

21

$$(x + 3)^2 + (y - 19)^2 = 144$$

The graph of the given equation is a circle in the xy -plane. The point (a, b) lies on the circle. Which of the following is a possible value for a ?

- ☐ A) -16
- ☐ B) -13
- ☐ C) 12
- ☐ D) 19

$$f(x) = 8(7)^2$$

The function f is defined by the given equation. If $g(x)=f(x+2)$, which of the following equations defines the function g ?

- ☐ A) $g(x) = 16(7)^x$
- ☒ B) $g(x) = 392(7)^x$
- ☐ C) $g(x) = 16(14)^x$
- ☐ D) $g(x) = 64(49)^x$

	Volume (cubic units)
Right circular cylinder A	72π
Right circular cylinder B	$4,608\pi$

The table shows the volume of two similar solids, right circular cylinder A and right circular cylinder B. The radius of right circular cylinder A is 3 units. The surface area of right circular cylinder A is $k\pi$ square units, and the surface area of right circular cylinder B is $n\pi$ square units, where k and n are constants. What is the value of $n - k$? (The surface area of a right circular cylinder with radius r and height h is $2\pi r^2 + 2\pi rh$.)

19

$$\frac{5}{8}(5x + 8)(x + \sqrt{5k + 8})(x - \sqrt{5k + 8}) = 0$$

In the given equation, k is a positive constant. The product of the solutions to the equation is 64. What is the value of k ?

16

One of the factors of $5x^3 + 105x^2 + 540x$ is $x + b$, where b is a positive constant. What is the smallest possible value of b ?

|

Function f is a quadratic function. The graph of $y=f(x)$ in the xy -plane has a vertex at $(-5, -8)$, contains the point $(-6, -10)$, and has a y -intercept at $(0, a)$. The graph of $y=6 \cdot f(x)$ has a y -intercept at $(0, b)$. What is the positive difference between a and b ?

18

$$\frac{4}{9}(4x + 9)(x + \sqrt{4k + 9})(x - \sqrt{4k + 9}) = 0$$

In the given equation, k is a positive constant. The product of the solutions to the equation is 63. What is the value of k ?

19/4

The function is defined by $h(x) = -\sqrt{x^2 + bx + c}$ where b and c are constants. In the xy -plane, the graph of $y = h(x)$ contains the points $(2, 0)$ and $(0, -\sqrt{266})$. If $h(m) = 0$, what is the greatest possible value of m ?

20

In the xy -plane, a unit circle with center at the origin O contains point A with coordinates $(1, 0)$ and point B with coordinates

$(\frac{7}{\sqrt{65}}, -\frac{4}{\sqrt{65}})$. If the measure of angle AOB is p radians,

what is the value of $\frac{\cos p}{\sin p}$?

|



Section 2, Module 2: Math

Student-produced response directions

- If you find **more than one correct answer**, enter only one answer.
- You can enter up to 5 characters for a **positive** answer and up to 6 characters (including the negative sign) for a **negative** answer.
- If your answer is a **fraction** that doesn't fit in the provided space, enter the decimal equivalent.
- If your answer is a **decimal** that doesn't fit in the provided space, enter it by truncating or rounding at the fourth digit.
- If your answer is a **mixed number** (such as $3\frac{1}{2}$), Enter it as an improper fraction ($7/2$) or its decimal equivalent (3.5).
- Don't enter **symbols** such as a percent sign, comma, or dollar sign.

Examples

Answer	Acceptable ways to enter answer	Unacceptable: will NOT receive credit
3.5	3.5 3.50 7/2	31/2 3 1/2
$\frac{2}{3}$	2/3 .6666 .6667 0.666 0.667	0.66 .66 0.67 .67
$-\frac{1}{3}$	-1/3 -.3333 -0.333	-.33 -0.33

22

$$(x - k)^2 = (k - 4a)(x - k)$$

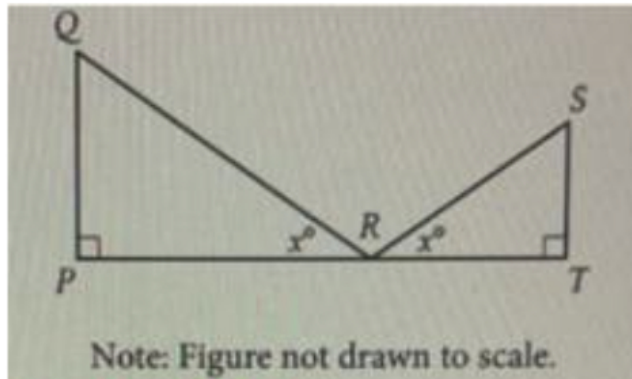
In the given equation, a and k are constant, where $k > 4a$. The sum of the solutions to the equation is $3k + 31$. What is the value of a ?

Submit All

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Next >

15



$\triangle QPR$ is similar to $\triangle STR$. The lengths represented by ST , QP , PR , and QR in the figure are 5, 7, 24, and 25, respectively. What is the length of SR ?

☒ A) $\frac{125}{7}$

☐ B) $\frac{125}{24}$

☐ C) $\frac{35}{24}$

☐ D) $\frac{35}{25}$



Section 2, Module 2: Math

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Examples

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$\frac{2}{3}$	2/3 .6666 .6667 0.666 0.667	0.66 .66 0.67 .67
$-\frac{1}{3}$	-1/3 -.3333 -0.333	-.33 -0.33

21

A circle in the xy -plane has a diameter with endpoints (2,4) and (2,14). An equation of this circle is $(x - 2)^2 + (y - 9)^2 = r^2$, where r is a positive constant. What is the value of r ?

Submit All

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Section 2, Module 2: Math

17

In the xy -plane, lines k and j are perpendicular and intersect at the point $(5, 28)$. Line j passes through the origin, and line k passes through the point $(p, 0)$, where p is a constant. What is the value of p ?

- ☐ A) -151.8
- ☐ B) -151.4
- ☐ C) 161.4
- ☒ D) 161.8

Question List



20:29



Section 2, Module 2: Math

12

value	Frequency
48	1
51	0
54	1
57	5
60	8
63	5
66	1
69	0
72	1

The table shows the frequencies of the values in a data set. Which of the following frequency tables represents a data set with the same mean as this data set?

☐

A)

value	frequency
48	0
51	0
54	1
57	5
60	8
63	5
66	1
69	0
72	0

☐

B)

value	frequency
48	1
51	0
54	1
57	5
60	8
63	5
66	1
69	0
72	1

☐

C)

value	frequency
48	0
51	0
54	1
57	5
60	8
63	5
66	1
69	0
72	1

☐

D)

value	frequency
48	1
51	0
54	1
57	5
60	8
63	5
66	1
69	0
72	0

Submit All

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21

$$f(x) = (x - a)(x - b)$$

The function f is defined by the given equation, where a and b are integer constants. If $f(18) > 0$, $f(21) < 0$, and $f(24) > 0$, which of the following could be the value of $a + b$?

- ☐ A) 21
- ☐ B) 23
- ☐ C) 39
- ☐ D) 41

11

A space probe uses a square-shaped solar sail to move through space. The side length of the solar sail is $8.83w$ meters, where w is the width, in meters, of the space probe. Which equation gives the area A , in square meters, of the solar sail?

☐ A) $A = (w + 8.83)(w + 8.83)$

☐ B) $A = (4)(8.83w)$

☒ C) $A = (8.83w)(8.83w)$

☐ D) $A = \left(\frac{8.83}{w}\right)\left(\frac{8.83}{w}\right)$

8

For the function f , $f(0) = 86$, and for each increase in x by 1, the value of $f(x)$ decreases by 80%. What is the value of $f(2)$?

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.)

- ☐ A) 0.4
- ☒ B) 23.5
- ☐ C) 153.2
- ☐ D) 281.6

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

$$\begin{aligned}ax + by &= 96 \\ 2ax + 8y &= 72\end{aligned}$$

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 ?

- ☐ A) 4
- ☐ B) 6
- ☐ C) 8
- ☐ D) 14

Section 2, Module 1: Math

16

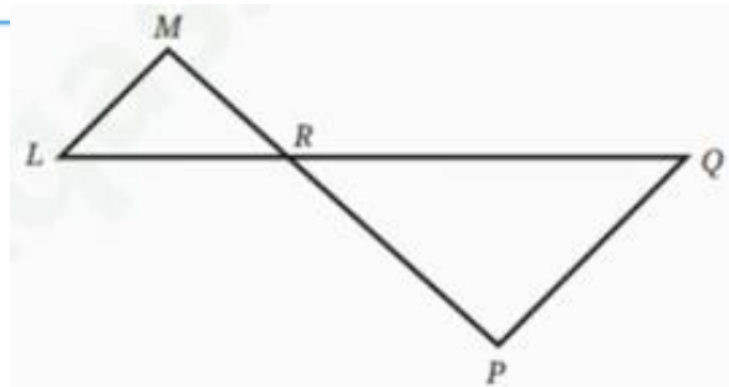
The function g is defined by $g(x) = -\frac{x}{3} + 11$. What is the x -intercept of the graph of $y = g(x) + 6$ in the xy -plane?

- ☐ A) $(-33,0)$
- ☐ B) $(-51,0)$
- ☒ C) $(33,0)$
- ☐ D) $(51,0)$

21

Function f is a quadratic function. The graph of $y = f(x)$ in the xy -plane has a vertex at $(9, -7)$, contains the point $(8, -9)$, and has a y -intercept at $(0, a)$. The graph of $y = 6 \cdot f(x)$ has a y -intercept at $(0, b)$. What is the positive difference between a and b ?

|



In the figure, $\overline{LQ}$ intersects $\overline{MP}$ at point R , and $\overline{LM}$ is parallel to $\overline{PQ}$. The lengths of $\overline{MR}$ and $\overline{RP}$ are 9 and 17 units, respectively. The area of $\triangle LMR$ is 45 square units. What is the area of $\triangle PQR$, in square units?

☐ A) $\frac{3,645}{289}$

☐ B) $\frac{405}{17}$

☒ C) 85

☐ D) $\frac{1,445}{9}$

ion 2, Module 2: Math

15

$$5x = 75y - 125$$

One of the two equations in a system of linear equations is given. The system has no solution. Which equation could be the second equation in this system?

- ☐ A) $x = 3y$
- ☒ B) $\frac{1}{5}x = 3y$
- ☐ C) $x = 15y - 25$
- ☐ D) $\frac{1}{5}x = 15y - 25$



tion 2, Module 2: Math

14

The function f is defined by $f(x) = 41(0.28)^x$. 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) 72
- ☐ B) 59
- ☐ C) 41
- ☐ D) 28

13

A rectangular poster has an area of 360 square inches. A copy of the poster is made in which the length and width of the original poster are each increased by 40%. What is the area of the copy, in square inches?

504

19

Mark for Review

$$6x^2(3x - 16)(3x - u) = 0$$

In the given equation, u is a positive constant. The sum of the solution of the equation is 13. What is the value of u ?

23

$$0 \neq \frac{16}{3}, \frac{u}{3}$$

Answer Preview:

$$\frac{16}{3} + \frac{u}{3} = 13$$

$$16 + u = 39$$

$$u = 23$$

$$0 \neq \frac{16}{3}, \frac{u}{3}$$

$$\frac{16}{3} + \frac{u}{3} = \frac{39}{3}$$

$$u = 23$$

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Mark for Review

Function f is a quadratic function. The graph of $y = f(x)$ in the xy -plane has a vertex at $(9, -7)$, contains the point $(8, -9)$, and has a y -intercept at $(0, a)$. The graph of $y = 6 \cdot f(x)$ has a y -intercept at $(0, b)$. What is the positive difference between a and b ?

928

$$f(x) = y$$

$$y = a(x-9)^2 - 7$$

$$-9 = a(8-9)^2 - 7$$

Answer Preview:

$$-9 = a - 7$$

$$a = -2$$

$$f(x) = (-2(x-9)^2 - 7) \cdot 6$$

$$f(x) = 81x - 2 = -162 - 7$$

$$= -169$$

$$= -930$$

$$+930 - 2 = +928$$



The function f is defined by $f(x) = a\sqrt{x+b}$, where a and b are constants. In the xy -plane, the graph of $y = f(x)$ passes through the point $(-24, 0)$, and $f(24) < 0$. Which of the following must be true?

(A) $f(0) = 24$

~~(A)~~

(B) $f(0) = -24$

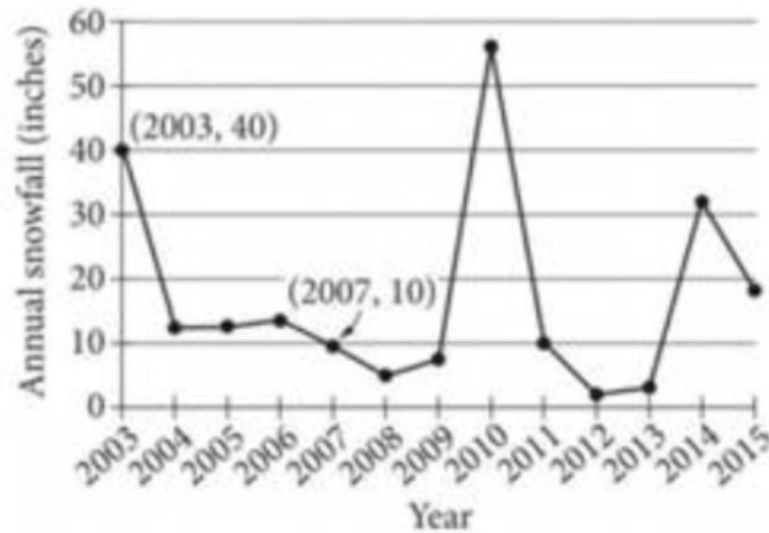
~~(B)~~

(C) $a > b$

~~(C)~~

(D) $a < b$

~~(D)~~



The line graph shows the total amount of snow, in inches, recorded each year in Washington, DC, from 2003 to 2015. If $p\%$ is the percent decrease in the annual snowfall from 2003 to 2007, what is the value of p ?

$$\sqrt[3]{110n}(\sqrt[4]{110n})^2$$

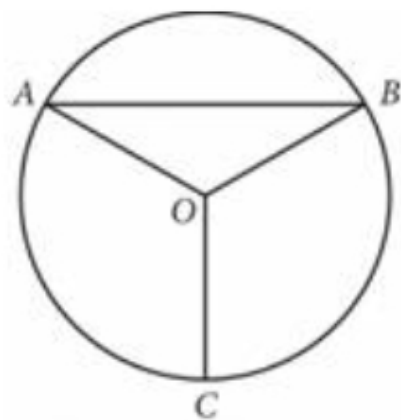
For what value of x is the given expression equivalent to $(110n)^{12x}$, where $n > 1$?

$$32x + 31y = c$$

$$31x - 32y = c$$

In the given system of equations, c is a positive constant. Which of the following could be the point where the graphs of the equations in this system intersect in the xy -plane?

- ☐ A) $(c, 0)$
- ☐ B) $(c, \frac{c}{63})$
- ☐ C) $(10, 630)$
- ☐ D) $(10, -\frac{10}{63})$



Point O is the center of the circle above, and the measure of $\angle OAB$ is 30° .

If the length of $\overline{OC}$ is 18, what is the length of arc $\widehat{AB}$?

- ☐ A) 9π ☒ B) 12π
- ☐ C) 15π ☐ D) 18π

Hannah and Wyatt are saving money to purchase a car. Hannah saves $\frac{1}{5}$ of her salary each month, and Wyatt saves $\frac{2}{7}$ of his salary each month. Together, they save a total of \$3,270 from their monthly salaries each month. If h and ω represent Hannah's and Wyatt's monthly salaries, in dollars, respectively, which equation shows the relationship between h and ω ?

- ☐ A) $h + \omega = 3,270$
- ☐ B) $h + 2\omega = 3,270$
- ☐ C) $10h + 7\omega = 114,450$
- ☐ D) $7h + 10\omega = 114.450$

1

Object Z has a mass of 170 grams. The mass of object X is 4,400% of the mass of object Z. The mass of object Z is 20% of the mass of object Y. The sum, in grams, of the mass of object X and the mass of object Y is equal to the product, in grams, of ω and the mass of object Z, where ω is a constant. What is the value of ω ?

A researcher investigated two species of mites: a predator and its prey. At the start of a week, there was an equal number of the two species. At the end of the week, the number of prey had increased by 1,900% of the number of prey at the start of the week, and the number of predators had increased by 380% of the number of predators at the start of the week. The number of prey at the end of the week was $p\%$ greater than the number of predators at the end of the week. What is the value of p ?