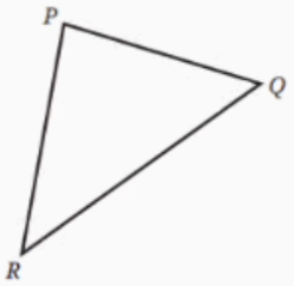
1



Note: Figure not drawn to scale.

In triangle PQR, the measure of $\angle P$ is 47°, and the measure of $\angle Q$ is 83°. What is the measure of $\angle R$?

Ⓐ 36°

Ⓑ 50°

Ⓒ 94°

Ⓓ 130°

2

	Live north of Center St.	Live south of Center St.	Total
Less than 45 years old	16	13	29
At least 45 years old	19	87	106
Total	35	100	135

The table summarizes members of a local organization by age and whether they live north or south of Center St. If a member of the organization is selected at random, what is the probability that the selected member is at least 45 years old?

Ⓐ $\frac{29}{135}$

Ⓑ $\frac{35}{135}$

Ⓒ $\frac{100}{135}$

Ⓓ $\frac{106}{135}$

3

If $3x + 4 = 10$, what is the value of $9x - 4$?

_____

4

The function f is defined by $f(x) = 2x^2 - 5x$. What is the value of $f(8)$?

_____

5

Line q in the xy-plane has a slope of -9 and passes through the point $(0, 14)$. Which equation defines line q?

Ⓐ $y = -9x + 14$

Ⓑ $y = 9x + 14$

Ⓒ $y = 14x - 9$

Ⓓ $y = 14x + 9$

6

For a 2-week period in a town in Iowa, the lowest recorded temperature was 26 degrees Fahrenheit (°F) and the highest recorded temperature was 63°F. Which inequality is true for any recorded temperature t, in °F, in this town for this 2-week period?

Ⓐ $t \leq 26$

Ⓑ $26 \leq t \leq 63$

Ⓒ $t \geq 63$

Ⓓ $t \geq 89$

7

$$\frac{j}{4} = k + 13m$$

The given equation relates the distinct positive numbers j, k, and m. Which equation correctly expresses j in terms of k and m?

Ⓐ $j = k + 7(13m)$

Ⓑ $j = 7(k + 13m)$

Ⓒ $j = 7k + 13m$

Ⓓ $j = \frac{k + 13m}{7}$

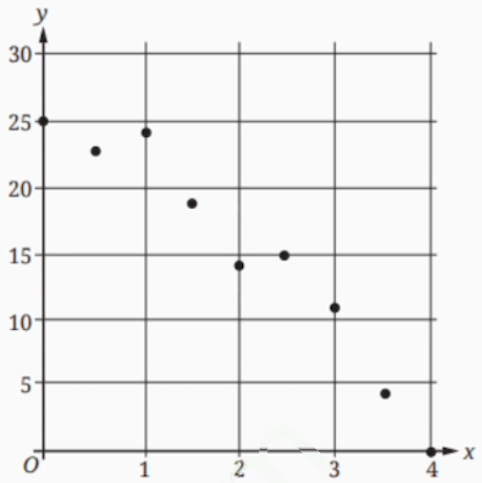
8

A student council group is selling car stickers for a fundraiser. They use the function $p(x) = 5x - 190$ to determine their profit $p(x)$, in dollars, for selling x car stickers. In order to earn a profit of \$600, how many car stickers must they sell?

_____

9

The scatterplot shows the relationship between two variables, x and y.



Which of the following equations is the most appropriate linear model for the data shown?

Ⓐ $y = -6 + 27x$

Ⓑ $y = 6 - 27x$

Ⓒ $y = 27 + 6x$

Ⓓ $y = 27 - 6x$

10

A batch of smoothies consists of 4 cups of milk and 2 bananas and has 1,226 milligrams(mg) of calcium. There is 304 mg of calcium in 1 cup of milk. How much calcium, in mg, is in 1 banana?

Ⓐ 5

Ⓑ 10

Ⓒ 461

Ⓓ 1,216

11

$$f(x) = 7{,}000(0.90)^x$$

A conservation scientist implemented a program to reduce a certain invasive insect population in an area. The given function estimates this insect species' population x years after 2008, where $x \leq 8$. Which of the following is the best interpretation of 7,000 in this context?

Ⓐ The estimated initial insect population for this species and area in 2008

Ⓑ The estimated insect population for this species and area 8 years after 2008

Ⓒ The estimated percent decrease in the insect population for this species and area each year after 2008

Ⓓ The estimated percent decrease in the insect population for this species and area every 8 years after 2008

12

Which of the following expressions is equivalent to $12x^{10} - 12x^9 + 120x$?

Ⓐ $x(11x^{10} - 11x^9 + 119x)$

Ⓑ $x(12x^{10} - 12x^9 + 120)$

Ⓒ $12x(x^{10} - x^9 + 10x)$

Ⓓ $12x(x^9 - x^8 + 10)$

13

The measure of angle F is $\frac{7\pi}{4}$ radians. What is the value of $\cos(F)$?

Ⓐ $-\frac{\sqrt{2}}{2}$

Ⓑ $-\frac{1}{2}$

Ⓒ $\frac{\sqrt{2}}{2}$

Ⓓ $\frac{\sqrt{3}}{2}$

14

Line k has a slope of 6 and a y-intercept of (0, 60). What is the x-coordinate of the x -intercept of line k?

_____

15

A hemisphere is half of a sphere. If a hemisphere has a radius of 56 inches, which of the following is closest to the volume, in cubic inches, of this hemisphere?

Ⓐ 6,600

Ⓑ 26,300

Ⓒ 275,900

Ⓓ 367,800

16

The function g is defined by $g(x) = -\frac{x}{3} + 11$. What is the x-intercept of the graph of $y = g(x) + 6$ in the xy-plane?

Ⓐ (−33, 0)

Ⓑ (−51, 0)

Ⓒ (33, 0)

Ⓓ (51, 0)

17

An auditorium has seats for 2,600 people. Tickets to attend a show at the auditorium currently cost $8.00. For each $1.00 increase to the ticket price, 100 fewer tickets will be sold. This situation can be modeled by the equation $y = -100x^2 + 1{,}800x + 20{,}800$, where x represents the increase in ticket price, in dollars, and y represents the revenue, in dollars, from ticket sales. If this equation is graphed in the xy-plane, at what value of x is the maximum of the graph?

Ⓐ 8

Ⓑ 9

Ⓒ 18

Ⓓ 26

18

$k + 21 = 63$

What is the solution to the given equation?

Ⓐ 3

Ⓑ 42

Ⓒ 84

Ⓓ 1,323

19

The function f gives the product of a number, x, and a number that is 45 more than x. Which equation defines f?

Ⓐ $f(x) = x^2 + x + 45$

Ⓑ $f(x) = x^2 + 45$

Ⓒ $f(x) = x^2 + 45x$

Ⓓ $f(x) = x^2 + 45x + 45$

20

$ax + by = 96$

$2ax + 8y = 72$

In the given system of equations, a and b are constants. The graphs of these equations in the xy-plane intersect at the point $(x, 6)$. What is the value of b?

Ⓐ 4

Ⓑ 6

Ⓒ 8

Ⓓ 14

21

If the perimeter of an equilateral triangle with a height of 21 is $a\sqrt{3}$, what is the value of a?

_____

22

An object's speed is increasing at a rate of 10.5 meters per second squared. What is this rate, in miles per minute squared, rounded to the nearest tenth? (Use 1 mile = 1,609 meters.)

Ⓐ 0.4

Ⓑ 23.5

Ⓒ 153.2

Ⓓ 281.6

1

The table summarizes the UV index value recorded by a research assistant at noon each day for 48 days.

UV index	Number of days
1	8
2	13
3	12
4	15

According to the table, a UV index value of 1 was recorded on how many days?

Ⓐ 48

Ⓑ 40

Ⓒ 8

Ⓓ 4

2

The function j is defined by $j(x)=\frac{x}{7}$. What is the value of $j(42)$?

Ⓐ 42

Ⓑ 35

Ⓒ 7

Ⓓ 6

3

The speed of a white-throated needletail, a type of bird, in flight was measured to be 79 miles per hour. What was the white-throated needletail's measured speed, in kilometers per hour? (Use 1 mile = 1.6 kilometers.)

Ⓐ 126.4

Ⓑ 80.6

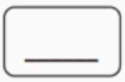
Ⓒ 77.4

Ⓓ 49.4

4

$$\left(2x^2+8x-6\right)-\left(4x^2+7x\right)$$

The given expression is equivalent to $-2x^2+ax-6$, where a is a constant. What is the value of a?



5

What is the y-intercept of the graph of $y = 11^x$ in the xy-plane?

Ⓐ (0, 1))

Ⓑ (0, 0)

Ⓒ (0, 11)

Ⓓ (0, 10)

6

$$y = x + 19$$

$$y = -x + 33$$

The solution to the given system of equations is (x, y). What is the value of $2y$?

Ⓐ 14

Ⓑ 26

Ⓒ 52

Ⓓ 104

7

To cut a lawn, Antwan charges a fee of $15.00 for his equipment and $8.50 per hour spent cutting a lawn. Taylor charges a fee of $12.00 for her equipment and $9.00 per hour spent cutting a lawn. If x represents the number of hours spent cutting a lawn, what are all the values of x for which Taylor's total charge is greater than Antwan's total charge?

Ⓐ $5 \le x \le 6$

Ⓑ $6 \le x \le 7$

Ⓒ $x < 5$

Ⓓ $x > 6$

8

The table summarizes the number of objects in each group.

Group	Number of objects
A	375
B	54
C	690
D	81
Total	1,200

The number of objects in group C is $p\%$ of the number of objects in group A. What is the value of p?