

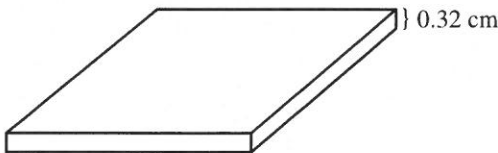
7. The first term is 1 in the geometric sequence 1, -3, 9, -27, ... What is the SEVENTH term of the geometric sequence?
- A. -243
 - B. -30
 - C. 81
 - D. 189
 - E. 729

8. The shipping rate for customers of Ship Quick consists of a fee per box and a price per pound for each box. The table below gives the fee and the price per pound for customers shipping boxes of various weights.

Weight of box (pounds)	Fee	Price per pound
Less than 10	\$ 5.00	\$1.00
10–25	\$10.00	\$0.65
More than 25	\$20.00	\$0.30

Gregg wants Ship Quick to ship 1 box that weighs 15 pounds. What is the shipping rate for this box?

- F. \$ 9.75
 - G. \$16.50
 - H. \$19.75
 - J. \$20.00
 - K. \$24.50
9. A computer chip 0.32 cm thick is made up of layers of silicon. If the top and bottom layers are each 0.03 cm thick and the inner layers are each 0.02 cm thick, how many inner layers are there?



- A. 13
 - B. 15
 - C. 16
 - D. 52
 - E. 64
10. The table below shows the number of cars Jing sold each month last year. What is the median of the data in the table?

Month	Number of cars sold
January	25
February	15
March	22
April	19
May	16
June	13
July	19
August	25
September	26
October	27
November	28
December	29

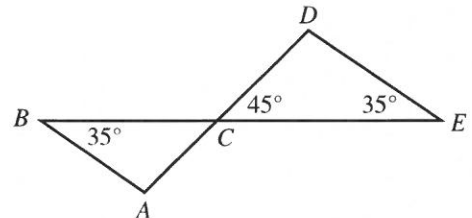
- F. 13
- G. 16
- H. 19
- J. 20.5
- K. 23.5

11. Students studying motion observed a cart rolling at a constant rate along a straight line. The table below gives the distance, d feet, the cart was from a reference point at 1-second intervals from $t = 0$ seconds to $t = 5$ seconds.

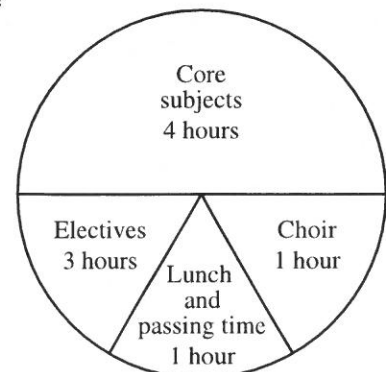
t	0	1	2	3	4	5
d	14	20	26	32	38	44

Which of the following equations represents this relationship between d and t ?

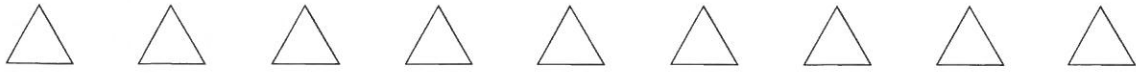
- A. $d = t + 14$
 - B. $d = 6t + 8$
 - C. $d = 6t + 14$
 - D. $d = 14t + 6$
 - E. $d = 34t$
12. The length of a rectangle with area 54 square centimeters is 9 centimeters. What is the perimeter of the rectangle, in centimeters?
- F. 6
 - G. 12
 - H. 15
 - J. 24
 - K. 30
13. In the figure below, C is the intersection of \overline{AD} and \overline{BE} . If it can be determined, what is the measure of $\angle BAC$?

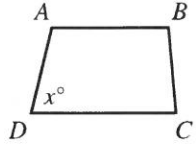


- A. 80°
 - B. 100°
 - C. 110°
 - D. 115°
 - E. Cannot be determined from the given information
14. Antwan drew the circle graph below describing his time spent at school in 1 day. His teacher said that the numbers of hours listed were correct, but that the central angle measures for the sectors were not correct. What should be the central angle measure for the Core subjects sector?



- F. 72°
- G. 80°
- H. 160°
- J. 200°
- K. 288°

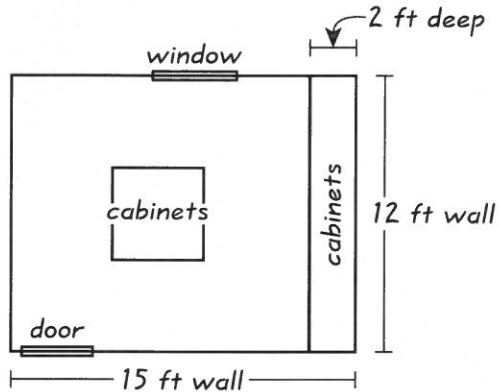


15. This month, Kami sold 70 figurines in 2 sizes. The large figurines sold for \$12 each, and the small figurines sold for \$8 each. The amount of money he received from the sales of the large figurines was equal to the amount of money he received from the sales of the small figurines. How many large figurines did Kami sell this month?
- A. 20
B. 28
C. 35
D. 42
E. 50
16. A car accelerated from 88 feet per second (fps) to 220 fps in exactly 3 seconds. Assuming the acceleration was constant, what was the car's acceleration, in feet per second per second, from 88 fps to 220 fps?
- F. $\frac{1}{44}$
G. $29\frac{1}{3}$
H. 44
J. $75\frac{1}{3}$
K. $102\frac{2}{3}$
17. In a plane, the distinct lines \overleftrightarrow{AB} and \overleftrightarrow{CD} intersect at A , where A is between C and D . The measure of $\angle BAC$ is 47° . What is the measure of $\angle BAD$?
- A. 43°
B. 47°
C. 94°
D. 133°
E. 137°
18. In which of the following are $\frac{1}{2}$, $\frac{5}{6}$, and $\frac{5}{8}$ arranged in ascending order?
- F. $\frac{1}{2} < \frac{5}{8} < \frac{5}{6}$
G. $\frac{5}{6} < \frac{1}{2} < \frac{5}{8}$
H. $\frac{5}{6} < \frac{5}{8} < \frac{1}{2}$
J. $\frac{5}{8} < \frac{1}{2} < \frac{5}{6}$
K. $\frac{5}{8} < \frac{5}{6} < \frac{1}{2}$
19. In scientific notation, $670,000,000 + 700,000,000 = ?$
- A. 1.37×10^{-9}
B. 1.37×10^7
C. 1.37×10^8
D. 1.37×10^9
E. 137×10^{15}
20. For trapezoid $ABCD$ shown below, $\overline{AB} \parallel \overline{DC}$, the measures of the interior angles are distinct, and the measure of $\angle D$ is x° . What is the degree measure of $\angle A$ in terms of x ?
- F. $(180 - x)^\circ$
G. $(180 - 0.5x)^\circ$
H. $(180 + 0.5x)^\circ$
J. $(180 + x)^\circ$
K. x°
- 
21. To get a driver's license, an applicant must pass a written test and a driving test. Past records show that 80% of the applicants pass the written test and 60% of those who have passed the written test pass the driving test. Based on these figures, how many applicants in a random group of 1,000 applicants would you expect to get driver's licenses?
- A. 200
B. 480
C. 600
D. 750
E. 800
22. If a , b , and c are positive integers such that $a^b = x$ and $c^b = y$, then $xy = ?$
- F. ac^b
G. ac^{2b}
H. $(ac)^b$
J. $(ac)^{2b}$
K. $(ac)^{b^2}$
23. Which of the following expressions is equivalent to $\frac{1}{2}y^2(6x + 2y + 12x - 2y)$?
- A. $9xy^2$
B. $18xy$
C. $3xy^2 + 12x$
D. $9xy^2 - 2y^3$
E. $3xy^2 + 12x - y^3 - 2y$
24. An artist makes a profit of $(500p - p^2)$ dollars from selling p paintings. What is the fewest number of paintings the artist can sell to make a profit of at least \$60,000?
- F. 100
G. 150
H. 200
J. 300
K. 600



Use the following information to answer questions 33–35.

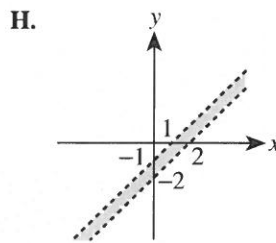
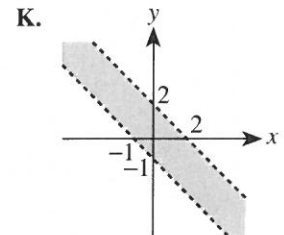
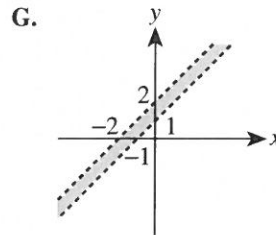
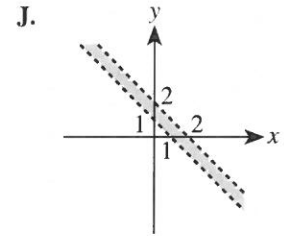
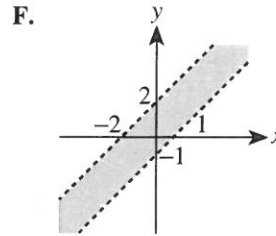
Gianna is converting a 12-foot-by-15-foot room in her house to a craft room. Gianna will install tile herself but will have CC Installations build and install the cabinets. The scale drawing shown below displays the location of the cabinets in the craft room (0.25 inch represents 2 feet).



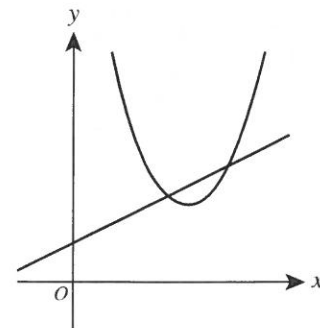
Cabinets will be installed along one of the 12-foot walls from floor to ceiling, and 4 cabinets that are each 3 feet tall will be installed in the middle of the room. These are the only cabinets that will be installed, and each of them will be 2 feet wide and 2 feet deep. CC Installations has given Gianna an estimate of \$2,150.00 for building and installing the cabinets.

33. A 15-foot wall is how many inches long in the scale drawing?
- A. 1.5
B. 1.875
C. 3
D. 3.375
E. 3.75
34. Gianna will install tile on the portion of the floor that will NOT be covered by cabinets. What is the area, in square feet, of the portion of the floor that will NOT be covered by cabinets?
- F. 72
G. 90
H. 140
J. 156
K. 164
35. CC Installations' estimate consists of a \$650.00 charge for labor, plus a fixed charge per cabinet. The labor charge and the charge per cabinet remain the same for any number of cabinets built and installed. CC Installations would give Gianna what estimate if the craft room were to have twice as many cabinets as Gianna is planning to have?
- A. \$2,800.00
B. \$3,000.00
C. \$3,450.00
D. \$3,650.00
E. \$4,300.00

36. Which of the following is the graph of the region $1 < x + y < 2$ in the standard (x, y) coordinate plane?



37. What is the difference between the mean and the median of the set $\{3, 8, 10, 15\}$?
- A. 0
B. 1
C. 4
D. 9
E. 12
38. Which of the following describes a true relationship between the functions $f(x) = (x - 3)^2 + 2$ and $g(x) = \frac{1}{2}x + 1$ graphed below in the standard (x, y) coordinate plane?

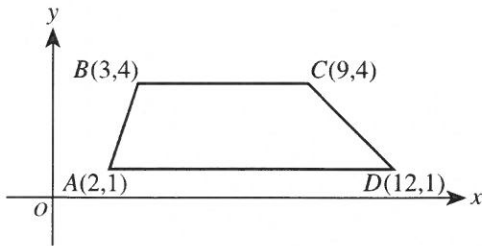


- F. $f(x) = g(x)$ for exactly 2 values of x
G. $f(x) = g(x)$ for exactly 1 value of x
H. $f(x) < g(x)$ for all x
J. $f(x) > g(x)$ for all x
K. $f(x)$ is the inverse of $g(x)$



Use the following information to answer questions 39–41.

Trapezoid $ABCD$ is graphed in the standard (x,y) coordinate plane below.



39. What is the slope of \overline{CD} ?

- A. -3
- B. -1
- C. 1
- D. $\frac{5}{21}$
- E. $\frac{3}{2}$

40. When $ABCD$ is reflected over the y -axis to $A'B'C'D'$, what are the coordinates of D' ?

- F. $(-12, 1)$
- G. $(-12, -1)$
- H. $(12, -1)$
- J. $(1, 12)$
- K. $(1, -12)$

41. Which of the following vertical lines cuts $ABCD$ into 2 trapezoids with equal areas?

- A. $x = 2.5$
- B. $x = 3.5$
- C. $x = 4.5$
- D. $x = 5.5$
- E. $x = 6.5$

42. Given $f(x) = x - \frac{1}{x}$ and $g(x) = \frac{1}{x}$, what is $f\left(g\left(\frac{1}{2}\right)\right)$?

- F. -3
- G. $-\frac{3}{2}$
- H. $-\frac{2}{3}$
- J. 0
- K. $\frac{3}{2}$

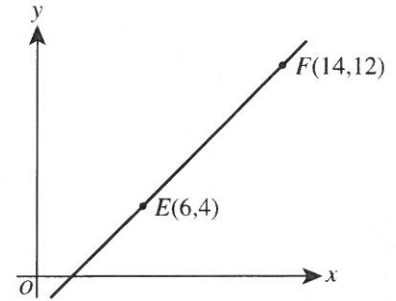
43. A formula to estimate the monthly payment, p dollars, on a short-term loan is

$$p = \frac{\frac{1}{2}ary + a}{12y}$$

where a dollars is the amount of the loan, r is the annual interest rate expressed as a decimal, and y years is the length of the loan. When a is multiplied by 2, what is the effect on p ?

- A. p is divided by 6
- B. p is divided by 2
- C. p does not change
- D. p is multiplied by 2
- E. p is multiplied by 4

44. The points $E(6,4)$ and $F(14,12)$ lie in the standard (x,y) coordinate plane shown below. Point D lies on \overline{EF} between E and F such that the length of \overline{EF} is 4 times the length of \overline{DE} . What are the coordinates of D ?



- F. $(7, 5)$
- G. $(8, 6)$
- H. $(8, 8)$
- J. $(10, 8)$
- K. $(12, 10)$

45. Given that $a \begin{bmatrix} 2 & 6 \\ 1 & 4 \end{bmatrix} = \begin{bmatrix} x & 27 \\ y & z \end{bmatrix}$ for some real number a , what is $x + z$?

- A. $\frac{4}{3}$
- B. $\frac{27}{2}$
- C. 26
- D. 27
- E. 48

46. A container is $\frac{1}{8}$ full of water. After 10 cups of water are added, the container is $\frac{3}{4}$ full. What is the volume of the container, in cups?

- F. $13\frac{1}{3}$
- G. $13\frac{1}{2}$
- H. 15
- J. 16
- K. 40

**Passage II**

In the fall, monarch butterflies (*Danaus plexippus*) in eastern North America migrate to Mexico, where they overwinter in high-altitude forests of *oyamel fir* (an evergreen conifer). The butterflies store (accumulate) body lipids to use as a source of energy at a later time. Consider the following 3 hypotheses pertaining to when the butterflies store lipids and when the energy from the stored lipids is used, with respect to migration and overwintering.

Hypothesis 1

Monarch butterflies require energy from stored lipids for migration and during the overwintering period. The butterflies first store lipids before they begin their migration. During migration, as stored lipids are converted to energy, lipid mass continuously decreases. When the butterflies reach the overwintering sites, ending their migration, they must store lipids again before beginning the overwintering period.

Hypothesis 2

Monarch butterflies require energy from stored lipids for migration but not during the overwintering period. The butterflies store lipids before they begin their migration. During migration, as stored lipids are converted to energy, lipid mass continuously decreases. Because energy from stored lipids is not required during the overwintering period, the butterflies do not store lipids while at the overwintering sites.

Hypothesis 3

Monarch butterflies require energy from stored lipids during the overwintering period but not for migration. The butterflies do not store lipids before they begin their migration. Instead, lipids are stored during migration; therefore, lipid mass continuously increases from the beginning of migration until the end of migration. The butterflies arrive at the overwintering sites with enough lipids to provide themselves with energy during the overwintering period, so they do not store lipids while at the overwintering sites.

8. Which hypothesis, if any, asserts that monarch butterflies store lipids during 2 distinct periods?

F. Hypothesis 1
G. Hypothesis 2
H. Hypothesis 3
J. None of the hypotheses

9. Which hypothesis, if any, asserts that monarch butterflies require energy from stored lipids neither for migration nor during the overwintering period?

A. Hypothesis 1
B. Hypothesis 2
C. Hypothesis 3
D. None of the hypotheses

10. Based on Hypothesis 3, which of the following figures best depicts the change in the lipid mass of a monarch butterfly from the beginning of migration to the end of migration?

(Note: In each figure, B represents the beginning of migration and E represents the end of migration.)

