2023–2024 Algebra I Benchmark Unit 1

Question 1.

Drag and drop the tiles below to show which process was used to obtain the answer shown.

$2(x + 4) = 30$

Step 1: $2x + 8 = 30$

DEST_1

Step 2: $2x = 22$

DEST_2

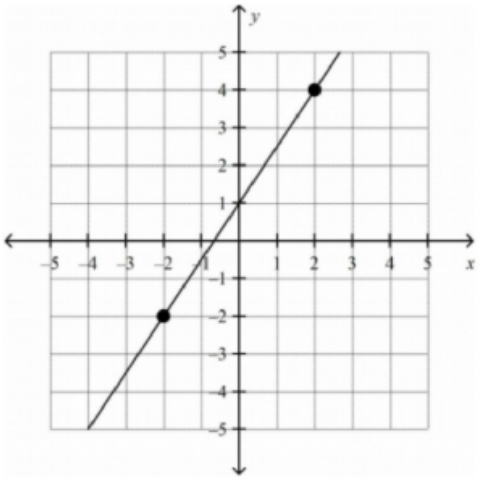
Step 3: $x = 11$

DEST_3

divide by 2 | multiply by | subtract 8

Question 2.

Write the slope–intercept form of the equation for the line



A. $y = \frac{2}{3}x - 1$

B. $y = -\frac{3}{2}x + 1$

C. $y = \frac{2}{3}x + 1$

D. $y = \frac{3}{2}x + 1$

Question 3.

The formula for the area of a triangle is $A = \frac{1}{2}bh$. Which equation correctly describes the height, *h*?

A. $h = \frac{A}{2b}$

B. $h = 2A - b$

C. $h = \frac{A}{2} - b$

D. $h = \frac{2A}{b}$

Question 4.

A student wants to solve for *y* in the equation below.

$5(y + 3) = 10x$

Which operation should be performed first to solve for the variable *y* using the fewest possible steps?

A. multiplying $10x$ by 5

B. dividing both sides by 5

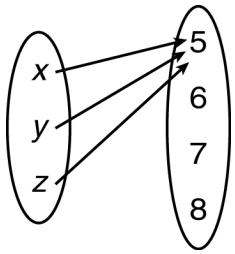
C. multiplying $(y + 3)$ by 5

D. subtracting 3 from both sides

Question 5.

Which mapping is a function?

A.



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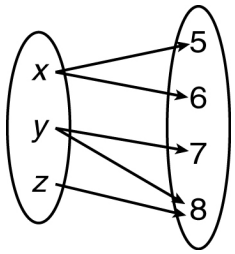

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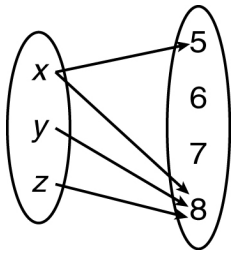
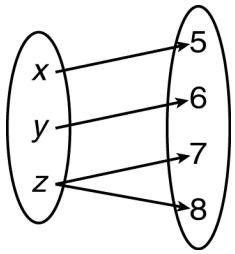
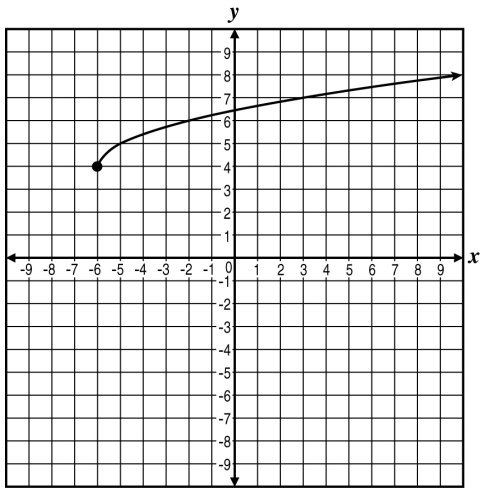


D.



Question 6.

The graph of a function is shown.



Which inequality represents the domain of the function?

A. $x \geq -6$

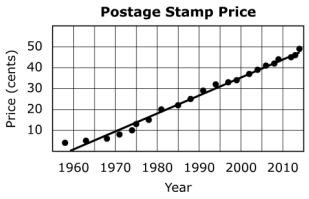
B. $y \geq 4$

C. $-6 \leq x \leq 10$

D. $4 \leq y \leq 8$

Question 7.

The scatter plot shows the price, in cents, of a postage stamp used to mail a letter in the United States for the years from 1958 to 2014. Also shown is a line of fit to model the data.



The equation of the line of fit is $y = -0.71 + 0.86x$, where y represents the predicted price, in cents, of a stamp and x represents the number of years since 1958.

Which statement best describes the model?

A. The model estimates an increase, on average, of 0.71 cent per year in the price of a stamp.

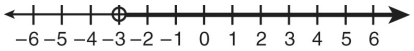
B. The model estimates a decrease, on average, of 0.71 cent per year in the price of a stamp.

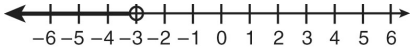
C. The model estimates an increase, on average, of 0.86 cent per year in the price of a stamp.

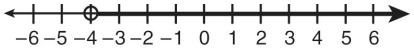
D. The model estimates a decrease, on average, of 0.86 cent per year in the price of a stamp.

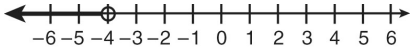
Question 8.

Which number line represents the solution to the inequality $1 + 2x < -7$?

A. 

B. 

C. 

D. 

Question 9.

What is the value of x if $15 - 2(x + 5) = 25$?

A. -15

B. -10

C. 10

D. 15

Question 10.

What is the range of the function $y = (2x + 3)$ for the domain $3 \leq x \leq 9$?

A. $0 \leq y \leq 3$

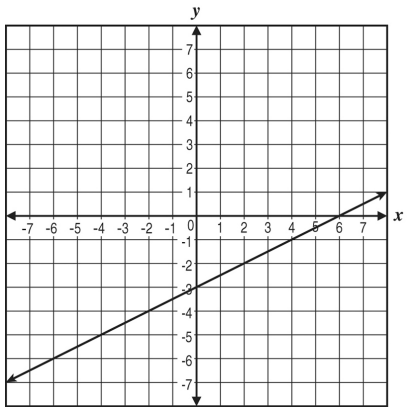
B. $0 \leq y \leq 6$

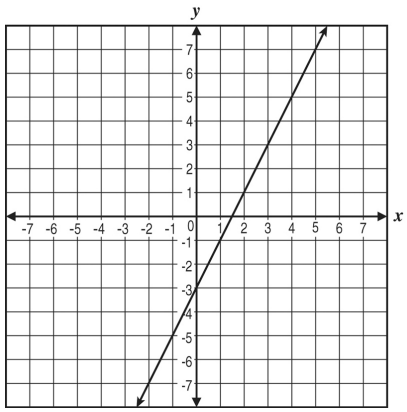
C. $6 \leq y \leq 12$

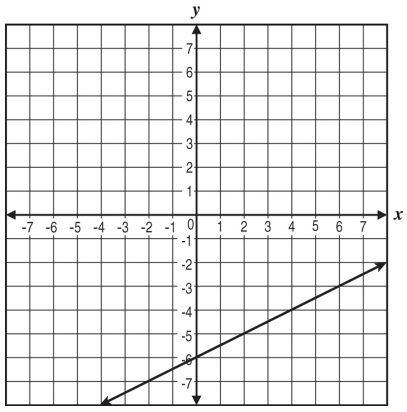
D. $9 \leq y \leq 21$

Question 11.

Which graph represents $x - 2y = 6$?

A. 

B. 

C. 

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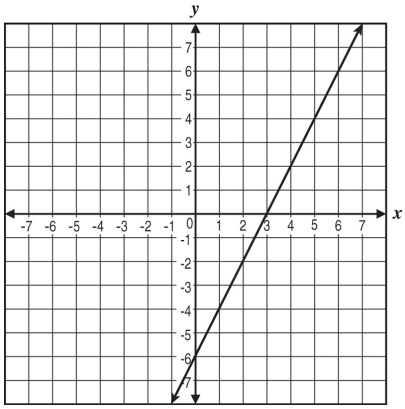


Question 12.

Place the number that **best** completes the sentence.

The table shows the relationship between calories and fat grams contained in orders of fried chicken from various restaurants.

Calories	305	410	320	500	510	440
Fat (grams)	28	34	28	41	42	38

These data show positive correlation and can be fit to a linear function.

0.05 | 0.09 | 5.9 | 11.9

The average number of fat grams per calorie is

[ ] .

Question 13.

The data in the table can be entered into a calculator to determine a linear equation of best fit where *x* represents the number of years with a company and *y* represents an employee's salary in dollars.

Employee's Salary

Years With Company, *x*	Salary, *y* ($)
1	42,000
2	43,000
3	44,000
4	46,000
5	56,000
6	58,000
7	65,000
8	68,000
9	71,000
10	78,000

What conclusion can be drawn from the correlation coefficient associated with this linear equation?

A. There is a strong negative correlation between the variables.

B. There is a strong positive correlation between the variables.

C. There is a weak negative correlation between the

variables.

D. There is a weak positive correlation between the variables.

Question 14.

If (2, 1) lies on the graph of equation $3y - x = a$, which point also lies on the graph?

A. (5, 2)

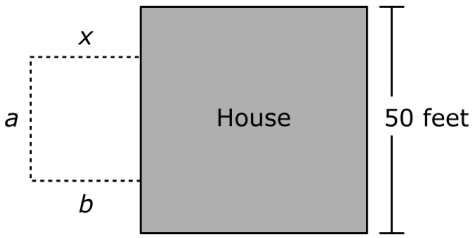
B. (2, 5)

C. (4, 3)

D. (3, 4)

Question 15.

The figure shows the 50-foot side of a house and a proposed rectangular garden to be fenced in on 3 sides.



The 3 sides, *a*, *b*, and *x*, will be made of 44 feet of fencing.

Which of the following is an expression for a in terms of x?

A. $2x+44$

B. $2x-44$

C. $44-2x$

D. $44-x+x$

Question 16.

Jesse wants to purchase three binders and a backpack. If the backpack costs $16, which equation represents the situation in which *x* denotes the cost per binder purchased and *y* denotes the total cost of Jesse's purchase?

A. $y = 16x$

B. $y = x + 16$

C. $y = 16x + 3$

D. $y = 3x + 16$

Question 17.

While Sam was at work, his house lost electrical power. By the time the electrical power came back on, the temperature inside the house was 88°F. The air conditioner immediately started to cool the house.
Let f(x) represent the temperature, in degrees Fahrenheit, of Sam's house x minutes after the air conditioner started to cool the house.

What is the meaning of the statement f(30)=76?

A. After 30 minutes, the house has cooled to 76°F.

B. After 30 minutes, the house is 76°F cooler than it was when the air conditioner started to cool the house.

C. After 76 minutes, the house has cooled to 30°F.

D. After 76 minutes, the house is 30°F cooler than it was when the air conditioner started to cool the house.

Question 18.

Place the option that correctly completes the sentence.

At cruising speed, a car burns fuel at a rate of 2.5 kilograms per hour. The initial mass of the car and the fuel is 1550 kg. The mass of the car when the fuel tank is empty is 1520 kg.

The function $m(t)$ defines the change in mass with time.

all real numbers

$t \geq 0$

$0 \leq t \leq 1550$

$0 \leq t \leq 12$

The domain of the function $m(t)$ is best described as

[ ] .

Question 19.

A car travels at 60 mph. The car's speed will decrease at a constant rate of 7.5 mph every second until the car stops 8 seconds later. If $s \leq 8$, which of the following expressions represents the car's speed, in mph, *s* seconds from now?

A. $60 - 7.5s$

B. $60 - 8s$

C. $60s - 7.5$

D. $(60 - 7.5)s$

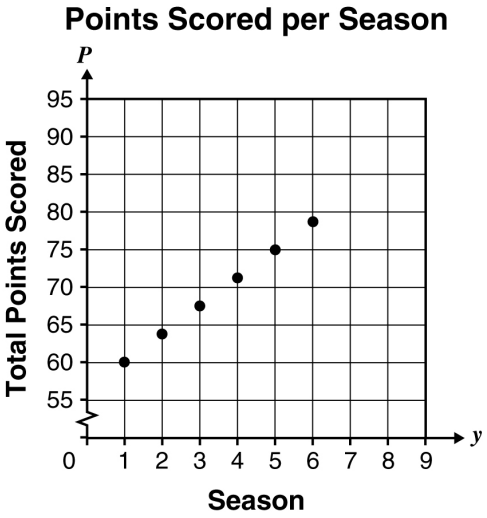
Question 20.

A group of students bakes 100 cookies to sell at the school bake sale. The students want to ensure that the price of each cookie offsets the cost of the ingredients. If all the cookies are sold for $0.10 each, the net result will be a loss of $4. If all the cookies are sold for $0.50 each, the students will make a $36 profit. First, write the linear function p(x) that represents the net profit from selling all the cookies, where x is the price of each cookie. Then, determine how much profit the students will make if they sell the cookies for $0.60 each.

Enter your answers in the spaces provided. Enter only your function and solution.

Question 21.

The graph displays the total points scored by a hockey team for several seasons.



The equation of the line of best fit of the data is $P = 5t + 46.5$, where P is the total points earned during each season, t. Which statement **best** describes the slope of the graph of this equation?

A. The team scored an average of five points per game.

B. Every five games, the number of points scored each game increased by one.

C. Every five seasons, the number of points scored during the season increased by one.

D. The number of points scored in a season increased by an average of five points each season.

Annual Expenditure on Health Insurance per Family	
Number of Years since 2000	Average Annual Expenditure on Health Insurance (dollars)
0	983
1	1061
2	1168
3	1252

Question 22.

The average annual expenditure on health insurance per family is shown in the table on the left.

Part A

Write the equation of the line of "best fit" that most accurately represents these data. Identify what each variable represents.

_____

Part B

Calculate the expected expenditure on health insurance for the year 2010. Explain your answer.