Math with Calculator: Question 1

1 Makayla is planning an event in a 5,400-square-foot room. If there should be at least 8 square feet per person, what is the maximum number of people that could attend this event?

View Answer

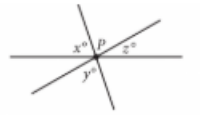
A. 588

B. 675

C. 15,274

D. 43,200

2



Note: Figure not drawn to scale.

In the figure, three lines intersect at point P. If $x = 65$ and $y = 75$, what is the value of z?

View Answer

A. 140

B. 80

C. 40

D. 20

3 If $\frac{1}{2}x - \frac{1}{6}x = 1$, what is the value of x?

View Answer

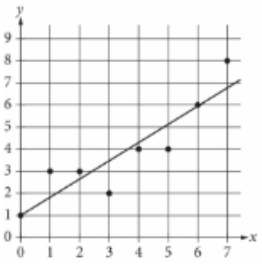
A. -4

B. $\frac{1}{3}$

C. 3

D. 6

4



The scatterplot above shows eight data points in the *xy*-plane. A line of best fit is also shown for the data. If each data point is shifted 3 units upward and a new line of best fit for the shifted points is drawn, how will the value of the *y*-intercept of the new line compare with that of the line shown?

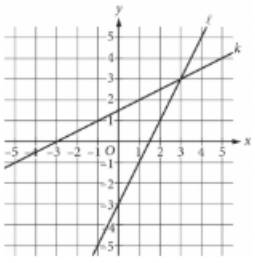
View Answer

A. It will increase.

B. It will decrease.

C. It will remain the same.

5



Lines ℓ and k in the *xy*-plane above are the graphs of the equations in a system. How many solutions does the system of equations have?

View Answer

A. None

B. One

C. Two

D. More than two

6 Gerardo has 3 blue shirts and w white shirts in his closet, and these are the only shirts in his closet. If Gerardo selects a shirt at random from his closet, which of the following gives the probability that Gerardo will select a white shirt?

View Answer

A. $\frac{w}{3+w}$

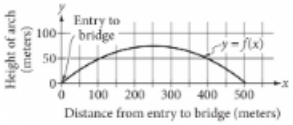
B. $\frac{3}{3+w}$

C. $\frac{w}{3}$

D. $\frac{3}{w}$

7 $f(x) = -0.001160(x-251.5)^2 + 73.37$

The vertical height, in meters, of the upper arch of the Harbor Bridge in Sydney, Australia, above the roadway of the bridge can be modeled by the function above, where x is the horizontal distance along the roadway, in meters, from the entry to the bridge. The graph of $y = f(x)$ is shown in the xy-plane below.



In the graph, the point $(0,0)$ represents the entry to the bridge. Which of the following points represents the exit from the bridge on the opposite end?

View Answer

A. $(0, 73.37)$

B. $(0, 503.0)$

C. $(73.37, 0)$

D. $(503.0, 0)$

8 The graph of $y = f(x)$ is a line in the xy-plane that passes through the point $(0, 2)$ and has a slope of 5. Which of the following equations could define the function f?

View Answer

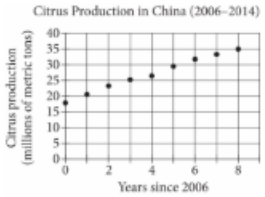
A. $f(x) = -\frac{1}{2}x + 5$

B. $f(x) = -\frac{1}{5}x + 2$

C. $f(x) = 2x + 5$

D. $f(x) = 5x + 2$

9



The scatterplot above shows the citrus production, in millions of metric tons, in China from 2006 through 2014. Which of the following could be the slope of a line of best fit for these data?

View Answer

A. 2.12

B. 5.25

C. 7.80

D. 10.29

10 $f(x) = (x + 4)(x - 1)(2x - 3)$

The function f is defined above. Which of the following is NOT an x-intercept of the graph of the function in the xy-plane?

View Answer

A. $(-4, 0)$

B. $\left(-\frac{2}{3}, 0\right)$

C. $(1, 0)$

D. $\left(\frac{3}{2}, 0\right)$

Questions 11 and 12 refer to the following information.

11

t	$C(t)$
1	8.5
2	11
3	13.5
4	16

The length $C(t)$, in inches, of a channel catfish in an Iowa river t years after the first year of life can be approximated by the linear function C. Some values of $C(t)$ are given in the table above.

$$F(t) = 3t + 4$$

The length $F(t)$, in inches, of a flathead catfish in the same Iowa river t years after the first year of life can be approximated by the linear function F, defined by the equation above.

According to the model, which of the following is closest to the expected age, to the nearest whole year, of a flathead catfish that is 31 inches long?

A. 10 years old

B. 13 years old

C. 98 years old

D. 106 years old

Question 12

Which of the following equations could define C as a function of t?

View Answer

A. $C(t) = 2.5t + 6$

B. $C(t) = \frac{2}{5}t + 8.5$

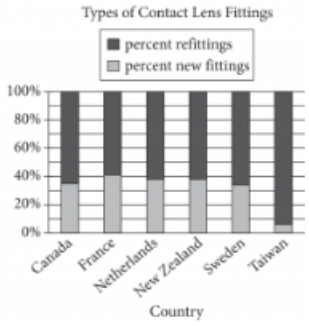
C. $C(t) = 2.5t + 8.5$

D. $C(t) = \frac{2}{5}t + 8.1$

Questions 13 and 14 refer to the following information.

13

Country	Total fittings	Mean age
Canada	936	34.6
France	1,470	34.9
Netherlands	943	35.0
New Zealand	721	36.3
Sweden	436	36.3
Taiwan	1,574	26.6



The results of an international survey of contact lens fittings during a given time period are summarized in the table and bar graph above. The table shows the number of total fittings and the mean age, in years, of the patients who were fitted for contact lenses during the time period. The total fittings consisted of new contact lens fittings and refittings. The bar graph shows the percent of the patients who received new fittings and the percent who received refittings.

What is the range, in years, of the mean ages of the patients surveyed who had contact lens fittings in the countries shown?

View Answer

A. 8.0

B. 8.4

C. 9.7

D. 10.3

: Question 14

Of the following, which best approximates the number of patients surveyed who received refittings in New Zealand?

View Answer

A. 274

B. 358

C. 447

D. 585

15 A park ranger asked a random sample of visitors how far they hiked during their visit. Based on the responses, the estimated mean was found to be 4.5 miles, with an associated margin of error of 0.5 miles. Which of the following is the best conclusion from these data?

View Answer

A. It is likely that all visitors hiked between 4 and 5 miles.

B. It is likely that most visitors hiked exactly 4.5 miles.

C. It is not possible that any visitor hiked less than 3 miles.

D. It is plausible that the mean distance hiked for all visitors is between 4 and 5 miles.

16

Observed Matings among Fruit Flies

		Female fruit fly group		
		Female raised on starch	Female raised on maltose	Total
Male fruit fly group	Male raised on starch	22	9	31
	Male raised on maltose	8	20	28
	Total	30	29	59

The table above shows the observed mating frequencies among a group of fruit flies raised on either a starch medium or a maltose medium. What fraction of the observed matings were between fruit flies that were raised on the same medium?

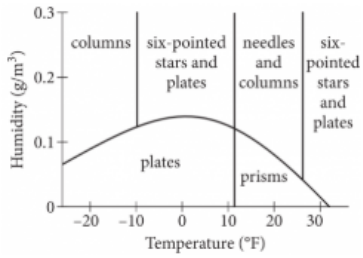
A. $\frac{9}{31}$

B. $\frac{17}{59}$

C. $\frac{31}{59}$

D. $\frac{42}{59}$

17



The figure above shows a graph with six regions that correspond to temperature, in degrees Fahrenheit (°F), and humidity conditions, in grams of water vapor per cubic meter of air (g/m^3), that will result in different snow crystal shapes when the crystals are grown in a laboratory. Base on the graph, which of the following is a combination of temperature and humidity at which prism will be formed?

A. 5°F and 0.15 g/m^3

B. 15°F and 0.18 g/m^3

C. 20°F and 0.02 g/m^3

D. 30°F and 0.08 g/m^3

18 A sample of 40 fourth-grade students was selected at random from a certain school. The 40 students completed a survey about the morning announcements, and 32 thought the announcements were helpful. Which of the following is the largest population to which the results of the survey can be applied?

View Answer

A. The 40 students who were surveyed

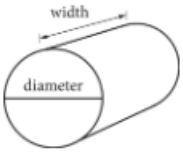
B. All fourth-grade students at the school

C. All students at the school

D. All fourth-grade students in the county in which the school is located

Questions 19 and 20 refer to the following information.

19 Ryan is comparing five different hay balers (machines that make bales of hay). The bales made are all in the shape of a cylinder, as shown below.



The price of each hay baler and the dimensions of the bales of hay it makes are shown in the table below.

Hay baler	Bale diameter range	Bale width	Price
A	32–51 in	46 in	$19,800
B	35–60 in	46 in	$27,900
C	35–72 in	46 in	$32,000
D	35–65 in	62 in	$37,500
E	32–72 in	62 in	$46,900

Of the following, which ratio is closest to the width of bales made by hay baler A to the width of bales made by hay baler D?

A. 0.74:1

B. 1.35:1

C. 1.74:1

D. 17:1

Question 20

Which of the following is closest to the percent by which the price of hay baler E exceeds the price of hay baler C?

View Answer

A. 18.9%

B. 31.8%

C. 40.5%

D. 46.6%

21 $x - y = 1$
$x + y = x^2 - 3$

Which ordered pair is a solution to the system of equations above?

View Answer

A. $(1+\sqrt{3}, \sqrt{3})$

B. $(\sqrt{3}, -\sqrt{3})$

C. $(1+\sqrt{5}, \sqrt{5})$

D. $(\sqrt{5}, -1+\sqrt{5})$

22 The graph of the exponential function g in the xy-plane passes through the points $(0, 1)$, $(1, 4)$, and $(2, 16)$. Which of the following is NOT true?

View Answer

A. A line can be drawn that does not intersect the graph of g.

B. A line can be drawn that intersects the graph of g at exactly one point.

C. A line can be drawn that intersects the graph of g at exactly two points.

D. A line can be drawn that intersects the graph of g at exactly three points.

23 In a right triangle, the tangent of one of the two acute angles is $\frac{\sqrt{3}}{3}$. What is the tangent of the other acute angle?

View Answer

A. $-\frac{\sqrt{3}}{3}$

B. $-\frac{3}{\sqrt{3}}$

C. $\frac{\sqrt{3}}{3}$

D. $\frac{3}{\sqrt{3}}$

24 In the *xy*-plane, line ℓ has a slope of 2. If line k is perpendicular to line ℓ, which of the following could be an equation of line k?

View Answer

A. $-10x-5y=20$

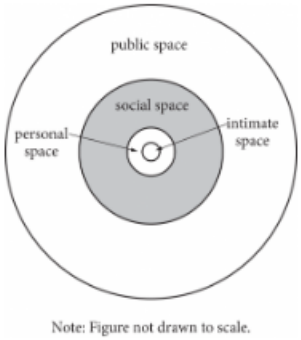
B. $3x-6y=14$

C. $4x-2y=17$

D. $6x+12y=36$

Question Difficulty: Hard

25



Note: Figure not drawn to scale.

The diagram above represents Edward T. Hall's concept of space surrounding a person defined by four nonoverlapping regions. Intimate space is the region inside a circle of radius 1 foot. Personal space is the region within a circle of radius 4 feet but outside intimate space. Social space is the region within a circle of radius 12 feet but outside personal space. Public space is the region within a circle of radius 25 feet but outside social space. What is the area, in square feet, of the shaded region representing a person's social space?

A. 127π

B. 128π

C. 144π

D. 625π

26 Anita created a batch of green paint by mixing 2 ounces of blue paint with 3 ounces of yellow paint. She must mix a second batch using the same ratio of blue and yellow paint as the first batch. If she uses 5 ounces of blue paint for the second batch, how much yellow paint should Anita use?

View Answer

A. Exactly 5 ounces

B. 3 ounces more than the amount of yellow paint used in the first batch

C. 1.5 times the amount of yellow paint used in the first batch

D. 1.5 times the amount of blue paint used in the second batch

27 $ax - 4(3 + 2x) = -12$

In the equation above, a is a constant. For what value of a does the equation have infinitely many solutions?

View Answer

A. -8

B. -2

C. 2

D. 8

28 The wholesale price of a kilogram of lentils decreased by 1% from the previous month for six consecutive months. If x is the number of months since the price began to drop and y is the cost of a kilogram of lentils, which of the following equations could model the cost of lentils over this time period?

View Answer

A. $y = 0.99x + 1.65$

B. $y = 1.01x + 1.65$

C. $y = 1.65(0.99)^x$

D. $y = 1.65(1.01)^x$

29 $\frac{2}{x-2} + \frac{3}{x+5} = \frac{rx+t}{(x-2)(x+5)}$

The equation above is true for all $x > 2$, where r and t are positive constants. What is the value of rt?

View Answer

A. -20

B. 15

C. 20

D. 60

30 If $ax + a = 3$, where a is a nonzero constant, which of the following must be equal to $x + 1$?

View Answer

A. 3

B. a

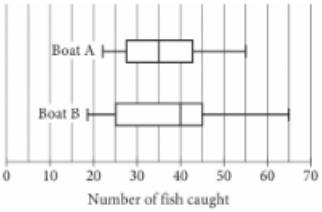
C. $3a$

D. $\frac{3}{a}$

31 $\sqrt{x+4} = 11$

What value of x satisfies the equation above?

32



The box plots above summarize the distribution of the number of fish caught each day on two commercial fishing boats for a season. By how many fish does the median number of fish caught each day on Boat B exceed the median number on Boat A?

33 If a is the mean and b is the median of nine consecutive integers, what is the value of $|a - b|$?

34 $y = -16t^2 + 64t + 80$

The equation above gives the height of an object above the ground, y, in feet, t seconds after it is launched from a platform. How many seconds after it is launched does the object reach the ground?

35 $I = \frac{V}{R}$

The formula above is Ohm's law for an electric circuit with current I, in amperes, potential difference V, in volts, and resistance R, in ohms. A circuit has a resistance of 500 ohms, and its potential difference will be generated by n six-volt batteries that produce a total potential difference of $6n$ volts. If the circuit is to have a current of no more than 0.25 ampere, what is the greatest number, n, of six-volt batteries that can be used?

36 In the xy-plane, line k intersects the y-axis at the point $(0, -6)$ and passes through the point $(2, 2)$. If the point $(20, w)$ lies on line k, what is the value of w?

37 In a science classroom, when labs are performed, students are seated at lab tables. If the teacher assigns 2 students to each lab table, 4 additional lab tables will be needed to seat all of the students. If the teacher assigns 4 students to each lab table, 4 lab tables will not be used. How many students are in the science class?

38 The number y is 20% greater than the number x. The number z is 20% less than y. The number z is how many times x?