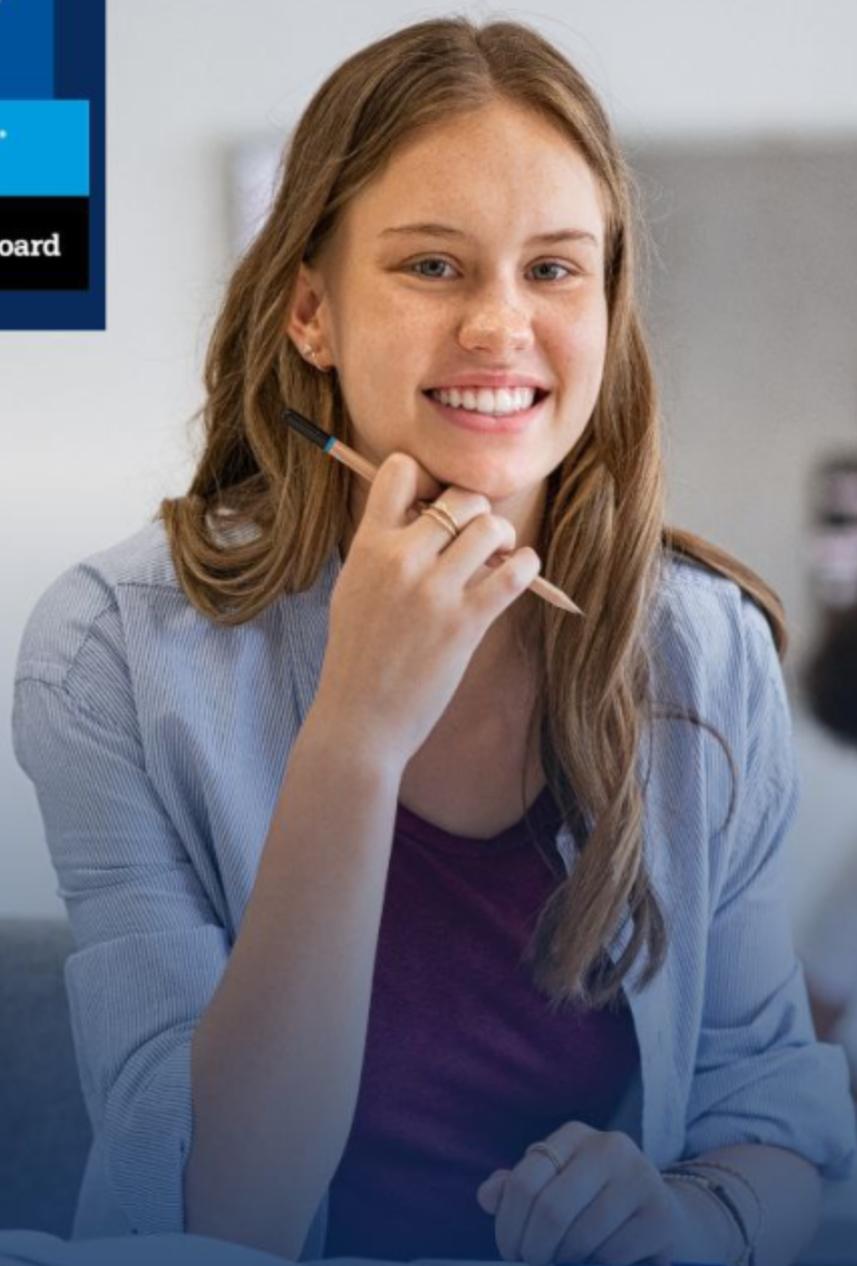# REAL SAT 2024

MATHEMATICS

Math
– 22 Questions I 35 minutes –

DIRECTIONS

The questions in this section address a number of important math skills. Use of a calculator is permitted for all questions.
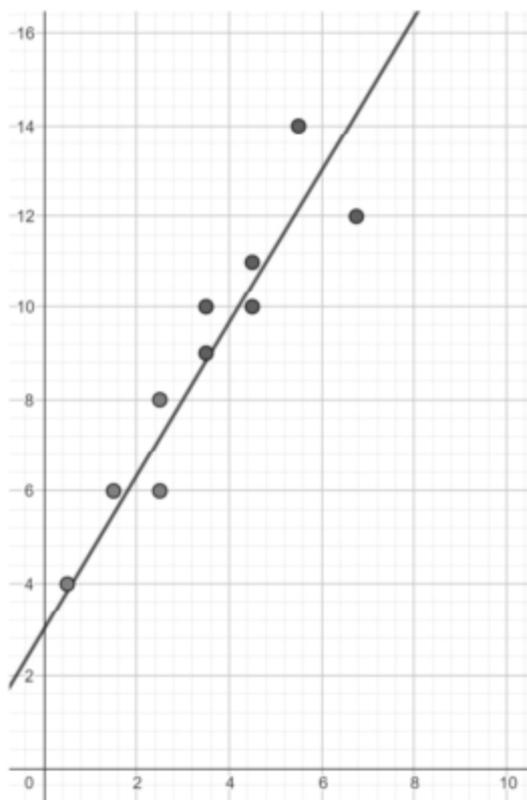
NOTES

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1

The scatterplot shows the relationship between two variables, x and y. A line of best fit is also shown.

Which of the following equations best represents the line of best fit shown?

A $y = \dfrac{5}{3}x + 3$

B $y = -2x + 1.5$

C $y = 3x + 1.5$

D $y = -3x + 1.5$

2

$$3x - 4y = 5$$
$$x = 7$$

Which is the solution (x, y) to the given systems of equations?

A $(7, 4)$

B $(7, 12)$

C $(7, -12)$

D $(7, -4)$

3

What value of x is the solution to the equation $20x + 24 = 28x$?

A $\dfrac{1}{4}$

B $\dfrac{1}{3}$

C 3

D 5

4

The function f is defined by $f(x) = \dfrac{7}{10}x + 74$. What is the value of $f(20)$?

5

The function f is defined by $f(x) = 8 + \sqrt{x}$. What is the value of $f(36)$?

- A   0
- B   14
- C   17
- D   26

6

Triangles ABC and DEF are congruent, where A corresponds to D and B and E are right angles. The measure of angle A is $27°$. What is the measure, in degrees, of angle F?

7

At a convention center, there are a total of 325 visitors. Each visitor is located in either room A, room B or room C. If one of these visitors is selected at random, the probability of selecting a visitor who is located in room A is 0.48, and the probability of selecting a visitor who is located in room B is 0.16. How many visitors are located in room C?

- A   25
- B   36
- C   104
- D   117

8

$$g(m) = -0.05m + 14.1$$

The given function g models the number of gallons of gasoline that remains from a full gas tank in a car after driving m miles. According to the model, about how many gallons of gasoline are used to drive each mile?

- A   0.05
- B   14.1
- C   20
- D   282

9

What is the center of the circle in the xy-plane defined by the equation $(x-9)^2 + (y+6)^2 = 81$?

- A $(-9, -6)$
- B $(-9, 6)$
- C $(9, -6)$
- D $(9, 6)$

10

If $2x + 3 = 9$, what is the value of $4x - 4$?

11

$$f(x) = 6,000(0.7)^x$$

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 $x \le 8$. Which of the following is the best interpretation of $6,000$ in this context?

- A   The estimated percent decrease in the insect population for this species and area every 8 years after 2008
- B   The estimated percent decrease in the insect population for this species and area each year after 2008
- C   The estimated insect population for this species and area 8 years after 2008
- D   The estimated initial insect population for this species and area in 2008

12

Line r is defined by the equation $4x - 5y = 8$. Line s is parallel to line r in the xy-plane. What is the slope of line s?

- A $\dfrac{5}{4}$
- B $\dfrac{4}{5}$
- C -4
- D -5

13

The cost to rent a bus from Company X is $\$750$ for the first 2 hours and an additional $\$50$ per hour for each hour after the first 2 hours. If the total cost to rent the bus from Company X for t hours, where $t > 2$, is $\$1,050$, which equation represents this situation?

A $750(t-2) + 50t = 1,050$

B $750(2t) + 50t = 1,050$

C $750 + 50(t-2) = 1,050$

D $750 + 50(2t) = 1,050$

14

$$y = -\frac{1}{4}x^2 + x + 28$$

The given equation models a company's active projects over 6 months, where y is the estimated number of active projects x months after the end of April 2012, where $0 < x < 6$. Which statement is the best interpretation of the y-intercept of the graph of this equation in the xy-plane?

A   At the end of April 2012, the estimated number of active projects was 0.

B   At the end of April 2012, the estimated number of active projects was 28.

C   At the end of May 2012, the estimated number of active projects was 0.

D   At the end of May 2012, the estimated number of active projects was 28.

15

In right triangle RST, the sum of the measures of angle R and angle S is 90 degrees. The value of $\sin(R)$ is $\frac{4\sqrt{2}}{9}$. What is the value of $\cos(S)$?

A $\dfrac{4\sqrt{2}}{9}$

B $\dfrac{4\sqrt{2}}{7}$

C $\dfrac{7\sqrt{2}}{8}$

D $\dfrac{9\sqrt{2}}{8}$

16

$$19.5x + 29.75y = 394$$

Odalys ordered mulch and river rock, which cost a total of $\$394$, for her home. The given equation represents the relationship between the number of cubic yards of mulch, x, and the number of tons of river rock, y Odalys ordered. How much more, in dollars, did a ton of river rock cost Odalys than a cubic yard of mulch? Enter decimal form only.

17

A hemisphere is half of a sphere. If a hemisphere has a radius of 50 inches, which of the following is closest to the volume, in cubic inches, of this hemisphere?

A $5,200$

B $20,900$

C $196,300$

D $261,800$

18

In triangle ABC, angle B is a right angle, and the length of BC is 248 millimeters. If $\cos(A) = \dfrac{3}{5}$, what is the length, in millimeters, of AB?

A   62

B   186

C   248

D   310

19

In a certain state, the population of pheasants, a type of bird, is estimated each year by counting the number of pheasants observed along certain roads in the state. On average, each year from 2005 to 2015 the number of pheasants counted per mile of road decreased by 3.5 of the number of pheasants per mile of road the previous year. Based on this average, if there were 6.97 pheasants per mile of road in this state in 2005, which of the following best approximates the number of pheasants per mile of road in 2015?

A $0.965(6.97)^{10}$

B $1.035(6.97)^{10}$

C $6.97(0.035)^{10}$

D $6.97(0.965)^{10}$

20

To study fluctuations in leaf water potential, samples of wood were taken from 25 trees and cut in the shape of a cube. The length of the edge of one of these cubes is 2.00 centimeters. If this cube has a mass of 2.72 grams, what is the density of this cube, in grams per cubic centimeter? Enter decimal form only.

21

x	y
−11	−25
9	55

The table shows two values of x and their corresponding values of y. The graph of the linear equation representing this relationship passes through the point $\left(\dfrac{1}{3}, a\right)$. What is the value of a? Enter decimal form only and round to two decimal places.

22

Which system of linear equations has no solution?

A
$$-2x + 8y = -5$$
$$2x - 8y = 5$$

B
$$2x - 8y = 5$$
$$3x + 9y = 6$$

C
$$2x - 8y = 5$$
$$-6x + 24y = -15$$

D
$$-2x + 8y = 5$$
$$4x - 16y = 10$$

STOP
If you finish before time is called, you may check your work on this module only.
Do not turn to any other module in the test.

Math

– 22 Questions I 35 minutes –

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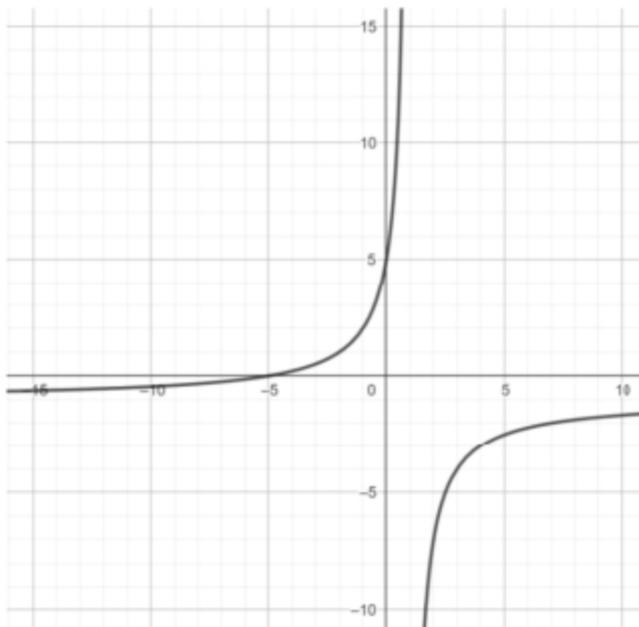
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1

The graph of $y = f(x)$ is shown in the xy-plane. What is the value of $f(0)$?

2

Which expression is equivalent to $(9nr^2 + 3nr) + (6n^2r + 5nr)$?

- **A** $15n^2r^2 + 8nr$
- **B** $15n^3r^3 + 8n^2r^2$
- **C** $54n^3r^3 + 15n^2r^2$
- **D** $9nr^2 + 6n^2r + 8nr$

3

If $\dfrac{2a}{b} = 5.8$ and $\dfrac{a}{bn} = 23.2$, what is the value of $\dfrac{1}{n}$?

4

$$v = -\frac{w}{161x}$$

The given equation relates the distinct positive numbers v, w and x. Which equation correctly expresses w in terms of v and x?

- **A** $w = -161vx$
- **B** $w = -\dfrac{161v}{x}$
- **C** $w = -\dfrac{x}{161v}$
- **D** $w = v + 161x$

5

A real estate company offers a series of three webinars. $1,250$ people attended the first webinar. 68 of the people who attended the first webinar attended the second webinar, and 32 of the people who attended the first and second webinars attended the third webinar. How many people attended all three webinars?

6

The graph of $y = f(x)$ is shown. What is the y-intercept of the graph of $y = f(x) + 13$?
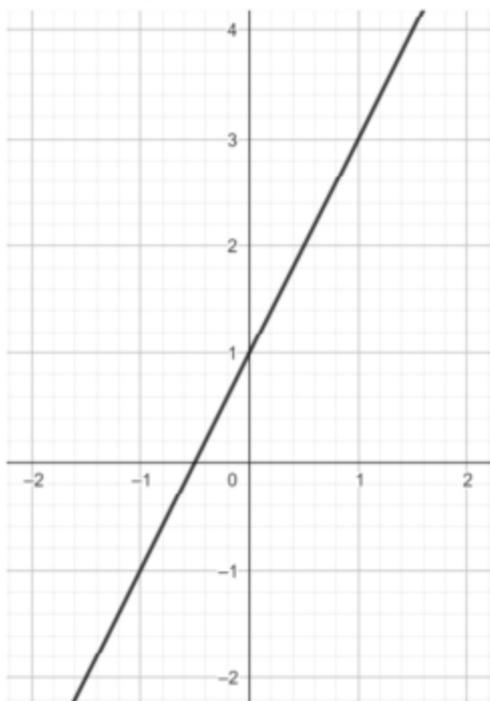
A $(0, -12)$

B $(0, 14)$

C $(1, 13)$

D $(1, 14)$

7

The function f is defined by $f(x) = |x - 6x|$. What value of a satisfies $f(7) - f(a) = -15$?

A -22

B 3

C 10

D 75

8

If $-9(15 - 3x) + 5 = -10(15 - 3x) + 21$, what is the value of $15 - 3x$?

9

The minimum value of x is 11 less than 8 times another number n. Which inequality shows the possible values of x?

A $x \leq 8n - 11$

B $x \geq 8n - 11$

C $x \leq 11 - 8n$

D $x \geq 11 - 8n$

10

The shaded region shown represents the solutions to the inequality $-18y < c$, where c is a constant. What is the value of c?
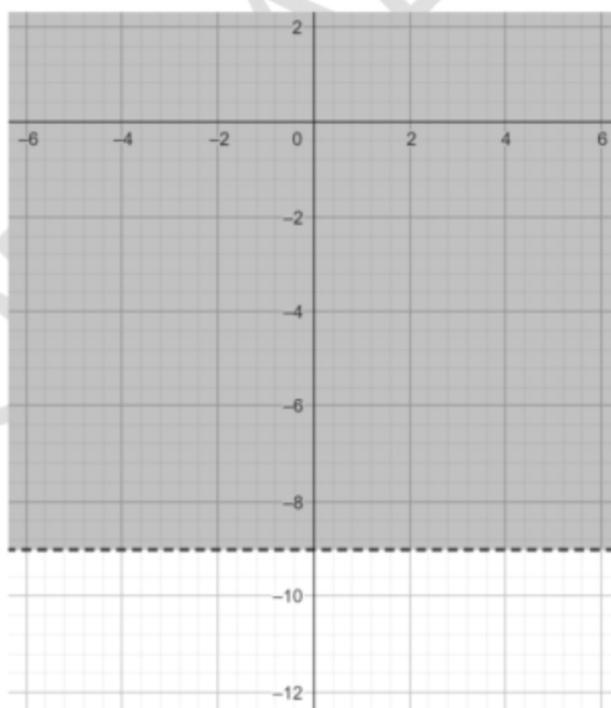
A 162

B 9

C -9

D -162

11

At a constant temperature, a scuba diver combines two different concentrations of nitrox mix (oxygen-nitrogen gas mixture) to fill a tank to a total pressure of 130 atmospheres (*atm*), of which 34 is contributed by oxygen. Nitrox mix *A* contributes x *atm* of pressure to the tank, of which 22 is contributed by oxygen. Nitrox mix *B* contributes y *atm* of pressure to the tank, of which 48 is contributed by oxygen. Which system of equations represents this situation?

A
$x + y = 130$
$0.48x + 0.22y = 0.34(130)$

B
$x + y = 130$
$0.22x + 0.48y = 0.34(130)$

C
$x + y = 0.34(130)$
$0.48x + 0.22y = 130$

D
$x + y = 0.34(130)$
$0.22x + 0.48y = 130$

12

The graph of the equation $y = 2^x + k$ is shown, where k is a constant. What is the value of k?
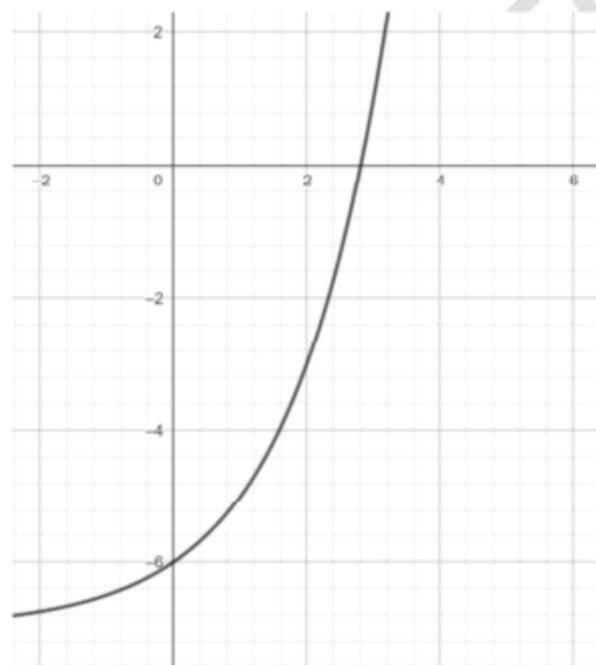
A   −7

B   −6

C   −5

D   −4

13

A certain town has an area of 3.99 square miles. What is the area, <u>in square yards</u>, of this town (1 mile $= 1,760$ yards)?

A   441

B   7,022

C   776,341

D   12,359,424

14

The function f is defined by $f(x) = 4x^2$. What is the value of $f(11)$?

A   44

B   52

C   88

D   484

15

The function f gives the product of a number, x, and a number that is 66 more than x. Which equation defines f?

A $f(x) = x^2 + x + 66$

B $f(x) = x^2 + 66$

C $f(x) = x^2 + 66x$

D $f(x) = x^2 + 66x + 66$

16

One of the factors of $4x^3 + 88x^2 + 468x$ is $x + b$, where b is a positive constant. What is the smallest possible value of b?

17

Alex engages in up to 3 types of exercise each week for a total of 9 hours while training for a triathlon. Alex swims for the same number of <u>minutes</u> each week. The equation $y = 540 - x - 200$ represents the situation where Alex bikes for x minutes during a week and runs for any remaining training time y, in minutes. If this equation is graphed in the xy-plane, which statement is the best interpretation of the x-intercept of the graph?

A   During a week when Alex swims for 340 minutes, he bikes for 200 minutes.

B   Each week, Alex bikes and runs for a total of 340 minutes.

C   During a week when Alex doesn't bike, he runs for 340 minutes.

D   During a week when Alex doesn't run, he bikes for 340 minutes.

18

Two lines intersect at exactly one point, forming two acute angles and two obtuse angles. The measure of one of these angles is $(9x - 190)^\circ$. Which of the following could **NOT** be the sum of the measures of any two of these angles?

A $(-18x + 380)^\circ$

B $(-18x + 740)^\circ$

C $(18x - 380)^\circ$

D 180°

19

$$\frac{4}{7}(4x + 7)\left(x + \sqrt{4k+7}\right)\left(x - \sqrt{4k+7}\right) = 0$$

In the given equation, k is a positive constant. The product of the solutions to the equation is 77. What is the value of k? Enter decimal form only.

20

At the time of posting a video, a social media channel had 100 subscribers. Each day for five days after the video was posted, the number of subscribers tripled from the number the previous day. Which equation gives the total number of subscribers, n, to the channel d days after the video was posted?

A $n = (100)^d$

B $n = 100(3)^d$

C $n = 100\left(\dfrac{1}{3}\right)^d$

D $n = (100)^3 + d$

21

	Volume *(cubic units)*
Right circular cylinder A	112π
Right circular cylinder B	$3,024\pi$

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 4 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 $2\pi r^2 + 2\pi rh$.

22

Function f is a quadratic function. The graph of $y = f(x)$ in the xy-plane has a vertex at $(-8, 1)$, contains the point $(-9, -1)$, and has a y-intercept at $(0, a)$. The graph of $y = 6f(x)$ has a y-intercept at $(0, b)$. What is the positive difference between a and b?

STOP

If you finish before time is called, you may check your work on this module only.

Do not turn to any other module in the test.

Digital SAT Reference Test

March 2024 *Question Booklet*

Test date: ...... / ...... / ....

SCOREBOARD

Reading and Writing   *Math*

Module 1	/ 27	/ 22
Module 2	/ 27	/ 22
Total points	/ 98	

1	5
2	D
3	8
4	A
5	272
6	B
7	C
8	16
9	B
10	A
11	B
12	A
13	D
14	D
15	C
16	9
17	D
18	A
19	9.25
20	B
21	704
22	635
1	A
2	A
3	C
4	88
5	B
6	63
7	D
8	A
9	C
10	8
11	D

m1

14	D
15	C
16	9
17	D
18	A
19	9.25
20	B
21	704
22	635
1	A
2	A
3	C
4	88
5	B
6	63
7	D
8	A
9	C
10	8
11	D
12	B
13	C
14	B
15	A
16	10.25
17	D
18	B
19	D
20	0.34
21	20.33
22	D

m2

Section 2

Module 1: Math

1 ☐ Mark for Review

$$13x = 42 - x$$

What value of x is the solution to the given equation?

3

Answer Preview: 3

2 ☐ Mark for Review

An arborist measured and recorded the heights of red maple trees in a certain area. Of the red maple tree heights recorded in this area, the minimum was **42** feet and the maximum was **57** feet. Which inequality is true for all possible values of t, where t represents the recorded height, in feet, of a red maple tree in this area?

(A) $t \leq 42$

(B) $t \geq 57$

(C) $t \geq 99$

(D) $42 \leq t \leq 57$

Javier deposits $45 in a savings account at the end of each week. At the beginning of the 1st week of a year there was $700 in that savings account. How much money, in dollars, will be in the account at the end of the 6th week of the year?

(A) 430

(B) 745

(C) 751

(D) 970

Student-produced response directions

- If you find **more than one correct answer**, enter only one answer.
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- 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	31/2 3 1/2

The y-intercept of the graph of $y = 2x^2 + 27$ is $(0, y)$. What is the value of y?
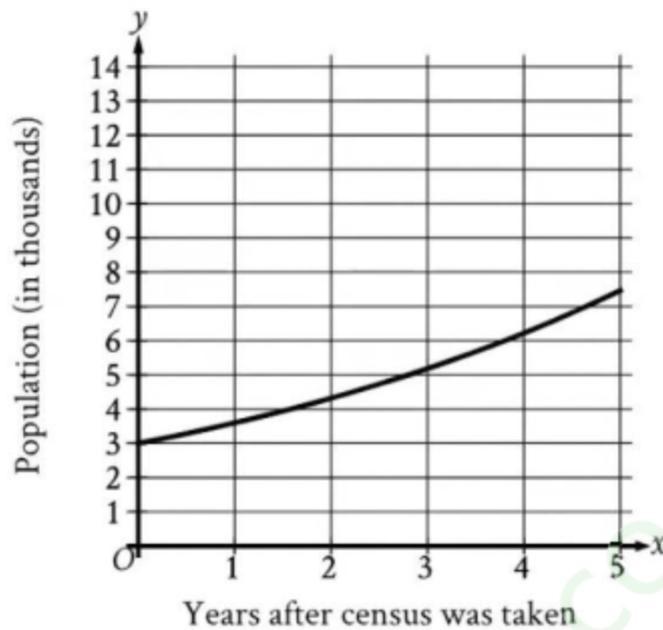
Years after census was taken

In 2000, a census was taken to determine the population of a certain town. The graph gives the estimated population y, in thousands, of this town x years after the 2000 census was taken, where $0 \leq x \leq 5$. Based on the graph, which of the following is the closest to

In 2000, a census was taken to determine the population of a certain town. The graph gives the estimated population y, in thousands, of this town x years after the 2000 census was taken, where $0 \leq x \leq 5$. Based on the graph, which of the following is the closest to the estimated population 2 years after the 2000 census was taken?

(A) 7,400

(B) 6,200

(C) 4,300

(D) 3,000

$$f(x) = 5x + b$$

For the linear function f, b is a constant and $f(7) = 35$. What is the value of b?

Ⓐ 0

Ⓑ 1

Ⓒ 5

Ⓓ 7

The function h is defined by $h(x) = 5|x|$. What is the value of $h(-3)$?

Ⓐ -15

Ⓑ 2

Ⓒ 8

Ⓓ 15

The table shows the frequency of values in a data set.

Value	Frequency
13	8
20	1
27	8
34	6

What is the minimum value of the data set?

(A) 1

(B) 8

(C) 13

(D) 20

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Examples

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The list gives the mass, in grams, of 5 ruffed lemurs.

3,910; 3,910; 3,130; 3,950; 3,150

What is the mean mass, in grams, of these 5 ruffed lemurs?

Answer Preview:

$$y = 5(x - 3)$$
$$y = (x - 3)^2$$

Which ordered pair (x, y) is a solution to the given system of equations?

(A) $(8, -5)$

(B) $(8, 25)$

(C) $(3, 8)$

(D) $(2, -5)$

Scientists collected fallen acorns that each housed a colony of the ant species *P. ohioensis* and analyzed each colony's structure. For any of these colonies, if the colony has x worker ants, the equation $y = 0.67x + 2.6$, where $20 \leq x \leq 110$, gives the predicted number of larvae, y, in the colony. If one of these colonies has **46** worker ants, which of the following is closest to the predicted number of larvae in the colony?

(A) 33

(B) 49

(C) 65

(D) 150

Liam has $150 in an account. Each year he expects to have 2.8% more money in the account than he had the previous year. Which of the following models best describes how Liam expects the money in his account to change over time?

(A) Decreasing exponential

(B) Decreasing linear

(C) Increasing exponential

(D) Increasing linear

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$$9x + 5y = 19$$
$$-9x - 3y = 7$$

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

Line k is defined by $y = 6x + \frac{1}{9}$. Line j is perpendicular to line k in the xy-plane. What is the slope of line j?

(A) -9

(B) $-\frac{1}{6}$

(C) $\frac{1}{9}$

(D) 6

Student-produced response directions

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Examples

Answer	Acceptable ways to enter answer	Unacceptable: will NOT receive credit
3.5	3.5 3.50	31/2 3 1/2

The product of a positive number x and the number that is 7 less than x is equal to 228. What is the value of x?

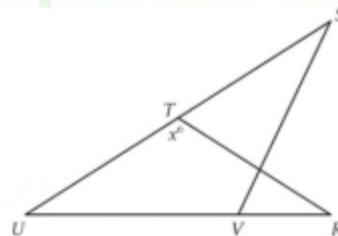**Student-produced response directions**

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Examples

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Raheem bought 9 shirts that were each the same price. He used a coupon for $54 off the entire purchase. The cost for the entire purchase after using the coupon was $108. What was the original price, in dollars, for 1 shirt?

Answer Preview:

$$7|x - 7| = 42$$

What is the sum of the solutions to the given equation?

(A) -6

(B) 0

(C) 14

(D) 49

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Examples

Answer	Acceptable ways to enter answer	Unacceptable: will NOT receive credit
3.5	3.5 3.50	31/2 3 1/2

Note: Figure not drawn to scale.

In the figure, $RT = TU$, the measure of angle VST is $23°$, and the measure of angle RVS is $34°$. What is the value of x?

Mark for Review

A cube has an edge length of 82 inches. A solid sphere with a radius of 41 inches is inside the cube, such that the sphere touches the center of each face of the cube. To the nearest cubic inch, what is the volume of the space in the cube <u>not</u> taken up by the sphere?

(A) 262,672

(B) 288,532

(C) 334,846

(D) 546,087

Mark for Review

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 $(0, 8)$ and $(2, 32)$. What is the value of ab?

(A) 32

(B) 35

(C) 40

(D) 64

Section 2

Module 2: Math

$$f(x) = k(1.84)^x$$

The function f is defined by the given equation, where k is a constant. The value of $f(x)$ increases by $p\%$ for every increase of x by 1. For which of the following functions, where k is a constant, does the value of $g(x)$ increase by $p\%$ for every increase of x by 4?

(A) $g(x) = k(1.84^x)^{\frac{1}{4}}$

(B) $g(x) = k(1.84^x)^4$

(C) $g(x) = k(1.84)^{x-4}$

(D) $g(x) = k(1.84)^{x+4}$

$$f(x) = \sqrt{5x + 6}$$

The function f is defined by the given equation. If $f(a) = -5a$, where a is a constant, what is the value of a?

(A) $\frac{3}{5}$

(B) $\frac{2}{5}$

(C) $-\frac{2}{5}$

(D) $-\frac{3}{5}$

If $2x = 10$, what is the value of $4x$?

(A) 7

(B) 10

(C) 12

(D) 20
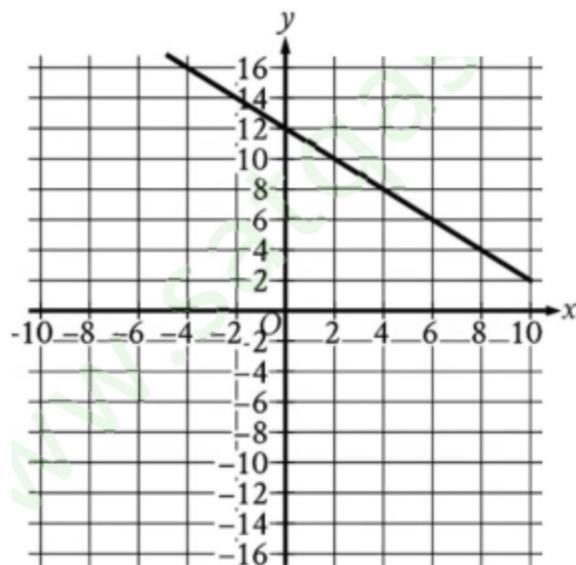
What is an equation of the graph shown?
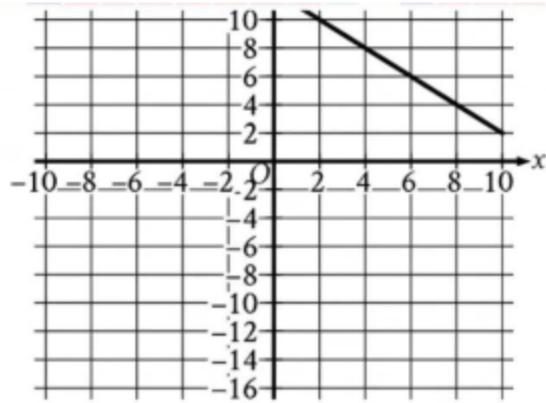
(A) $y = x + 12$

What is an equation of the graph shown?

- (A) $y = x + 12$
- (B) $y = -x + 12$
- (C) $y = 2x + 12$
- (D) $y = -2x + 12$

x	$h(x)$
0	1.25
2	1.80
4	2.59

The table shows the exponential relationship between the number of years, x, since Hana started training in pole vault, and the estimated height $h(x)$, in meters, of her best pole vault for that year. Which of the following functions best represents this relationship, where $x \leq 4$?

(A) $h(x) = 1.20(0.25)^x$

(B) $h(x) = 1.20(1.25)^x$

(C) $h(x) = 1.25(0.20)^x$

(D) $h(x) = 1.25(1.20)^x$

---

5 ☐ Mark for Review

$$x^2 = 2,601$$

How many distinct real solutions does the given equation have?

(A) Zero

(B) Exactly one

(C) Exactly two

(D) Infinitely many

The function $P(x) = 533(1.011)^x$ models the population of a certain town each year from 1951 through 1966, where x is the number of years after 1951. Which of the following is the best interpretation of "$P(5)$ is approximately equal to 563" in this context?

(A) The population of the town is estimated to be approximately 5 greater in 1956 than in 1951.

(B) The population of the town is estimated to be approximately 563 in 1956.

(C) The population of the town is estimated to be approximately 5 times greater in 1956 than in 1951.

(D) The population of the town is estimated to increase by approximately 563 every 5 years between 1951 and 1966.

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

Age group	Proportion
Less than 18 years old	27%
18–40 years old	24%
41-65 years old	28%
Greater than 65 years old	21%

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?

(A) 0.21

(B) 0.29

For a certain rectangular region, the ratio of its length to its width is 10 to 4. If the width of the rectangular region increases by 7 units, how must the length change to maintain this ratio?

(A) It must decrease by 7 units.

(B) It must increase by 7 units.

(C) It must increase by 17.5 units.

(D) It must decrease by 17.5 units.

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	31/2 3 1/2

The expression $(9x - 28)(15x + 4)$ is equivalent to the expression $ax^2 + bx + c$, where a, b, and c are constants. What is the value of b?

Rectangles $ABCD$ and $EFGH$ are similar. The length of each side of $EFGH$ is 6 times the length of the corresponding side of $ABCD$. The area of $ABCD$ is 96 square units. What is the area, in square units, of $EFGH$?

(A) 16

(B) 36

(C) 576

(D) 3,456

Data set A: $8, 11, 12, 15, 21, 27$

Data set B: $9, 12, 13, 16, 22, h$

Data sets A and B each consist of 6 values as shown, where h is a constant. If the standard deviation of data set A is greater than the standard deviation of data set B, which of the following could be the value of h?

I. 23
II. 28
III. 29

(A) I only

(B) II only

(C) III only

(D) II or III

Number of K-type stars (y-axis)

Number of M-type stars (x-axis)
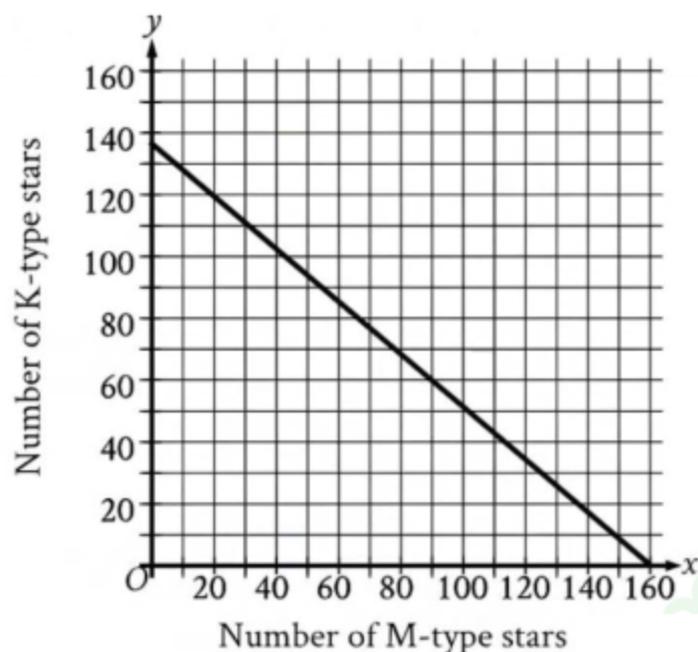
A certain open star cluster contains M-type stars and K-type stars. The estimated total mass of M-type and K-type stars in this open star cluster is **132,778 quettagrams**. The graph shown models the possible combinations of the number of M-type stars, x, and K-type stars, y, that could be in this open star cluster if all the M-type stars have the same estimated mass and all the K-type stars have the same estimated mass. Based on the graph, which of the following is closest to the estimated mass, in quettagrams, of each M-type star in this cluster?

(A) 828

(B) 973

(C) 52,992

(D) 79,786

13 🔖 Mark for Review

The function f is defined by $f(x) = (x-9)(x-6)(x-5)$. In the xy-plane, the graph of $y = g(x)$ is the result of translating the graph of $y = f(x)$ up 4 units. What is the value of $g(0)$?

[   ]

Answer Preview:

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14 🔖 Mark for Review

At a depth of h meters below the surface, the estimated total pressure P_1, in kilopascals (**kPa**), a diver experienced is given by $P_1 = 10h + 101$, which is a combination of estimated water pressure and estimated atmospheric pressure. After maintaining a certain depth, the diver descended d additional meters. The estimated total pressure P_2, in **kPa**, the diver experienced after descending these d additional meters is given by $P_2 = 10d + 311$. Which of the following is the best interpretation of **311** in this context?

(A) The estimated total pressure, in **kPa**, the diver experienced at a depth of d meters

(B) The estimated increase in the total pressure, in **kPa**, the diver experienced for each increase in the depth by **1** meter

(C) The estimated increase in the total pressure, in **kPa**, the diver experienced for each increase in the depth by d meters

(D) The estimated total pressure, in **kPa**, the diver experienced when the diver began to descend d additional meters

15 ☐ Mark for Review

A circle has diameters $\overline{AC}$ and $\overline{BD}$. The circumference of the circle is 84π, and the length of arc DA is 2 times the length of arc AB. What is the length of arc BC?

(A) 2π

(B) 14π

(C) 21π

(D) 28π

16 ☐ Mark for Review

In triangle XYZ, angle Y is a right angle, the measure of angle Z is $39°$, and the length of $\overline{YZ}$ is 22 units. If the area, in square units, of triangle XYZ can be represented by the expression $k\tan 39°$, where k is a constant, what is the value of k?

17 ☐ Mark for Review

In right triangle RST, the sum of the measures of angle R and angle S is 90 degrees. The value of $\sin(R)$ is $\frac{3\sqrt{17}}{13}$. What is the value of $\cos(S)$?

(A) $\frac{4\sqrt{17}}{51}$

(B) $\frac{3\sqrt{17}}{13}$

(C) $\frac{13\sqrt{17}}{51}$

(D) $\frac{3\sqrt{17}}{4}$

18 ☐ Mark for Review

The composition of an animal is defined as the muscles, bones, and fat of the animal. A scientist studied the composition of one young swamp buffalo and determined the buffalo had **133** kilograms of muscle, which made up approximately **65.9%** of its composition. Of the remaining composition of this buffalo, approximately **46.2%** was bone, and the remainder was fat. Based on these approximations, to the nearest tenth, how many kilograms of this buffalo's composition was bone?

☐

Answer Preview:

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19 ☐ Mark for Review

Which of the following expressions has a factor of $x + 2b$, where b is a positive integer constant?

(A) $3x^2 + 9x + 18b$

(B) $3x^2 + 24x + 18b$

(C) $3x^2 + 30x + 18b$

(D) $3x^2 + 39x + 18b$

$$31(x - n) = 31y + 31n$$

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

(A) $3x - 3y = 6n$

(B) $3x + 3y = 3n$

(C) $3x + 3y = 6n$

(D) $3x - 3y = 3n$

The cost of renting a piece of equipment is \$64n for the first day and \$32n for each additional day, where n is a positive integer. Which of the following functions gives the cost $C(x)$, in dollars, of renting this equipment for x days, where x is a positive integer?

(A) $C(x) = 32nx + 32n$

(B) $C(x) = 32nx + 64n$

(C) $C(x) = 64nx + 32n$

(D) $C(x) = 64nx - 32n$

In triangle ABC and triangle DEF, sides AB and DE each have a side length of 6 inches, and angles A and D each have an angle measure of $40°$. Which of the following additional pieces of information is(are) sufficient to prove whether triangle ABC is congruent to triangle DEF?

    I. The measures of angles B and C are equal.
    II. The lengths of sides AC and DF are equal.
    III. The lengths of sides BC and EF are equal.

(A) I is sufficient, but II and III are not.

(B) II is sufficient, but I and III are not.

(C) III is sufficient, but I and II are not.

(D) II is sufficient and III is sufficient, but I is not.

MATH module 1 answers

1)3	12)C
2)D	13)26
3)D	14)B
4)29	15)19
5)C	16)18
6)A	17)C
7)D	18)158
8)C	19)A
9)3,610	20)B
10)B	21)A
11)A	22)C

Module 2 answers

1)D	12)A
2)B	13)-266
3)MISSED*	14)A
4)D	15)D
5)C	16)22
6)B	17)B
7)B	18)31.8
8)C	19)D
9)-384	20)D
10)3,456	21)B
11)A	22)D

Math Module 1

1

The equation d = 29w + 100 gives the total amount of money d, in dollars, that James plans to save w weeks after he starts to save. What is the total amount of money, in dollars, he plans to save in 10 weeks?

A) 340

B) 390

C) 440

D) 490

2

Carrie has c dollars and Marjani has m dollars. Carrie has 3 times as many dollars as Marjani, and together they have a total of $28.00. Which system of equations represents this situation?

A) c=3m; c+m=28

B) m=3c; c+m=28

C) c=28m; c+m=3

D) m=28c; c+m=3

3

$$x^2 = (29)(29)$$

What is the positive solution to the given equation?

A)

B)

C)

D)

4

A car travels at a speed of at least 40 miles per hour but no more than 65 miles per hour for a certain part of a trip. Which inequality represents this situation, where z is the speed of the car, in miles per hour, on this part of the trip?

A) $x \geq 40$

B) $x \geq 65$

C) $40 \leq x \leq 65$

D) $x \leq 105$

5

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

The graphs of the equations in the given system of equations intersect at the point (x, y) in the xy-plane. What is the value of y?

A) 9

B) 26

C) 81

D) 89

6

The function f is defined by $f(x) = x^2 + x + 44$.
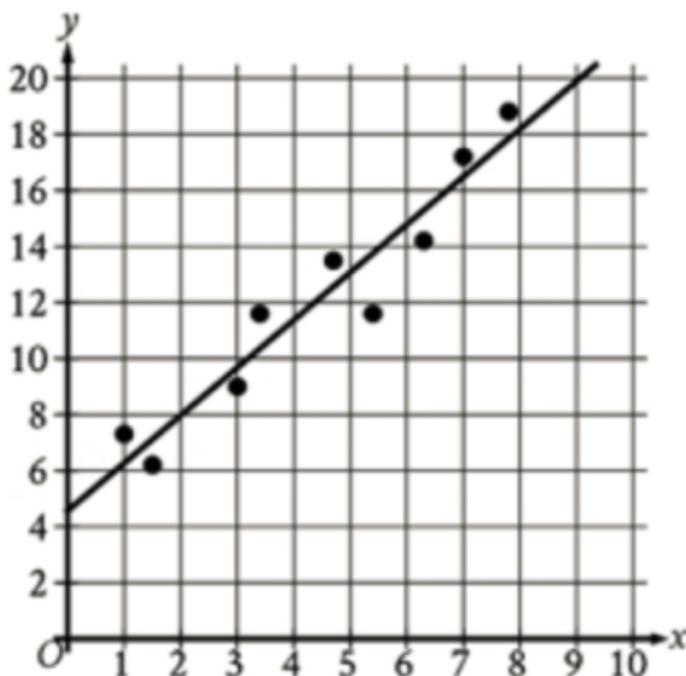
What is the value of f (2)?

A)

B)

C)

D)

7

The scatterplot shows the relationship between two variables, x and y. A line of best fit for the data is also shown. For how many of the 9 data points is the actual y-value less than the y-value predicted by the line of best fit?

A) 2

B) 4

C) 5

D) 7

8

Jasmin grows bean pods in her garden. This year, she harvested 490 bean pods and saved 10% of them to plant next year. How many of the harvested bean pods did Jasmin save to plant next year?

A) 39

B) 49

C) 57

D) 59

9

6(3x - 4)=42

Which equation has the same solution as the given equation?

A) 3x-4=36

B) 3x-4=7

C) 3x-24=42

D) 3x-24=48

What is an x-intercept of the graph of the equation y= (x + 8)(x - 11)(x + 12) in the xy-plane?

A) (1,0)

B) (0,8)

C) (11,0)

D) (0,12)

Each side of equilateral triangle S is multiplied by a scale factor of k to create equilateral triangle T. The length of each side of triangle T is greater than the length of each side of triangle S. which of the following could be the value of k?

A) 0

B) 43/44

C) 1

D) 44/43

Which expression is equivalent to 2(x – 7/2)(x + 6)?

A) $x^2 + 5x - 21$

B) $2x^2 - x - 21$

C) $2x^2 + 5x - 42$

D) $2x^2 - 42$

y=9x-15

5x+y=41

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

A)

B)

C)

D)

A salesperson earns 2 points for each call made to a potential customer and 6 points for each visit made to a potential customer. Last week, the salesperson earned a total of 366 points. The equation 2x + 6y= 366 represents this situation. Which is the best interpretation of 6y in this context?

A) The number of calls the salesperson made to potential customers last week

B) The number of visits the salesperson made to potential customers last week

C) The total number of points the salesperson earned from calls made to potential customers last week

D) The total number of points the salesperson earned from visits made to potential customers last week

y = (2/5) x + 7

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

A) - 7

B) – 1/7

C) 1/7

D) 7

The kinetic energy, in joules, of an object with mass 75 kilograms traveling at a speed of v meters per second is given by the function K,

where K (v) = 1/2 (75)(v^2) .

Which of the following is the best interpretation of K(0)= 0 in this context?

A) The kinetic energy of the object is 0 joules when the mass of the object is 0 kilograms.

B) The speed of the object is 0 meters per second when the mass of the object is 0 kilograms.

C) The kinetic energy of the object is 0 joules when the object is traveling at a speed of 0 meters per second.

D) The height of the object is 0 meters when the object is traveling at a speed of 0 meters per second.

In triangle ABC, angle B is a right angle. The length of side AB is $10\sqrt{69}$ and the length of side BC is $24\sqrt{69}$. What is the length of side AC?

A) $14\sqrt{69}$

B) $26\sqrt{69}$

C) $34\sqrt{69}$

D) $\sqrt{34*69}$

x	y
-4	$n+142$
-2	$n+71$
0	n

The table shows three values of x and their corresponding values of y, where n is a constant, for the linear relationship between s and y. What is the slope of the line that represents this relationship in the xy-plane?

A) – 71/2

B) – 2/71

C) (n+71) / (-2)

D) (2n - 71) /2

Square A has side lengths that are 192 times the side lengths of square B. The area of square A is k times the area of square B. What is the value of k?

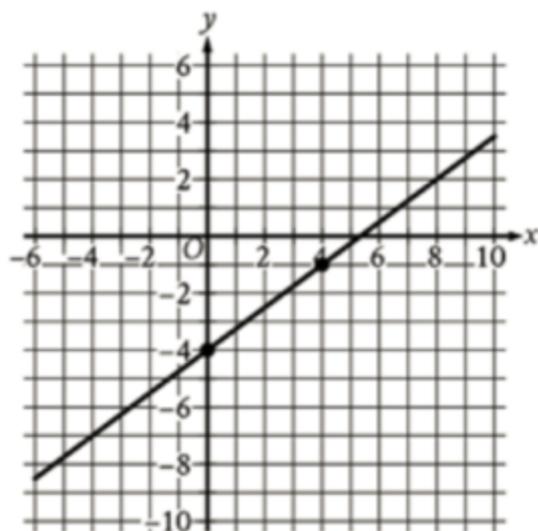A)

B)

C)

D)

20

What is the value of tan 50π/ 3 ?

A) $- \sqrt{3}$

B) $- \sqrt{3}/3$

C) $\sqrt{3}/3$

D) $\sqrt{3}$

21

A conservation specialist hung artificial nesting structures each in the shape of a right rectangular prism for a species of native duck. Each structure has a height of 12 inches. The length of each structure's base is x inches, which is 1 inch more than the width of the structure's base. Which function V gives the volume of each structure, in cubic inches, in terms of the length of the structure's base?

A) V(x) = x(x + 12)(x + 1)

B) V(x) = x(x + 12)(x - 1)

C) V(x) = 12x (x + 1)

D) V(x) = 12x(x - 1)

22
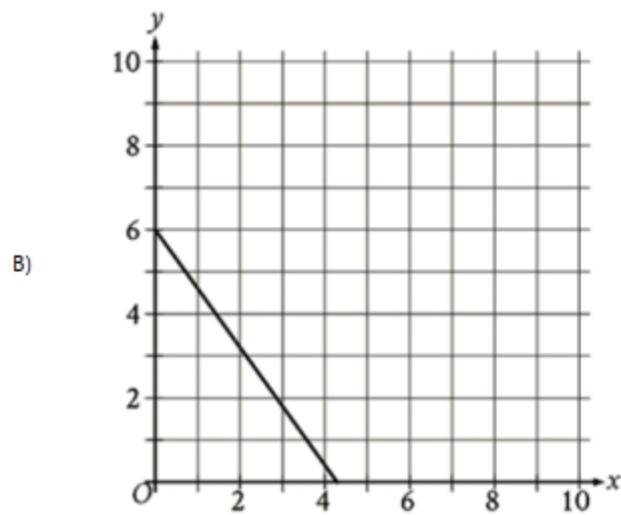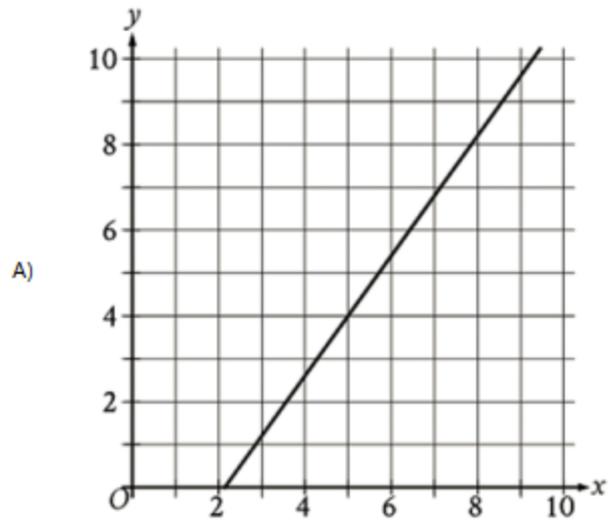

Line r is shown in the xy-plane. Line t (not shown) is perpendicular to line r and passes through the point (5, 8). What is the y-coordinate of the y-intercept of line t?
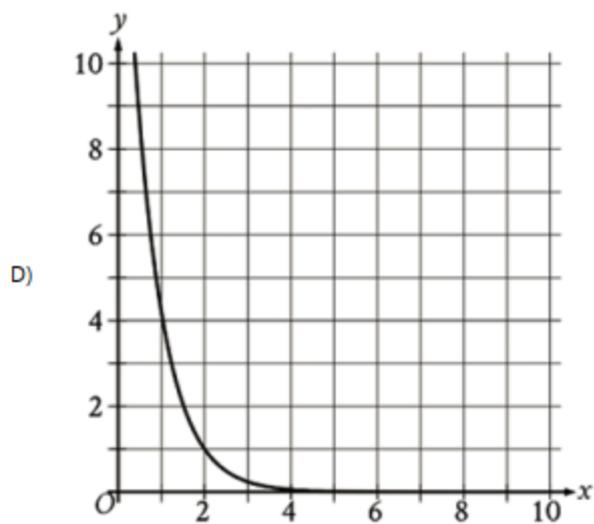
A)

B)

C)

D)

Math Module 2

Which of the following is a graph of a decreasing exponential function?

A)

B)

C) 图片缺失

D)

2

What is the y-intercept of the graph of $y = 6x^2 + 3x + 4$ in the xy-plane?

A) (0,3)

B) (0,4)

C) (0,6)

D) (0,7)

3

If 2x+5=9, what is the value of 8x-4?

A)

B)

C)

D)

4

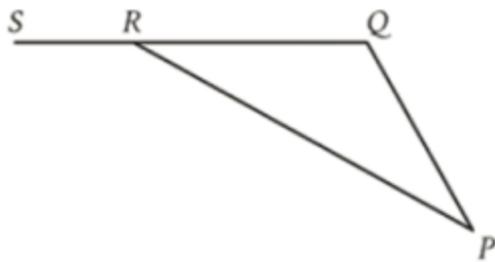The product of a positive number z and the number that is 1 less than s is equal to 12. What is the value of x?

A) 0.5

B) 4

C) 11

D) 13

5

A cylinder has a diameter of 6 inches and a height of 24 inches. What is the volume, in cubic inches, of the cylinder?

A) 9π

B) 144π

C) 216π

D) 864π

6

Note: Figure not drawn to scale.

In triangle PQR, QR is extended to point S. The measure of ∠PQR is 114°, and the measure of ∠PRS is 158°. What is the measure of ∠QPR?

A) 66°

B) 44°

C) 33°

D) 22°

7

Sarah used wax to make candles. The function f(x) = - 12x+ 60 approximates the weight, in ounces, of wax Sarah had remaining after making a candles. Which statement is the best interpretation of the y-intercept of the graph of y= f(x) in the xy-plane in this context?

A) Sarah used approximately 12 ounces of wax for each candle.

B) Sarah had approximately 12 ounces of wax when she began to make the candles.

C) Sarah had approximately 60 ounces of wax when she began to make the candles.

D) Sarah used approximately 60 ounces of wax for each candle.

8

ak= (b/11)(14+m)

The given equation relates the positive variables a, b, k, and m. Which equation correctly expresses m in terms of a. b, and k?

A) m = 11(ak-14) / b

B) m = ak – 14 – b/11

C) m= ak – 14b / 11

D) m = 11ak / b - 14

9

The function g is defined by

$g(x) = 10^{3x-7}$

What is the value of a when g(x) is equal to 10,000?

A) 3

B) 10/3

C) 11/3

D) 4

10

If x/y =2 and 5x/ty = 50, what is the value of t?

A) 1/5

B) 2/5

C) 5/2

D) 5

11

A piece of string with a length of 30 inches is cut into two parts. One part has a length of x inches, and the other part has a length of y inches. The value of x is 3 more than 2 times the value of y. What is the value of x?

A)

B)

C)

D)

12

Which equation has no solution?

A) -15x- 1/6 = -15x – 1/6

B) -15x- 1/6 = -15x + 1/6

C) -15x- 1/6 = 15x – 1/6

D) -15x- 1/6 = 15x + 1/6

13

F(x) = (9/5)(x-273.15)+32

The function F gives the temperature, in degrees Fahrenheit, that corresponds to a temperature of x kelvins. If a temperature increased by 9.40 kelvins, by how much did the temperature increase, in degrees Fahrenheit?

A) 16.92

B) 48.92

C) 474.75

D) 506.75

14

$y = -0.5$
$y = x^2 + 10x + a$

In the given system of equations, a is a positive integer constant. The system has no real solutions. What is the least possible value of a?

A)

B)

C)

D)

15

An environmental scientist is investigating the volatility of 175 organic compounds by finding the boiling point of each compound. The mean boiling point of all 175 compounds is 183 degrees Celsius. The scientist classifies each of these compounds as either semivolatile or volatile. Of the 175 compounds, 50 compounds were classified as semi-volatile, and these 50 compounds have a mean boiling point of338 degrees Celsius. The remaining125 compounds were classified as volatile. What is the mean boiling point, in degrees Celsius, of the 125 compounds classified as volatile compounds?

A)

B)

C)

D)

16

$$f(x) = 28(1.30)^{x/4}$$

For the given function f, the value of f(x) increases by p% for every increase of a by 8. What is the value of p?

A) 30

B) 41

C) 60

D) 69

A carpenter charges a flat rate of $306 for the first 3 hours of work and $85 for each additional hour of work. Which equation gives the total amount y, in dollars, that the carpenter charges for x hours of work, where x >3?

A) y = 85x + 51

B) y = 306x + 85

C) y = 306x + 561

D) y = 85x + 306

$$\sqrt[3]{285n}\left(\sqrt[4]{285n}\right)^{2}$$

For what value of x is the given expression equivalent to $(285n)^{12x}$, where $n > 1$?

A)

B)

C)

D)

	0–9 years	10–19 years	20+ years	Total
Group A	15	18	7	40
Group B	6	7	27	40
Group C	19	15	6	40
Total	40	40	40	120

The table summarizes the distribution of age and assigned group for 120 participants in a study. One of these participants will be selected at random. What is the probability of selecting a participant from group A, given that the participant is at least 10 years of age?

A) 5/24

B) 5/16

C) 9/20

D) 5/8

x	$g(x)$
-24	3
-9	0
16	5

The table shows three values of x and their corresponding values of g(x), where g(x) = f(x)/(x+4) and f is a linear function. What is the y-intercept of the graph of y = f(x) in the xy-plane?

A) (0,36)

B) (0,9)

C) (0,4)

D) (0,-9)

21

The mass of object A is 481% of the mass of object B, and the mass of object A is 0.074% 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 /1,000 ?

A)

B)

C)

D)

22

1/cx = x / 128 + 1/c

In the given equation, c is a constant. If the equation has exactly one solution, what is the value of c?

A)

B)

C)

D)

Math Module 1 Answers

1. B
2. A
3. 29
4. C
5. D
6. 50
7. B
8. B
9. B
10. C
11. D
12. C
13. 25
14. D
15. D
16. C
17. B
18. A
19. 36864
20. A
21. D
22. 44/3

Math Module 2 Answers

1. D
2. B
3. 12
4. B
5. C
6. B
7. C
8. D
9. C
10. A
11. 21
12. B
13. A
14. 25
15. 121
16. D
17. A
18. 5/72
19. B
20. A
21. 650
22. -32

Math Module 1

1

The equation d = 29w + 100 gives the total amount of money d, in dollars, that James plans to save w weeks after he starts to save. What is the total amount of money, in dollars, he plans to save in 10 weeks?

A) 340

B) 390

C) 440

D) 490

(handwritten)
$$w = 10$$
$$d = 29(10) + 100 = 390$$

2

(handwritten labels: c, m, c+m)

Carrie has c dollars and Marjani has m dollars. Carrie has 3 times as many dollars as Marjani, and together they have a total of $28.00. Which system of equations represents this situation?

A) c=3m; c+m=28

B) m=3c; c+m=28

C) c=28m; c+m=3

D) m=28c; c+m=3

(handwritten)
$$c = 3m$$
$$c + m = 28$$

3

$$x^2 = (29)(29)$$

What is the positive solution to the given equation?

A)

B)

C)

D)

(handwritten)
$$x^2 = 29^2$$
$$\sqrt{x^2} = \sqrt{29^2}$$
$$x = 29$$

4

(handwritten: $w \le x$)

A car travels at a speed of at least 40 miles per hour but no more than 65 miles per hour for a certain part of a trip. Which inequality represents this situation, where ● is the speed of the car, in miles per hour, on this part of the trip?

A) x ≥ 40

B) x ≥ 65

C) 40 ≤ x ≤ 65

D) x ≤ 105

(handwritten) $x \le 65$

$$40 \le x \le 65$$

5

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

The graphs of the equations in the given system of equations intersect at the point (x, y) in the xy-plane. What is the value of y?

A) 9

B) 26

(handwritten)
$$y = 9^2 + 8$$
$$y = 89$$

C) 81
D) 89 *(circled in green)*

6

The function f is defined by $f(x) = x^2 + x + 44$.

What is the value of $f(2)$?
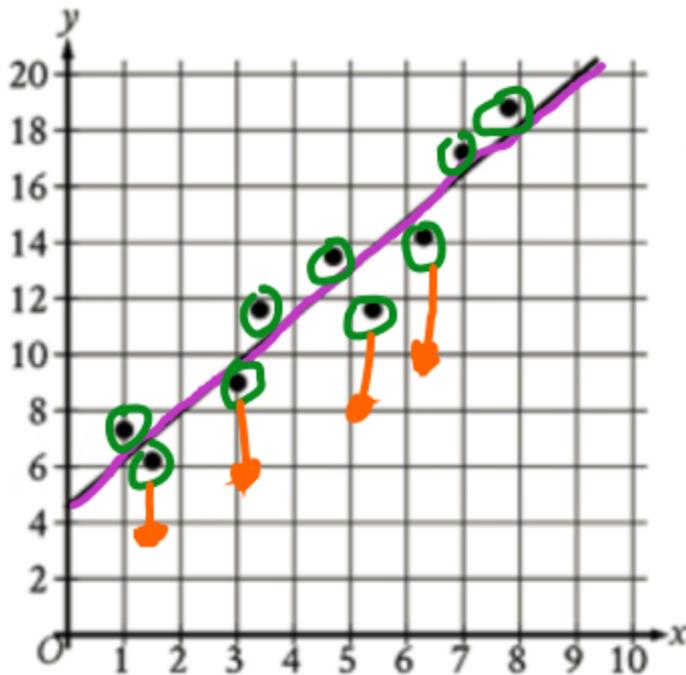
A)

B)

C)

D)

(handwritten)
$$x=2 \quad y=?$$
$$y = (2)^2 + 2 + 44 = \boxed{50}$$

7

The scatterplot shows the relationship between two variables, x and y. A line of best fit for the data is also shown. For how many of the 9 data points is the actual y-value less than the y-value predicted by the line of best fit?

A) 2

B) 4 *(circled in red)*

C) 5

D) 7

(handwritten)
points dotted < → points on Line
"points under Line"

8

Jasmin grows bean pods in her garden. This year, she harvested 490 bean pods and saved 10% of them to plant next year. How many of the harvested bean pods did Jasmin save to plant next year?

A) 39

B) 49 *(circled in blue)*

C) 57

D) 59

(handwritten)
$$490 \times 10\% = 49$$

9

$6(3x - 4) = 42$ → shift solve $x = 3.66$

OR ÷6

$$6(3x-4)=42$$
$$3x-4=7$$

Which equation has the same solution as the given equation?

A) 3x-4=36   shift solve $x = 13.33$ XX

B) $3x-4=7$ *Shift Solve* $X = 3.66$ ✓✓

C) $3x-24=42$

D) $3x-24=48$

10

$y=0$

What is an x-intercept of the graph of the equation $y=(x+8)(x-11)(x+12)$ in the xy-plane?

A) (1,0)

B) (0,8) ✗

C) (11,0)

D) (0,12) ✗

$(x+8)(x-11)(x+12)=0$

$(-8,0)$
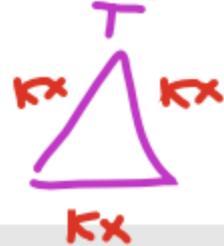$(11,0)$
$(-12,0)$

$x+8=0$ $x-11=0$ $x+12=0$

$x=-8$ $x=11$ $x=-12$

OR   OR

11

Each side of equilateral triangle S is multiplied by a scale factor of k to create equilateral triangle T. The length of each side of triangle T is greater than the length of each side of triangle S. which of the following could be the value of k?

A) 0

B) 43/44

C) 1

D) 44/43

S T

→ $K=1$ same Triangles

→ $K>1$ $\triangle_T > \triangle_S$

$K<1$ value ↓↓
$K>1$ value ↑↑

12

Which expression is equivalent to $2(x-7/2)(x+6)$?

A) $x^2+5x-21$ ✗

B) $2x^2-x-21$

C) $2x^2+5x-42$

D) $2x^2-42$

$(2x-7)(x+6)$

$2x^2+12x-7x-42$

$2x^2+5x-42$

13

$y=9x-15$
$5x+y=41$

$x+y=25$

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

A)

B)

C)

D)

Substitution

$5x+(9x-15)=41$

$14x=56$

$x=4$
$y=21$

or

$-9x+y=-15$
$5x+y=41$

Mode 5-1

$x=4$ $y=21$

14

A salesperson earns 2 points for each call made to a potential customer and 6 points for each visit made to a potential customer. Last week, the salesperson earned a total of 366 points. The equation $2x+6y=366$ represents this situation. Which is the best interpretation of 6y in this context?

A) The number of calls the salesperson made to potential customers last week ✗

B) The number of visits the salesperson made to potential customers last week

C) The total number of points the salesperson earned from calls made to potential customers last week

D) The total number of points the salesperson earned from visits made to potential customers last week

$2x$
$6y$

$2x+6y=366$

Total points from calls   Total points   Total points from visits

15

$y=(2/5)x+7$

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

same line

A) - 7

B) – 1/7

C) 1/7

D) 7

$m = \frac{2}{5}$

$b = 7$

$y = \frac{2}{5}x + 7$

$y = mx + b$

$\frac{1}{1} = \frac{\frac{2}{5}}{m} = \frac{7}{b}$

16

The kinetic energy, in joules, of an object with mass 75 kilograms traveling at a speed of v meters per second is given by the function K,

where $K(v) = 1/2 \, (75)(v^2)$.

$v = 0$

$K = 0$

when speed = 0 then Kinetic Energy = 0

Which of the following is the best interpretation of K(0) = 0 in this context?

A) The kinetic energy of the object is 0 joules when the mass of the object is 0 kilograms.

B) The speed of the object is 0 meters per second when the mass of the object is 0 kilograms.

C) The kinetic energy of the object is 0 joules when the object is traveling at a speed of 0 meters per second.

D) The height of the object is 0 meters when the object is traveling at a speed of 0 meters per second.

17

In triangle ABC, angle B is a right angle. The length of side AB is $10\sqrt{69}$ and the length of side BC is $24\sqrt{69}$. What is the length of side AC?

A) $14\sqrt{69}$

B) $26\sqrt{69}$

C) $34\sqrt{69}$

D) $\sqrt{34 * 69}$

$AC = \sqrt{AB^2 + BC^2}$

$= 26\sqrt{69}$
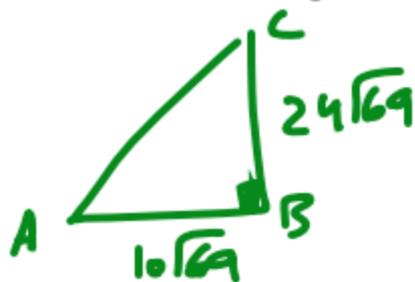
18

x	y
-4	n + 142
-2	n + 71
0	n

$(-4, n+142)$

$(-2, n+71)$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{n+71 - (n+142)}{-2 - (-4)}$

$= \frac{n+71 - n - 142}{2}$

$= \frac{-71}{2}$

The table shows three values of x and their corresponding values of y, where n is a constant, for the linear relationship between s and y. What is the slope of the line that represents this relationship in the xy-plane?

A) – 71/2

B) – 2/71

C) (n+71) / (-2)

D) (2n - 71) /2

19

Square A has side lengths that are 192 times the side lengths of square B. The area of square A is k times the area of square B. What is the value of k?

A)

$A = 192B \quad (\wedge 2)$

$(A)^2 = (192B)^2$

Area of square $= L^2$

Area A $= A^2$

Area B $= B^2$

B)
C)
D)

$A^2 = \boxed{36864} B^2$ $A^2 = \bigcirc{K} B^2$

$K = 36864$

20

What is the value of tan 50π/ 3 ?

$0 \leq Angle \leq 360$

A) - $\sqrt{3}$

B) - $\sqrt{3}$ /3

C) $\sqrt{3}$ /3

D) $\sqrt{3}$

$Tan \left(\dfrac{50 \times 180}{3} \right) = -\sqrt{3}$ "Calculator"

$3000 \xrightarrow{-360} 2640 \xrightarrow{-360} 2280 \xrightarrow{-360} 1920$

$1560 \xrightarrow{-360} 1200 \xrightarrow{-360} 840 \xrightarrow{-360} 480 \xrightarrow{-360} \boxed{120}$

21

A conservation specialist hung artificial nesting structures each in the shape of a right rectangular prism for a species of native duck. Each structure has a height of 12 inches. The length of each structure's base is x inches, which is 1 inch more than the width of the structure's base. Which function V gives the volume of each structure, in cubic inches, in terms of the length of the structure's base?

A) V(x) = x(x + 12)(x + 1)

B) V(x) = x(x + 12)(x - 1)

C) V(x) = 12x (x + 1)

D) V(x) = 12x(x - 1)

$Length = 1 + width$
$x = 1 + width$
$\boxed{width = x - 1}$

$V = Lwh$

$V = (x)(x-1)$
(12)

22
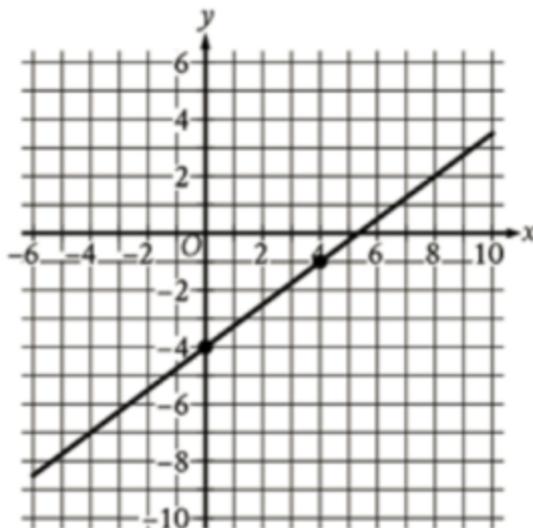
Line r is shown in the xy-plane. Line t (not shown) is perpendicular to line r and passes through the point (5, 8). What is the y-coordinate of the y-intercept of line t?

A)
B)
C)
D)

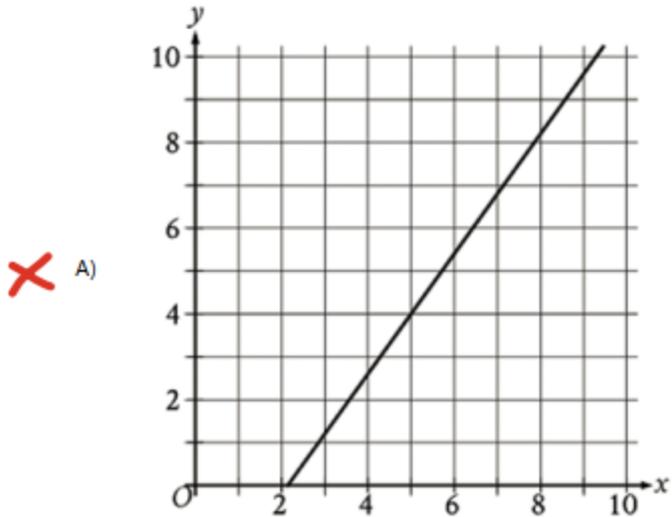$Line \, r$

$(0, -4) \quad (4, -1)$

$M_1 = \dfrac{-4-(-1)}{6-4} = \dfrac{-3}{-4} = \dfrac{3}{4}$

$Line \, T$

$m_2 = \dfrac{-4}{3}$

$y = \dfrac{-4}{3} x + b$ $(5, 8)$

$8 = \dfrac{-4}{3}(5) + b$ $Shift \, 2 \, solve$
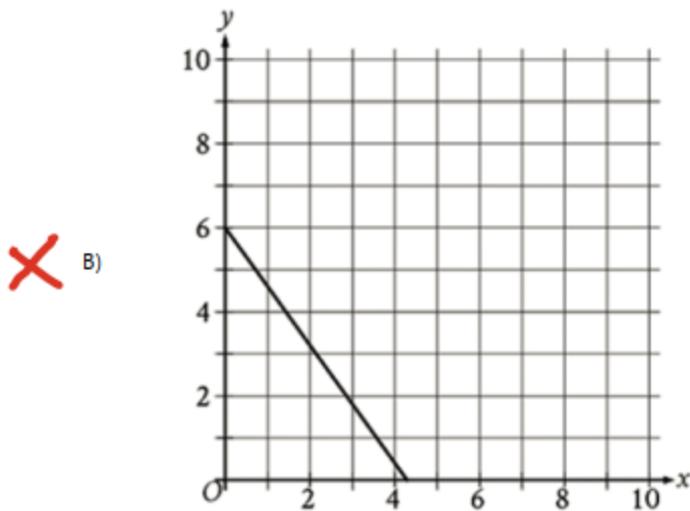
$b = 14.66$

Math Module 2

1

Which of the following is a graph of a decreasing exponential function?

X A)

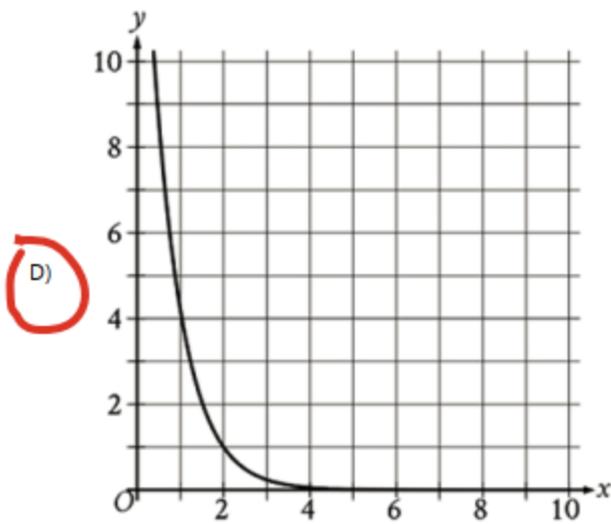

Increasing

X B)

Linear

C) 图片缺失

Line ← Linear

Curve ← Exponential

(D)

2

$x = 0$

What is the y-intercept of the graph of $y = 6x^2 + 3x + 4$ in the xy-plane?

A) (0,3)

B) (0,4)

C) (0,6)

D) (0,7)

$y = 6(0) + 3(0) + 4 = 4$

$(0, 4)$

3

If 2x+5=9, what is the value of 8x-4?

A)

B)

C)

D)

$2x = 4$

$x = 2$

$8(2) - 4 = 12$

4

The product of a positive number x and the number that is 1 less than x is equal to 12. What is the value of x?

A) 0.5

B) 4

C) 11

D) 13

$(x)(x-1) = 12$

$x^2 - x - 12 = 0$

$x = 4$ $x = -3$

5

A cylinder has a diameter of 6 inches and a height of 24 inches. What is the volume, in cubic inches, of the cylinder?
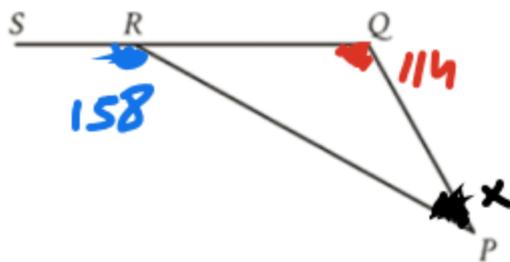
A) 9π

B) 144π

C) 216π

D) 864π

$V = \pi r^2 h$

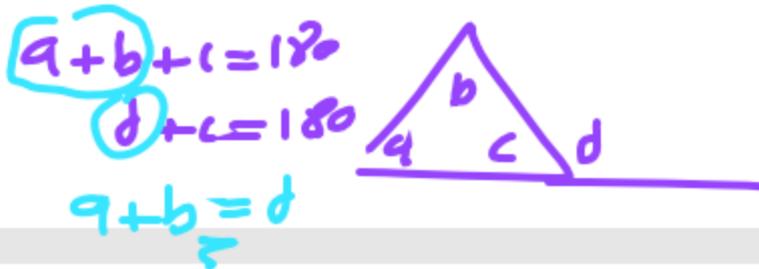$= \pi (3)^2 (24)$

$= 216\pi$

6

$radius = \dfrac{6}{2} = 3$

Note: Figure not drawn to scale.

Handwritten: 158, 114, x

Handwritten (green):
$$x + 114 = 158$$
$$x = 44$$

In triangle PQR, QR is extended to point S. The measure of ∠PQR is 114°, and the measure of ∠PRS is 158°. What is the measure of ∠QPR?

A) 66°

B) 44° *(circled)*

C) 33°

D) 22°

Handwritten (cyan):
$$a + b + c = 180$$
$$d + c = 180$$
$$a + b = d$$

Handwritten (purple triangle with labels a, b, c, d)

7

Sarah used wax to make candles. The function f(x) = - 12x+ 60 approximates the weight, in ounces, of wax Sarah had remaining after making a candles. Which statement is the best interpretation of the y-intercept of the graph of y= f(x) in the xy-plane in this context?

✗ A) Sarah used approximately 12 ounces of wax for each candle.

✗ B) Sarah had approximately 12 ounces of wax when she began to make the candles.

C) Sarah had approximately 60 ounces of wax when she began to make the candles. *(circled)*

D) Sarah used approximately 60 ounces of wax for each candle.

Handwritten (red):
$$y = -12x + 60$$
Decrease per candle   Initial y-Int   12

8

ak= (b/11)(14+m)

The given equation relates the positive variables a, b, k, and m. Which equation correctly expresses m in terms of a. b, and k?

A) m = 11(ak-14) / b

B) m = ak – 14 – b/11

C) m= ak – 14b / 11

D) m = 11ak / b - 14 *(circled)*

Handwritten:
$$ak = \frac{b}{11}(14+m)$$
$$11ak = b(14+m)$$
$$\frac{11ak}{b} = 14 + m$$
$$m = \frac{11ak}{b} - 14$$

9

The function g is defined by

g(x) = 10^{3x-7}

What is the value of a when g(x) is equal to 10,000? *(10,000 circled)*

A) 3

B) 10/3

C) 11/3 *(boxed)*

D) 4

Handwritten:
$$y = 10,000$$
$$10000 = 10^{3x-7}$$
$$10^{4} = 10^{3x-7}$$

10

If x/y =2 and 5x/ty = 50, what is the value of t?

A) 1/5 *(circled)*

Handwritten (orange):
$$3x - 7 = 4$$
$$3x = 11$$
$$x = \frac{11}{3}$$

B) 2/5
C) 5/2
D) 5

$\frac{x}{y} = 2$ $\frac{5x}{2y} = 50$

$\frac{5}{t} \times 2 = 50$

$\begin{cases} \frac{10}{2} = 50 \\ t = \frac{10}{50} = \boxed{\frac{1}{5}} \end{cases}$

11

A piece of string with a length of 30 inches is cut into two parts. One part has a length of x inches, and the other part has a length of y inches. The value of x is 3 more than 2 times the value of y. What is the value of x?

A)

B)

C)

D)

$x + y = 30$

$x = 3 + 2y$

$x + y = 30$

$x - 2y = 3$

Mode 5-1 $x = 21$ $y = 9$

12

Which equation has no solution?

A) -15x - 1/6 = -15x - 1/6

B) 15x - 1/6 = -15x + 1/6

C) -15x - 1/6 = 15x - 1/6

D) -15x - 1/6 = 15x + 1/6

A] $-15x + 15x = \frac{-1}{6} + \frac{1}{6}$

$0 = 0$ → Infinite

B] $-15x + 15x = \frac{1}{6} + \frac{1}{6}$

$0 = \frac{2}{6}$ → No solution

13

F(x) = (9/5)(x-273.15)+32

The function F gives the temperature, in degrees Fahrenheit, that corresponds to a temperature of x kelvins. If a temperature increased by 9.40 kelvins, by how much did the temperature increase, in degrees Fahrenheit?

A) 16.92

B) 48.92 ×9.4 $\begin{pmatrix} x=0 & y = -459.67 \\ x = 9.4 & y = -442.75 \end{pmatrix}$ y↑ 16.92

C) 474.75

D) 506.75

14

y = - 0.5

y = x² + 10x + a

$b^2 - 4ac < 0$

In the given system of equations, a is a positive integer constant. The system has no real solutions. What is the least possible value of a?

$ax^2 + bx + c$

A)

B)

C)

D)

$-0.5 = x^2 + 10x + a$

$0 x^2 + 10x + (a + 0.5) = 0$

$10^2 - 4(1)(a + 0.5) < 0$

$\begin{cases} 100 - 4a - 2 < 0 \\ 98 < 4a \\ 24.5 < a \end{cases}$

$\boxed{a = 25}$

15

An environmental scientist is investigating the volatility of 175 organic compounds by finding the boiling point of each compound. The mean boiling point of all 175 compounds is 183 degrees Celsius. The scientist classifies each of these compounds as either semivolatile or volatile. Of the 175 compounds, 50 compounds were classified as semi-volatile, and these 50 compounds have a mean boiling point of 338 degrees Celsius. The remaining 125 compounds were classified as volatile. What is the mean boiling point, in degrees Celsius, of the 125 compounds classified as volatile compounds?

32025 - 16400
= 15125

A) 32025

B) 16400

C)

D) 175

$Avg = \frac{Sum}{Count}$

$183 = \frac{Sum}{175}$

$Sum = 32\,025$

$Avg_{50} = \frac{Sum}{Count}$

$338 = \frac{Sum}{50}$

$Sum = 16400$

$Avg_{125} = \frac{Sum}{Count}$

$= \frac{15125}{125}$

$= \boxed{121}$

16

$f(x) = 28(1.30)^{x/4}$

y ↑ p% when x ↑ 8

For the given function f, the value of f(x) increases by p% for every increase of a by 8. What is the value of p?

A) 30

B) 41

C) 60

(D) 69

8 (x = 0   y = 28
*   (x = 8   y = 47.32*

28 (1+p%) = 47.32
shift solve
⟼ p = 69

17

A carpenter charges a flat rate of $306 for the first 3 hours of work and $85 for each additional hour of work. Which equation gives the total amount y, in dollars, that the carpenter charges for x hours of work, where x >3?

(A) y = 85x + 51

B) y = 306x + 85

C) y = 306x + 561

D) y = 85x + 306

y = (306) + 85(x-3) = 306 + 85x - 255
*   = 85x + 51*
first 3 hours   Additional hour more than 3

18

$$\sqrt[3]{285n}\left(\sqrt[4]{285n}\right)^2$$

For what value of x is the given expression equivalent to $(285n)^{12x}$, where $n > 1$?

A)

B)

C)

D)

$(285n)^{\frac{1}{3}} \cdot \left[(285n)^{\frac{1}{4}}\right]^2 = (285n)^{12x}$

$(285n)^{\frac{1}{3}} \cdot (285n)^{\frac{1}{2}} = (285n)^{12x}$

$(285n)^{\frac{1}{3}+\frac{1}{2}} = (285n)^{\boxed{12x}}$

$\frac{5}{6} = 12x$

$x = \frac{5}{72}$

19

	0–9 years	10–19 years	20+ years	Total
Group A	15	18	7	40
Group B	6	7	27	40
Group C	19	15	6	40
Total	40	40	40	120

The table summarizes the distribution of age and assigned group for 120 participants in a study. One of these participants will be selected at random. What is the probability of selecting a participant from group A, given that the participant is at least 10 years of age?

A) 5/24

(B) 5/16

C) 9/20

D) 5/8

$\frac{18+7}{40+40} = \boxed{\frac{5}{16}}$

20

x	$g(x)$
-24	3
0	9
16	5

$$g(x) = \frac{F(x)}{x+4} = \frac{mx+b}{x+4}$$

$$g(0) = \frac{m(0)+b}{(0)+4}$$

$$9 = \frac{b}{4}$$

The table shows three values of x and their corresponding values of g(x), where g(x) = f(x)/(x+4) and f is a linear function. What is the y-intercept of the graph of y = f(x) in the xy-plane?

A) (0,36) → $x=0$

$$b = 36$$

B) (0,9)

C) (0,4)

D) (0,-9)

$$\frac{P}{100} = 650$$

21

The mass of object A is 481% of the mass of object B, and the mass of object A is 0.074% 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 /1,000 ?

A)

B)

C)

D)

$$C = (P\%)B$$

$$A = 481\% \, B$$
$$A = 0.074\% \, C$$

$$481\% \, B = 0.074\% \, C$$

$$C = 6500 \, B \qquad \frac{P}{1000}$$
$$\frac{P}{100} = 6500 \qquad \Downarrow$$
$$P = 650000 \qquad \frac{650000}{1000}$$
$$= 650$$

22

1/cx = x / 128 + 1/c

$$b^2 - 4ac = 0$$

In the given equation, c is a constant. If the equation has exactly one solution, what is the value of c?

A)

B)

C)

D)

$$\frac{1}{cx} = \frac{x}{128} + \frac{1}{c} \qquad (\times cx)$$

$$1 = \frac{cx^2}{128} + x$$

$$\frac{c}{128} x^2 + x - 1 = 0$$

$$(1)^2 - 4\left(\frac{c}{128}\right)(-1) = 0$$

$$\text{Shift Solve} \Rightarrow \boxed{c = -32}$$

Math Module 1 Answers

1. B
2. A
3. 29
4. C
5. D
6. 50
7. B
8. B
9. B
10. C
11. D
12. C
13. 25
14. D
15. D
16. C
17. B
18. A
19. 36864
20. A
21. D
22. 44/3

Math Module 2 Answers

1. D
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3. 12
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21. 650
22. -32

2   Module 1   **2**

Math
27 QUESTIONS

DIRECTIONS

The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

NOTES

Unless otherwise indicated:

- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
- The domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

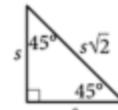**REFERENCE**

$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

$A = \dfrac{1}{2} bh$

$c^2 = a^2 + b^2$

Special Right Triangles

$V = \ell wh$

$V = \pi r^2 h$

$V = \dfrac{4}{3} \pi r^3$

$V = \dfrac{1}{3} \pi r^2 h$

$V = \dfrac{1}{3} \ell wh$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π.

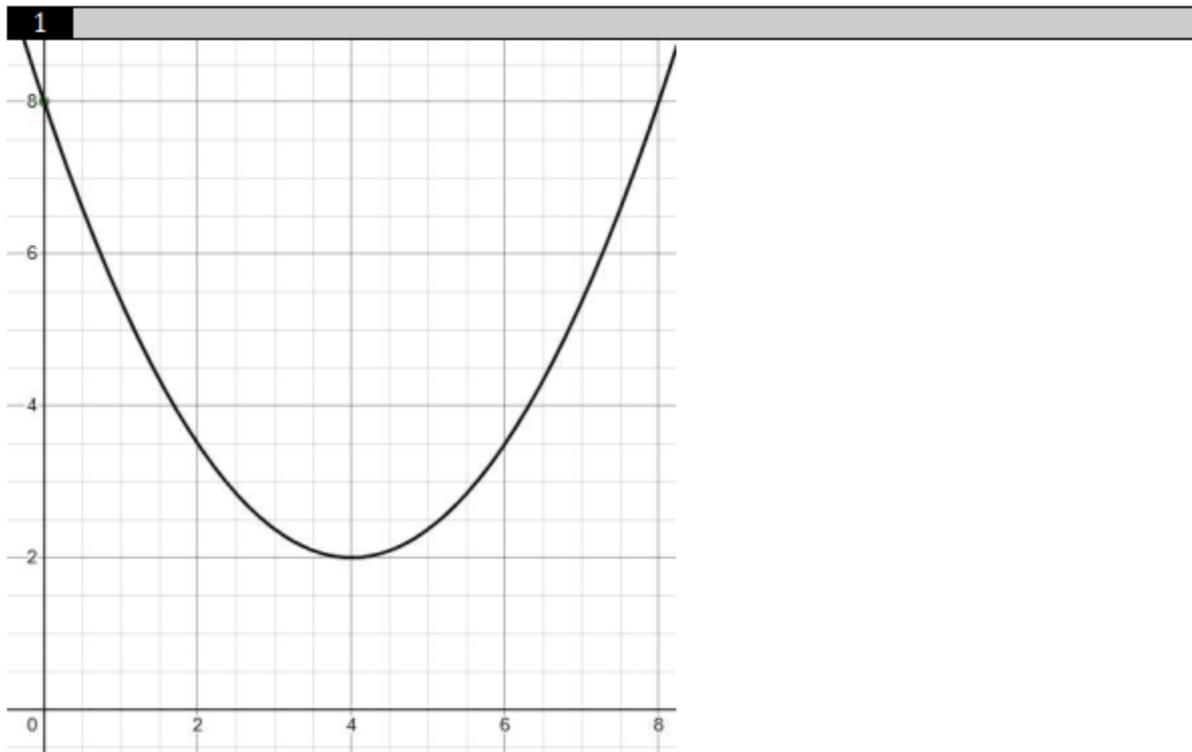The sum of the measures in degrees of the angles of a triangle is 180.

2

2

For multiple-choice questions, solve each problem, choose the correct answer from the choices provided, and then circle your answer in this book. Circle only one answer for each question. If you change your mind, completely erase the circle. You will not get credit for questions with more than one answer circled, or for questions with no answers circled.

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- Don't include **symbols** such as a percent sign, comma, or dollar sign in your circled answer.

1

The graph shows a toy car's height above the ground y, in inches, x seconds after it started moving on an elevated track. Which of the following is the best interpretation of the y-intercept of the graph?

A. The toy car's height was 0 inches above the ground 8 seconds after it started moving.

B. The toy car's height was 8 inches above the ground when it started moving.

C. The toy car's minimum height was 0 inches above the ground.

D. The toy car's minimum height was 8 inches above the ground.

2

A jar has 550 marbles, and 20% of these marbles are orange. How many marbles in the jar are orange?

A) 110

B) 220

C) 275

D) 530

3

The function k is defined by $k(x) = x^3 + 1000$. What is the value of k(x) when x = 2?

A) 1008
B) 1006
C) 1005
D) 1000

4

Sophia bought confetti and balloons for $55. Each package of confetti cost $2, and each balloon cost $1. If Sophia bought 10 packages of confetti, how many balloons did she buy?

5

The function $f(x) = 8x + 6$ gives the estimated height, in feet, of a poplar tree x years after its height was first measured. Which statement is the best interpretation of 6 in this context?

A) The tree will be measured each year for 6 years.

B) The tree is estimated to grow to a maximum height of 6 feet.

C) The estimated height of the tree increased by 6 feet each year.

D) The estimated height of the tree was 6 feet when it was first measured.

6

The function g is defined by $g(x) = -15 - 6x$. For what value of x does g(x) = -183?

A) -33

B) 28

C) 33

D) 1,083

7

For the linear function f, f(0) = 0 and f(15) = 5. Which equation defines f?

   A) $f(x) = x/5$

   B) $f(x) = x/3$

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

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

8

$$4(y - 15) + 11 = 3(y - 15) + 11$$

What value of y is the solution to the given equation?

   A) 0

   B) 1

   C) 11

   D) 15

9

Which expression is equivalent to $(d - 7)(8d^2 - 5)$?

   A) $8d^3 - 15d^2 - 5d + 35$

   B) $8d^3 - 20d^2 + 56$

   C) $8d^3 - 56d^2 - 5d + 35$

   D) $8d^3 - 61d^2 + 56$

10

A small business owner budgets $2,700 to purchase books each year. The owner must purchase a minimum of 250 books for the year to maintain the discounted pricing. If the owner pays $4.90 per book to purchase paperback books and $11.70 per book to purchase hardcover books, what is the maximum number of hardcover books the owner can purchase to stay within the budget and maintain the discounted pricing?

11

The function h is defined by h(x) = -16x + 7/6. What is the slope of the graph of y = h(x) in the xy-plane?

A) -16

B) -7/6

C) 7/6

D) 16

12
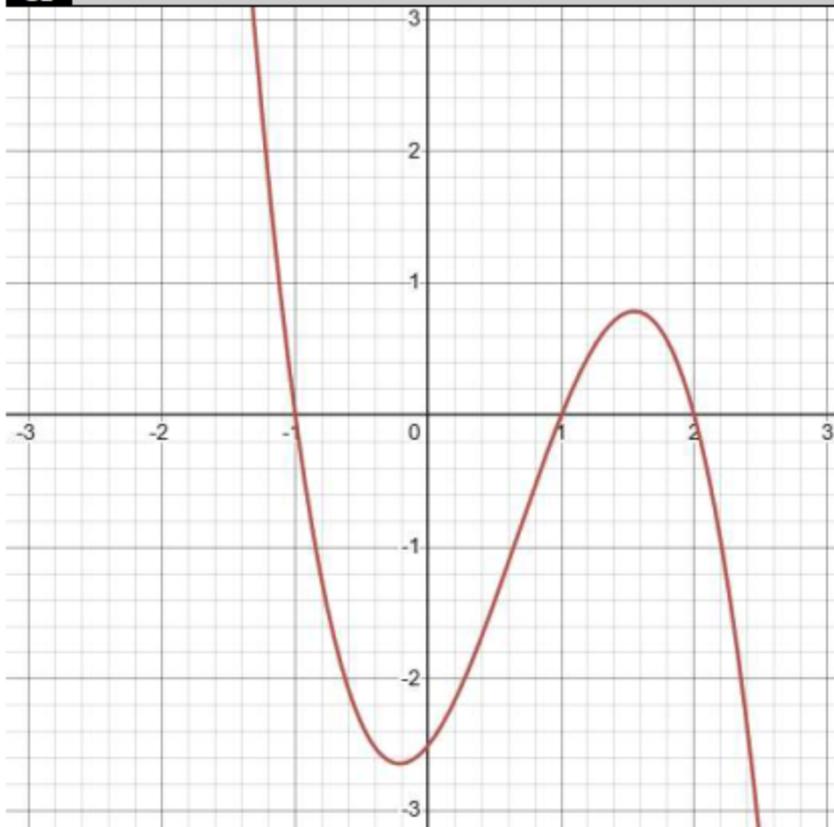
The graph of y = f(x) is shown, where the function f is defined by
$f(x) = ax^3 + bx^2 + cx + d$, and a, b, c, and d are constants. For how many values of x does f(x) = 0?

A) One

B) Two

C) Three

D) Four

13

$$104x + 78y = 65$$

One of the equations in a system of two linear equations is given. The system has infinitely many solutions. If the second equation in the system is written as Ax + By = C, where A, B, and C are constants, what is the value of (A+C)/B?

14

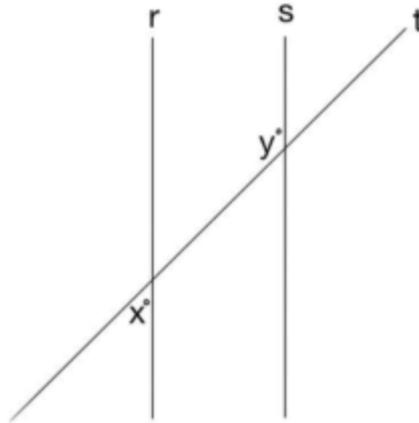If x > 0 and x is 41% of y, which expression represents y in terms of x?

A) $\frac{100x}{41}$

B) $\frac{10x}{41}$

C) $\frac{1x}{41}$

D) $\frac{59x}{100}$

15

$$f(x) = -(x - 4)^2 + 10$$

The function f is defined by the given equation. For what value of x does f(x) reach its maximum?

16

Note: Figure not drawn to scale

In the figure shown, line r is parallel to line s, and both lines are intersected by line t. If x = 2w + 22, y = 6w + 27, and 8w = a, where a is a constant, what is the value of a?

17

On January 1, there were 231 views of a video posted on a social media site. Every 2 days after January 1, the number of views of the video had increased by 70% of the number of views 2 days earlier. The function f gives the predicted number of views x days after January 1. Which equation defines f?

A) $f(x) = 231(0.70)^{\frac{x}{2}}$

B) $f(x) = 231(0.70)^{2x}$

C) $f(x) = 231(1.70)^{\frac{x}{2}}$

D) $f(x) = 231(1.70)^{2x}$

18
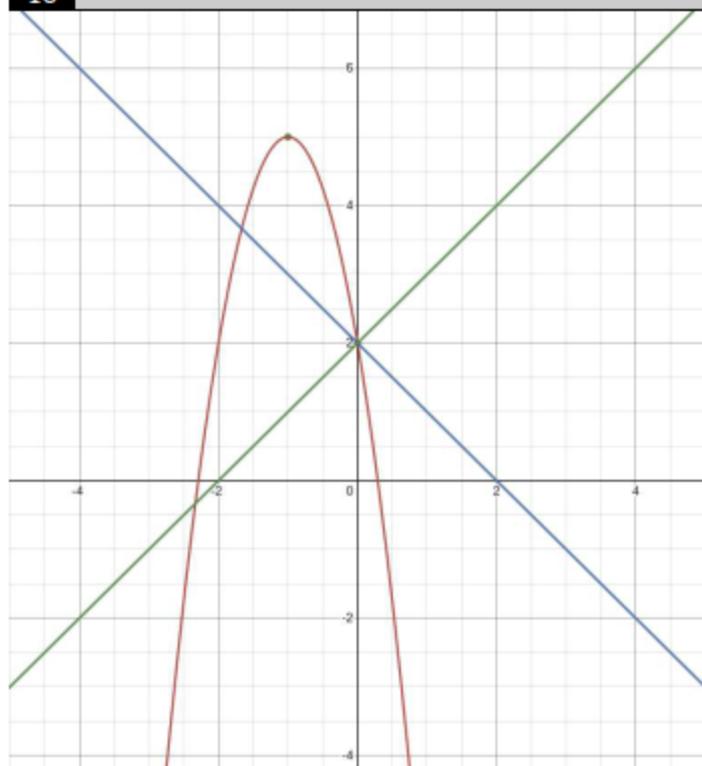
The graph of a system of three equations is shown. The system consists of two linear equations and one quadratic equation. How many solutions does this system have?

A) 1
B) 2
C) 3
D) 4

19
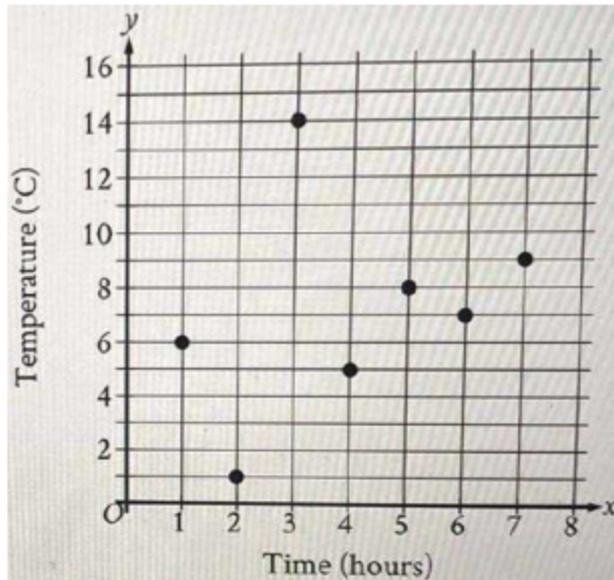
What is the value of $\tan(\frac{26\pi}{3})$

A. $-\sqrt{3}$

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

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

D. $\sqrt{3}$

20

During an experiment, the temperature, in degrees Celsius (°C), of a mixture was recorded to the nearest integer at certain times. The scatterplot shows the recorded temperature y, in °C, of the mixture x hours after the start of the experiment.

What was the average rate of change of the recorded temperature of the mixture over time, in °C per hour, from x = 1 to x = 3?
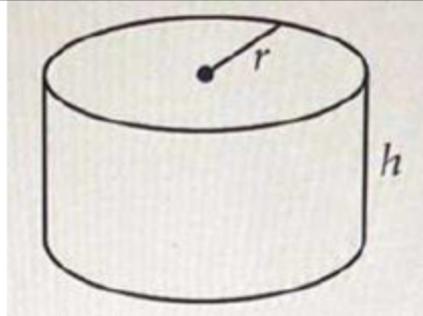
21

$$(x - 8) - 5(y + 6) = 130$$
$$(x - 8) + 5(y + 6) = 435$$

The solution to the given system of equations is (x,y). What is the value of 4(x - 8)?

22

The figure shown is a right circular cylinder with a radius of r and height of h. A second right circular cylinder (not shown) has a volume that is 324 times as large as the volume of the cylinder shown. Which of the following could represent the radius R, in terms of r, and the height H, in terms of h, of the second cylinder?

A) R = 9r and H = 6h
B) R = 9r and H = 36h
C) R = 6r and H = 9h
D) R = 36r and H = 9h

2 ◇ Module 2 ◇ **2**
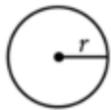
Math
27 QUESTIONS

DIRECTIONS

The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.
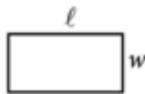
NOTES

Unless otherwise indicated:

- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
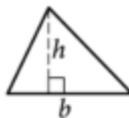- The domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

$A = \pi r^2$
$C = 2\pi r$
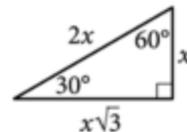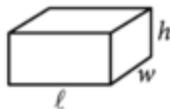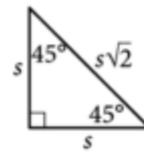
$A = \ell w$

$A = \frac{1}{2}bh$
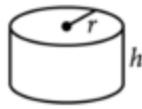
$c^2 = a^2 + b^2$

Special Right Triangles

$V = \ell w h$

$V = \pi r^2 h$

$V = \frac{4}{3}\pi r^3$

$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\ell w h$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π.

The sum of the measures in degrees of the angles of a triangle is 180.

---

2 Module 2 **2**

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1

The ratio of the base to the height of a triangle is 1 to 8. The base of the triangle is 152 centimeters. What is the height, in centimeters, of the triangle?

A) 19

B) 76

C) 152

D) 1,216

2

$$q(x) = 24(3^x)$$

Which table gives three values of x and their corresponding values of q(x) for function q?

A)

x	-1	0	1
q(x)	8	24	72

B)

x	-1	0	1
q(x)	1/8	24	72

C)

x	-1	0	1
q(x)	1/8	3	72

D)

x	-1	0	1
q(x)	-72	0	72

3

A plant nursery classifies a perennial flower species as tall if its typical height when fully grown is more than 100 centimeters. Each of the following inequalities represents the possible heights h, in centimeters, for a specific perennial flower species when fully grown.

Which inequality represents the possible heights h, in centimeters, for a tall perennial flower species?

A) $12 < h < 92$

B) $48 < h < 88$

C) $83 < h < 100$

D) $108 < h < 150$

4

A linear function f gives a company's profit, in dollars, for selling x items. The company's profit is $230 when it sells 5 items, and its profit is $580 when it sells 10 items. Which equation defines f?

A) $f(x) = 170x - 580$

B) $f(x) = 58x$

C) $f(x) = 70x - 10x$

D) $f(x) = 70x - 120$

5

Each year, the value of an investment increases by 0.67% of its value the previous year. Which of the following functions best models how the value of the investment changes over time?

A) Decreasing exponential

B) Decreasing linear

C) Increasing exponential

D) Increasing linear

6

Line p in the xy-plane is defined by $y = x + 4/9$ and passes through the points $(a, 0)$ and $(0, b)$, where a and b are constants. What is the value of a?

7

$$\frac{17x}{x^2 - 1} = \frac{x}{x - 1} + \frac{16}{x + 1}$$

What is the positive solution to the given equation?

8

How many solutions does the equation $9(x + 14) + 5x = 14(x + 9)$ have?

A) Exactly one

B) Exactly two

C) Infinitely many

D) Zero

9

In right triangle RST, the sum of the measures of angle R and angle S is 90 degrees. The value of $\sin(R)$ is $\frac{4}{5}$. What is the value of $\cos(S)$?

10

The manager of a gym selected a sample of 137 members at random to estimate the percentage of the gym's members that would continue to pay for a membership if the price increased. From the survey, the manager estimates that 82% of the gym's members would continue to pay for a membership if the price increased, with an associated margin of error of 6.43%. If the survey is repeated with a random sample of 274 members and the results are calculated in the same way, which of the following will be the most likely effect of using the larger random sample compared to the smaller random sample?

A) The margin of error will be lower.

B) The margin of error will be higher.

C) The estimate of the percentage of the gym's members that would continue to pay for a membership if the price increased will be lower.

D) The estimate of the percentage of the gym's members that would continue to pay for a membership if the price increased will be higher.

11
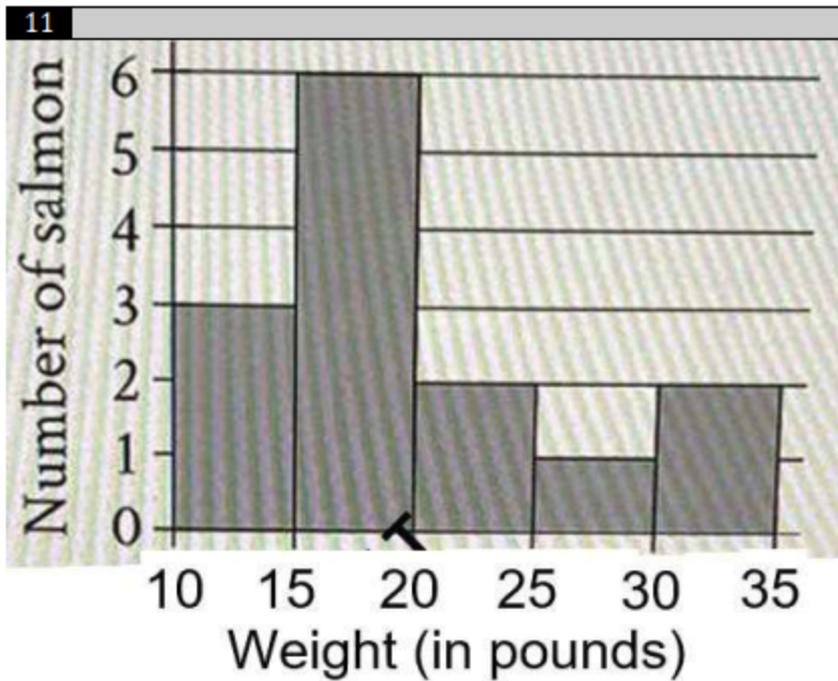
The histogram summarizes a data set of the weights, in pounds, of 14 salmon. If an additional weight of 78 pounds is added to the original data set to create a new data set of 15 weights of salmon, which of the following measures must be greater for the new data set than for the original data set?

I.   The median
II.   II. The mean

A) I only

B) II only

C) I and II

D) Neither I nor II

12

x	y
-13	48
a	3
3	b

The table shows three values of x and their corresponding values of y, where a and b are constants. There is a linear relationship between x and y. In the xy-plane, the y- intercept of the line representing this relationship is (0, -17). What is the value of a + b?

A) -47

B) -46

C) -37

D) -36

13

$$(x + k)^2 + 45 = 45$$

In the given equation, k is a constant. How many distinct real solutions does this equation have?

A) Zero

B) Exactly one

C) Exactly two

D) Infinitely many

14

For a certain circuit, its power P, in watts; current C, in amperes; voltage V, in volts; and resistance R, in ohms, are related as $\frac{CV^2}{P} = \sqrt{PR}$, where P, C, V, and R are positive. When R = 41, which equation correctly expresses P in terms of C and V?

A) $P = \frac{CV^2}{\sqrt{41}}$

B) $P = \frac{CV^2}{\sqrt{41P}}$

C) $P = \sqrt[3]{\frac{41}{C^2V^4}}$

D) $P = \sqrt[3]{\frac{C^2V^4}{41}}$

15

$$y \le -6x - 21$$

$$y > -4x - 9$$

For which of the following tables are all the value of x and their corresponding values of y solutions to the given system of inequalities?

A)

x	y
-7	17
-8	37
-10	-4

C)

x	y
-7	18
-8	25
-10	37

B)

x	y
-7	21
-8	25
-10	-4

D)

x	y
-7	20
-8	26
-10	37

16

A rectangular region of land is divided into 88 square lots of equal area R, in square units. The length of the region is 5.5 times the width of the region. If the width of the region is $x\sqrt{R}$ units, what is the value of x?

17

A circle is inscribed in a square such that the circumference of the circle touches the midpoint of each side of the square. The length of the diagonal of the square is 136 units. What is the area, in square units, of the circle?

A) $2,312\pi$

B) $4,624\pi$

C) $9,248\pi$

D) $18,496\pi$

18

The expression kx represents the result of decreasing a positive force, x, acting on an object by 0.42%. What is the value of k?

19

A polygon has exactly 57 sides. If the measure of each of the 57 interior angles of this polygon is $(180p)°$, what is the value of p?

20

The function $f(n) = 7(20.41)^{\frac{n}{5}}$ gives each term of a sequence as a function of the term's position, n, in the sequence, where n is a whole number. The value of the term in position 15 is p% more than the value of the term in position 10. What is the value of p?

A) 20.41

B) 41

C) 1,941

D) 2,041

21

A right square pyramid has a total surface area of 18,816 square inches, and the combined surface area of the four lateral faces of this pyramid is 9,600 square inches. What is the height, in inches, of this pyramid?

A) 14

B) 48

C) 50

D) 96

22

The expression $6x^4 + 23x^2 + 7$ can be rewritten as $(3x^2 + a)(2x^2 + b)$, where a and b are positive integers, or as $(3x^2 + c)(2x^2 + d)$, where c and d are positive non-integers. What is the value of $a + c$?

	R&W 1	R&W 2	Math 1	Math 2
1	B	C	B	D
2	B	A	A	A
3	C	B	A	D
4	C	C	35	D
5	D	B	D	C
6	A	A	B	-4/9
7	B	A	B	4
8	A	B	D	C
9	A	A	C	4/5
10	C	B	216	A
11	D	D	A	B
12	A	B	C	D
13	C	D	13/6	B
14	D	B	A	D
15	D	B	4	D
16	A	D	131	4
17	D	D	C	A
18	C	C	A	4979/5000
19	D	D	A	55/57
20	A	B	4	C
21	D	A	1130	A
22	B	C	C	23/2
23	B	A		
24	C	B		
25	C	C		
26	A	A		
27	B	D		

Math Module 1

33 QUESTIONS

1

The equation d = 29w + 100 gives the total amount of money d, in dollars, that James plans to save w weeks after he starts to save. What is the total amount of money, in dollars, he plans to save in 10 weeks?

A) 340

B) 390

C) 440

D) 490

2

Carrie has c dollars and Marjani has m dollars. Carrie has 3 times as many dollars as Marjani, and together they have a total of $28.00. Which system of equations represents this situation?

A) c=3m; c+m=28

B) m=3c; c+m=28

C) c=28m; c+m=3

D) m=28c; c+m=3

3

$$x^2 = (29)(29)$$

What is the positive solution to the given equation?

A)

B)

C)

D)

4

A car travels at a speed of at least 40 miles per hour but no more than 65 miles per hour for a certain part of a trip. Which inequality represents this situation, where z is the speed of the car, in miles per hour, on this part of the trip?

A) $x \geq 40$

B) $x \geq 65$

C) $40 \leq x \leq 65$

D) $x \leq 105$

5

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

The graphs of the equations in the given system of equations intersect at the point (x, y) in the xy-plane. What is the value of y?

A) 9

B) 26

C) 81

D) 89

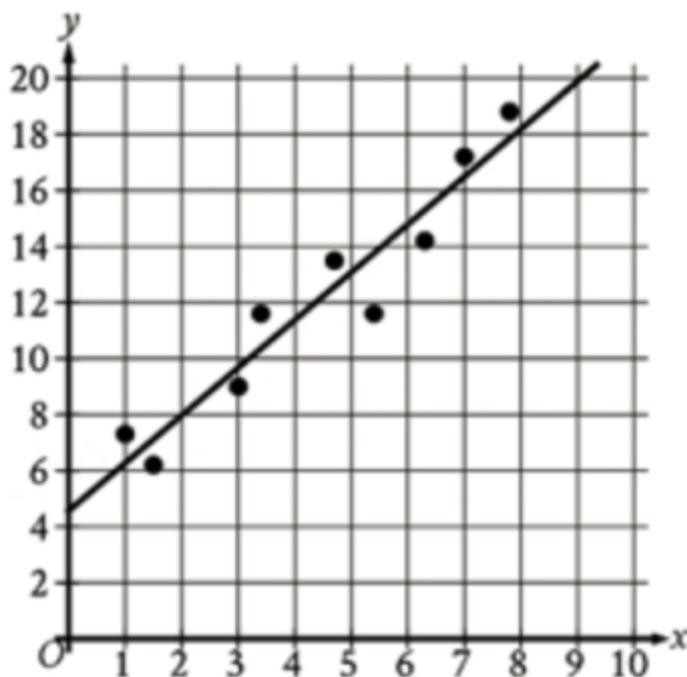The function f is defined by $f(x) = x^2 + x + 44$.

What is the value of f (2)?

A)

B)

C)

D)

The scatterplot shows the relationship between two variables, x and y. A line of best fit for the data is also shown. For how many of the 9 data points is the actual y-value less than the y-value predicted by the line of best fit?

A) 2

B) 4

C) 5

D) 7

Jasmin grows bean pods in her garden. This year, she harvested 490 bean pods and saved 10% of them to plant next year. How many of the harvested bean pods did Jasmin save to plant next year?

A) 39

B) 49

C) 57

D) 59

6(3x - 4)=42

Which equation has the same solution as the given equation?

A) 3x-4=36

B) 3x-4=7

C) 3x-24=42

D) 3x-24=48

10

What is an x-intercept of the graph of the equation $y= (x + 8)(x - 11)(x + 12)$ in the xy-plane?

A) (1,0)

B) (0,8)

C) (11,0)

D) (0,12)

11

Each side of equilateral triangle S is multiplied by a scale factor of k to create equilateral triangle T. The length of each side of triangle T is greater than the length of each side of triangle S. which of the following could be the value of k?

A) 0

B) 43/44

C) 1

D) 44/43

12

Which expression is equivalent to $2(x – 7/2)(x + 6)$?

A) $x^2 + 5x - 21$

B) $2x^2 - x - 21$

C) $2x^2 + 5x - 42$

D) $2x^2 - 42$

13

y=9x-15

5x+y=41

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

A)

B)

C)

D)

14

A salesperson earns 2 points for each call made to a potential customer and 6 points for each visit made to a potential customer. Last week, the salesperson earned a total of 366 points. The equation $2x + 6y= 366$ represents this situation. Which is the best interpretation of 6y in this context?

A) The number of calls the salesperson made to potential customers last week

B) The number of visits the salesperson made to potential customers last week

C) The total number of points the salesperson earned from calls made to potential customers last week

D) The total number of points the salesperson earned from visits made to potential customers last week

15

y = (2/5) x + 7

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

A) - 7

B) – 1/7

C) 1/7

D) 7

The kinetic energy, in joules, of an object with mass 75 kilograms traveling at a speed of v meters per second is given by the function K,

where K (v) = 1/2 (75)(v²) .

Which of the following is the best interpretation of K(0)= 0 in this context?

A) The kinetic energy of the object is 0 joules when the mass of the object is 0 kilograms.

B) The speed of the object is 0 meters per second when the mass of the object is 0 kilograms.

C) The kinetic energy of the object is 0 joules when the object is traveling at a speed of 0 meters per second.

D) The height of the object is 0 meters when the object is traveling at a speed of 0 meters per second.

In triangle ABC, angle B is a right angle. The length of side AB is $10\sqrt{69}$ and the length of side BC is $24\sqrt{69}$. What is the length of side AC?

A) $14\sqrt{69}$

B) $26\sqrt{69}$

C) $34\sqrt{69}$

D) $\sqrt{34 * 69}$

x	y
-4	$n + 142$
-2	$n + 71$
0	n

The table shows three values of x and their corresponding values of y, where n is a constant, for the linear relationship between s and y. What is the slope of the line that represents this relationship in the xy-plane?

A) – 71/2

B) – 2/71

C) (n+71) / (-2)

D) (2n - 71) /2

Square A has side lengths that are 192 times the side lengths of square B. The area of square A is k times the area of square B. What is the value of k?
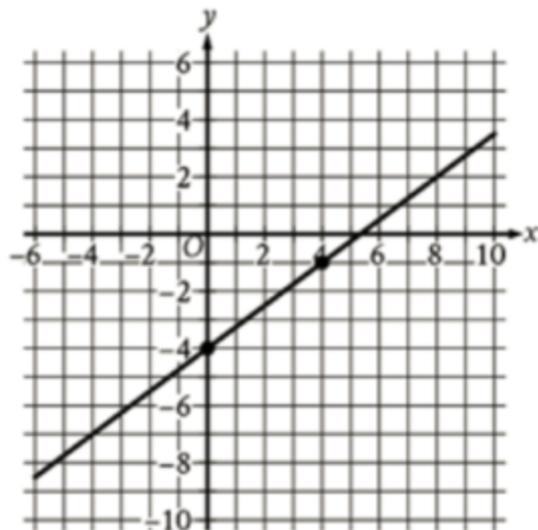
A)

20

What is the value of tan 50π/ 3 ?

A) $- \sqrt{3}$

B) $- \sqrt{3}/3$

C) $\sqrt{3}/3$

D) $\sqrt{3}$

21

A conservation specialist hung artificial nesting structures each in the shape of a right rectangular prism for a species of native duck. Each structure has a height of 12 inches. The length of each structure's base is x inches, which is 1 inch more than the width of the structure's base. Which function V gives the volume of each structure, in cubic inches, in terms of the length of the structure's base?

A) V(x) = x(x + 12)(x + 1)

B) V(x) = x(x + 12)(x - 1)

C) V(x) = 12x (x + 1)

D) V(x) = 12x(x - 1)

22

Line r is shown in the xy-plane. Line t (not shown) is perpendicular to line r and passes through the point (5, 8). What is the y-coordinate of the y-intercept of line t?
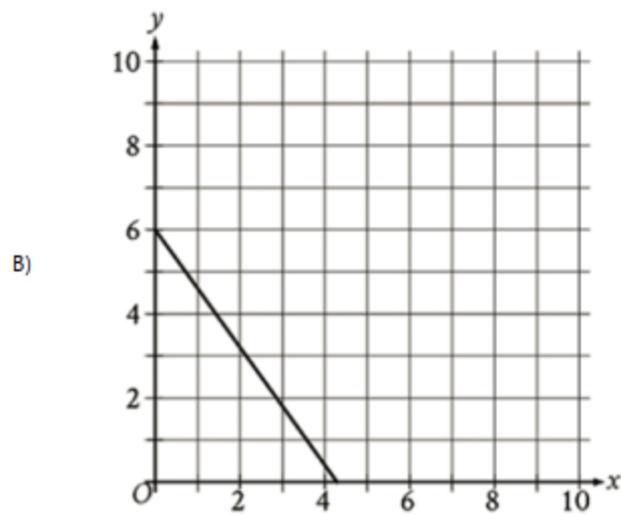
A)

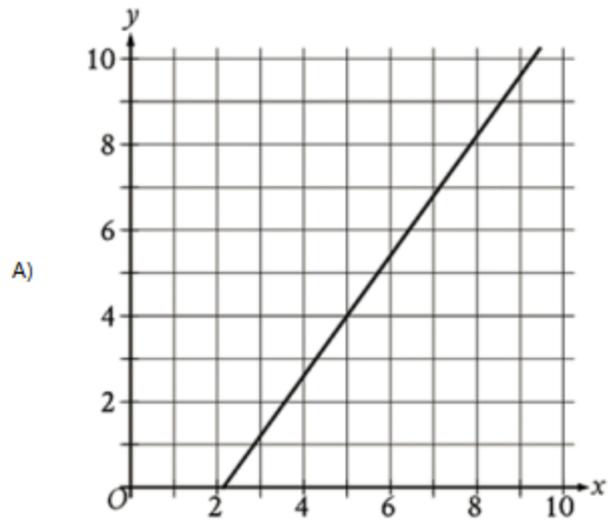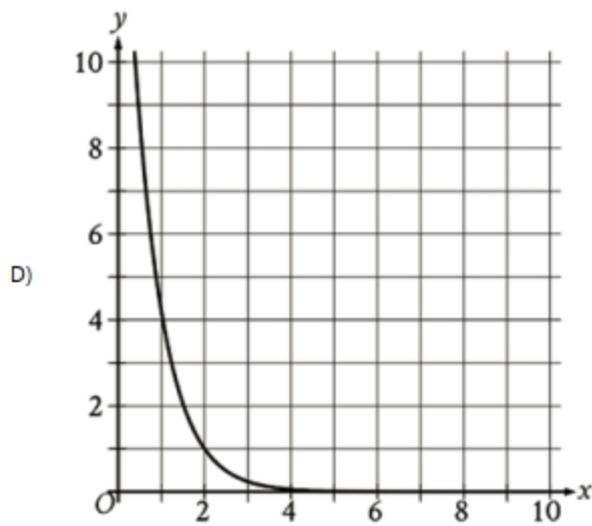B)

C)

D)

Math Module 2

1

Which of the following is a graph of a decreasing exponential function?

A)

B)

C) 图片缺失

D)

2

What is the y-intercept of the graph of $y = 6x^2 + 3x + 4$ in the xy-plane?.

A) (0,3)

B) (0,4)

C) (0,6)

D) (0,7)

3

If 2x+5=9, what is the value of 8x-4?

A)

B)

C)

D)

4

The product of a positive number z and the number that is 1 less than s is equal to 12. What is the value of x?
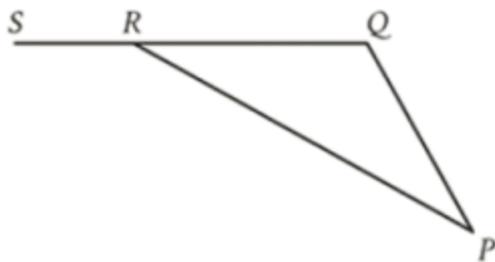
A) 0.5

B) 4

C) 11

D) 13

5

A cylinder has a diameter of 6 inches and a height of 24 inches. What is the volume, in cubic inches, of the cylinder?

A) 9π

B) 144π

C) 216π

D) 864π

6

Note: Figure not drawn to scale.

In triangle PQR, QR is extended to point S. The measure of ∠PQR is 114°, and the measure of ∠PRS is 158°. What is the measure of ∠QPR?

A) 66°

B) 44°

C) 33°

D) 22°

7

Sarah used wax to make candles. The function f(x) = - 12x+ 60 approximates the weight, in ounces, of wax Sarah had remaining after making a candles. Which statement is the best interpretation of the y-intercept of the graph of y= f(x) in the xy-plane in this context?

A) Sarah used approximately 12 ounces of wax for each candle.

B) Sarah had approximately 12 ounces of wax when she began to make the candles.

C) Sarah had approximately 60 ounces of wax when she began to make the candles.

D) Sarah used approximately 60 ounces of wax for each candle.

8

ak= (b/11)(14+m)

The given equation relates the positive variables a, b, k, and m. Which equation correctly expresses m in terms of a. b, and k?

A) m = 11(ak-14) / b

B) m = ak – 14 – b/11

C) m= ak – 14b / 11

D) m = 11ak / b - 14

9

The function g is defined by

$g(x) = 10^{3x-7}$

What is the value of a when g(x) is equal to 10,000?

A) 3

B) 10/3

C) 11/3

D) 4

10

If x/y =2 and 5x/ty = 50, what is the value of t?

A) 1/5

B) 2/5

C) 5/2

D) 5

11

A piece of string with a length of 30 inches is cut into two parts. One part has a length of x inches, and the other part has a length of y inches. The value of x is 3 more than 2 times the value of y. What is the value of x?

A)

B)

C)

D)

12

Which equation has no solution?

A) $-15x- 1/6 = -15x - 1/6$

B) $-15x- 1/6 = -15x + 1/6$

C) $-15x- 1/6 = 15x - 1/6$

D) $-15x- 1/6 = 15x + 1/6$

13

$F(x) = (9/5)(x-273.15)+32$

The function F gives the temperature, in degrees Fahrenheit, that corresponds to a temperature of x kelvins. If a temperature increased by 9.40 kelvins, by how much did the temperature increase, in degrees Fahrenheit?

A) 16.92

B) 48.92

C) 474.75

D) 506.75

14

$$y = -0.5$$
$$y = x^2 + 10x + a$$

In the given system of equations, a is a positive integer constant. The system has no real solutions. What is the least possible value of a?

A)

B)

C)

D)

15

An environmental scientist is investigating the volatility of 175 organic compounds by finding the boiling point of each compound. The mean boiling point of all 175 compounds is 183 degrees Celsius. The scientist classifies each of these compounds as either semivolatile or volatile. Of the 175 compounds, 50 compounds were classified as semi-volatile, and these 50 compounds have a mean boiling point of338 degrees Celsius. The remaining125 compounds were classified as volatile. What is the mean boiling point, in degrees Celsius, of the 125 compounds classified as volatile compounds?

A)

B)

C)

D)

$$f(x) = 28(1.30)^{x/4}$$

For the given function f, the value of f(x) increases by p% for every increase of a by 8. What is the value of p?

A) 30

B) 41

C) 60

D) 69

17

A carpenter charges a flat rate of $306 for the first 3 hours of work and $85 for each additional hour of work. Which equation gives the total amount y, in dollars, that the carpenter charges for x hours of work, where x >3?

A) y = 85x + 51

B) y = 306x + 85

C) y = 306x + 561

D) y = 85x + 306

18

$$\sqrt[3]{285n}\left(\sqrt[4]{285n}\right)^{2}$$

For what value of x is the given expression equivalent to $(285n)^{12x}$, where $n > 1$?

A)

B)

C)

D)

19

	0–9 years	10–19 years	20+ years	Total
Group A	15	18	7	40
Group B	6	7	27	40
Group C	19	15	6	40
Total	40	40	40	120

The table summarizes the distribution of age and assigned group for 120 participants in a study. One of these participants will be selected at random. What is the probability of selecting a participant from group A, given that the participant is at least 10 years of age?

A) 5/24

B) 5/16

C) 9/20

D) 5/8

20

x	$g(x)$
-24	3
-9	0
16	5

The table shows three values of x and their corresponding values of g(x), where g(x) = f(x)/(x+4) and f is a linear function. What is the y-intercept of the graph of y = f(x) in the xy-plane?

A) (0,36)

B) (0,9)

C) (0,4)

D) (0,-9)

21

The mass of object A is 481% of the mass of object B, and the mass of object A is 0.074% 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 /1,000 ?

A)

B)

C)

D)

22

1/cx = x / 128 + 1/c

In the given equation, c is a constant. If the equation has exactly one solution, what is the value of c?

A)

B)

C)

D)

Math Module 1 Answers

33 QUESTIONS

1. B
2. A
3. 29
4. C
5. D
6. 50
7. B
8. B
9. B
10. C
11. D
12. C
13. 25
14. D
15. D
16. C
17. B
18. A
19. 36864
20. A
21. D
22. 44/3

Math Module 2 Answers

33 QUESTIONS

1. D
2. B
3. 12
4. B
5. C
6. B
7. C
8. D
9. C
10. A
11. 21
12. B
13. A
14. 25
15. 121
16. D
17. A
18. 5/72
19. B
20. A
21. 650
22. -32