



18

$$y < -x + a$$

$$y > x + b$$

In the  $xy$ -plane, if  $(0, 0)$  is a solution to the system of inequalities above, which of the following relationships between  $a$  and  $b$  must be true?

- A)  $a > b$
- B)  $b > a$
- C)  $|a| > |b|$
- D)  $a = -b$

19

A food truck sells salads for \$6.50 each and drinks for \$2.00 each. The food truck's revenue from selling a total of 209 salads and drinks in one day was \$836.50. How many salads were sold that day?

- A) 77
- B) 93
- C) 99
- D) 105



19

At a lunch stand, each hamburger has 50 more calories than each order of fries. If 2 hamburgers and 3 orders of fries have a total of 1700 calories, how many calories does a hamburger have?

20

In triangle  $ABC$ , the measure of  $\angle B$  is  $90^\circ$ ,  $BC = 16$ , and  $AC = 20$ . Triangle  $DEF$  is similar to triangle  $ABC$ , where vertices  $D$ ,  $E$ , and  $F$  correspond to vertices  $A$ ,  $B$ , and  $C$ , respectively, and each side of triangle  $DEF$  is  $\frac{1}{3}$  the length of the corresponding side of triangle  $ABC$ . What is the value of  $\sin F$  ?

**STOP**

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**



4

If  $3(c + d) = 5$ , what is the value of  $c + d$  ?

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

5

The weight of an object on Venus is approximately  $\frac{9}{10}$  of its weight on Earth. The weight of an object on Jupiter is approximately  $\frac{23}{10}$  of its weight on Earth. If an object weighs 100 pounds on Earth, approximately how many more pounds does it weigh on Jupiter than it weighs on Venus?

- A) 90
- B) 111
- C) 140
- D) 230

6

An online bookstore sells novels and magazines. Each novel sells for \$4, and each magazine sells for \$1. If Sadie purchased a total of 11 novels and magazines that have a combined selling price of \$20, how many novels did she purchase?

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



10

Between 1497 and 1500, Amerigo Vespucci embarked on two voyages to the New World. According to Vespucci's letters, the first voyage lasted 43 days longer than the second voyage, and the two voyages combined lasted a total of 1,003 days. How many days did the second voyage last?

- A) 460  
 B) 480  
 C) 520  
 D) 540

11

$$7x + 3y = 8$$

$$6x - 3y = 5$$

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

- A)  $-\frac{4}{3}$   
 B)  $\frac{2}{3}$   
 C)  $\frac{4}{3}$   
 D)  $\frac{22}{3}$

10	100
11	110
12	120
13	130
14	140
15	150
16	160
17	170
18	180
19	190
20	200
21	210
22	220
23	230
24	240
25	250
26	260
27	270
28	280
29	290
30	300



1

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

- A) 2
- B) 4
- C) 9
- D) 10

2

For  $i = \sqrt{-1}$ , what is the sum  $(7 + 3i) + (-8 + 9i)$ ?

- A)  $-1 + 12i$
- B)  $-1 - 6i$
- C)  $15 + 12i$
- D)  $15 - 6i$

3

On Saturday afternoon, Armand sent  $m$  text messages each hour for 5 hours, and Tyrone sent  $p$  text messages each hour for 4 hours. Which of the following represents the total number of messages sent by Armand and Tyrone on Saturday afternoon?

- A)  $9mp$
- B)  $20mp$
- C)  $5m + 4p$
- D)  $4m + 5p$

4

Kathy is a repair technician for a phone company. Each week, she receives a batch of phones that need repairs. The number of phones that she has left to fix at the end of each day can be estimated with the equation  $P = 108 - 23d$ , where  $P$  is the number of phones left and  $d$  is the number of days she has worked that week. What is the meaning of the value 108 in this equation?

- A) Kathy will complete the repairs within 108 days.
- B) Kathy starts each week with 108 phones to fix.
- C) Kathy repairs phones at a rate of 108 per hour.
- D) Kathy repairs phones at a rate of 108 per day.



20

Alma bought a laptop computer at a store that gave a 20 percent discount off its original price. The total amount she paid to the cashier was  $p$  dollars, including an 8 percent sales tax on the discounted price. Which of the following represents the original price of the computer in terms of  $p$ ?

- A)  $0.88p$
- B)  $\frac{p}{0.88}$
- C)  $(0.8)(1.08)p$
- D)  $\frac{p}{(0.8)(1.08)}$

21

Dreams Recalled during One Week

	None	1 to 4	5 or more	Total
Group X	15	28	57	100
Group Y	21	11	68	100
Total	36	39	125	200

The data in the table above were produced by a sleep researcher studying the number of dreams people recall when asked to record their dreams for one week. Group X consisted of 100 people who observed early bedtimes, and Group Y consisted of 100 people who observed later bedtimes. If a person is chosen at random from those who recalled at least 1 dream, what is the probability that the person belonged to Group Y?

- A)  $\frac{68}{100}$
- B)  $\frac{79}{100}$
- C)  $\frac{79}{164}$
- D)  $\frac{164}{200}$



Feeding Information for Boarded Pets

	Fed only dry food	Fed both wet and dry food	Total
Cats	5	11	16
Dogs	2	23	25
Total	7	34	41

The table above shows the kinds of foods that are fed to the cats and dogs currently boarded at a pet care facility. What fraction of the dogs are fed only dry food?

- A)  $\frac{2}{41}$   
 B)  $\frac{2}{25}$   
 C)  $\frac{7}{41}$   
 D)  $\frac{2}{7}$

$$(x^2 - 3) - (-3x^2 + 5)$$

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

- A)  $4x^2 - 8$   
 B)  $4x^2 - 2$   
 C)  $-2x^2 - 8$   
 D)  $-2x^2 - 2$

3

A certain package requires 3 centimeters of tape to be closed securely. What is the maximum number of packages of this type that can be secured with 6 meters of tape? (1 meter = 100 cm)

- A) 100  
 B) 150  
 C) 200  
 D) 300

1

A market researcher selected 200 people at random from a group of people who indicated that they liked a certain book. The 200 people were shown a movie based on the book and then asked whether they liked or disliked the movie. Of those surveyed, 95% said they disliked the movie. Which of the following inferences can appropriately be drawn from this survey result?

- A) At least 95% of people who go see movies will dislike this movie.  
 B) At least 95% of people who read books will dislike this movie.  
 C) Most people who dislike this book will like this movie.  
 D) Most people who like this book will dislike this movie.



6

Where Do People Get Most of Their Medical Information?

Source	Percent of those surveyed
Doctor	63%
Internet	13%
Magazines/brochures	9%
Pharmacy	6%
Television	2%
Other/none of the above	7%

The table above shows a summary of 1,200 responses to a survey question. Based on the table, how many of those surveyed get most of their medical information from either a doctor or the Internet?

- A) 865
- B) 887
- C) 912
- D) 926

7

The members of a city council wanted to assess the opinions of all city residents about converting an open field into a dog park. The council surveyed a sample of 500 city residents who own dogs. The survey showed that the majority of those sampled were in favor of the dog park. Which of the following is true about the city council's survey?

- A) It shows that the majority of city residents are in favor of the dog park.
- B) The survey sample should have included more residents who are dog owners.
- C) The survey sample should have consisted entirely of residents who do not own dogs.
- D) The survey sample is biased because it is not representative of all city residents.



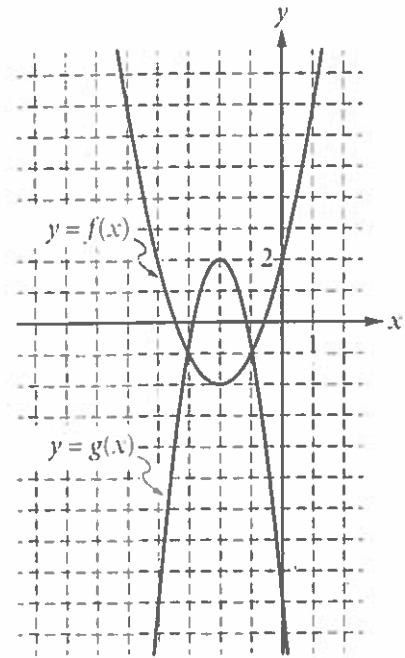


15

In order to determine if treatment X is successful in improving eyesight, a research study was conducted. From a large population of people with poor eyesight, 300 participants were selected at random. Half of the participants were randomly assigned to receive treatment X, and the other half did not receive treatment X. The resulting data showed that participants who received treatment X had significantly improved eyesight as compared to those who did not receive treatment X. Based on the design and results of the study, which of the following is an appropriate conclusion?

- A) Treatment X is likely to improve the eyesight of people who have poor eyesight.
- B) Treatment X improves eyesight better than all other available treatments.
- C) Treatment X will improve the eyesight of anyone who takes it.
- D) Treatment X will cause a substantial improvement in eyesight.

16



Graphs of the functions  $f$  and  $g$  are shown in the  $xy$ -plane above. For which of the following values of  $x$  does  $f(x) + g(x) = 0$ ?

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



25

Population of Greenleaf, Idaho

Year	Population
2000	862
2010	846

The table above shows the population of Greenleaf, Idaho, for the years 2000 and 2010. If the relationship between population and year is linear, which of the following functions  $P$  models the population of Greenleaf  $t$  years after 2000?

- A)  $P(t) = 862 - 1.6t$
- B)  $P(t) = 862 - 16t$
- C)  $P(t) = 862 + 16(t - 2,000)$
- D)  $P(t) = 862 - 1.6(t - 2,000)$

26

To determine the mean number of children per household in a community, Tabitha surveyed 20 families at a playground. For the 20 families surveyed, the mean number of children per household was 2.4. Which of the following statements must be true?

- A) The mean number of children per household in the community is 2.4.
- B) A determination about the mean number of children per household in the community should not be made because the sample size is too small.
- C) The sampling method is flawed and may produce a biased estimate of the mean number of children per household in the community.
- D) The sampling method is not flawed and is likely to produce an unbiased estimate of the mean number of children per household in the community.



22

Which of the following is closest to the percent increase in the billions of pounds of plastic produced in the United States from 2000 to 2003?

- A) 10%
- B) 44%
- C) 77%
- D) 110%

23

$$M = 1,800(1.02)^t$$

The equation above models the number of members,  $M$ , of a gym  $t$  years after the gym opens. Of the following, which equation models the number of members of the gym  $q$  quarter years after the gym opens?

- A)  $M = 1,800(1.02)^{\frac{q}{4}}$
- B)  $M = 1,800(1.02)^{4q}$
- C)  $M = 1,800(1.005)^{4q}$
- D)  $M = 1,800(1.082)^q$

24

For the finale of a TV show, viewers could use either social media or a text message to vote for their favorite of two contestants. The contestant receiving more than 50% of the vote won. An estimated 10% of the viewers voted, and 30% of the votes were cast on social media. Contestant 2 earned 70% of the votes cast using social media and 40% of the votes cast using a text message. Based on this information, which of the following is an accurate conclusion?

- A) If all viewers had voted, Contestant 2 would have won.
- B) Viewers voting by social media were likely to be younger than viewers voting by text message.
- C) If all viewers who voted had voted by social media instead of by text message, Contestant 2 would have won.
- D) Viewers voting by social media were more likely to prefer Contestant 2 than were viewers voting by text message.



20

What is the sum of the solutions to  $(x - 6)(x + 0.7) = 0$  ?

- A) -6.7
- B) -5.3
- C) 5.3
- D) 6.7

21

A study was done on the weights of different types of fish in a pond. A random sample of fish were caught and marked in order to ensure that none were weighed more than once. The sample contained 150 largemouth bass, of which 30% weighed more than 2 pounds. Which of the following conclusions is best supported by the sample data?

- A) The majority of all fish in the pond weigh less than 2 pounds.
- B) The average weight of all fish in the pond is approximately 2 pounds.
- C) Approximately 30% of all fish in the pond weigh more than 2 pounds.
- D) Approximately 30% of all largemouth bass in the pond weigh more than 2 pounds.

22

Number of States with 10 or More Electoral Votes in 2008

Electoral votes	Frequency
10	4
11	4
12	1
13	1
15	3
17	1
20	1
21	2
27	1
31	1
34	1
55	1

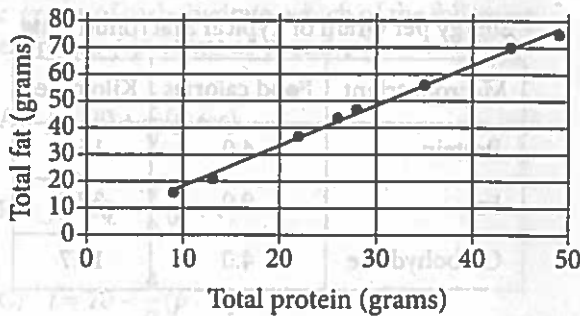
In 2008, there were 21 states with 10 or more electoral votes, as shown in the table above. Based on the table, what was the median number of electoral votes for the 21 states?

- A) 13
- B) 15
- C) 17
- D) 20



21

Total Protein and Total Fat  
for Eight Sandwiches



The scatterplot above shows the numbers of grams of both total protein and total fat for eight sandwiches on a restaurant menu. The line of best fit for the data is also shown. According to the line of best fit, which of the following is closest to the predicted increase in total fat, in grams, for every increase of 1 gram in total protein?

- A) 2.5
- B) 2.0
- C) 1.5
- D) 1.0

The world's population has grown at an average rate of 1.9 percent per year since 1945. There were approximately 4 billion people in the world in 1975. Which of the following functions represents the world's population,  $P$ , in billions of people,  $t$  years since 1975? (1 billion = 1,000,000,000)

- A)  $P(t) = 4(1.019)^t$
- B)  $P(t) = 4(1.9)^t$
- C)  $P(t) = 1.19 \cdot 4^t$
- D)  $P(t) = 1.019 \cdot 4^t$

22

Percent of Residents Who Earned  
a Bachelor's Degree or Higher

State	Percent of residents
State A	21.9%
State B	27.9%
State C	25.9%
State D	19.5%
State E	30.1%
State F	36.4%
State G	35.5%

A survey was given to residents of all 50 states asking if they had earned a bachelor's degree or higher. The results from 7 of the states are given in the table above. The median percent of residents who earned a bachelor's degree or higher for all 50 states was 26.95%. What is the difference between the median percent of residents who earned a bachelor's degree or higher for these 7 states and the median for all 50 states?

- A) 0.05%
- B) 0.95%
- C) 1.22%
- D) 7.45%



27

In the  $xy$ -plane, the point  $(p, r)$  lies on the line with equation  $y = x + b$ , where  $b$  is a constant. The point with coordinates  $(2p, 5r)$  lies on the line with equation  $y = 2x + b$ . If  $p \neq 0$ , what is the value of  $\frac{r}{p}$ ?

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

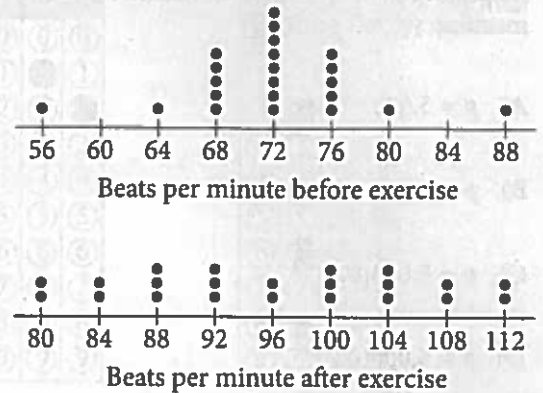
B)  $\frac{3}{4}$

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

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

28

The 22 students in a health class conducted an experiment in which they each recorded their pulse rates, in beats per minute, before and after completing a light exercise routine. The dot plots below display the results.

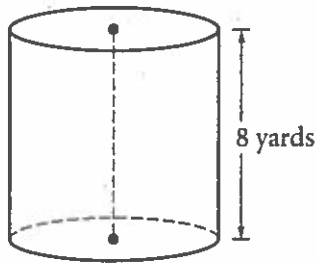


Let  $s_1$  and  $r_1$  be the standard deviation and range, respectively, of the data before exercise, and let  $s_2$  and  $r_2$  be the standard deviation and range, respectively, of the data after exercise. Which of the following is true?

- A)  $s_1 = s_2$  and  $r_1 = r_2$   
 B)  $s_1 < s_2$  and  $r_1 < r_2$   
 C)  $s_1 > s_2$  and  $r_1 > r_2$   
 D)  $s_1 \neq s_2$  and  $r_1 = r_2$



35



A dairy farmer uses a storage silo that is in the shape of the right circular cylinder above. If the volume of the silo is  $72\pi$  cubic yards, what is the diameter of the base of the cylinder, in yards?

36

$$h(x) = \frac{1}{(x-5)^2 + 4(x-5) + 4}$$

For what value of  $x$  is the function  $h$  above undefined?

Questions 37 and 38 refer to the following information.

Jessica opened a bank account that earns 2 percent interest compounded annually. Her initial deposit was \$100, and she uses the expression  $\$100(x)^t$  to find the value of the account after  $t$  years.

37

What is the value of  $x$  in the expression?

38

Jessica's friend Tyshaun found an account that earns 2.5 percent interest compounded annually. Tyshaun made an initial deposit of \$100 into this account at the same time Jessica made a deposit of \$100 into her account. After 10 years, how much more money will Tyshaun's initial deposit have earned than Jessica's initial deposit? (Round your answer to the nearest cent and ignore the dollar sign when gridding your response.)

# STOP

If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.



26

If the 180 food calories in a granola bar come entirely from  $p$  grams of protein,  $f$  grams of fat, and  $c$  grams of carbohydrate, which of the following expresses  $f$  in terms of  $p$  and  $c$ ?

A)  $f = 20 + \frac{4}{9}(p + c)$

B)  $f = 20 - \frac{4}{9}(p + c)$

C)  $f = 20 - \frac{4}{9}(p - c)$

D)  $f = 20 + \frac{9}{4}(p + c)$

27

The world's population has grown at an average rate of 1.9 percent per year since 1945. There were approximately 4 billion people in the world in 1975. Which of the following functions represents the world's population  $P$ , in billions of people,  $t$  years since 1975? (1 billion = 1,000,000,000)

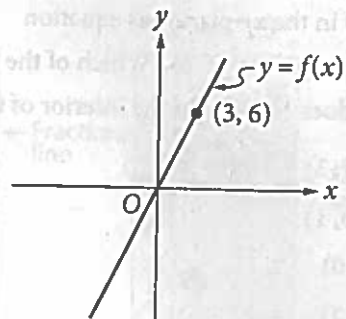
A)  $P(t) = 4(1.019)^t$

B)  $P(t) = 4(1.9)^t$

C)  $P(t) = 1.19t + 4$

D)  $P(t) = 1.019t + 4$

28



In the  $xy$ -plane above, a point (not shown) with coordinates  $(s, t)$  lies on the graph of the linear function  $f$ . If  $s$  and  $t$  are positive integers, what is the ratio of  $t$  to  $s$ ?

A) 1 to 3

B) 1 to 2

C) 2 to 1

D) 3 to 1





26

In the  $xy$ -plane, the line determined by the points  $(2, k)$  and  $(k, 32)$  passes through the origin. Which of the following could be the value of  $k$ ?

- A) 0
- B) 4
- C) 8
- D) 16

27

A rectangle was altered by increasing its length by 10 percent and decreasing its width by  $p$  percent. If these alterations decreased the area of the rectangle by 12 percent, what is the value of  $p$ ?

- A) 12
- B) 15
- C) 20
- D) 22

28

In planning maintenance for a city's infrastructure, a civil engineer estimates that, starting from the present, the population of the city will decrease by 10 percent every 20 years. If the present population of the city is 50,000, which of the following expressions represents the engineer's estimate of the population of the city  $t$  years from now?

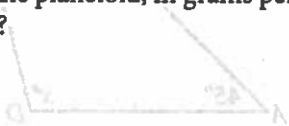
- A)  $50,000(0.1)^{20t}$
- B)  $50,000(0.1)^{\frac{t}{20}}$
- C)  $50,000(0.9)^{20t}$
- D)  $50,000(0.9)^{\frac{t}{20}}$



8

An astronomer has discovered a new planetoid about 1.2 AU from the Sun. According to the line of best fit, which of the following best approximates the density of the planetoid, in grams per cubic centimeter?

- A) 3.6  
B) 4.1  
C) 4.6  
D) 5.5



10

Lani spent 15% of her 8-hour workday in meetings. How many minutes of her workday did she spend in meetings?

- A) 1.2  
B) 15  
C) 48  
D) 72

9

$$9ax + 9b - 6 = 21$$

Based on the equation above, what is the value of  $ax + b$  ?

- A) 3  
B) 6  
C) 8  
D) 12

11

A software company is selling a new game in a standard edition and a collector's edition. The box for the standard edition has a volume of 20 cubic inches, and the box for the collector's edition has a volume of 30 cubic inches. The company receives an order for 75 copies of the game, and the total volume of the order to be shipped is 1,870 cubic inches.

Which of the following systems of equations can be used to determine the number of standard edition games,  $s$ , and collector's edition games,  $c$ , that were ordered?

- A)  $75 - s = c$   
 $20s + 30c = 1,870$
- B)  $75 - s = c$   
 $30s + 20c = 1,870$
- C)  $s - c = 75$   
 $25(s + c) = 1,870$
- D)  $s - c = 75$   
 $30s + 20c = 1,870$



7

If  $\frac{3}{5}w = \frac{4}{3}$ , what is the value of  $w$ ?

- A)  $\frac{9}{20}$
- B)  $\frac{4}{5}$
- C)  $\frac{5}{4}$
- D)  $\frac{20}{9}$

8

The average number of students per classroom at Central High School from 2000 to 2010 can be modeled by the equation  $y = 0.56x + 27.2$ , where  $x$  represents the number of years since 2000, and  $y$  represents the average number of students per classroom. Which of the following best describes the meaning of the number 0.56 in the equation?

- A) The total number of students at the school in 2000
- B) The average number of students per classroom in 2000
- C) The estimated increase in the average number of students per classroom each year
- D) The estimated difference between the average number of students per classroom in 2010 and in 2000

9

Nate walks 25 meters in 13.7 seconds. If he walks at this same rate, which of the following is closest to the distance he will walk in 4 minutes?

- A) 150 meters
- B) 450 meters
- C) 700 meters
- D) 1,400 meters



31

There are two atoms of hydrogen and one atom of oxygen in one molecule of water. How many atoms of hydrogen are there in 51 molecules of water?

32

$$x - \frac{1}{2}a = 0$$

If  $x = 1$  in the equation above, what is the value of  $a$ ?

33

In the  $xy$ -plane, the equations  $x + 2y = 10$  and  $3x + 6y = c$  represent the same line for some constant  $c$ . What is the value of  $c$ ?

34

On April 18, 1775, Paul Revere set off on his midnight ride from Charlestown to Lexington. If he had ridden straight to Lexington without stopping, he would have traveled 11 miles in 26 minutes. In such a ride, what would the average speed of his horse have been, to the nearest tenth of a mile per hour?



7

The Downtown Business Association (DBA) in a certain city plans to increase its membership by a total of  $n$  businesses per year. There were  $b$  businesses in the DBA at the beginning of this year. Which function best models the total number of businesses,  $y$ , the DBA plans to have as members  $x$  years from now?

- A)  $y = nx + b$
- B)  $y = nx - b$
- C)  $y = b(n)^x$
- D)  $y = n(b)^x$

8

Which of the following is an equivalent form of  $(1.5x - 2.4)^2 - (5.2x^2 - 6.4)$  ?

- A)  $-2.2x^2 + 1.6$
- B)  $-2.2x^2 + 11.2$
- C)  $-2.95x^2 - 7.2x + 12.16$
- D)  $-2.95x^2 - 7.2x + 0.64$

9

In the 1908 Olympic Games, the Olympic marathon was lengthened from 40 kilometers to approximately 42 kilometers. Of the following, which is closest to the increase in the distance of the Olympic marathon, in miles? (1 mile is approximately 1.6 kilometers.)

- A) 1.00
- B) 1.25
- C) 1.50
- D) 1.75



24

Which of the following is an equation of a circle in the  $xy$ -plane with center  $(0, 4)$  and a radius with endpoint  $\left(\frac{4}{3}, 5\right)$ ?

- A)  $x^2 + (y - 4)^2 = \frac{25}{9}$   
 B)  $x^2 + (y + 4)^2 = \frac{25}{9}$   
 C)  $x^2 + (y - 4)^2 = \frac{5}{3}$   
 D)  $x^2 + (y + 4)^2 = \frac{3}{5}$

25

$$h = -4.9t^2 + 25t$$

The equation above expresses the approximate height  $h$ , in meters, of a ball  $t$  seconds after it is launched vertically upward from the ground with an initial velocity of 25 meters per second. After approximately how many seconds will the ball hit the ground?

- A) 3.5  
 B) 4.0  
 C) 4.5  
 D) 5.0

26

Katarina is a botanist studying the production of pears by two types of pear trees. She noticed that Type A trees produced 20 percent more pears than Type B trees did. Based on Katarina's observation, if the Type A trees produced 144 pears, how many pears did the Type B trees produce?

- A) 115  
 B) 120  
 C) 124  
 D) 173

27

A square field measures 10 meters by 10 meters. Ten students each mark off a randomly selected region of the field; each region is square and has side lengths of 1 meter, and no two regions overlap. The students count the earthworms contained in the soil to a depth of 5 centimeters beneath the ground's surface in each region. The results are shown in the table below.

Region	Number of earthworms	Region	Number of earthworms
A	107	F	141
B	147	G	150
C	146	H	154
D	135	I	176
E	149	J	166

Which of the following is a reasonable approximation of the number of earthworms to a depth of 5 centimeters beneath the ground's surface in the entire field?

- A) 150  
 B) 1,500  
 C) 15,000  
 D) 150,000



Questions 23 and 24 refer to the following information.

Townsend Realty Group Investments		
Property address	Purchase price (dollars)	Monthly rental price (dollars)
Clearwater Lane	128,000	950
Driftwood Drive	176,000	1,310
Edgemont Street	70,000	515
Glenview Street	140,000	1,040
Hamilton Circle	450,000	3,365

The Townsend Realty Group invested in the five different properties listed in the table above. The table shows the amount, in dollars, the company paid for each property and the corresponding monthly rental price, in dollars, the company charges for the property at each of the five locations.

23

The relationship between the monthly rental price  $r$ , in dollars, and the property's purchase price  $p$ , in thousands of dollars, can be represented by a linear function. Which of the following functions represents the relationship?

- A)  $r(p) = 2.5p - 870$
- B)  $r(p) = 5p + 165$
- C)  $r(p) = 6.5p + 440$
- D)  $r(p) = 7.5p - 10$

24

Townsend Realty purchased the Glenview Street property and received a 40% discount off the original price along with an additional 20% off the discounted price for purchasing the property in cash. Which of the following best approximates the original price, in dollars, of the Glenview Street property?

- A) \$350,000
- B) \$291,700
- C) \$233,300
- D) \$175,000



25

A psychologist set up an experiment to study the tendency of a person to select the first item when presented with a series of items. In the experiment, 300 people were presented with a set of five pictures arranged in random order. Each person was asked to choose the most appealing picture. Of the first 150 participants, 36 chose the first picture in the set. Among the remaining 150 participants,  $p$  people chose the first picture in the set. If more than 20% of all participants chose the first picture in the set, which of the following inequalities best describes the possible values of  $p$ ?

- A)  $p > 0.20(300 - 36)$ , where  $p \leq 150$
- B)  $p > 0.20(300 + 36)$ , where  $p \leq 150$
- C)  $p - 36 > 0.20(300)$ , where  $p \leq 150$
- D)  $p + 36 > 0.20(300)$ , where  $p \leq 150$

26

The surface area of a cube is  $6\left(\frac{a}{4}\right)^2$ , where  $a$  is a positive constant. Which of the following gives the perimeter of one face of the cube?

- A)  $\frac{a}{4}$
- B)  $a$
- C)  $4a$
- D)  $6a$

27

The mean score of 8 players in a basketball game was 14.5 points. If the highest individual score is removed, the mean score of the remaining 7 players becomes 12 points. What was the highest score?

- A) 20
- B) 24
- C) 32
- D) 36





Questions 37 and 38 refer to the following information.

If shoppers enter a store at an average rate of  $r$  shoppers per minute and each stays in the store for an average time of  $T$  minutes, the average number of shoppers in the store,  $N$ , at any one time is given by the formula  $N = rT$ . This relationship is known as Little's law.

The owner of the Good Deals Store estimates that during business hours, an average of 3 shoppers per minute enter the store and that each of them stays an average of 15 minutes. The store owner uses Little's law to estimate that there are 45 shoppers in the store at any time.

37

Little's law can be applied to any part of the store, such as a particular department or the checkout lines. The store owner determines that, during business hours, approximately 84 shoppers per hour make a purchase and each of these shoppers spends an average of 5 minutes in the checkout line. At any time during business hours, about how many shoppers, on average, are waiting in the checkout line to make a purchase at the Good Deals Store?

38

The owner of the Good Deals Store opens a new store across town. For the new store, the owner estimates that, during business hours, an average of 90 shoppers per hour enter the store and each of them stays an average of 12 minutes. The average number of shoppers in the new store at any time is what percent less than the average number of shoppers in the original store at any time? (Note: Ignore the percent symbol when entering your answer. For example, if the answer is 42.1%, enter 42.1)

**STOP**

**If you finish before time is called, you may check your work on this section only.  
Do not turn to any other section.**