



# SAT<sup>®</sup> January 2017

## IMPORTANT REMINDERS:

**1**

A No. 2 pencil is required for the test. Do not use a mechanical pencil or pen.

**2**

Sharing any questions with anyone is a violation of the SAT<sup>®</sup> Program's Test Security and Fairness policies and may result in your scores being canceled.

**3**

Requests to cancel scores must be received in writing by the Wednesday following the test date.



## Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

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

### DIRECTIONS

For questions 1-15, 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

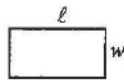
- The use of a calculator is **not permitted**.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated,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

### REFERENCE

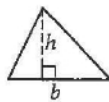


$$A = \pi r^2$$

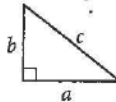
$$C = 2\pi r$$



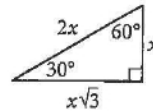
$$A = \ell w$$



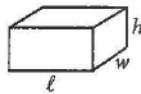
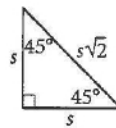
$$A = \frac{1}{2}bh$$



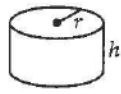
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = \ell wh$$



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



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



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



$$V = \frac{1}{3}\ell wh$$

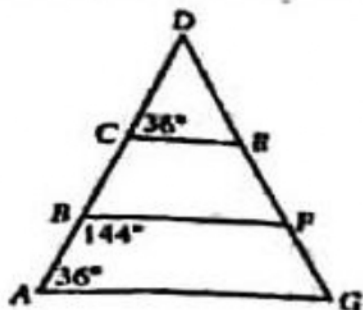
The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.

CONTINUE

1



Note: Figure not drawn to scale.

Which of the following statements is(are) true based on the diagram above?

- I.  $\triangle ADG$  is similar to  $\triangle BDF$ .
- II.  $\triangle ADG$  is similar to  $\triangle CDE$ .
- III.  $\triangle BDF$  is similar to  $\triangle CDE$ .

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

2

$$\begin{aligned} 2x - 3 &= y \\ x + 2y &= -21 \end{aligned}$$

What is the solution  $(x, y)$  of the system of equations above?

- A)  $(-6, -15)$
- B)  $(-3, -9)$
- C)  $(3, -12)$
- D)  $(4, 5)$

3

A contractor needs to purchase plywood boards and nails for a job. The contractor will buy  $p$  plywood boards for \$16.99 each and one box of nails for \$12.99. Which of the following equations shows the total cost,  $c$ , of the plywood boards and nails that the contractor will buy?

- A)  $c = 16.99p + 12.99$
- B)  $c = (12.99 + 16.99)p$
- C)  $p = 16.99c + 12.99$
- D)  $p = (12.99 + 16.99)c$

4

$$3ax - 7 = 6x - 7$$

In the equation above,  $a$  is a constant. For what value of  $a$  does the equation have infinitely many solutions?

- A) 0
- B) 2
- C) 6
- D) 7

$$\sqrt{x+9} = 4$$

Which of the following sets consists of all values of  $x$  that satisfy the equation above?

- A)  $\{-11, -7\}$
- B)  $\{-25, 7\}$
- C)  $\{-7\}$
- D)  $\{7\}$

6

In January 2005, a ranger began monitoring the deer population in an area. The function  $P$ , defined by  $P(t) = 650(1.02)^t$ , where  $0 \leq t \leq 5$ , models the number of deer in the area  $t$  years after January 2005. What does the 650 represent in the model?

- A) The number of deer in the area in January 2005
- B) The number of deer in the area in January 2010
- C) The increase in the number of deer per year in the area from January 2005 to January 2010
- D) The decrease in the number of deer per year in the area from January 2005 to January 2010

7

A soccer team needs new supplies. The team will buy  $x$  soccer balls at \$19.50 each and  $y$  pairs of shin guards at \$12.25 per pair. The soccer team cannot spend more than \$350. Every player needs shin guards, so the team will buy at least 11 pairs. Which of the following systems of inequalities gives the possible numbers of soccer balls and pairs of shin guards the team can buy and meet the given conditions?

- A)  $12.25x + 19.50y \geq 350$   
 $x \geq 11$
- B)  $12.25x + 19.50y \leq 350$   
 $x \geq 11$
- C)  $19.50x + 12.25y \geq 350$   
 $y \geq 11$
- D)  $19.50x + 12.25y \leq 350$   
 $y \geq 11$

8

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

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



9

Which of the following expressions is equivalent to

$$\frac{x^2 - 5x - 6}{x^2 - 2x - 3}, \text{ where } x \neq -1, 3?$$

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

10

For a car driving  $m$  miles on a highway, Toll A's cost, in dollars, can be modeled by the function  $f(m) = 0.15m + 1.25$ . For a car driving  $m$  miles on a highway, Toll B's cost, in dollars, can be modeled by the function  $g(m) = 0.20m + 0.50$ . How much greater is  $g(40)$  than  $f(40)$ ?

- A) \$3.60
- B) \$2.40
- C) \$1.25
- D) \$0.75

11

$$f(p) = 7,000 - 30p$$

A manufacturer of DVD players developed the function  $f$  above, where  $f(p)$  represents the number of DVD players retailers are likely to purchase each week when the DVD players cost  $p$  dollars each. What is the best interpretation of the number 30 in the function?

- A) For every 1 dollar increase in price, 30 fewer DVD players are likely to be purchased each week.
- B) For every 1 dollar increase in price, 30 more DVD players are likely to be purchased each week.
- C) For every 30 dollar increase in price, 1 fewer DVD player is likely to be purchased each week.
- D) For every 30 dollar increase in price, 1 more DVD player is likely to be purchased each week.

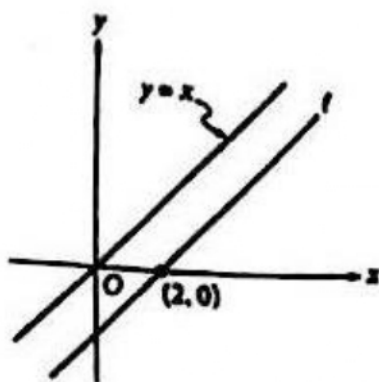
12

In the  $xy$ -plane, the graph of the function  $f$  is a parabola with vertex at  $(1, 1)$  and  $y$ -intercept  $(0, -1)$ . Which of the following defines  $f$ ?

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



13



In the  $xy$ -plane above, line  $l$  is parallel to the line  $y = x$ . Which of the following is an equation of line  $l$ ?

- A)  $y = x + 2$
- B)  $y = x - 2$
- C)  $y = 2x$
- D)  $y = 2x - 2$

14

$$x^2 + y^2 + 2x - 10y + 17 = 0$$

The graph of the equation above in the  $xy$ -plane is a circle. What are the coordinates of the center of the circle?

- A)  $(1, -5)$
- B)  $(1, 5)$
- C)  $(-1, -5)$
- D)  $(-1, 5)$

15

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

For the quadratic function  $f$  above,  $a$ ,  $b$  and  $c$  are constants. In the  $xy$ -plane, the graph of  $f$  is a parabola that opens downward, and the coordinates of its vertex are both positive. Which of the following could be true?

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



**DIRECTIONS**

For questions 16–20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- 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. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or 7/2. (If  $\begin{array}{|c|c|c|c|} \hline 3 & 1 & / & 2 \\ \hline \circ & \circ & \circ & \circ \\ \hline \end{array}$  is entered into the grid, 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 accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Answer:  $\frac{7}{12}$

	7	/	1	2
Write answer in boxes. →	○	○	○	○
	0	0	0	0
Grid in result. ↓	①	①	①	①
	2	2	2	2
	3	3	3	3
	4	4	4	4
	5	5	5	5
	6	6	6	6
	7	7	7	7
	8	8	8	8
	9	9	9	9

← Fraction line

Answer: 2.5

	2	.	5
	○	○	○
	0	0	0
	①	①	①
	2	2	2
	3	3	3
	4	4	4
	5	5	5
	6	6	6
	7	7	7
	8	8	8
	9	9	9

← Decimal point

Acceptable ways to grid  $\frac{2}{3}$  are:

	2	/	3
○	○	○	○
0	0	0	0
①	①	①	①
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7

.	6	6	6
○	○	○	○
0	0	0	0
①	①	①	①
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7

.	6	6	7
○	○	○	○
0	0	0	0
①	①	①	①
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7

Answer: 201 – either position is correct

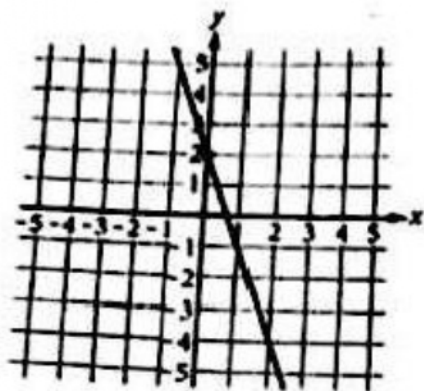
	2	0	1
○	○	○	○
0	0	0	0
①	①	①	①
2	2	2	2
3	3	3	3

2	0	1	
○	○	○	○
0	0	0	0
①	①	①	①
2	2	2	2
3	3	3	3

**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



16



The line graphed in the  $xy$ -plane above can be described by the equation  $y = -3(x + t) + 5$ , where  $t$  is a real number. What is the value of  $t$ ?

18

$$2x^2 - 17x + 36 = 0$$

What is a solution to the equation above?

17

If  $(x - 1)(x - 2)(x + 3)(x + 4) = x^4 + ax^3 + bx^2 + cx + d$  for all values of  $x$ , what is the value of  $a$ ?





19

The measure of angle  $A$  is  $\frac{5}{12}\pi$  radians greater than the measure of angle  $B$ . How much greater is the measure of angle  $A$  than the measure of angle  $B$ , in degrees? (Disregard the degree symbol when gridding your answer.)

20

A supply room clerk at an office orders more reams of paper on Monday if the supply is 50 reams or less. This Monday, the supply of paper is 325 reams. The office uses an average of 15 reams of paper per week. At this rate, in how many weeks will the supply room clerk order more paper on Monday?



## Math Test – Calculator

55 MINUTES, 38 QUESTIONS

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

### DIRECTIONS

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

- The use of a calculator is permitted.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- 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.

### REFERENCE

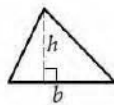


$$A = \pi r^2$$

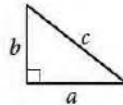
$$C = 2\pi r$$



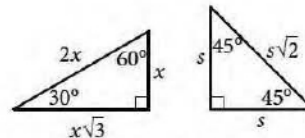
$$A = \ell w$$



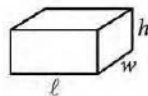
$$A = \frac{1}{2}bh$$



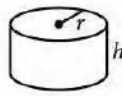
$$c^2 = a^2 + b^2$$



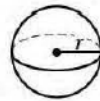
Special Right Triangles



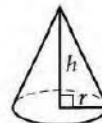
$$V = \ell wh$$



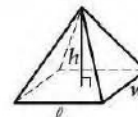
$$V = \pi r^2 h$$



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



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



$$V = \frac{1}{3}\ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.



1

A production manager sets a conveyor belt of an assembly line to move at a rate of 1 foot per second. At what rate does the conveyor belt move in feet per minute?

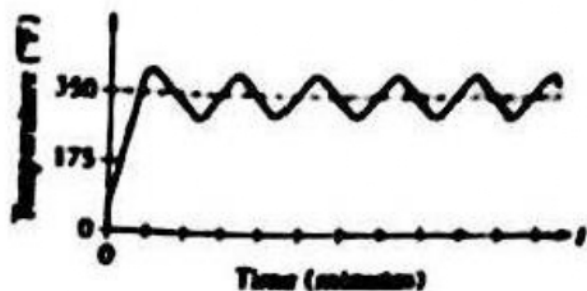
- A) 5
- B) 12
- C) 60
- D) 120

2

2) If  $\frac{3x}{4y} = \frac{9}{8}$  what is the value of  $\frac{x}{y}$  ?

- A)  $\frac{2}{3}$
- B)  $\frac{3}{4}$
- C)  $\frac{27}{32}$
- D)  $\frac{3}{2}$

3



The graph above represents the temperature of an oven  $t$  minutes after the oven temperature is set to 350°F. Based on the graph, which of the following best describes the oven temperature?

- A) The oven temperature rises and falls periodically around a temperature of 350°F
- B) The oven temperature rises at a positive exponential growth rate until it reaches a maximum temperature of 350°F
- C) The oven temperature rises to 350°F, and then it varies periodically between room temperature and 350°F
- D) The oven temperature reaches 350°F and remains constant.



4

A serving of apple provides 52 calories and 14 grams of carbohydrates, while a serving of banana provides 89 calories and 23 grams of carbohydrates. Which of the following combinations of apple and banana servings contains more than 250 calories but less than 75 grams of carbohydrates?

- A) 2 apple servings and 1 banana serving  
 B) 2 apple servings and 2 banana servings  
 C) 3 apple servings and 2 banana servings  
 D) 4 apple servings and 1 banana serving

5

Mode of Transportation to School

Grade	Walk	Bike	Bus	Car	Total
9th	24	16	46	18	104
10th	20	8	40	24	92
11th	11	8	32	38	89
12th	12	11	18	46	87
Total	67	43	136	126	372

The table above displays the results of a survey given to 372 students at a high school regarding their typical mode of transportation to school. What is the probability that a student selected at random uses a bus or car as his or her mode of transportation to school, given that the student is in the 11th grade?

- A)  $\frac{32}{89}$   
 B)  $\frac{70}{89}$   
 C)  $\frac{89}{372}$   
 D)  $\frac{262}{372}$

6

$$2(10ax - 9) = 2ax + 26$$

Based on the equation above, what is the value of  $1 - ax$ ?

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

7

A fabric salesperson receives 5 percent of the amount of each sale as commission. What is the salesperson's commission on a sale of 400 square yards of fabric selling for \$8 per square yard?

- A) \$160  
 B) \$200  
 C) \$320  
 D) \$1,600



8

For their practical exam in binary fission, a biology class at Central High School placed 50 bacteria cells in a culture dish in their laboratory. The number of cells of these bacteria doubles every 20 minutes. How many bacteria cells will be in the culture dish when 1 hour has passed?

- A) 800
- B) 400
- C) 200
- D) 150

9

Ellen would like to find the proportion of all houses in a large city that have a garage. Of the following, which sampling method would be the best in estimating this proportion?

- A) Research the 100 houses most recently sold in the city
- B) Randomly select a small area within the city and research the houses in that area
- C) Randomly select 10 houses from all of the houses in the city
- D) Randomly select 100 houses from all of the houses in the city

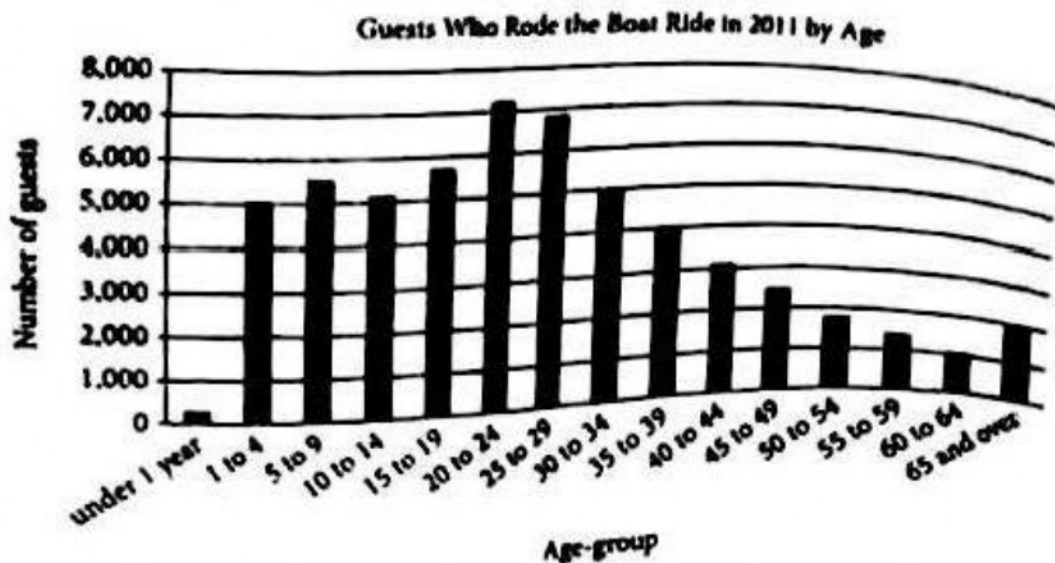
10

A radar gun was used to measure the speed of vehicles traveling along a highway. After all of the data were collected, it was found that the radar gun had been calibrated incorrectly and was reporting each speed as 3.9 miles per hour lower than the actual speed of the vehicles. Which of the following statistics will NOT change if the speeds are reported at their actual values?

- A) Mean
- B) Median
- C) Minimum
- D) Standard deviation



Questions 11-13 refer to the following information.



In 2011, the total number of guests who rode the boat ride at a small amusement park was 56,384. The bar graph above shows the distribution of the guests by age.

**11**

Of the following, which is closest to the ratio of the number of guests who rode the boat ride aged 60 to 64 to the number of guests who rode the boat ride aged 65 and over?

- A) 1 to 4
- B) 2 to 5
- C) 1 to 2
- D) 2 to 1

**12**

Which of the following age-groups is approximately 25% larger in number than the 65 and over group?

- A) 5 to 9
- B) 20 to 24
- C) 35 to 39
- D) 45 to 49

**13**

Which of the following ages could be the median age of the group of guests who rode the boat ride in 2011?

- A) 23
- B) 27
- C) 31
- D) 35



Questions 16 -19 refer to the following information

Mount Everest is the highest mountain on the planet. In 1999, the highest point on the mountain was measured to be 29,035 feet above sea level. Scientists believe that Mount Everest is still growing and estimate that the height of the mountain is increasing between 0.16 and 2.4 inches every year. (Note: 1 foot = 12 inches)

16

Based on the scientists' estimates, which of the following inequalities represents the height  $h$ , in feet, of Mount Everest 12 years after 1999?

- A)  $29,035 + 0.16 < h < 29,035 + 2.4$
- B)  $29,035 + 0.16 > h > 29,035 + 2.4$
- C)  $29,035 + 0.16h < 29,035 + 2.4h$
- D)  $29,035 + 0.16h > 29,035 + 2.4h$

17

Which of the following expressions represents the difference between the maximum and minimum predicted heights, in inches, of Mount Everest  $t$  years after 1999?

- A)  $2.24t$
- B)  $\frac{2.24t}{12}$
- C)  $29,035 + \frac{2.24t}{12}$
- D)  $29,035 + \frac{2.56t}{12}$

18

If the height of Mount Everest increases by 2.4 inches each year, how many years after 1999 would the mountain be expected to have a maximum height of 6 miles above sea level? (Note: 1 mile = 5,280 feet)

- A) 2,645 years
- B) 13,225 years
- C) 31,740 years
- D) 76,176 years

19

The base camp for Mount Everest climbers is 17,598 feet above sea level. The fastest anybody has climbed from base camp to the highest point on the mountain is 8 hours and 10 minutes. If  $T$  is the time, in minutes, it took this person to reach the highest point on the mountain from the base camp, what are the value and meaning of  $m$  in the equation  $17,598 + mT = 29,035$ ?

- A) The climbing distance from the base camp to the highest point on the mountain is 11,437 feet.
- B) The person took 490 minutes to make the climb.
- C) The person's height above sea level increased at an average rate of approximately 23 feet per minute.
- D) The slope of the mountain is about 11 vertical feet for every horizontal foot closer to the highest point.



20

Mandy is riding her bicycle at 44 feet per second. She reaches a downhill slope and accelerates at a constant rate, increasing her speed by 2 feet per second every 10 seconds. Which of the following expressions gives Mandy's speed, in feet per second,  $t$  seconds after she started accelerating?

- A)  $44 + 2t$   
 B)  $44 - 5t$   
 C)  $44 + \frac{t}{5}$   
 D)  $44 - \frac{t}{5}$

21

$$2x - \frac{1}{4}y = 15$$

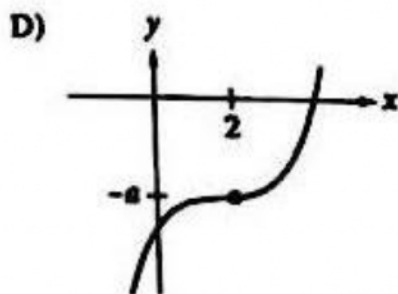
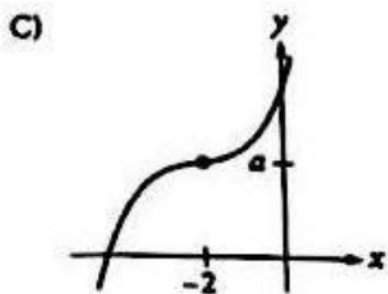
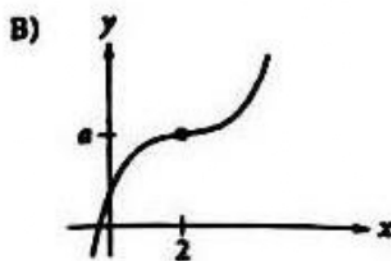
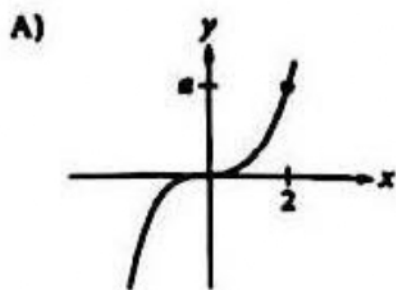
$$\frac{1}{2}x + y = 8$$

If  $(x, y)$  satisfies the system of equations above, what is the value of  $x$ ?

- A) 2  
 B) 6  
 C) 8  
 D) 10

22

Which of the following could be the graph of  $y = \frac{1}{4}(x - 2)^3 + a$  in the  $xy$ -plane, where  $a$  is a positive constant?







23

A company sells each phone it produces for \$200. The company has a fixed cost of \$800,000 to produce the phones plus a cost of \$80 for each phone produced. Which of the following functions best models the profit  $P$ , in dollars, made by the company for producing and selling  $n$  phones? (Profit is total sales minus total cost.)

- A)  $P(n) = 120^n - 800,000$   
 B)  $P(n) = 200^n - 80^n - 800,000$   
 C)  $P(n) = 120n - 800,000$   
 D)  $P(n) = 200n - 800,000$

24

Cara has  $f$  flasks in her chemistry lab. After discarding one-fourth of the flasks, she orders three new sets of flasks, each containing 4 flasks. After receiving the order, she has  $n$  flasks. Which of the following equations gives  $n$  in terms of  $f$ ?

- A)  $n = \frac{1}{4}f + 4$   
 B)  $n = \frac{1}{4}f + 12$   
 C)  $n = \frac{3}{4}f + 4$   
 D)  $n = \frac{3}{4}f + 12$

25

Depth $d$ (feet)	Pressure $p$ (pounds per square inch)
11	20
33	30

The table above gives the pressure on an object at two depths under the surface of a body of water. The formula  $p = a + kd$  gives the pressure  $p$ , in pounds per square inch, exerted on an object at depth  $d$ , in feet, where  $a$  and  $k$  are constants. What is the value of  $k$ ?

- A)  $\frac{5}{11}$   
 B)  $\frac{11}{5}$   
 C) 5  
 D) 11



26

In the  $xy$ -plane, what is the radius of the circle with center  $(5, 2)$  and  $y$ -intercepts  $(0, -10)$  and  $(0, 14)$ ?

- A) 10
- B) 12
- C) 13
- D) 14

27

What are all values of  $x$  for which  $\sqrt{x^2 - 5}$  is a real number?

- A)  $|x| \geq \sqrt{5}$
- B)  $|x| \leq \sqrt{5}$
- C)  $|x| \geq 5$
- D)  $|x| \leq 5$

28

The amount of money,  $A$ , in a bank account earning simple interest can be determined using the formula  $A = P + Prt$ , where  $P$  is the principal,  $r$  is the rate of interest earned, and  $t$  is the time in years. Which formula shows the value of the principal in terms of the account balance, rate of interest, and time?

A)  $P = \frac{A}{1 + rt}$

B)  $P = \frac{1 + rt}{A}$

C)  $P = \frac{A}{2rt}$

D)  $P = A - 2rt$



29

In a US census, it was reported that 82,921,961 people who were 3 years old or older were enrolled in some type of school. The table below shows the estimated percentages of those people enrolled in schools broken down by type of school and gender.

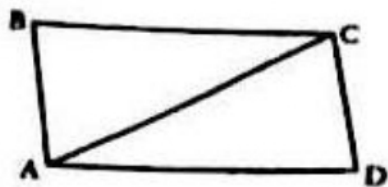
US School Enrollment of People  
3 Years Old and Older

	Male	Female
Population	40,806,514	42,115,447
Nursery school or preschool	6.4%	5.8%
Kindergarten through 12th grade	68.1%	62.5%
College, vocational, or graduate school	25.5%	31.7%
Total	100.0%	100.0%

To the nearest tenth of a percent, what percent of the total population enrolled in some type of school were males enrolled in college, vocational, or graduate school?

- A) 12.5%
- B) 12.8%
- C) 25.5%
- D) 44.6%

30



In the figure above,  $ABCD$  is a rectangle. Which of the following must be true?

- A)  $\sin(\angle ABC) = \cos(\angle ADC)$
- B)  $\sin(\angle ACB) = \cos(\angle CAD)$
- C)  $\sin(\angle BAC) = \cos(\angle ACD)$
- D)  $\sin(\angle BAC) = \cos(\angle CAD)$

**DIRECTIONS**

For questions 31–38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

- 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. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or 7/2. (If  $\begin{array}{|c|c|c|c|} \hline 3 & 1 & / & 2 \\ \hline \bullet & \bullet & \bullet & \bullet \\ \hline \end{array}$  is entered into the grid, 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 accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Answer:  $\frac{7}{12}$

Write answer in boxes. →

7	/	1	2
●	●	●	●
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

← Fraction line

Grid in result. →

Answer: 2.5

	2	.	5
●	●	●	●
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

← Decimal point

Acceptable ways to grid  $\frac{2}{3}$  are:

	2	/	3
●	●	●	●
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7

.	6	6	6
●	●	●	●
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7

.	6	6	7
●	●	●	●
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7

Answer: 201 – either position is correct

	2	0	1
●	●	●	●
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7

2	0	1	
●	●	●	●
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7

**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



31

The Silk Road was a 4000-mile trade route that connected China to Europe. To the nearest league, how long was the Silk Road?  
(Note: 1 league = 3 miles)

32

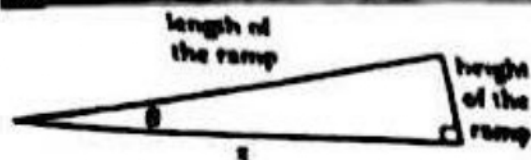
what is the slope of the line in the  $xy$ -plane with equation  $3x - 5y = 18$ ?

33

$$b^2 - 36 = ab$$

In the equation above, if  $a > 0$  and both  $a$  and  $b$  are integers, what is one possible value of  $a$ ?

34

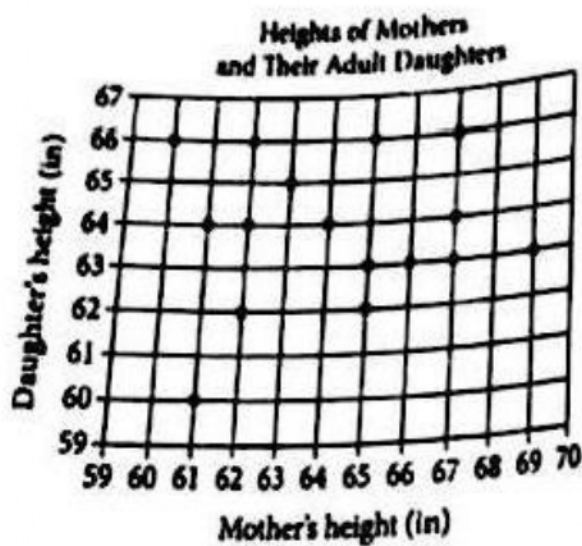


Note: Figure not drawn to scale.

According to a law, ramps for use by the general public must form an angle with level ground such that the tangent of the angle  $\theta$  is  $\frac{1}{12}$ . In the figure above, if the ramp conforms to the law and has a height of 1.5 feet, what is the value of  $x$ , in feet?



35



The scatterplot above shows the heights, in inches, of 16 randomly selected mothers and their adult daughters. What fraction of the mother-daughter pairs has a difference in height greater than 4 inches?

36

$$y = 0$$

$$y = x^2 + 6x + a$$

In the system of equation above,  $a$  is a positive constant. For which value of  $a$  does the system have exactly one real solution?

Questions 37 and 38 refer to the following information.

In a community garden, the ratio of tomato plants to pepper plants is 1:3, and the ratio of pepper plants to pea plants is 8:1. There are 6 pea plants in the garden.

37

How many tomato plants are in the garden?

38

Next year, there will be 25% more pepper plants in the garden. If each plant yields 4 peppers, how many peppers will there be?

## Jan. 2017 Answer Key

Section (3)		Section (4)			
1	D	1	C	21	C
2	B	2	D	22	B
3	A	3	A	23	C
4	B	4	B	24	D
5	D	5	B	25	A
6	A	6	B	26	C
7	D	7	A	27	A
8	A	8	B	28	A
9	A	9	D	29	A
10	C	10	D	30	D
11	A	11	C	31	1333
12	A	12	D	32	$\frac{3}{5}$ or .6
13	B	13	A	33	5, 9, 16 or 35
14	D	14	C	34	18
15	C	15	B	35	$\frac{1}{8}$ or .125
16	1	16	A	36	9
17	4	17	A	37	16
18	$\frac{9}{2}$ or 4.5 or 4	18	B	38	240
19	75	19	C		
20	19	20	C		