Answer: B

Section: Section 2, Module 1: Math, Difficulty: unknown (22 questions)

1.

If $9x + 4 = 67$, what is the value of $90x + 40$?

A. 7

B. 70

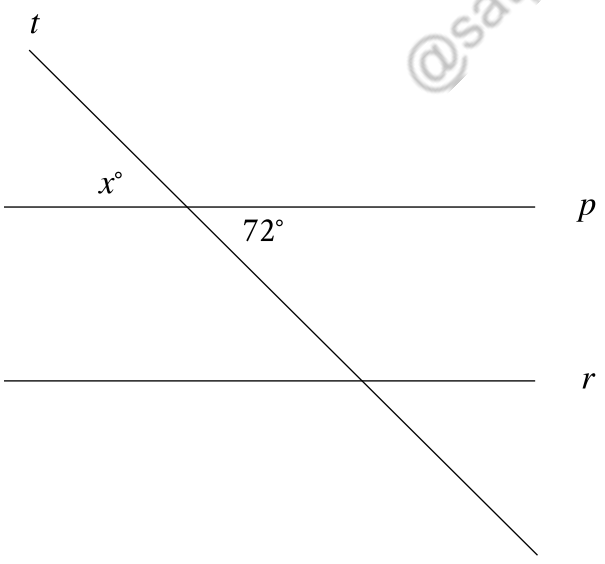
C. 130

D. 670

Answer: D

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2.



Note: Figure not drawn to scale.

In the figure, line p is parallel to line r, and line t intersects both lines. What is the value of x?

A. 36

B. 72

C. 180

D. 252

Answer: B

3.

A length of 450 meters is equal to how many decimeters? $(1 \text{ meter} = 10 \text{ decimeters})$

Answer: 4500

4.

The equation $58 = 2x + 2y$ gives the perimeter of a rectangular garden that has length x, in feet, and width y, in feet. The width of the garden is 14 feet. What is the length, in feet, of the garden?

Answer: 15

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5.

The relationship between the variables x and y is defined by an exponential equation. When $x = 0$, the value of y is 40, and for every increase in the value of x by 1, the corresponding value of y increases by 50% of its previous value. Which equation represents this relationship?

A. $y = 40(1.50)^x$

B. $y = 40(1.05)^x$

C. $y = 50(1.40)^x$

D. $y = 50(1.04)^x$

Answer: A

6.

The function f is defined by $f(x) = \frac{1}{8x}$. What is the value of $f(x)$ when $x = 9$?

Answer: .0138

7.

The function f is defined by $f(x) = 3x - \frac{1}{4}$. What is the *y*-intercept of the graph of $y = f(x)$ in the *xy*-plane?

A. $\left(0, -\frac{1}{4}\right)$

B. $(0, -3)$

C. $(0, 3)$

D. $(0, 4)$

Answer: A

8.

$$x + 6y = 28$$

$$6y = 14$$

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

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Answer: 14

9.

The length of a side of square X is 9 centimeters. The area of rectangle Y is 32 square centimeters. What is the total area, in square centimeters, of square X and rectangle Y?

A. 145

B. 113

C. 82

D. 81

Answer: B

10.

During hibernation, American black bears do not eat or replenish calories. A certain black bear weighed 293 pounds when entering hibernation and lost weight at a mean rate of 0.9

pounds per day. At this rate, how many days after entering hibernation would the black bear weigh 230 pounds?

A. 57

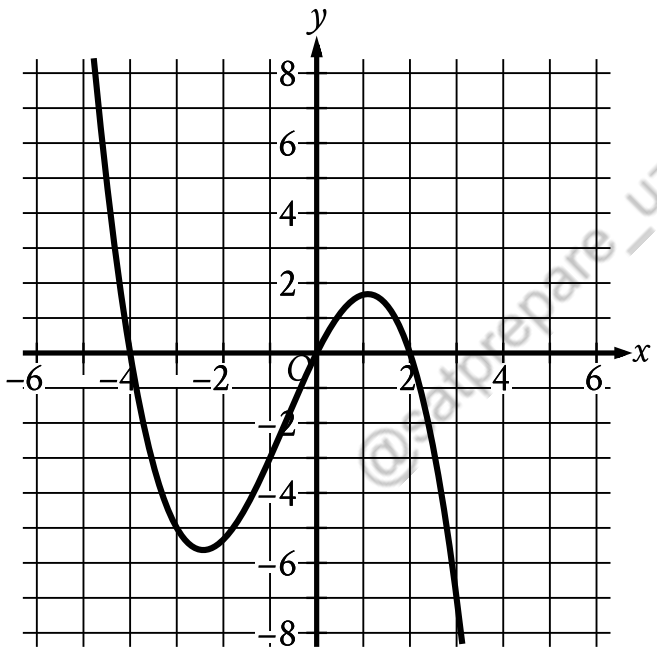
B. 63

C. 70

D. 207

Answer: C

11.



The complete graph of $y = f(x)$ is shown. For how many values of x does $f(x) = 0$?

A.

One

B.

Two

C.

Three

D.

Four

Answer: C

12.

$$b^2 + 4c = 7d$$

The given equation relates the real numbers b, c, and d, where $d > \frac{4}{7}c$. Which equation correctly expresses b in terms of c and d?

A. $b = \frac{7d+4c}{2}$

B. $b = \frac{7d-4c}{2}$

C. $b = \pm\sqrt{7d+4c}$

D. $b = \pm\sqrt{7d-4c}$

Answer: D

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13.

$$x^2 - \frac{81}{16} = 0$$

How many distinct real solutions does the given equation have?

A.

Zero

B.

Exactly one

C.

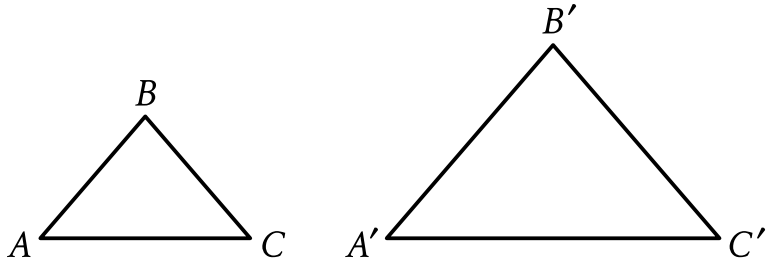
Exactly two

D.

Infinitely many

Answer: C

14.



Note: Figures not drawn to scale.

Triangles ABC and $A'B'C'$ are shown. Triangle ABC is dilated by a scale factor of 6 to form triangle $A'B'C'$. If the length of $\overline{AB}$ is 18, what is the length of $\overline{A'B'}$?

A. 3

B. 6

C. 24

D. 108

Answer: D

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15.

What is the radius of the circle in the *xy*-plane defined by $(x+3)^2+(y+9)^2=361$?

Answer: 19

16.

In the *xy*-plane, which of the following does NOT contain any points that are part of the solution set to $5x-7y>35$?

A.

The *x*-axis

B.

The region where $x>0$ and $y>0$

C.

The region where $x < 0$ and $y < 0$

D.

The region where $x < 0$ and $y > 0$

Answer: D

17.

The table shows the distribution of people in a certain city by age group.

Age group	Proportion
Less than 18 years old	26%
18–40 years old	21%
41–65 years old	29%
Greater than 65 years old	24%

If a person in this city is selected at random, which of the following is closest to the probability of selecting a person who is greater than 65 years old, given that the person is at least 18 years old?

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A. 0.24

B. 0.32

C. 0.50

D. 0.92

Answer: B

18.

Line h is defined by $\frac{1}{2}x + \frac{1}{9}y - 54 = 0$. Line j is perpendicular to line h in the *xy*-plane. What is the slope of line j?

A. $-\frac{9}{2}$

B. $-\frac{2}{9}$

C. $\frac{9}{2}$

D. $\frac{2}{9}$

Answer: D

19.

$$a,\ 26,\ 29,\ b,\ 31,\ 47,\ c$$

For the given data set, the data values are listed in ascending order, where a, b, and c are constants. For this data set, the mean is 36, the median is 29, and the range is 72. What is the value of c?

A. 54

B. 72

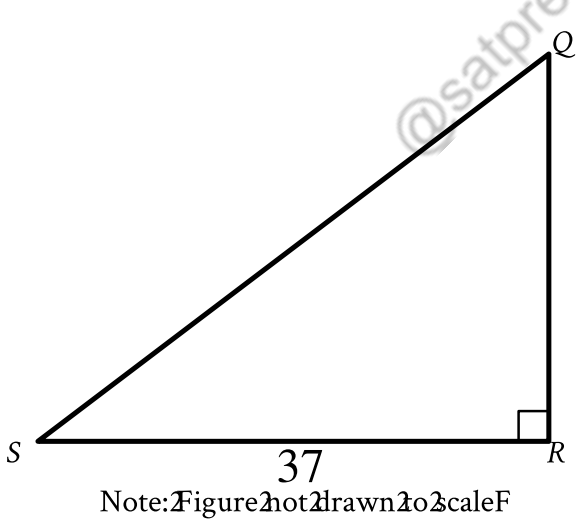
C. 81

D. 98

Answer: C

20.

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Note: Figure not drawn to scale

In triangle QRS shown, $QR < RS$. Which expression represents the length of $\overline{QS}$?

A. $37 \cos Q$

B. $37 \sin Q$

C. $\frac{37}{\cos Q}$

D. $\frac{37}{\sin Q}$

Answer: D

21.

$$y = 9\left(\frac{a}{7}\right)^{x+c} - b$$

How many times does the graph of the given equation in the *xy*-plane cross the *x*-axis, where a, b, and c are positive constants such that $a > 7$ and $b > c$?

A.

Zero

B.

One

C.

Two

D.

Three

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Answer: B

22.

A certain town has an area of 4.29 square miles. What is the area, in square yards, of this town? $(1 \text{ mile} = 1{,}760 \text{ yards})$

A. 410

B. $7{,}550$

C. $722{,}051$

D. $13{,}288{,}704$

Answer: D

Section: Section 2, Module 2: Math, Difficulty: easy (22 questions)

1.

What is 50% of 480?

A. 720

B. 480

C. 240

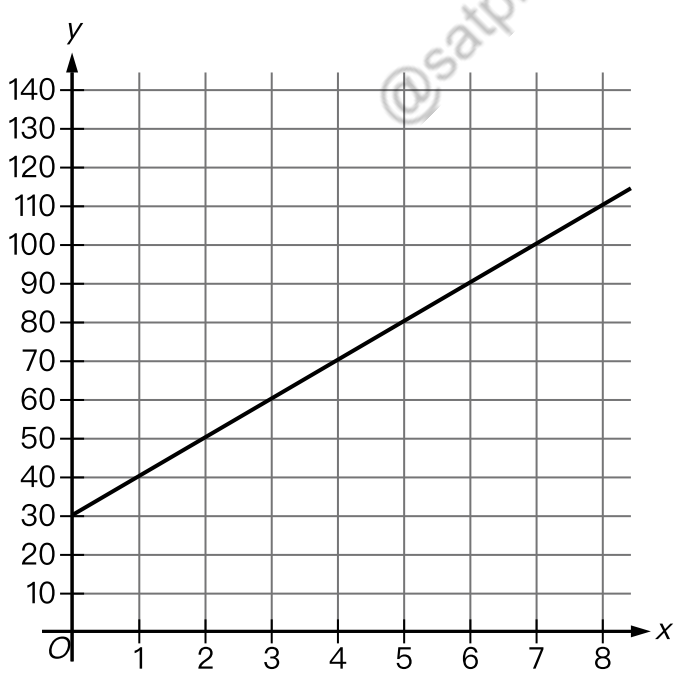
D. 48

Answer: C

2.

A biologist is studying the growth of a sunflower plant. The graph models the height y, in centimeters, of the sunflower plant after x weeks of observation.

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According to the model, what is the estimated height, in centimeters, of the sunflower plant after 3 weeks of observation?

A. 3

B. 10

C. 30

D. 60

Answer: D

3.

For a psychology class, a student's research paper needs to have no more than $5{,}000$ words. If a student has already written $3{,}051$ words, what is the maximum number of additional words the student can write for the research paper?

A. $8{,}051$

B. $5{,}000$

C. $3{,}051$

D. $1{,}949$

Answer: D

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4.

During a 6-day period, a weather station recorded a total of 2.6 inches of rain and snow. During this period, the weather station recorded r inches of rain and s inches of snow. Which equation represents this situation?

A. $r + s = 2.6$

B. $r - s = 2.6$

C. $s - r = 2.6$

D. $rs = 2.6$

Answer: A

5.

$$y = 5x + 17$$

One of the two equations in a system of linear equations is given. The system has infinitely many solutions. If the second equation in this system is $y = mx + b$, where m and b are

constants, what is the value of b?

Answer: 17

6.

What value of p is the solution to the equation $p - 17 = 1$?

A. $\frac{1}{17}$

B. 16

C. 17

D. 18

Answer: D

7.

The equation $d = 25w + 100$ gives the total amount of money d, in dollars, that Janna plans to save w weeks after she starts to save. What is the total amount of money, in dollars, she plans to save in 10 weeks?

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A. 300

B. 350

C. 400

D. 450

Answer: B

8.

A triathlon is a multisport race consisting of three different consecutive events. A triathlon participant plans to complete the cycling event with an average speed of $28{,}512$ yards per hour. What is this average speed, in miles per hour? $(1 \text{ mile} = 1{,}760 \text{ yards})$

Answer: 16.2

9.

Triangle ABC is similar to triangle DEF, where angle A corresponds to angle D, and angles C and F are right angles. If $\cos B = \frac{1}{24}$, what is the value of $\cos E$?

A. $\frac{1}{24}$

B. $\frac{1}{25}$

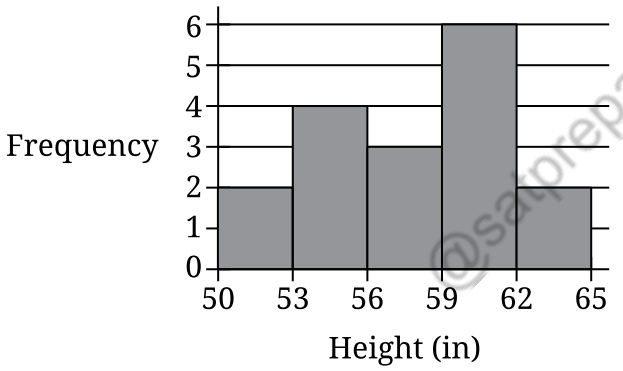
C. $\frac{23}{24}$

D. $\frac{24}{25}$

Answer: A

10.

For a project, Kayla recorded the heights of 17 people in her neighborhood. The histogram summarizes the heights, in inches (in), of these 17 people in Kayla's neighborhood. The first bar represents people with a height of at least 50 in but less than 53 in. The second bar represents people with a height of at least 53 in but less than 56 in, and so on.



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How many of these 17 people in Kayla's neighborhood had a height of at least 50 in but less than 56 in?

Answer: 6

11.

The table shows values of x and their corresponding values of y for three points on line j in the *xy*-plane.

x	y
0	-10
1	-4

x	y
2	2

Line k also lies in the *xy*-plane and is defined by the equation $y = 4x$. At what point (x, y) do lines j and k intersect?

A. $(5, 20)$

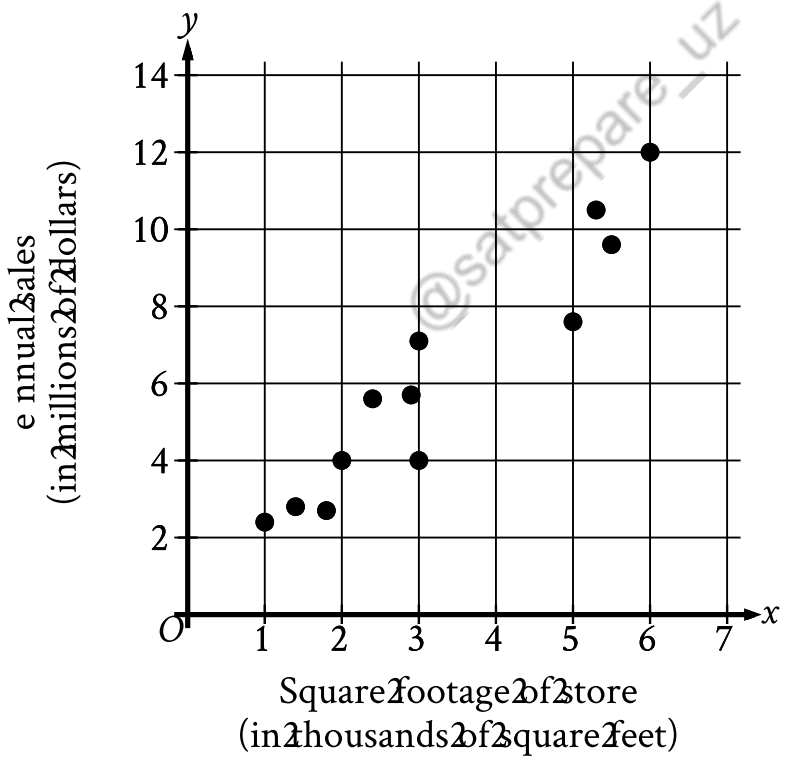
B. $(5, -44)$

C. $(6, 24)$

D. $(6, 26)$

Answer: A

12.



The scatterplot shows the relationship between the square footage of 12 clothing stores and their annual sales, in millions of dollars. According to the trend shown by the data, which of the following is the best prediction for the annual sales, in millions of dollars, of a clothing store that is 4 thousand square feet?

A. 4.1

B. 5.4

C. 7.5

D. 10.1

Answer: C

13.

In $\triangle FGH$, the measures of $\angle F$ and $\angle G$ are each 53°. What is the measure of $\angle H$?

A. 143°

B. 127°

C. 106°

D. 74°

Answer: D

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14.

Which expression is equivalent to $7xy\left(2x^2+9y\right)$?

A. $9x^3y+16xy^2$

B. $14x^2y+9y$

C. $14x^2y+63xy$

D. $14x^3y+63xy^2$

Answer: D

15.

$$\frac{27(k+5)}{3(k+5)}$$

The given expression is equivalent to c, where c is a constant and $k > -5$. What is the value of c?

Answer: 9

16.

The graph of $y = \left(\frac{1}{9}\right)^x + 1$ in the *xy*-plane is shifted up 4 units. What is an equation of the resulting graph?

A. $y = \left(\frac{1}{9}\right)^{(x+4)} + 1$

B. $y = \left(\frac{1}{9}\right)^{(x-4)} + 1$

C. $y = 4\left(\frac{1}{9}\right)^x + 1$

D. $y = \left(\frac{1}{9}\right)^x + 5$

Answer: D

17.

The function $f(x) = 1{,}200(0.5)^{\frac{x}{17}}$ gives the predicted intensity of a beam $f(x)$, in number of photons in the beam, x millimeters below the surface of a certain material. What is the best interpretation of $f(17) = 600$?

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A.

A beam at the surface of the material has a predicted intensity of 17 photons in the beam.

B.

A beam at the surface of the material has a predicted intensity of 600 photons in the beam.

C.

A beam 17 millimeters below the surface of the material has a predicted intensity of 600 photons in the beam.

D.

A beam 600 millimeters below the surface of the material has a predicted intensity of $1{,}200$ photons in the beam.

Answer: C

18.

$$x^2 + \left(\sqrt{k-3}\right)x + 42 = 0$$

In the given equation, k is a constant. The equation has exactly one real solution. What is the value of k?

A. 171

B. 168

C. 165

D. 45

Answer: A

19.

In the *xy*-plane, the graph of $y = 4x$ intersects the graph of $y = x^2 - 45$ at two points. What is the sum of the *x*-coordinates of the two points of intersection?

A. -45

B. -5

C. 4

D. 9

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Answer: C

20.

For the linear function h, $h(0) = 0$ and $h(4) = 3$. Which equation defines h?

A. $h(x) = \frac{4}{3}x$

B. $h(x) = \frac{4}{3}x + 4$

C. $h(x) = \frac{3}{4}x$

D. $h(x) = \frac{3}{4}x + 3$

Answer: C

21.

$$(x-16)(x-12)(x+9)(x+19)=0$$

What is a positive solution to the given equation?

Answer: 12

22.

$$x^2-2x=28$$

What is one of the solutions to the given equation?

A. $\sqrt{28}$

B. $1+\sqrt{29}$

C. 29

D. $28+\sqrt{2}$

Answer: B

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Section: Section 2, Module 2: Math, Difficulty: hard (22 questions)

1.

Zuri has a goal to run at least 16 miles per week while training for a race. This week, she has run 4 miles. If x represents the additional number of miles Zuri needs to run this week to meet her goal, which inequality represents this situation?

A. $4-x\le 16$

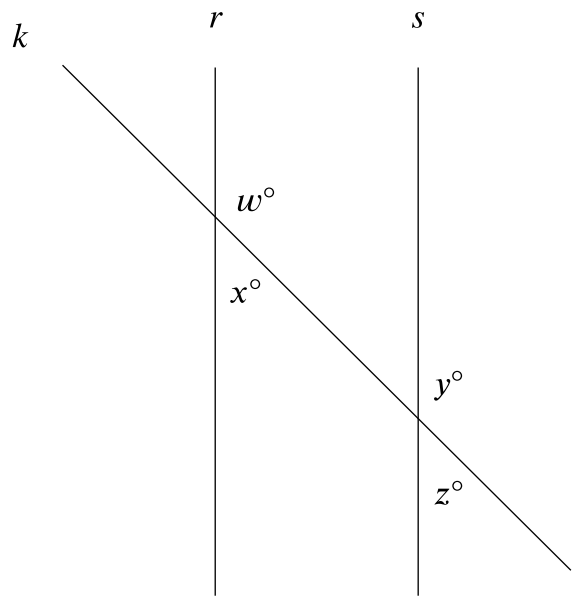
B. $4+x\le 16$

C. $4-x\ge 16$

D. $4+x\ge 16$

Answer: D

2.



Note: Figure not drawn to scale.

In the figure shown, line k intersects lines r and s. If $w = 147$, which additional piece of information is sufficient to prove that lines r and s are parallel?

A.

$x = 33$

B.

$y = 147$

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C.

$w + y = 180$

D.

$y + z = 180$

Answer: B

3.

Number of food tickets	Total amount paid
10	$44.00
15	$51.50
25	$66.50

At a fundraiser, a family pays a fixed entrance fee. They then purchase food tickets, which each have the same cost. The table shows the relationship between the number of food tickets, x, that are purchased and the total amount paid y, in dollars, for both the entrance fee and the food tickets. Which equation represents the relationship between x and y?

A. $y = \frac{3}{2}x + 29$

B. $y = \frac{3}{2}x - 56$

C. $y = \frac{2}{3}x + \frac{112}{3}$

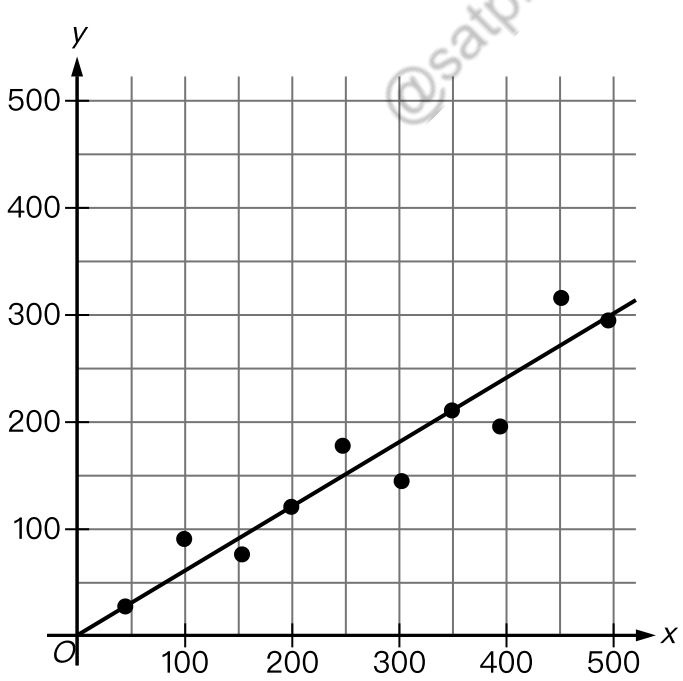
D. $y = \frac{2}{3}x + \frac{58}{3}$

Answer: A

4.

A group of 10 gardeners recorded data on the germination rates of their tomato crop for one growing season. The scatterplot shows the relationship between the number of tomato seeds planted, x, and the number of tomato seeds that germinated, y, for each of the gardeners. A line of best fit is also shown.

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Which of the following is the best interpretation of the slope of the line of best fit in this context?

A.

The number of tomato seeds planted is predicted to increase by 60 seeds every 100 days.

B.

The number of tomato seeds planted is predicted to increase by 300 seeds every 100 days.

C.

The number of tomato seeds that germinate is predicted to increase by 60 seeds for every additional 100 tomato seeds that are planted.

D.

The number of tomato seeds that germinate is predicted to increase by 300 seeds for every additional 100 tomato seeds that are planted.

Answer: C

5.

The graph of $2x + y = 11$ in the *xy*-plane is a line. What is the slope of the line?

Answer: -2

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6.

$$f(x) = 2x + 3$$

$$g(x) = 7x - 2$$

$$h(x) = 5x + 6$$

The functions f, g, and h are defined as shown. If $f(x) \cdot g(x) - h(x) = ax^2 + bx + c$, where a, b, and c are constants, what is the value of b?

A. -5

B. 12

C. 20

D. 22

Answer: B

7.

The function f is defined by $f(x) = \frac{x+11}{5}$, and $f(a) = -18$, where a is a constant. What is the value of a?

A. -101

B. -79

C. $-\frac{79}{5}$

D. $-\frac{7}{5}$

Answer: A

8.

The table shows values of x and their corresponding values of y for three points on line j in the *xy*-plane.

x	y
0	-10
1	-4
2	2

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Line k also lies in the *xy*-plane and is defined by the equation $y = 4x$. At what point (x, y) do lines j and k intersect?

A. $(5, 20)$

B. $(5, -44)$

C. $(6, 24)$

D. $(6, 26)$

Answer: A

9.

$$h(t) = -16t^2 + b$$

The function h estimates an object's height, in feet, above the ground t seconds after the object is dropped, where b is a constant. The function estimates that the object is 19.36 feet

above the ground when it is dropped at $t = 0$. How many seconds after being dropped does the function estimate the object will hit the ground?

Answer: 1.1

10.

$$|4x - 3| = -9$$

How many solutions does the given equation have?

A.

Zero

B.

One

C.

Two

D.

Infinitely many

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Answer: A

11.

The function h is defined by $h(x) = a^x + b$, where a and b are positive constants. The graph of $y = h(x)$ in the *xy*-plane passes through the points $(0, 10)$ and $(2, 13)$. What is the value of ab?

A. 13

B. 18

C. 20

D. 26

Answer: B

12.

A circle has center P, and points A and B lie on the circle. The measure of arc AB is 45° and the length of arc AB is 4π units. What is the length, in units, of the radius of the circle?

Answer: 16

13.

The function f is defined by $f(x) = 56(0.19)^x$. For any positive integer n, the value of $f(n)$ is $p\%$ less than the value of $f(n-1)$. What is the value of p?

A. 19

B. 44

C. 56

D. 81

Answer: D

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14.

$$x^2 + \left(\sqrt{k-3}\right)x + 42 = 0$$

In the given equation, k is a constant. The equation has exactly one real solution. What is the value of k?

A. 171

B. 168

C. 165

D. 45

Answer: A

15.

$$x^2 + y^2 = 36$$

$$y = mx + \tfrac{b}{4}$$

In the given system of equations, m and b are negative constants. In the *xy*-plane, the graphs of the equations in the given system intersect at the point $(-5, y)$, where $y < 0$. Which expression represents the value of b?

A. $-\frac{5m}{4} + \frac{\sqrt{11}}{4}$

B. $\frac{5m}{4} - \frac{\sqrt{11}}{4}$

C. $-20m + 4\sqrt{11}$

D. $20m - 4\sqrt{11}$

Answer: D

16.

A biologist mixed a solution that is 0.3% sodium chloride by mass with a solution that is 0.15% sodium chloride by mass to obtain a new solution, which has a mass of 80 grams and contains 0.21 grams of sodium chloride. How many grams of 0.3% sodium chloride solution did the biologist use?

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A. 0.14

B. 20

C. 60

D. 79.86

Answer: C

17.

For data set A, the table summarizes the distribution of the number of pieces of mail received by a business each day during a period of 11 days.

Pieces of mail	Days
0	2
3	2
4	2
5	2
6	1

Pieces of mail	Days
7	1
13	1

The data value 13 is removed from data set A to create data set B, which consists of the remaining 10 data values. Which statement best compares the median of data set A and the median of data set B?

A.

The median of data set B is less than the median of data set A.

B.

The median of data set B is greater than the median of data set A.

C.

The median of data set B is equal to the median of data set A.

D.

There is not enough information to compare the medians of the two data sets.

Answer: C

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18.

$$\frac{x}{5} + \frac{y}{9} = \frac{47}{45}$$

An engineer connects resistors in series, where the resistors in the series have a total resistance of $\frac{47}{45}$ ohms. In this series, there are x resistors of type A, which each have a resistance of a ohms, and y resistors of type B, which each have a resistance of b ohms. The given equation represents this situation. According to this equation, what is the positive difference between the value of a and the value of b?

A. 47

B. 4

C. $\frac{47}{45}$

D. $\frac{4}{45}$

Answer: D

19.

$$9x^2 + 8 = nx$$

In the given equation, n is a constant. The equation has exactly one solution. What is the value of $\frac{n^2}{8}$?

Answer: 36

20.

The table gives the areas and perimeters of two similar rectangles, where n is a constant.

	Area (square inches)	Perimeter (inches)
Rectangle A	630	210
Rectangle B	$2{,}520$	n

What is the value of n?

A. $2{,}100$

B. $1{,}680$

C. 840

D. 420

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Answer: D

21.

The mass of object A is 444% of the mass of object B, and the mass of object A is 0.740% of the mass of object C. If the mass of object C is $p\%$ of the mass of object B, what is the value of p?

Answer: 60000

22.

Which expression is a factor of $y^2(x-3) - 25(x-3)^3$?

A. $y(x-3)$

B. $(x-5)(x-3)$

C. $y+x-3$

D. $y+5x-15$

Answer: D

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