

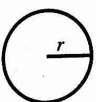
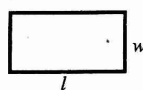
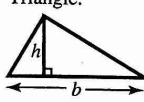
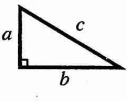
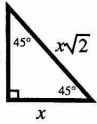
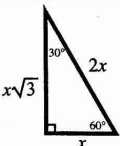
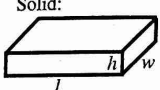

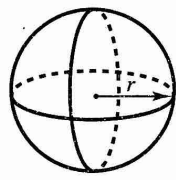
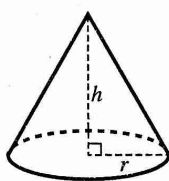
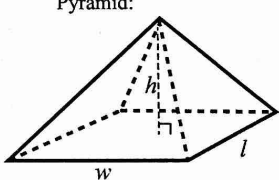
TURN TO SECTION 4 OF YOUR ANSWER SHEET TO ANSWER THE QUESTIONS IN THIS SECTION.

Directions: For questions 1–30, solve each problem, select the best answer from the choices provided, and fill in the corresponding oval on your answer sheet. For Questions 31–38, solve the problem and enter your answer in the grid on the answer sheet. The directions before Question 31 will provide information on how to enter your answers in the grid.

ADDITIONAL INFORMATION:

- 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 specified, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

Reference Information

<p>Circle:</p>  <p>$C = 2\pi r$ $A = \pi r^2$</p>	<p>Rectangle:</p>  <p>$A = lw$</p>	<p>Triangle:</p>  <p>$A = \frac{1}{2}bh$</p>  <p>$a^2 + b^2 = c^2$</p>  		
<p>Rectangular Solid:</p>  <p>$V = lwh$</p>	<p>Cylinder:</p>  <p>$V = \pi r^2 h$</p>	<p>Sphere:</p>  <p>$V = \frac{4}{3}\pi r^3$</p>	<p>Cone:</p>  <p>$V = \frac{1}{3}\pi r^2 h$</p>	<p>Rectangular Based Pyramid:</p>  <p>$V = \frac{1}{3}lwh$</p>

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

1 What is the total savings in purchasing thirty 13-cent lollipops for a class party at a reduced rate of \$1.38 per dozen?

- (A) \$0.35
- (B) \$0.40
- (C) \$0.45
- (D) \$0.50

2 If it costs \$1.30 a square foot to lay linoleum, what will be the cost of laying 20 square yards of linoleum? (3 ft. = 1 yd.)

- (A) \$26.00
- (B) \$78.00
- (C) \$156.00
- (D) \$234.00

3. Mary wants to determine the average height of the plants in her plant collection. She measures them and finds their heights are 8 inches, 7.5 inches, 11 inches, 6.5 inches, and 14 inches. What is the average height of her plants?
- (A) 8 inches
(B) 8.2 inches
(C) 9.4 inches
(D) 10.5 inches
4. A gallon of water is equal to 231 cubic inches. How many gallons of water are needed to fill a fish tank that measures 11" high, 14" long, and 9" wide?
- (A) 6
(B) 9
(C) 12
(D) 14
5. The recommended daily protein intake for an adult weighing 50 kg (approximately 110 pounds) is 40 grams. One cup of milk contains 8 grams of protein, and one egg contains 6 grams of protein. Which of the following inequalities represents the possible number of cups of milk, m , and eggs, n , an adult weighing 50 kg could consume in a day to meet or exceed the recommended daily protein intake from these alone?
- (A) $8m + 6n \geq 40$
(B) $8m + 6n > 40$
(C) $\frac{8}{m} + \frac{6}{n} \geq 40$
(D) $\frac{8}{m} + \frac{6}{n} > 40$
6. Amy is renting a moving van that charges \$19.99 per day, plus an additional \$0.15 per mile. A tax of 7.5% is applied to both the daily rate and the mileage rate. Which of the following represents the total charge, y , that Amy will pay to rent the van for one day and drive it x miles?
- (A) $y = 19.99 + 0.075x + 0.15$
(B) $y = 1.075(19.99) + 0.15x$
(C) $y = 1.075(19.99 + 0.15x)$
(D) $y = 1.075(19.99 + 0.15)x$
7. If nails are bought at 35 cents per dozen and sold at 3 for 10 cents, the total profit on $5\frac{1}{2}$ dozen is
- (A) 25 cents.
(B) $27\frac{1}{2}$ cents.
(C) $31\frac{1}{2}$ cents.
(D) 35 cents.
8. A cubic foot of concrete weighs approximately 150 pounds. How many pounds will a similar block of concrete weigh if the edges are twice as long?
- (A) 300 pounds
(B) 450 pounds
(C) 800 pounds
(D) 1200 pounds
9. Which of the following expressions is equivalent to $-x(3x - 2) + 2(3 - 2x)$?
- (A) $-3x^2 - 6x + 6$
(B) $-3x^2 - 2x + 6$
(C) $3x^2 - 6x + 6$
(D) $3x^2 - 2x + 6$

- 10 A local organization is giving away t-shirts for its 5-kilometer road race. The cost of the t-shirts is defined by the equation $C(x) = 7x + 60$. The organization gives away the t-shirts for free to people who sign up for the race more than one month in advance and pay the \$20 sign-up fee. What is the fewest number of people who must sign up in order for the organization to profit if the only cost is the t-shirts and the only income is the sign-up fee?

- (A) 3
(B) 5
(C) 13
(D) 20

- 11 A small college, which has a population of 2,180 students, recently held a fundraiser in which each male student raised \$20, and each female student raised \$25 each. Together, they raised a total of \$50,000. If x represents the number of male students in the college and y represents the number of female students in the college, which system of equations can be used to represent the scenario?

$x + y = 50,000$
(A) $20x + 25y = 2180$

$x + y = 2180$
(B) $20x + 25y = 50,000$

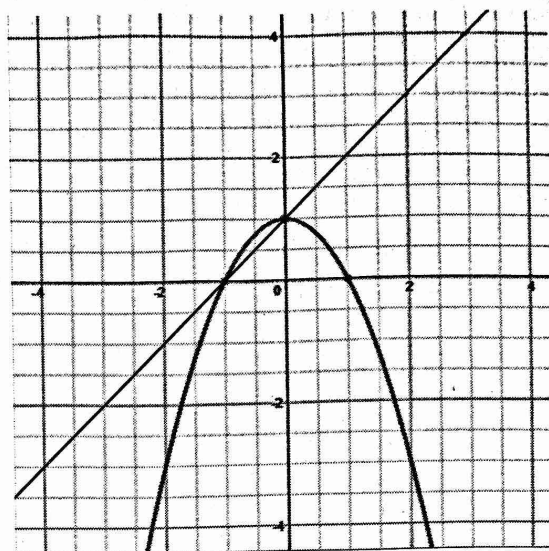
$x + y = 2180$
(C) $25x + 20y = 50,000$

$x + y = 50,000$
(D) $25x + 20y = 50,000$

- 12 Which of the following is an expression equivalent to $\sqrt[3]{9x^3y^5z^6}$?

- (A) $3y^2z^3$
(B) $3xy^2z^3$
(C) $9^{\frac{1}{3}}xy^2z^3$
(D) $9^{\frac{1}{3}}xy^{\frac{5}{3}}z^2$

13



$y = x + 1$

$y = x^2 + 1$

A system of equations and their graphs is shown above. Which of the following are solutions to the system?

- I. (0, 1)
II. (1, 0)
III. (-1, 0)
IV. (0, -1)

- (A) I only
(B) II only
(C) I and III only
(D) II and IV only

- 14 If $\frac{x}{3} - \frac{y}{4} = 5$, what is the value of $6y - 8x$?

- (A) -120
(B) -60
(C) 60
(D) 120

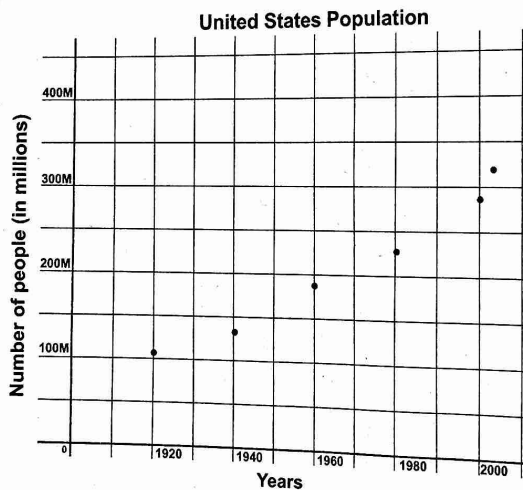
- 15** At a restaurant, the rates for meals are \$7.50 for a lunch and \$12.00 for a dinner. One weekend, the restaurant sold a total of 241 meals for \$2523.00. Which of the following systems of equations can be used to determine the number of lunches, x , and the number of dinners, y , that the restaurant sold?

(A)
$$\begin{aligned} 7.5x + 12y &= 241 \\ x + y &= 2523 \end{aligned}$$

(B)
$$\begin{aligned} 12x + 7.5y &= 241 \\ x + y &= 2523 \end{aligned}$$

(C)
$$\begin{aligned} 7.5x + 12y &= 2523 \\ x + y &= 241 \end{aligned}$$

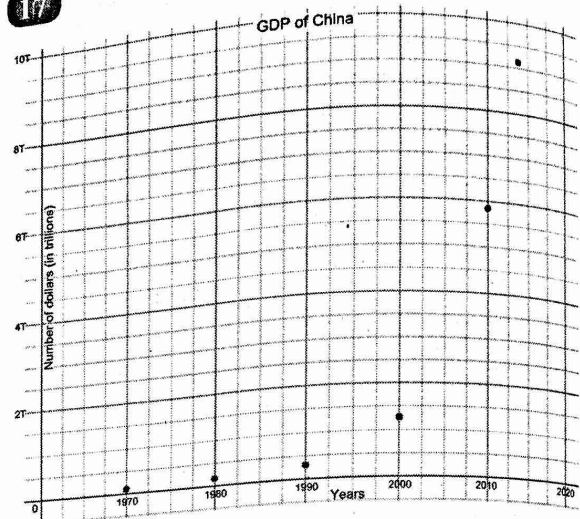
(D)
$$\begin{aligned} 12x + 7.5y &= 2523 \\ x + y &= 241 \end{aligned}$$

16

The graph shows data representing the population of the United States, where x represents the year, and y represents the number of people, in millions. Which of the following statements is true about the data shown on the graph?

- (A) There is a weak correlation between the variables.
 (B) There is a strong correlation between the variables.
 (C) There is no clear correlation between the variables.
 (D) There is an exponential correlation between the variables.

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17

The graph shows data representing the gross domestic product (GDP), in trillions of dollars, of China from 1980 through 2013. Which of the following statements best describes the type of function which would represent the data?

- (A) A linear function would best represent this data.
 (B) A logarithmic function would best represent this data.
 (C) A cubic function would best represent this data.
 (D) An exponential function would best represent this data.

18

A college graduate goes to work for x dollars per week. After several months, the company gives all the employees a 10% pay cut. A few months later, the company gives all the employees a 10% raise. What is the college graduate's new salary?

- (A) $0.90x$
 (B) $0.99x$
 (C) x
 (D) $1.01x$

19 $y < -x + b$

$y > x - c$

In the xy -plane, if $(1, 1)$ is a solution to the system of inequalities above, which of the following relationships between b and c must be true?

- (A) $b > c$
- (B) $c > b$
- (C) $|b| > |c|$
- (D) $|c| > |b|$

20 If four triangles are constructed with side lengths indicated below, which triangle will NOT be a right triangle?

- (A) 5-12-13
- (B) 8-15-17
- (C) 9-40-41
- (D) 12-15-18

21 What is the original price of an item if it costs \$12.60 at a 10% discount off the selling price?

- (A) \$11.34
- (B) \$12.48
- (C) \$13.86
- (D) \$14.00

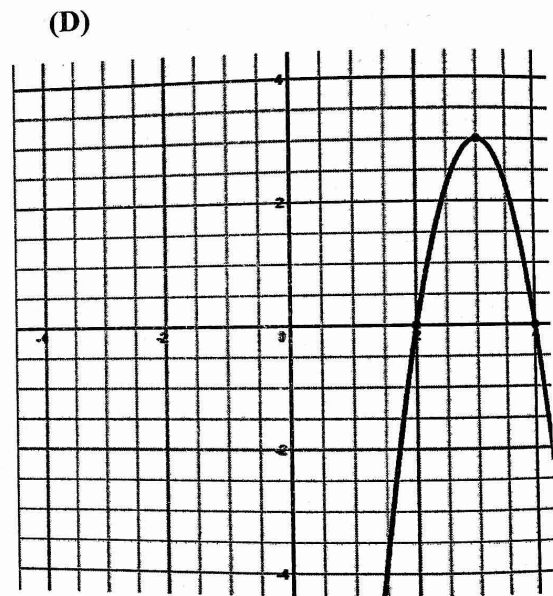
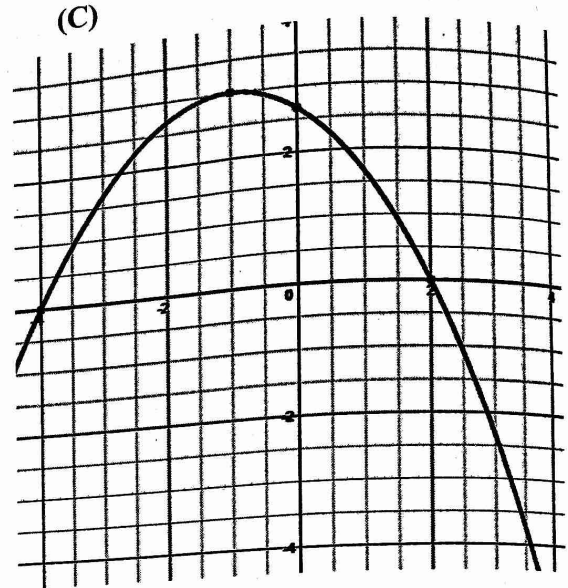
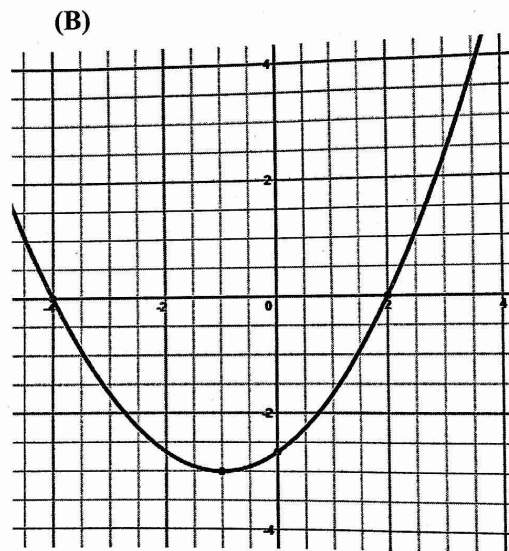
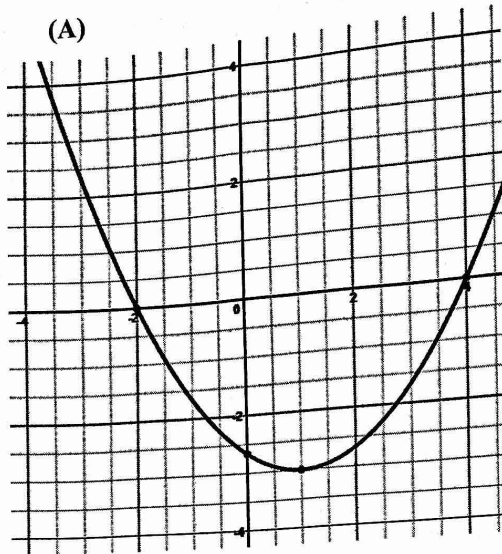
22 A recipe for a homemade weed killer calls for $1\frac{1}{3}$ gallons of white vinegar and 2 cups of table salt. Miguel made a large batch of the weed killer and used 7 cups of table salt. If he followed the recipe correctly, how many gallons of white vinegar did he use?

- (A) 4
- (B) $4\frac{2}{3}$
- (C) $5\frac{1}{3}$
- (D) 6

23 A circle has a circumference that is equal to the perimeter of a hexagon. The sides of the hexagon are each 22 inches long. Which of the following is closest to the length of the radius of the circle?

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

- 24 If $(x-4)$ and $(x+2)$ are factors of $f(x)$, which of the following graphs could represent the function $f(x)$?



25

	None	1 to 3	4 or more
Group A	8	23	19
Group B	14	21	5
Total	22	44	24

The data in the table above were produced by demographic researchers studying the number of living siblings people have. If a person is chosen at random from Group A, what is the probability that the person has no living siblings?

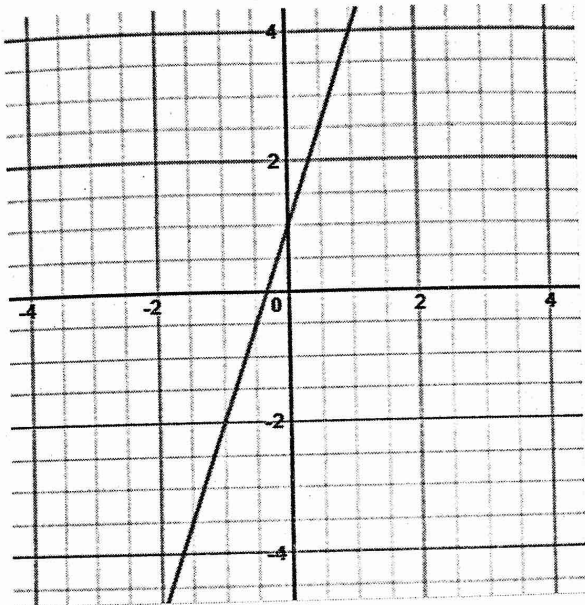
- (A) $\frac{4}{25}$
 (B) $\frac{4}{11}$
 (C) $\frac{7}{11}$
 (D) $\frac{22}{25}$

26 During the Apollo 14 mission, astronaut Alan Shepard hit a golf ball on the moon. The height of the ball in meters is modeled by the function $f(t) = -0.81t^2 + 55t + 0.02$, where t is the time in seconds after the ball was hit. What does 0.02 stand for in this equation?

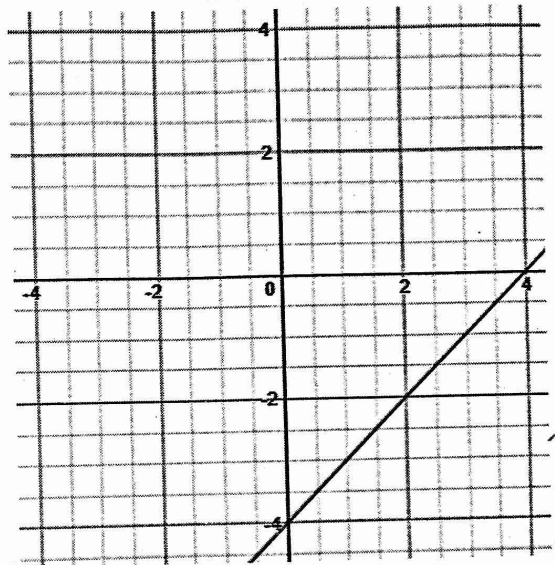
- (A) Acceleration of the ball due to gravity
- (B) Vertical velocity of the ball
- (C) Horizontal velocity of the ball
- (D) Height of the ball before it is hit

27 If k is a positive constant other than 1, which of the following could be the graph of $kx + y = c$?

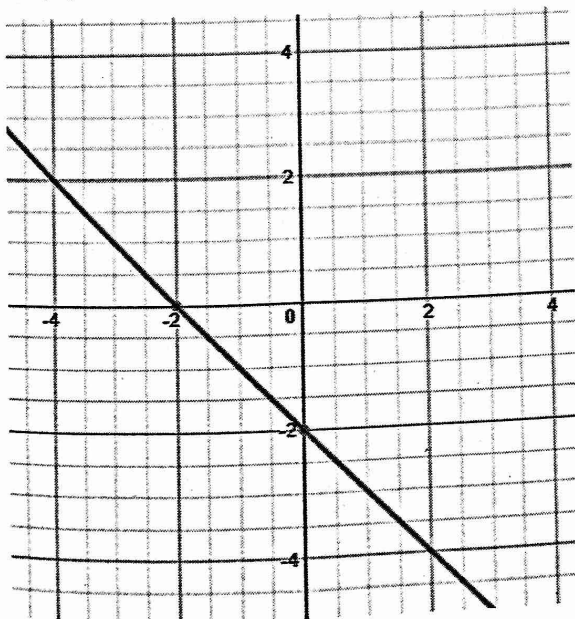
(A)



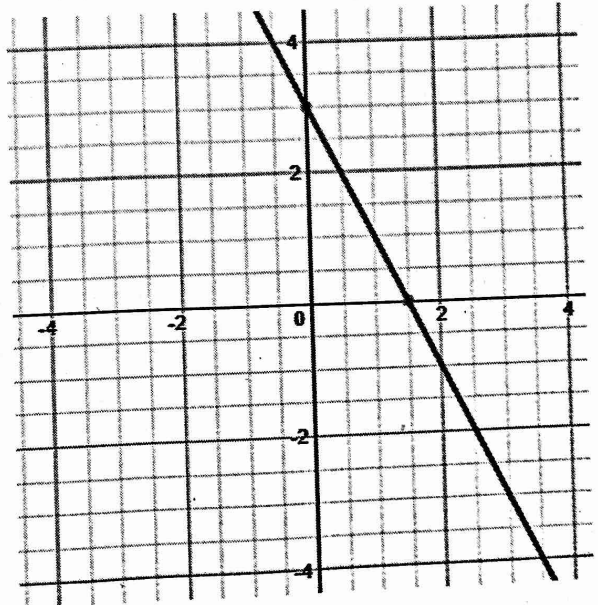
(C)



(B)



(D)





- 28 The Cyber Corporation buys a new machine for \$80,000. If the machine loses 15% of its value each year, what is its value after 4 years?

- (A) \$41,760.50
- (B) \$42,750.50
- (C) \$48,000.00
- (D) \$49,130.00

- 29 The table below shows the total number of medals won by the United States in the last 6 Winter Olympics.

	1994	1998	2002	2006	2010	2014
Number of Medals	12	13	31	25	37	28

How many medals will the United States have to win in the 2018 Winter Olympics in order to increase the average number of medals won by 1?

- (A) 29
- (B) 31
- (C) 32
- (D) 36

- 30 If the expression $\frac{6x}{2x+4}$ is written in the form $3 + \frac{A}{x+2}$, what is the value of A ?

- (A) -12
- (B) -6
- (C) 6
- (D) 12

- 31 What is the value of b in the equation $(3x - 4)(2 - 5x) = ax^2 + bx + c$?



- 33 In a 3-hour examination of 350 questions, there are 50 mathematical problems. If twice as much time should be allowed for each mathematical problem as for each of the other questions, how many minutes should be spent on the mathematical problems?

- 32 If $-\frac{1}{4} < -2p + 4 < \frac{3}{4}$, what is one possible value for p ?

- 34 In the 1924–25 season of the National Hockey League (NHL), the Montreal Canadiens won 57% of their games. During the 1947–48 season, they won 33% of their games. If there were twice as many games played in the 1947–48 season as in the 1924–25 season, what percentage of the games did the Montreal Canadiens win in these two seasons of the league? (Do not grid the percentage sign.)



35 A polling company surveys 625 randomly selected registered voters to determine whether a proposed ballot measure might pass. Of those surveyed, 400 voters were in favor of the ballot measure. The polling company reports that the poll results have a conservative margin of error of 4%. If 9000 people actually vote, what is the minimum number of people likely to vote for the ballot measure?

37

$$3x + y = -4$$
$$x + y = 13$$

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

36 The average weight of a medium-sized bottlenose dolphin is 400 pounds. If a particular medium-sized bottlenose dolphin weighs 110% of the average, then how many pounds does the dolphin weigh?

38

$$-3x + 2 = -1$$
$$6x - by = 8$$

What is the value for b that will make the system above have no solution?