Practice Test - Chapter 2

1. State the domain and range of the relation shown in the table. Then determine if it is a function. If it is a function, determine if it is *one-to-one*, *onto*, *both*, or *neither*.

x	y
–2	3
4	–1
3	2
6	3

SOLUTION:

The domain is the set of x-coordinates.

$D = \{-2, 3, 4, 6\}$

The range is the set of y-coordinates.

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

Since each element in the domain is related with unique element in the range, it is a function. Since –2 and 6 are mapped to 3 in the range, the function is not one-to-one. Since each element in the range has an element in the domain, the function is onto.

Find each value if $f(x) = -2x + 3$.

2. $f(-4)$

SOLUTION:

$$f(x) = -2x + 3$$
$$f(-4) = -2(-4) + 3$$
$$= 8 + 3$$
$$= 11$$

3. $f(3y)$

SOLUTION:

$$f(x) = -2x + 3$$
$$f(3y) = -2(3y) + 3$$
$$= -6y + 3$$

4. Write $2y = -6x + 4$ in standard form. Identify A, B and C.

SOLUTION:

$$2y = -6x + 4$$
$$6x + 2y = 4$$

Compare the equation $6x + 2y = 4$ with the equation $Ax + By = C$.

From the equation, $A = 6$, $B = 2$, $C = 4$. Because A, B, and C have a common factor of 2, divide each by 2. So, $A = 3$, $B = 1$, and $C = 2$.

5. Find the x-intercept and the y-intercept for $3x - 4y = -24$.

SOLUTION:

Substitute $y = 0$ in the equation $3x - 4y = -24$.

$$3x - 4(0) = -24$$
$$3x = -24$$
$$\frac{3x}{3} = -\frac{24}{3}$$
$$x = -8$$

So, the x-intercept is (–8, 0).

Substitute $x = 0$ in the equation $3x - 4y = -24$.

$$3(0) - 4y = -24$$
$$-4y = -24$$
$$\frac{-4y}{-4} = \frac{-24}{-4}$$
$$y = 6$$

So, the y-intercept is (0, 6).

6. **MULTIPLE CHOICE** The cost of producing x pumpkin pies at a small bakery is given by $C(x) = 49 + 1.75x$. Find the cost of producing 25 pies.

A \$74.00

B \$81.50

C \$92.75

D \$108.25

SOLUTION:

Substitute $x = 25$ in the equation $C(x) = 49 + 1.75x$.

$$\begin{aligned} C(x) &= 49 + 1.75x \\ C(25) &= 49 + 1.75(25) \\ &= 49 + 43.75 \\ &= 92.75 \end{aligned}$$

The cost of producing 25 pies is \$92.75.
So, the correct choice is C.

Find the slope of the line that passes through each pair of points.

7. (1, 6), (3, 10)

SOLUTION:

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{10 - 6}{3 - 1} \\ &= \frac{4}{2} \\ &= 2 \end{aligned}$$

The slope of the line that passes through (1, 6) and (3, 10) is 2.

8. (–2, 7), (3, –1)

SOLUTION:

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-1 - 7}{3 - (-2)} \\ &= \frac{-8}{3 + 2} \\ &= -\frac{8}{5} \end{aligned}$$

The slope of the line that passes through (–2, 7) and (3, –1) is $-\frac{8}{5}$.

9. **MULTIPLE CHOICE** Find the equation of the line that passes through (0, –3) and (4, 1).

F $y = –x + 3$

G $y = –x – 3$

H $y = x – 3$

J $y = x + 3$

SOLUTION:

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{1 - (-3)}{4 - 0} \\ &= \frac{1 + 3}{4} \\ &= \frac{4}{4} \\ &= 1 \end{aligned}$$

Substitute $m = 1$ and $(x_1, y_1) = (0, -3)$ in the equation $y - y_1 = m(x - x_1)$.

$$\begin{aligned} y - (-3) &= 1(x - 0) \\ y + 3 &= x \\ y &= x - 3 \end{aligned}$$

10. Write an equation in slope-intercept form for the line that has slope –2 and passes through the point (3, –4).

SOLUTION:

Substitute $m = -2$ and $(x, y) = (3, -4)$ in the equation $y = mx + b$.

$$\begin{aligned} -4 &= -2(3) + b \\ -4 &= -6 + b \\ -4 + 6 &= -6 + b + 6 \\ 2 &= b \end{aligned}$$

Substitute $m = -2$ and $b = 6$ in the formula $y = mx + b$.

$$y = -2x + 2$$

So, the equation for the line that has slope –2 and passes through the point (3, –4) is $y = -2x + 2$.

11. Write an equation of the line that passes through the points (2, –4) and (1, 6).

SOLUTION:

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{6 - (-4)}{1 - 2} \\ &= \frac{6 + 4}{-1} \\ &= \frac{10}{-1} \\ &= -10 \end{aligned}$$

Substitute $m = -10$ and $(x_1, y_1) = (2, -4)$ in the point-slope form.

$$\begin{aligned} y - y_1 &= m(x - x_1) \\ y - (-4) &= -10(x - 2) \\ y + 4 &= -10(x - 2) \\ y + 4 &= -10x + 20 \\ y &= -10x + 16 \end{aligned}$$

So, the equation of the line that passes through the points (2, –4) and (1, 6) is $y = -10x + 16$.

12. Write an equation in slope-intercept form for the line that passes through (–3, 5) and is parallel to $y = -6x + 1$.

SOLUTION:

Since the required line is parallel to $y = -6x + 1$, the slope of the line is the same as the slope of the line $y = -6x + 1$.

So, $m = -6$.

Substitute $m = -6$ and $(x, y) = (-3, 5)$ in the slope-intercept form $y = mx + b$.

$$\begin{aligned} 5 &= -6(-3) + b \\ 5 &= 18 + b \\ 5 - 18 &= b \\ -13 &= b \end{aligned}$$

Substitute $m = -6$ and $b = -13$ in the slope-intercept form $y = mx + b$.

$$y = -6x - 13$$

So, the slope-intercept form for the line that passes through (–3, 5) and is parallel to $y = -6x + 1$ is $y = -6x - 13$.

13. **EMERGENCY ROOM** A hospital tracks the number of emergency room visits during the fall and winter months.

Month	Oct	Nov	Dec	Jan	Feb
Visits	124	163	155	171	192

a. Make a scatter plot and describe the correlation.

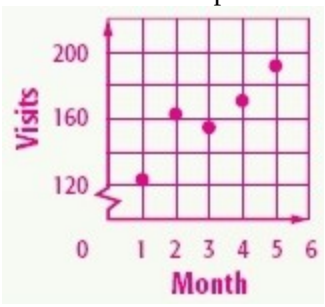
b. Use two ordered pairs to write a prediction equation

.

c. Use your prediction equation to estimate the number of emergency room visits for March.

SOLUTION:

a. Make a scatter plot.



Since the number of room visits increases as the number of months increases, the correlation is

positive.

b. Use the ordered pairs (1, 124) and (5, 192).

$$m = \frac{192-124}{5-1}$$
$$= \frac{68}{4}$$
$$= 17$$

Substitute $m = 17$ and $(x, y) = (1, 124)$ in the slope-intercept form $y = mx + b$.

$$124 = 17(1) + b$$
$$124 = 17 + b$$
$$124 - 17 = b$$
$$107 = b$$

Substitute $m = 17$ and $b = 107$ in the slope-intercept form $y = mx + b$.

$$y = 17x + 107$$

So, a prediction equation for the scatter plot is $y = 17x + 107$.

c. Substitute $x = 6$ in the equation $y = 17x + 107$.

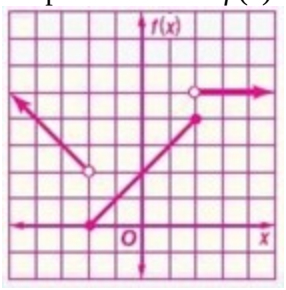
$$y = 17(6) + 107$$
$$= 102 + 107$$
$$= 209$$

So, there will be 209 number of emergency room visits for March.

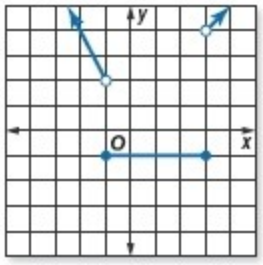
14. Graph $f(x) = \begin{cases} -x \text{ if } x < -2 \\ x + 2 \text{ if } -2 \le x \le 2 \\ 5 \text{ if } x > 2 \end{cases}$

SOLUTION:

Graph the function $f(x)$.



15. Write the piecewise function shown.



SOLUTION:

$$y = \begin{cases} -2x & \text{if } x < -1 \\ -1 & \text{if } -1 \le x \le 3 \\ x + 1 & \text{if } x > 3 \end{cases}$$

16. Identify the domain and range of $y = [\![x]\!] + 2$.

SOLUTION:

The greatest integer function is defined for all real numbers. So, the domain of the function is all real numbers.

$$D = \{\text{all real numbers}\}$$

The greatest integer function takes values from the set of all integers. So, the range of the function is all integers.

$$R = \{\text{all integers}\}$$

17. Describe the translation to $y = x^2 + 5$.

SOLUTION:

To obtain the graph of $y = x^2 + 5$, shift the graph of $y = x^2$ by 5 units upwards.

18. Describe the reflection in $y = -|x|$.

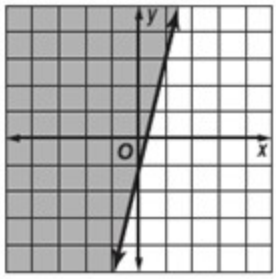
SOLUTION:

To obtain the graph of $y = -|x|$, reflect the graph of $y = |x|$ over the x-axis.

Graph each inequality.

19. $y \geq 4x - 1$

SOLUTION:



20. $2x + 6y < -12$

SOLUTION: