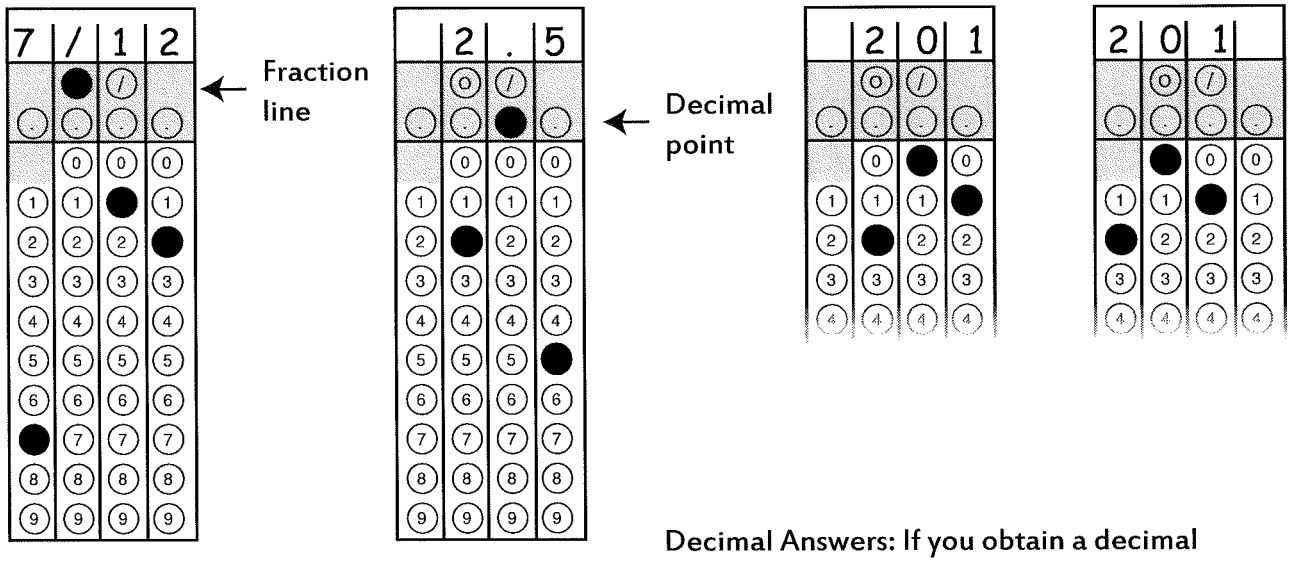
30



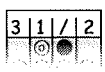
Enzymes, the catalysts that allow biological processes to occur, are extremely sensitive to temperature. At what temperature does the enzyme modeled in the graph above work most efficiently?

A) 0
B) 16
C) 60
D) $20 \leq x \leq 50$

Each of the remaining questions requires you to solve the problem and enter your answer by marking the circles in the special grid, as shown in the examples below. You may use any available space for scratch work.

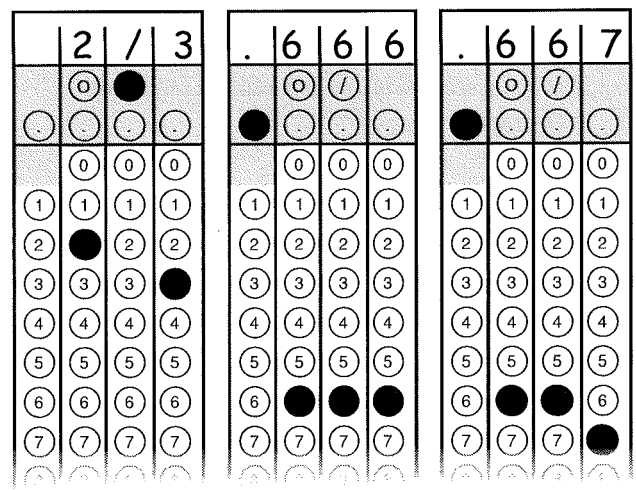


- Mark no more than one circle in any column.
- Because the answer sheet will be machine-scored, you will receive credit only if the circles are filled in correctly.
- Although not required it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- Mixed numbers such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2.

(If  is gridded, it will be interpreted as $\frac{31}{2}$ not $3\frac{1}{2}$.)

Decimal Answers: If you obtain a decimal answer with more digits than the grid can accomodate, it may be either rounded or truncated, but it must fill the entire grid. For example, if you obtain an answer such as 0.6666... you should record your result as .666 or .667. A less accurate value such as .66 or .67 will be scored as incorrect.

Acceptable ways to grid 2/3 are:



CONTINUE

31

A polynomial has one unique real root, a set of repeating roots, and two complex roots. What is the minimum order of the polynomial? The order of a polynomial is the degree of the exponent of the leading term.

32

How many intercepts does the graph $y = 3x + 2$ have?

33

$$\frac{(x+1)(x-1)(x+2)(x-3)(x+4)(x+1)}{(x+1)(x+1)(x+2)(x-4)(x+3)}$$

If you were to graph the rational expression above, how many holes of discontinuity would there be?

34

Janna has 314 apples, all of which were freshly picked this morning. It took her 2 hours to pick the apples and then an additional 4 hours to sell half the apples. If she sold each apple for \$0.30 each, what was her hourly wage for her work that day?

35

The prince of Prussia has one of the finest marbles collections in the world. He has a dozen stone marbles from ancient Rome, nine glass marbles from Zoroaster, three Babylonian silver marbles, six diamond marbles, two platinum marbles, seven crystal marbles from Aristotle's collection, and a dozen gold marbles. If he randomly selects a marble from his bag, what are the odds it is made out of a precious metal? For this scenario, silver, platinum, and gold are considered precious.

36

$f(x) = x(-3x + 1) + 2(x^2 - 1) + (x + 1)(x - 1)$

If in the equation above $f(a) = 4$, then what is the value of a ?

37

$$f(x) = 2x^2 + 1$$
$$g(x) = x^2 + c$$

If c is a non-negative integer, and neither of the functions above intersects, then what is one possible value of c ?

38

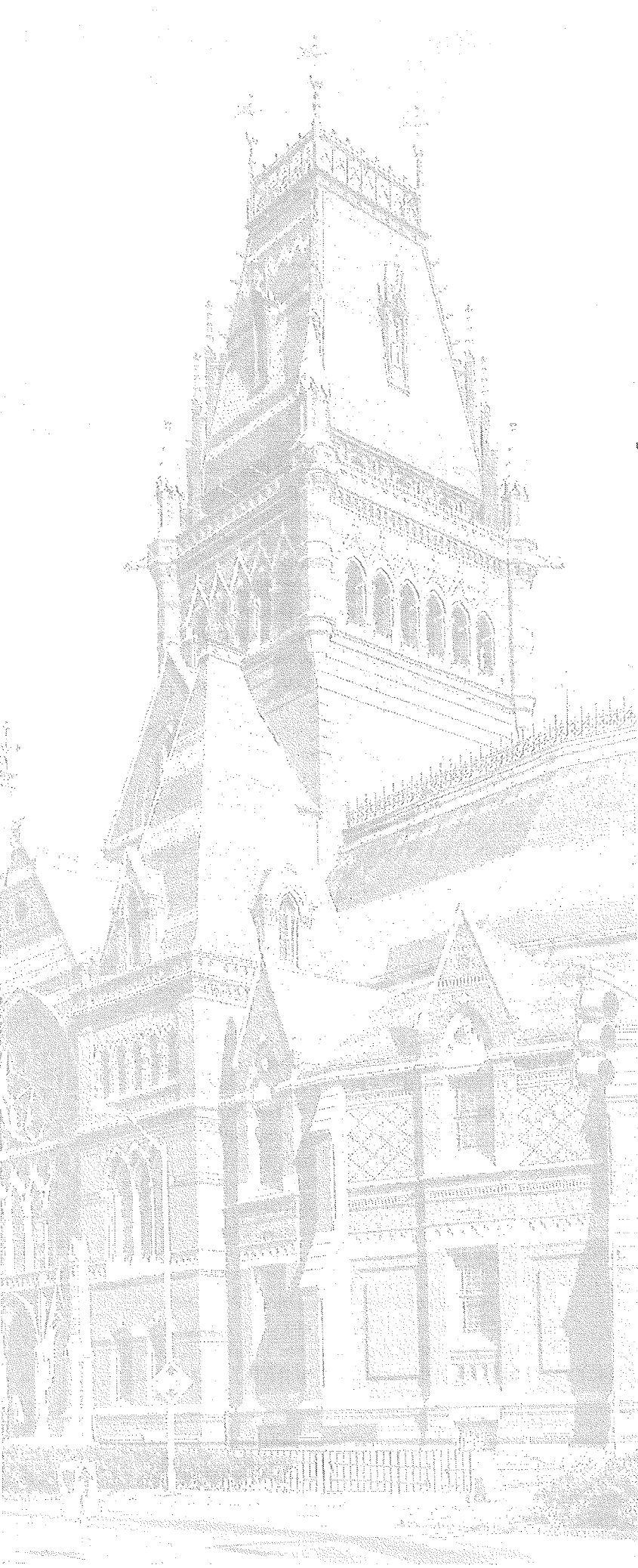
A teacher of a class of 12 shakes hands with all of his students as well as their parents and grandparents. If everyone in his class has both of their parents alive and on average 3 out of their 4 grandparents alive, how many hands does the teacher shake?

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS SECTION ONLY. DO NOT TURN TO ANY OTHER SECTION IN THE TEST.

Section 1, Reading	Section 2, Writing & Language	Section 3, Math, No Calculator	Section 4, Math, Calculator
1 C	1 B	1 B	1 B
2 B	2 D	2 D	2 B
3 A	3 B	3 A	3 A
4 B	4 A	4 B	4 B
5 C	5 C	5 A	5 D
6 B	6 B	6 B	6 C
7 C	7 D	7 B	7 A
8 C	8 C	8 A	8 D
9 D	9 D	9 C	9 A
10 A	10 B	10 D	10 B
11 C	11 C	11 D	11 D
12 C	12 C	12 A	12 A
13 B	13 D	13 C	13 B
14 D	14 C	14 C	14 D
15 A	15 A	15 B	15 D
16 A	16 B	16 1	16 A
17 C	17 C	17 6	17 B
18 C	18 B	18 0	18 D
19 A	19 B	19 1040	19 A
20 C	20 D	20 2	20 A
21 C	21 B		21 B
22 D	22 B		22 C
23 B	23 B		23 C
24 A	24 C		24 D
25 B	25 C		25 C
26 D	26 A		26 A
27 C	27 C		27 B
28 A	28 B		28 C
29 D	29 A		29 B
30 C	30 C		30 C
31 A	31 B		31 5
32 C	32 C		32 2
33 A	33 A		33 2
34 B	34 C		34 7.85
35 D	35 B		35 1/3
36 B	36 D		.333
37 B	37 B		36 7
38 C	38 C		37 0
39 D	39 A		38 72
40 C	40 B		
41 D	41 A		
42 D	42 C		
43 A	43 B		
44 A	44 A		
45 C			
46 D			
47 C			
48 A			
49 D			
50 B			
51 B			
52 B			

Calculate your estimated score by using the conversion chart on page 319.

Section 1 Raw Score (Total Correct)	Section 2 Raw Score (Total Correct)	Section 3 Raw Score (Total Correct)	Section 4 Raw Score (Total Correct)
_____	_____	_____	_____



PRACTICE TEST 6

Test Reminders

1. A #2 pencil is required.
2. Follow the time restrictions for each section.
3. You are allowed to write on the test.
4. Circle your answers to ensure accuracy when filling in the answer sheet, provided on page 317.
5. Calculate your estimated score by using the conversion chart on page 319.

Math Test

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

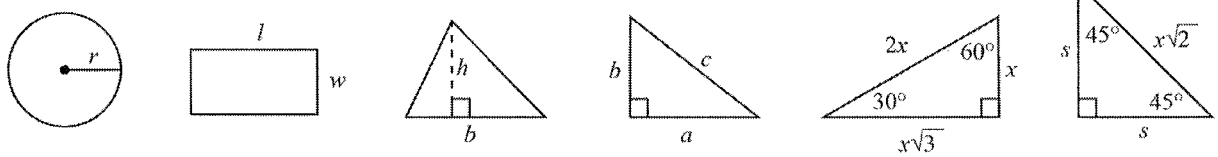
3

25 MINUTES, 20 QUESTIONS

For questions 1-20, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16-20**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

Notes:

1. The use of a calculator **is not permitted.**
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.



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

$A = lw$

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

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

Special Right Triangles

$V = lwh$

$V = \pi r^2 h$

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

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

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

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

1

$$\frac{1-\frac{9}{y^2}}{1-\frac{3}{y}}-\frac{3}{y}$$

Assuming the range does not include 0, which of the following is the simplified version of the rational expression above?

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

2

If $p+2\sqrt{x-1}=q$, and $q>p$, what is $x-1$ in terms of p and q ?

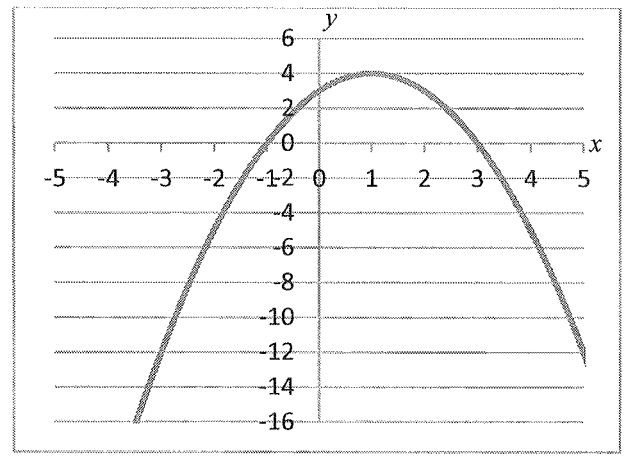
A) $\frac{\sqrt{q-p}}{2}$
B) $\sqrt{\frac{q-p}{2}}$
C) $\frac{q-p}{2}$
D) $\frac{(q-p)^2}{4}$

3

The daytime telephone rate between two cities is 90 cents for the first 3 minutes and c cents for each additional minute. The total charge is reduced 65 percent on calls made after 11:00 PM. The cost in dollars of a 30-minute call made after 11:00 PM between two cities is:

A) $0.35(0.90)+.27c$
B) $0.35(0.90+27c)$
C) $0.35(90)+27c$
D) $0.35(90+27c)$

4



For what y values on the curve above does $y=4x$?

A) -3 and 1
B) -2 and 3
C) -12 and 4
D) -3

5

Every month you earn x dollars and spend y dollars. Which of the following expressions models your savings after 5 years?

A) $60xy$
B) $60x - y$
C) $60(x - y)$
D) $60x$

6

If p is an odd integer and $3p^2 = 3p + 6$, then which of the following represents the possible value(s) of p ?

A) $p = -1, 2$
B) $p = -1$
C) $p = 2$
D) $p = -2, 1$

7

At Cambridge Institute of Knowledge, exactly 72% of the students were accepted to the top 25 universities. Which of the following could be the number of students at Cambridge Institute of Knowledge?

A) 200
B) 201
C) 202
D) 203

8

A right cone has a slant height of 15 and a radius of 9. What is the volume of this cone?

A) 201π
B) 216π
C) 243π
D) 324π

CONTINUE

9

Two cars are driving in opposite directions of each other for one hour. Car 1 is going 48 mph east and started off 36 miles directly north of the city. Car 2 is going 30 miles per hour west and started off 20 miles south of the city. Which of the following, when evaluated, will yield the distance, d, between the two vehicles after one hour?

A) $d = \sqrt{(36-(-48))^2 + (30-(-20))^2}$

B) $d = \sqrt{(36-(-20))^2 + (48-(-30))^2}$

C) $d = \sqrt{(36-(-48))^2 - (30-(-20))^2}$

D) $d = \sqrt{(36-(-20))^2 - (30-(-48))^2}$

10

If $\frac{a}{x} - \frac{b}{y} = x$ and $xy = \frac{1}{x}$, then $bx =$

A) $1 - ay$

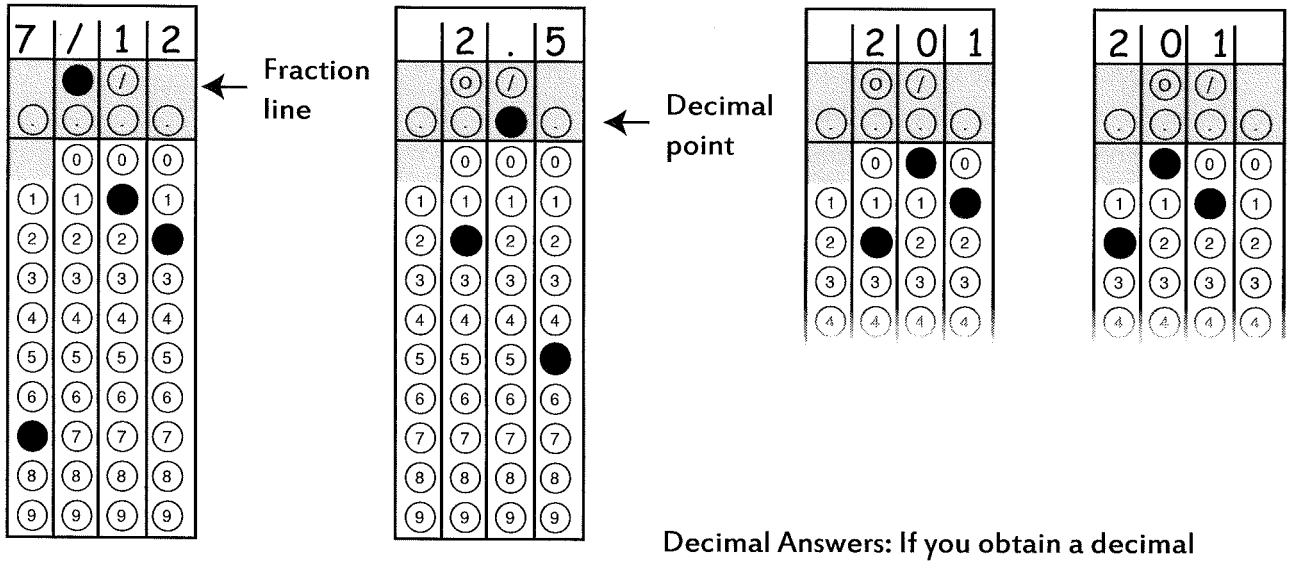
B) ay

C) $ay + 1$

D) $ay - 1$

Each of the remaining questions requires you to solve the problem and enter your answer by marking the circles in the special grid, as shown in the examples below. You may use any available space for scratch work.

Answer: 201
Either position is correct



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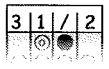
(If  is gridded, it will be interpreted as $\frac{31}{2}$ not $3\frac{1}{2}$.)

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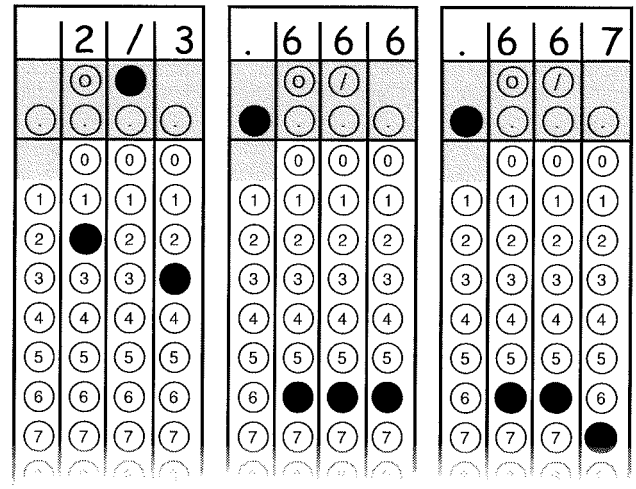
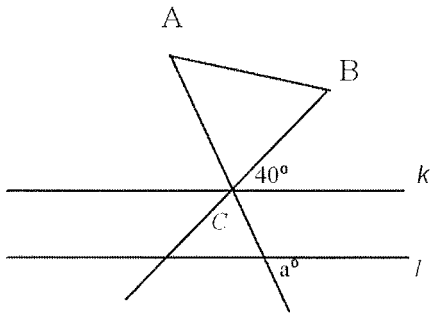


CONTINUE

16



In the figure above, lines k and l are parallel, and line k passes through C, one of the vertices of equilateral triangle ABC. What is the value of $\angle a$?

17

A dish contains five bacteria at 8:00 AM, 15 bacteria at 9:00 AM, and 45 bacteria at 10:00 AM. How many bacteria will be present in the dish at noon?

18

If $(y-4)^2 = 36$ and $y < 0$, what is the value of $y + 4$?

19

What is the leading coefficient (the coefficient of the highest order term) of $(x + 34532)(2x - 65698)(5x + 20980)$?

20

If a right circular cylinder has a volume of 144π and a height of 9π, then what is the area of a single base to the nearest tenth?

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS SECTION ONLY. DO NOT TURN TO ANY OTHER SECTION IN THE TEST.

Math Test

55 MINUTES, 38 QUESTIONS

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

4

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38,** solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

Notes:

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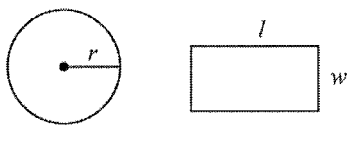
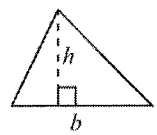


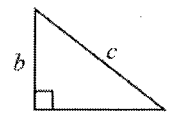
$A = \pi r^2$

$C = 2\pi r$

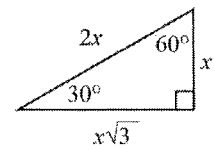
$A = lw$

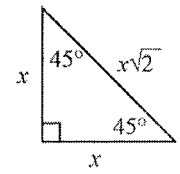


$A = \frac{1}{2}bh$

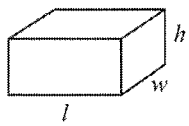


$c^2 = a^2 + b^2$

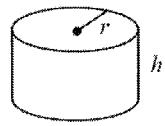




Special Right Triangles

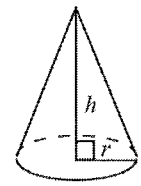


$V = lwh$

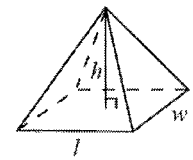


$V = \pi r^2 h$

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



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



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

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

1

Thomas takes the train to work every morning and the bus back home every night. While the train goes quicker due to a lack of traffic, the route it takes is 25% longer than the route of the bus, and as a result, their travel times are equal. If the bus travels for an hour and 36 minutes at 50 miles an hour, what is the velocity (rate) of the train in miles per minute?

A) $\frac{25}{24}$

B) $\frac{125}{2}$

C) 60

D) 1

2

If $y = mx + b$ and $y > 0$ for all values of x, which of the following must be true?

A) m must be positive and b must be negative.
B) m must be negative and b must be positive.
C) m must be positive and b must be positive.
D) m must be zero and b must be positive.

3

Mickey is hosting an event with 55 guests at his house. In order to make a plate of jalapeño poppers for the event, Chowder's Catering Company must hollow out a dozen peppers and then wash them. Afterwards they put a half ounce of cream cheese and 2/3 of an ounce of cheddar cheese into each pepper. They then bake the peppers for 35 minutes at 350 degrees and then pull them out to let them cool. After 5 minutes the chefs then put 32 mL of lemon juice onto each plate. If the catering company has 600 ml of lemon juice, 96 ounces of cream cheese, 150 ounces of cheddar cheese, and 200 jalapeños; are there enough ingredients to serve each guest 2/7 of a plate of peppers?

A) No, there is not enough lemon juice.
B) No, there is not enough cheddar cheese.
C) No, there are not enough peppers.
D) Yes, there is enough of each ingredient.

Questions 4, 5, and 6 refer to the following information and chart.

Ms. Szimonetta uses a computer program to produce periodic progress reports.

Student:	Smith, Joseph		
Task	Points Possible	Student Score	Class average
Homework #1	100	96	86.7
Homework #2	100	85	81.2
Homework #3	100	89	87.4
Quiz #1	100	85	77.9
Quiz #2	100	93	89.1
Quiz #3	100	89	85.1
Quiz #4	100		
Test #1	100	88	81.5
Test #2	100	68	81.0
Pre-test	100	69	76.6
Post-test	100		

4

The solution of which of the following inequalities would tell Joseph the minimum score (represented by x) he needs to earn on Quiz #4 in order to have a quiz average of at least 90 ?

A) $\frac{85+93+89+x}{4} \geq 90$

B) $\frac{85+93+89+x}{3} \geq 90$

C) $\frac{85+93+89+x}{2} \geq 90$

D) $\frac{\frac{85+93+89}{3}+x}{2} \geq 90$

5

Assuming that every task is weighed equally, what is Joseph's average grade for assignments that have been completed?

A) 69.27
B) 82.94
C) 84.67
D) 89.00

6

What is the mode for the average score of the class?

A) 85
B) 89
C) 85 & 89
D) There is no discernible mode.

7

Several students were given an electrical "black box." This box contained a battery with an electrical circuit that displayed the gain across both a 10 μF capacitor and a 10,000 Ω resistor.

Frequency (Hz)	Gain across 10 μF capacitor	Gain across 10,000 Ω resistor
10	0.16	1.00
10^2	0.02	1.00
10^3	0.00	1.00
10^4	0.00	1.00
10^5	0.00	1.00
10^6	0.00	1.00

The gain across the capacitor at low frequency compared to at high frequency is

A) always greater at low frequencies.
B) always smaller at low frequencies.
C) unrelated to the frequency.
D) the same as the gain across the resistor.

8

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

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

9

A material's thermal conductivity is a measure of its ability to transport energy from one location to another. The table below lists the thermal conductivities ((μJ/(sec · cm · °C)), a unit of energy) of various gases at different temperatures (°C).

Thermal Conductivity ($\frac{\mu J}{sec \cdot cm \cdot °C}$)					
Gas	20°C	40°C	60°C	80°C	100°C
CH_4	334	361	387	416	445
C_2H_6	204	228	257	288	316
C_3H_8	171	192	215	238	262
C_4H_{10}	154	174	193	213	233

One of the gases listed in the tables has a thermal conductivity of 216 (μJ/(sec · cm · °C)) at 30°C. What is the identity of the gas?

A) CH_4
B) C_2H_6
C) C_3H_8
D) CH_{10}

CONTINUE

10

Functions $f(x)$ and $g(x)$ operate on {a, b, c, d} according to the following table:

x	$f(x)$	$g(x)$
a	c	c
b	c	d
c	c	c
d	a	d

The range of $f(g(x))$ is:

A) {a, c}
B) {c, d}
C) {a, c, d}
D) {a, b, c, d}

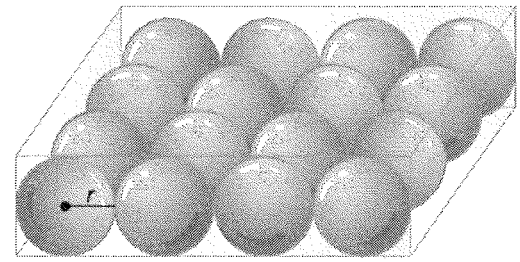
11

The frequency f of vibration of a string in a stringed instrument varies inversely with the length l (in inches) of the string (as the string shrinks, the frequency grows). A C string that is 12 inches long vibrates at 600Hz. If the D string is 9 inches long, what is the frequency of vibration?

A) 450 hz
B) 800hz
C) 900 hz
D) 1,200 hz

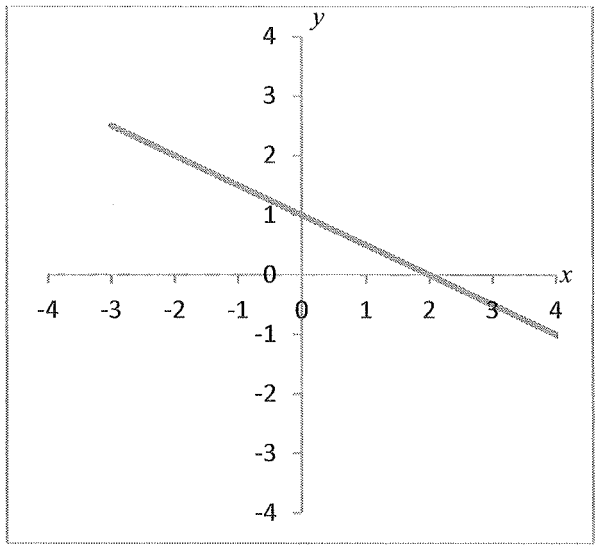
12

Sixteen perfectly spherical snooker balls fit tightly into the box shown below. Find the percent of the box's volume that is *not* occupied by the balls. Use 3.14 for π.



A) 38.97%
B) 47.64%
C) 58.53%
D) 72.12%

13



Which of the following is the equation of the line in the figure shown above?

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

14

$$ax^3 + bx^2 - cx - d$$

If a, b, c, and d are all positive integers, then what is the maximum number of roots the expression above can have?

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

15

Two asteroids in the Oort Cloud are on a direct collision path with each other. One asteroid is traveling at 750 km/hr while the other travels at 1,050 km/hr. If the two asteroids are 3.6×10^6 meters away from each other, how many meters will the faster asteroid have traveled at the time of impact?

A) $3.6x10^6$
B) $2.1x10^6$
C) $1.8x10^6$
D) $1.5x10^6$

16

Three turkeys, Larry, Curly, and Moe, are all being weighed today. Larry weighs L pounds, Curly C pounds, and Moe M pounds. If Curly weighs the average amount and Moe weighs most of all, which of the following equations describes the total mass of the turkeys, T.

A) $T = \frac{2M+2L+2T}{3}$

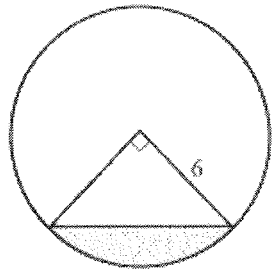
B) $T = M - L + C$

C) $T = 3C$

D) $T = (M - C)^2 - (L - C)^2 + (M - L)^2$

CONTINUE

17



What is the area of the shaded region in the figure above?

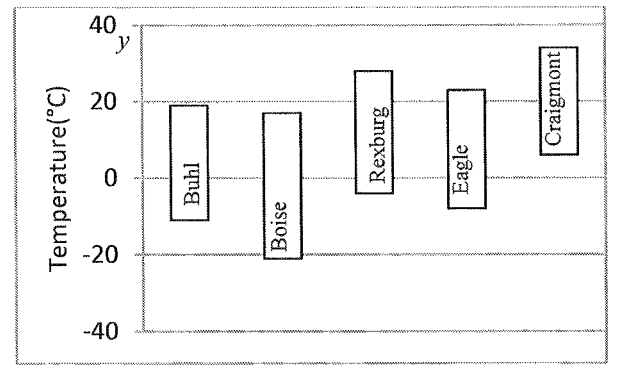
A) $36\pi - 18\sqrt{2}$
B) $9\pi - 18\sqrt{2}$
C) $9\pi - 18$
D) $18\sqrt{2} - 6\pi$

18

If $\frac{1}{x+1} + \frac{1}{x-1} = \frac{a}{x^2-1}$, then $a =$

A) 2
B) x^2
C) $2x$
D) $2x + 2$

19



Which city had the greatest difference between its highest and lowest temperature?

A) Buhl
B) Boise
C) Rexburg
D) Craigmont

20

A bank offers two different retirement savings plans to its customers. For the first offer, the bank will match every dollar deposited up to $450, at which point all funds in the account will collect 3% interest annually. The second offer has no price matching, but instead pays an interest rate of 7%. At what principal value are the two accounts an identical investment after one year?

A) $866.35
B) $2,257.83
C) $4,562.43
D) $11,587.50

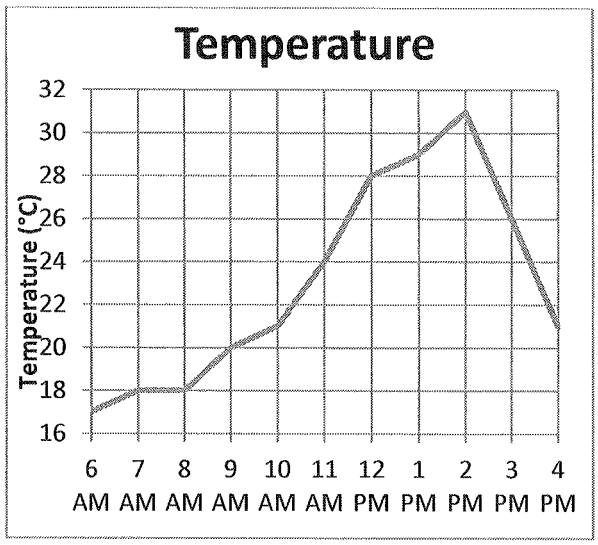
CONTINUE

21

If $4x-3<-9$, then which of the following could be one solution for x ?

A) –2
B) –1
C) 3
D) 4

22



Based on the provided graph, which of the following is correct?

A) The change in temperature between 7 AM and noon was 8°.
B) The highest temperature reached during the day was 32°.
C) The change in temperature between 8 AM and noon was -10°.
D) The temperature did not change between 7 AM and 8 AM.

23

In the Pasadena library, there are x bookcases with s shelves in each bookcase. If a total of b books are to be evenly distributed among each of the shelves, what is the number of books per shelf?

A) $\frac{b}{xs}$

B) $\frac{xb}{s}$

C) $\frac{x}{s}-b$

D) $\frac{b}{s}-x$

24

If $S=\frac{rL-a}{r-1}$, $r=$

A) $\frac{a-S}{S-L}$

B) $\frac{1}{S-L}$

C) $\frac{S-a}{S-L}$

D) $\frac{S-a}{L-S}$

CONTINUE

25

The exchange rates of several currencies are as follows:

Dollars to Pesos ~ 1:11
Pesos to Euros ~ 14:1
Euros to Dollars ~ 0.7:1

What is the magnitude of the difference in dollars of converting $100 to pesos, then to euros, and finally back from euros to dollars?

A) 12.24
B) 78.41
C) 87.76
D) 112.24

26

$$x^2 + 4$$

Which of the following is the factorization of the expression above?

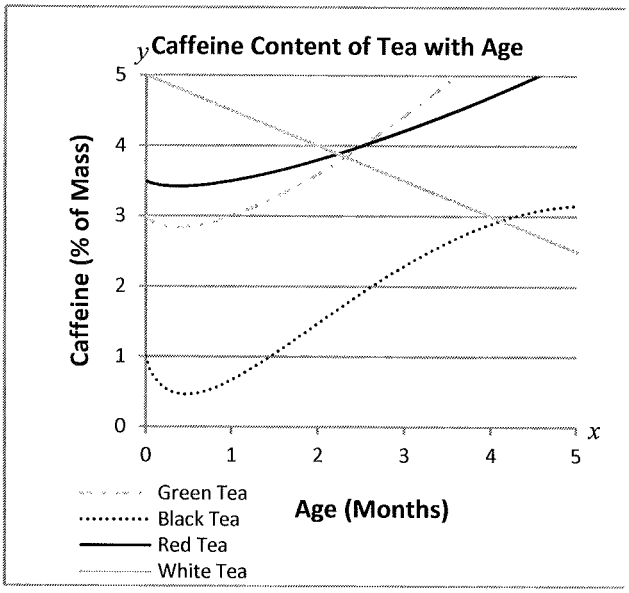
A) $(x - 2)(x + 2)$
B) $(x + 2)^2$
C) $(x - 2i)(x + 2i)$
D) $(x - 2i)^2$

27

The number of new chainsaws sold t years after the introduction of a new model is given by the function $y = 2300\ln(8t + 3)$. How many chainsaws will be sold 5 years after the new model is introduced?

A) 8,651 chainsaws
B) 5,290 chainsaws
C) 4,447 chainsaws
D) 2,300 chainsaws

Questions 28, 29, and 30 refer to the following graph and information.



Several enzymes, most of which are found in all types of tea leaves, produce caffeine. Despite the fact that caffeine naturally decays in tea, the caffeine content can often increase with age due to these enzymes.

28

Which kind of tea lacks caffeine creating enzymes?

A) Green Tea
B) Black Tea
C) Red Tea
D) White Tea

29

Which tea has the greatest rate of caffeine production at $3\frac{1}{2}$ months?

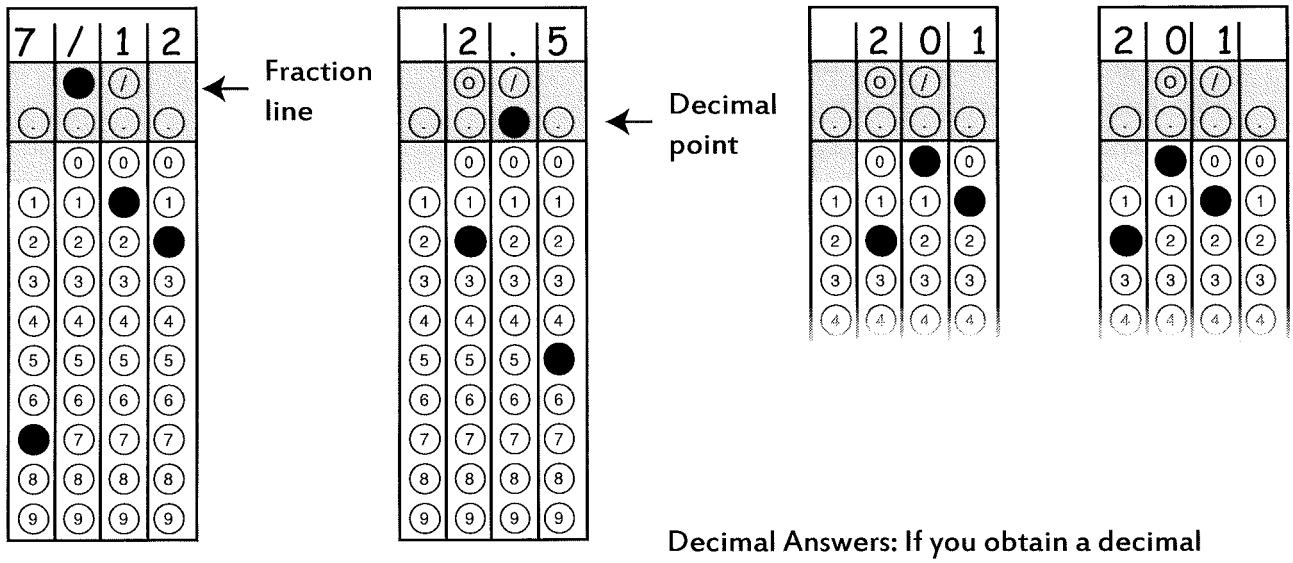
A) Green Tea
B) Black Tea
C) Red Tea
D) White Tea

30

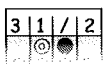
What is the slope of the only tea to be modeled by a linear function?

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

Each of the remaining questions requires you to solve the problem and enter your answer by marking the circles in the special grid, as shown in the examples below. You may use any available space for scratch work.

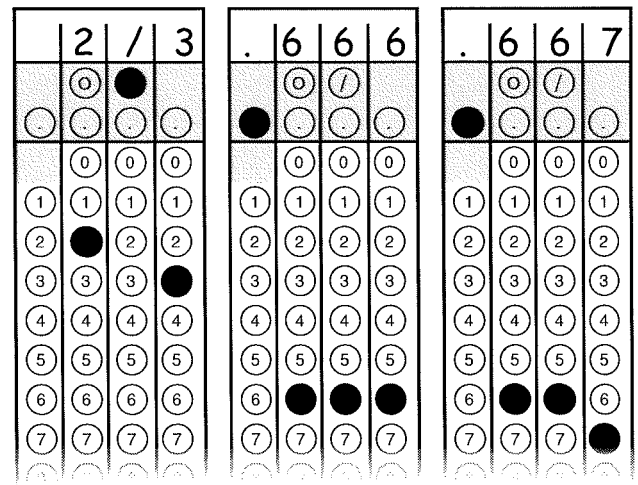


- Mark no more than one circle in any column.
- Because the answer sheet will be machine-scored, you will receive credit only if the circles are filled in correctly.
- Although not required it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- Mixed numbers such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2.

(If  is gridded, it will be interpreted as $\frac{31}{2}$ not $3\frac{1}{2}$.)

Decimal Answers: If you obtain a decimal answer with more digits than the grid can accomodate, it may be either rounded or truncated, but it must fill the entire grid. For example, if you obtain an answer such as 0.6666... you should record your result as .666 or .667. A less accurate value such as .66 or .67 will be scored as incorrect.

Acceptable ways to grid 2/3 are:



31

Your family has invested in a time share in the mountains for winter break. The cost of the time share is split up evenly among all of the families involved. At the moment there are 4 other families signed up and each of you should pay $600. Your family is only able to pay $500 for the vacation. How many more families must be signed up to make your vacation a reality?

32

After becoming a marine biologist, you are required to put an increasing amount of your paycheck each year towards retirement. In your first year you deposit $340, with the future obligation to put in $35 more than you did the year prior. In your 15th year of employment, how much of your paycheck goes towards retirement?

33

What is the value of $\frac{4(x-y)-8y}{2x-6y}$?

34

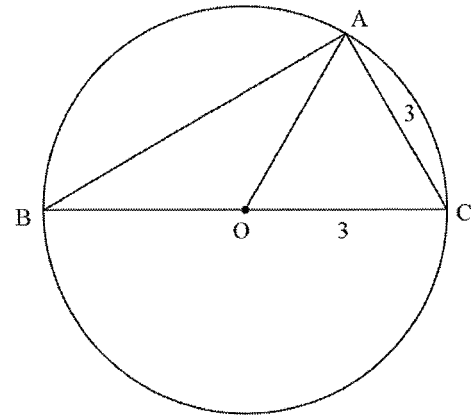
If $8x - \frac{15}{7} = -\frac{3}{4}$ then $\frac{15}{7} - 8x =$

CONTINUE

35

A nurse gives her patient one pill every 45 minutes. How many pills will she need for a 9-hour shift if she gives the patient the first pill at the beginning and the last pill at the end of the shift?

36



Triangle ABC is inside circle O. If $\overline{OC} = \overline{AC} = 3$, what is the area of ΔABC to the nearest tenth?

Questions 37 and 38 refer to the following information.

$$x(t) = x_0 + v_0 t + \frac{1}{2}at^2$$

The equation above models the distance an object has travelled with respect to time given its initial position (x_0), velocity (v_0), and acceleration (a). On Earth the acceleration due to gravity is approximately $10\ m/s$.

37

If a ball is dropped from a blimp with no initial velocity, how many meters does it travel in $3\ s$?

38

Sir Isaac Newton discovered that g, the acceleration due to gravity, is dependent on mass (m), the distance between the two objects (r), and the gravitational constant G .

$$g = \frac{Gm}{r^2}$$

If the earth has a mass of approximately $5.972x10^{24}$ kg, a radius of 6,371 km, and G is approximately $6.67x10^{-11}$ $m^3kg^{-1}s^{-2}$ then what is the approximate gravity on earth in m/s^2 to the nearest one tenth?

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS SECTION ONLY. DO NOT TURN TO ANY OTHER SECTION IN THE TEST.

Section 1, Reading	Section 2, Writing & Language	Section 3, Math, No Calculator	Section 4, Math, Calculator
1 A	1 B	1 C	1 A
2 A	2 D	2 D	2 D
3 D	3 B	3 B	3 D
4 C	4 C	4 C	4 A
5 B	5 C	5 C	5 C
6 C	6 C	6 B	6 D
7 C	7 C	7 A	7 A
8 B	8 D	8 D	8 D
9 B	9 A	9 B	9 B
10 A	10 D	10 D	10 A
11 B	11 C	11 B	11 B
12 B	12 B	12 C	12 B
13 A	13 B	13 C	13 A
14 B	14 A	14 D	14 B
15 D	15 A	15 A	15 B
16 D	16 C	16 80	16 C
17 A	17 B	17 405	17 C
18 C	18 C	18 2	18 C
19 A	19 A	19 10	19 B
20 B	20 D	20 16	20 D
21 A	21 B		21 A
22 B	22 A		22 D
23 C	23 B		23 A
24 A	24 C		24 C
25 B	25 A		25 A
26 B	26 B		26 C
27 B	27 B		27 A
28 C	28 A		28 D
29 B	29 D		29 A
30 B	30 D		30 B
31 B	31 B		31 1
32 B	32 A		32 830
33 D	33 D		33 2
34 B	34 B		34 3/4 or .75
35 B	35 C		35 13
36 A	36 D		36 7.8
37 C	37 A		37 45
38 B	38 C		38 9.8
39 D	39 B		
40 D	40 A		
41 C	41 B		
42 A	42 B		
43 D	43 C		
44 D	44 D		
45 B			
46 C			
47 B			
48 B			
49 C			
50 C			
51 A			
52 D			

Calculate your estimated score by using the conversion chart on page 319.

Section 1 Raw Score (Total Correct)	Section 2 Raw Score (Total Correct)	Section 3 Raw Score (Total Correct)	Section 4 Raw Score (Total Correct)
_____	_____	_____	_____