Mid-Chapter Quiz: Lessons 2-1 through 2-4

1. State the domain and range of the relation {(–3, 2), (4, 1), (0, 3), (5, –2), (2, 7)}. Then determine whether the relation is a function.

SOLUTION:

The domain is the set of x-coordinates.

$D = \{-3, 0, 2, 4, 5\}$

The range is the set of y-coordinates.

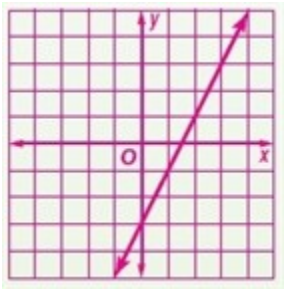
$R = \{-2, 1, 2, 3, 7\}$

Since each element is paired with unique element in the range, it is a function.

2. Graph $y = 2x - 3$ and determine whether the equation is a *function*, is *one-to-one*, *onto*, *both*, or *neither*. State whether it is *discrete* or *continuous*.

SOLUTION:

Graph the equation $y = 2x - 3$.



Since no vertical line intersects the graph at more than one point, the equation is a function.

The function is both *one-to-one* and *onto* because each element of the domain is paired with a unique element of the range and each element of the range correspond to an element of the domain.

The domain has an infinite number of elements and the function can be graphed with a solid straight line. So the function is continuous.

Given $f(x) = 3x^3 - 2x + 7$, find each value.

3. $f(-2)$

SOLUTION:

$$\begin{aligned} f(x) &= 3x^3 - 2x + 7 \\ f(-2) &= 3(-2)^3 - 2(-2) + 7 \\ &= 3(-8) - 2(-2) + 7 \\ &= -24 + 4 + 7 \\ &= -13 \end{aligned}$$

4. $f(2y)$

SOLUTION:

$$\begin{aligned} f(x) &= 3x^3 - 2x + 7 \\ f(2y) &= 3(2y)^3 - 2(2y) + 7 \\ &= 3\left(8y^3\right) - 2(2y) + 7 \\ &= 24y^3 - 4y + 7 \end{aligned}$$

5. $f(1.4)$

SOLUTION:

$$\begin{aligned} f(x) &= 3x^3 - 2x + 7 \\ f(1.4) &= 3(1.4)^3 - 2(1.4) + 7 \\ &= 3(2.744) - 2.8 + 7 \\ &= 12.432 \end{aligned}$$

6. State whether $f(x) = 2x^2 - 9$ is a linear function. Explain.

SOLUTION:

Since the variable is squared, it is not a linear function.

7. **MULTIPLE CHOICE** The daily pricing for renting a mid-sized car is given by the function $f(x) = 0.35x + 49$, where $f(x)$ is the total rental price for a car driven x miles. Find the rental cost for a car driven 250 miles.

A \$84

B \$112.50

C \$136.50

D \$215

SOLUTION:

Substitute $x = 250$ in the function $f(x) = 0.35x + 49$.

$$\begin{aligned} f(x) &= 0.35x + 49 \\ f(250) &= 0.35(250) + 49 \\ &= 87.5 + 49 \\ &= 136.50 \end{aligned}$$

The rental cost for a car driven 250 miles is \$136.50. So, the correct choice is C.

Write each equation in standard form. Identify *A*, *B*, and *C*.

8. $y = -6x + 5$

SOLUTION:

$$\begin{aligned} y &= -6x + 5 \\ 6x + y &= 5 \end{aligned}$$

Compare the equation $6x + y = 5$ with the standard form $Ax + By = C$.

So, $A = 6$, $B = 1$, and $C = 5$.

9. $y = 10x$

SOLUTION:

$$\begin{aligned} y &= 10x \\ 10x - y &= 0 \end{aligned}$$

Compare the equation $10x - y = 0$ with the standard form $Ax + By = C$.
So $A = 10$, $B = -1$, and $C = 0$.

10. $-\frac{5}{8}x = 2y + 11$

SOLUTION:

$$\begin{aligned} -\frac{5}{8}x &= 2y + 11 \\ 8\left(-\frac{5}{8}x\right) &= 8(2y + 11) \\ -5x &= 16y + 88 \\ 5x + 16y &= -88 \end{aligned}$$

Compare the equation $5x + 16y = -88$ with the standard form $Ax + By = C$.
So $A = 5$, $B = 16$, and $C = -88$.

11. $0.5x = 3$

SOLUTION:

$$\begin{aligned} 0.5x &= 3 \\ 2(0.5x) &= 2(3) \\ x &= 6 \end{aligned}$$

Compare the equation $x = 6$ with the standard form $Ax + By = C$.
So $A = 1$, $B = 0$, and $C = 6$.

Mid-Chapter Quiz: Lessons 2-1 through 2-4

Find the *x*-intercept and the *y*-intercept of the graph of each equation. Then graph the equation using the intercepts.

12. $4x - 3y + 12 = 0$

SOLUTION:

Substitute $y = 0$ in the equation $4x - 3y + 12 = 0$.

$$\begin{aligned} 4x - 3(0) + 12 &= 0 \\ 4x + 12 &= 0 \\ 4x + 12 - 12 &= -12 \\ 4x &= -12 \\ \frac{4x}{4} &= \frac{-12}{4} \\ x &= -3 \end{aligned}$$

The *x*-intercept is –3.

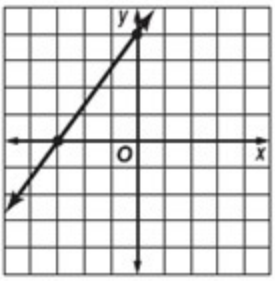
Substitute $x = 0$ in the equation $4x - 3y + 12 = 0$.

$$\begin{aligned} 4(0) - 3y + 12 &= 0 \\ -3y + 12 &= 0 \\ -3y + 12 - 12 &= -12 \\ -3y &= -12 \\ \frac{-3y}{-3} &= \frac{-12}{-3} \\ y &= 4 \end{aligned}$$

The *y*-intercept is 4

.

Plot the *x*-intercept and the *y*-intercept in a coordinate plane and connect them by a straight line.



13. $10 - x = 2y$

SOLUTION:

Substitute $y = 0$ in the equation $10 - x = 2y$.

$$\begin{aligned} 10 - x &= 2y \\ 10 - x &= 2(0) \\ 10 - x &= 0 \\ 10 - x - 10 &= -10 \\ -x &= -10 \\ x &= 10 \end{aligned}$$

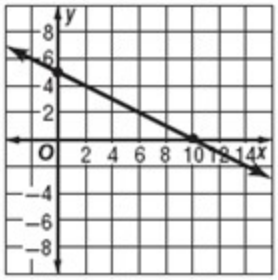
The *x*-intercept is 10.

Substitute $x = 0$ in the equation $10 - x = 2y$.

$$\begin{aligned} 10 - 0 &= 2y \\ 10 &= 2y \\ \frac{10}{2} &= \frac{2y}{2} \\ 5 &= y \end{aligned}$$

The *y*-intercept is 5.

Plot the *x*-intercept and the *y*-intercept in a coordinate plane and connect them by a straight line.



14. **SPEED** The table shows the distance traveled by a car after each time given in minutes. Find the rate of change in distance for the car.

Time (min)	Distance (mi)
15	20
30	40
45	60
60	80
75	100

SOLUTION:

Consider the ordered pairs (45, 60) and (30, 40).

$$\text{Rate of change} = \frac{60-40}{45-30}$$
$$= \frac{20}{15}$$
$$= \frac{4}{3} \approx 1.33$$

So, the rate of change is 1.33 miles per minute.

Find the slope of the line that passes through each pair of points. Express as a fraction in simplest form.

15. (–2, 6), (1, 15)

SOLUTION:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{15-6}{1-(-2)}$$
$$= \frac{9}{1+2}$$
$$= \frac{9}{3}$$
$$= 3$$

The slope of the line that passes through the points (−2, 6) and (1, 15) is 3.

16. (3, 5), (7, 15)

SOLUTION:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{15-5}{7-3}$$
$$= \frac{10}{4}$$
$$= \frac{5}{2}$$

The slope of the line that passes through the points (3, 5) and (7, 15) is $\frac{5}{2}$.

17. (4, 8), (4, –3)

SOLUTION:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{-3-8}{4-4}$$
$$= \frac{-11}{0}$$

The slope of the line that passes through the points (4, 8) and (4, –3) is undefined.

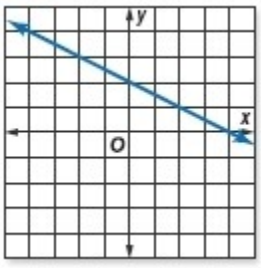
18. (–2.5, 4), (1.5, –2)

SOLUTION:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{-2-4}{1.5-(-2.5)}$$
$$= \frac{-6}{1.5+2.5}$$
$$= \frac{-6}{4}$$
$$= -\frac{3}{2}$$

The slope of the line that passes through the points (–2.5, 4) and (1.5, –2) is $-\frac{3}{2}$.

Find the slope of the line shown.

19. 

SOLUTION:

The graph passes through the points (0, 2) and (2, 1).

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{1-2}{2-0}$$
$$= -\frac{1}{2}$$

The slope of the line is $-\frac{1}{2}$.

Write an equation for the line that satisfies each set of conditions.

20. slope $\frac{2}{3}$, passes through (3, –4)

SOLUTION:

Substitute $m = \frac{2}{3}$ and $(x_1, y_1) = (3, -4)$ in the formula $y - y_1 = m(x - x_1)$.

$$y-(-4) = \frac{2}{3}(x-3)$$
$$y+4 = \frac{2}{3}(x-3)$$
$$3(y+4) = 2(x-3)$$
$$3y+12 = 2x-6$$
$$2x-3y = 12+6$$
$$2x-3y = 18$$

21. slope –2.5, passes through (1, 2)

SOLUTION:

Substitute $m = -2.5$ and $(x_1, y_1) = (1, 2)$ in the formula $y - y_1 = m(x - x_1)$.

$$y-2 = -2.5(x-1)$$
$$y-2 = -2.5x+2.5$$
$$y-2+2 = -2.5x+2.5+2$$
$$y = -2.5x+4.5$$

Write an equation of the line through each set of points.

22. (–2, 3), (4, 1)

SOLUTION:

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{1-3}{4-(-2)} \\ &= \frac{-2}{4+2} \\ &= \frac{-2}{6} \\ &= -\frac{1}{3} \end{aligned}$$

Substitute $m = -\frac{1}{3}$ and $(x_1, y_1) = (-2, 3)$ in the formula $y - y_1 = m(x - x_1)$.

$$\begin{aligned} y-3 &= -\frac{1}{3}(x-(-2)) \\ y-3 &= -\frac{1}{3}(x+2) \\ y-3 &= -\frac{1}{3}x - \frac{2}{3} \\ y &= -\frac{1}{3}x - \frac{2}{3} + 3 \\ y &= -\frac{1}{3}x - \frac{7}{3} \end{aligned}$$

23. (4.2, 3.6), (1.8, –1.2)

SOLUTION:

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-1.2-3.6}{1.8-4.2} \\ &= \frac{-4.8}{-2.4} \\ &= 2 \end{aligned}$$

Substitute $m = 2$ and $(x_1, y_1) = (4.2, 3.6)$ in the formula $y - y_1 = m(x - x_1)$.

$$\begin{aligned} y-3.6 &= 2(x-4.2) \\ y-3.6 &= 2x-8.4 \\ y-3.6+3.6 &= 2x-8.4+3.6 \\ y &= 2x-4.8 \end{aligned}$$

24. **MULTIPLE CHOICE** Each week, Jaya earns $32 plus $0.25 for each newspaper she delivers. Write an equation that can be used to determine how much Jaya earns each week. How much will she earn during a week in which she delivers 240 papers?

F $75

G $92

H $148

J $212

SOLUTION:

Let x = number of newspaper Jaya delivers.
Let y = dollars earned by Jaya each week.

$y = 0.25x + 32$

Substitute $x = 240$ in the equation $y = 0.25x + 32$.

$$\begin{aligned} y &= 0.25(240) + 32 \\ &= 60 + 32 \\ &= 92 \end{aligned}$$

She will earn $92 if she delivers 240 papers. So, the correct choice is G.

25. **PART-TIME JOB** Jesse is a pizza delivery driver. Each day his employer gives him $20 plus $0.50 for every pizza that he delivers.

a. Write an equation that can be used to determine how much Jesse earns each day if he delivers x pizzas.

b. How much will he earn the day he delivers 20 pizzas?

SOLUTION:

a. Let y = dollars earned by Jesse each day. Since he will get $0.50 for every pizza he delivers, the slope of the equation is 0.5.
Therefore, the equation representing the situation is $y = 0.5x + 20$

b. Substitute $x = 20$ in the equation $y = 0.5x + 20$.

$$\begin{aligned} y &= 0.5(20) + 20 \\ &= 10 + 20 \\ &= 30 \end{aligned}$$

He will $30 if he delivers 20 pizzas in a day.