SAT Math

Linear Functions 3

Question #	ID

3.1 2b15d65f

An economist modeled the demand Q for a certain product as a linear function of the selling price P. The demand was 20,000 units when the selling price was $40 per unit, and the demand was 15,000 units when the selling price was $60 per unit. Based on the model, what is the demand, in units, when the selling price is $55 per unit?

A. 16,250

B. 16,500

C. 16,750

D. 17,500

3.2 be9cb6a2

The cost of renting a backhoe for up to 10 days is $\$270$ for the first day and $\$135$ for each additional day. Which of the following equations gives the cost y, in dollars, of renting the backhoe for x days, where x is a positive integer and $x \leq 10$?

A. $y = 270x - 135$

B. $y = 270x + 135$

C. $y = 135x + 270$

D. $y = 135x + 135$

3.3 b988eeec

The functions f and g are defined as $f(x) = \frac{1}{4}x - 9$ and $g(x) = \frac{3}{4}x + 21$. If the function h is defined as $h(x) = f(x) + g(x)$, what is the x-coordinate of the x-intercept of the graph of $y = h(x)$ in the xy-plane?

3.4 af2ba762

According to data provided by the US Department of Energy, the average price per gallon of regular gasoline in the United States from September 1, 2014, to December 1, 2014, is modeled by the function F defined below, where $F(x)$ is the average price per gallon x months after September 1.

$F(x) = 2.74 - 0.19(x - 3)$

The constant 2.74 in this function estimates which of the following?

A. The average monthly decrease in the price per gallon

B. The difference in the average price per gallon from September 1, 2014, to December 1, 2014

C. The average price per gallon on September 1, 2014

D. The average price per gallon on December 1, 2014

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3.5 16889ef3

Oil and gas production in a certain area dropped from 4 million barrels in 2000 to 1.9 million barrels in 2013. Assuming that the oil and gas production decreased at a constant rate, which of the following linear functions *f* best models the production, in millions of barrels, *t* years after the year 2000?

A. $f(t)=\frac{21}{130}t+4$

B. $f(t)=\frac{19}{130}t+4$

C. $f(t)=-\frac{21}{130}t+4$

D. $f(t)=-\frac{19}{130}t+4$

3.6 6989c80a

$$F(x)=\tfrac{9}{5}(x-273.15)+32$$

The function F gives the temperature, in degrees Fahrenheit, that corresponds to a temperature of x kelvins. If a temperature increased by 2.10 kelvins, by how much did the temperature increase, in degrees Fahrenheit?

A. 3.78

B. 35.78

C. 487.89

D. 519.89

3.7 78391fcc

x	-11	-10	-9	-8
$f(x)$	21	18	15	12

The table above shows some values of *x* and their corresponding values $f(x)$ for the linear function *f*. What is the *x*-intercept of the graph of $y=f(x)$ in the *xy*-plane?

A. $(-3,0)$

B. $(-4,0)$

C. $(-9,0)$

D. $(-12,0)$

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3.8 a04050d8

Energy per Gram of Typical Macronutrients

Macronutrient	Food calories	Kilojoules
Protein	4.0	16.7
Fat	9.0	37.7
Carbohydrate	4.0	16.7

The table above gives the typical amounts of energy per gram, expressed in both food calories and kilojoules, of the three macronutrients in food. If the 180 food calories in a granola bar come entirely from p grams of protein, f grams of fat, and c grams of carbohydrate, which of the following expresses f in terms of p and c ?

A. $f = 20 + \frac{4}{9}(p + c)$

B. $f = 20 - \frac{4}{9}(p + c)$

C. $f = 20 - \frac{4}{9}(p - c)$

D. $f = 20 + \frac{9}{4}(p + c)$

3.9 daad7c32

An object hangs from a spring. The formula $\ell = 30 + 2w$ relates the length ℓ, in centimeters, of the spring to the weight w, in newtons, of the object.

Which of the following describes the meaning of the 2 in this context?

A. The length, in centimeters, of the spring with no weight attached

B. The weight, in newtons, of an object that will stretch the spring 30 centimeters

C. The increase in the weight, in newtons, of the object for each one-centimeter increase in the length of the spring

D. The increase in the length, in centimeters, of the spring for each one-newton increase in the weight of the object

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3.10 023c0a8d

For the function f, if $f(3x) = x - 6$ for all values of x, what is the value of $f(6)$?

A. -6

B. -4

C. 0

D. 2

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3.11 50f4cb9c

x	$f(x)$
1	-64
2	0
3	64

For the linear function f, the table shows three values of x and their corresponding values of $f(x)$. Function f is defined by $f(x) = ax + b$, where a and b are constants. What is the value of $a - b$?

A. -64

B. 62

C. 128

D. 192

3.12 bbf9e5ce

For groups of 25 or more people, a museum charges $\$21$ per person for the first 25 people and $\$14$ for each additional person. Which function f gives the total charge, in dollars, for a tour group with n people, where $n \geq 25$?

A. $f(n) = 14n + 175$

B. $f(n) = 14n + 525$

C. $f(n) = 35n - 350$

D. $f(n) = 14n + 21$

3.13 b3abf40f

$$F(x) = \frac{9}{5}(x - 273.15) + 32$$

The function F gives the temperature, in degrees Fahrenheit, that corresponds to a temperature of x kelvins. If a temperature increased by 9.10 kelvins, by how much did the temperature increase, in degrees Fahrenheit?

A. 16.38

B. 48.38

C. 475.29

D. 507.29

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3.14 abcd0008

$$f(x) = 6d(20x + 21) + 17$$

Which of the following represents the x-intercept of the graph of $y = f(x) + 9$ in the xy-plane, where d is a constant?

(A) $\left(\frac{-126d-26}{120d}, 0\right)$

(B) $\left(9 - \frac{126d+17}{120d}, 0\right)$

(C) $\left(-\frac{38}{120d+9}, 0\right)$

(D) $(126d + 26, 0)$

3.15 a309803e

One gallon of paint will cover 220 square feet of a surface. A room has a total wall area of w square feet. Which equation represents the total amount of paint P, in gallons, needed to paint the walls of the room twice?

A. $P = \frac{w}{110}$

B. $P = 440w$

C. $P = \frac{w}{220}$

D. $P = 220w$

3.16 0bd33265

The equation $h = \frac{9(v-273.15)}{5} + 32$ gives the corresponding temperature h, in degrees Fahrenheit, of any substance that has a temperature of v kelvins, where $v > 0$. If a substance has a temperature of 467.33 degrees Fahrenheit, what is the corresponding temperature, in kelvins, of this substance?

3.17 a7e2859a

The cost of renting a large canopy tent for up to 10 days is $\$430$ for the first day and $\$215$ for each additional day. Which of the following equations gives the cost y, in dollars, of renting the tent for x days, where x is a positive integer and $x \leq 10$?

A. $y = 215x + 215$

B. $y = 430x - 215$

C. $y = 430x + 215$

D. $y = 215x + 430$

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3.18 0b0fa68b

For the function f, $f(cx) = x - 8$ for all values of x, where c is a positive constant. If $f(2) = 35$, what is the value of c?

3.19 e25f0807

x	y
-12	-45
6	45

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 $\left(\frac{1}{4},\ a\right)$. What is the value of a?