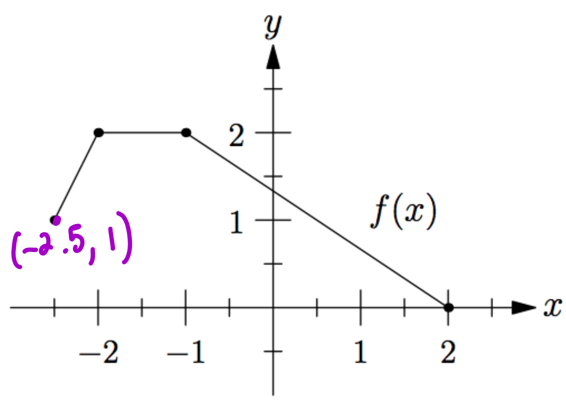
Do Now: From yesterday's Do Now sheet #s 4-6

5. If $h(x) = 3x + 5$ and $h(a) = 27$, then what is the value of a?

$$3a + 5 = 27$$
$$3a = 22$$
$$a = \frac{22}{3}$$



6. For the function f graphed in the xy-plane above, if $f(-2.5) = k$, then what is $f(2k)$?

$K = 1$

$$f(2(1)) = f(2) = 0$$

4. For any positive integer n, let $n^{\lozenge}$ be defined by $n^{\lozenge} = 2n(n+1)$. What is the value of $\frac{8^{\lozenge}}{2^{\lozenge}}$?

(A) $2^{\lozenge}$ (B) $4^{\lozenge}$ (C) $6^{\lozenge}$ (D) $8^{\lozenge}$ (E) $10^{\lozenge}$

$$\frac{\cancel{2}(\cancel{8}^{4})(8+1)}{\cancel{2}(\cancel{2})(2+1)} = \frac{4(\cancel{9}^{3})}{\cancel{3}} = 12$$

Name:__________________________________ Date:____________

PCH: Review of Linear Functions Ms. Loughran

A ***linear function*** is a function defined by the equation $f(x) = mx + b$, where "m" is called the slope and "b" is called the y-intercept. This equation is called the slope intercept form of a line. The graph of a linear equation is a straight line.

Formula for slope:

$m = \dfrac{y_1 - y_2}{x_1 - x_2} = \dfrac{\Delta y}{\Delta x}$

Other ways to write the equation of a line:

Point slope: $y - y_1 = m(x - x_1)$

Standard form: $Ax + By = C$ * A, B + C are non fractional

Parallel lines have __ = __ slopes.

$\parallel$

Perpendicular lines have slopes that are __negative__ __reciprocals__.

$\perp$

Horizontal lines are in the form $y =$ __constant__. Slope of a horizontal line is __0__.

Vertical lines are in the form $x =$ __constant__. Slope of a vertical line is __undefined__

Exercises

1. Find the slope of the line passing through each pair of points.

(a) $(-2,0)$ and $(3,1)$ (b) $(-1,2)$ and $(2,2)$ (c) $(0,4)$ and $(1,-1)$

$m = \dfrac{0-1}{-2-3} = \dfrac{1}{5}$ $m = \dfrac{2-2}{2-(-1)} = 0$

2. Find an equation of the line that passes through the point $(1,-2)$ and has a slope of 3 in:
   (a) point slope form
   (b) slope intercept form $(y = mx + b)$
   (c) standard form

$y - y_1 = m(x - x_1)$

(a) $y + 2 = 3(x - 1)$

$y + 2 = 3x - 3$

(B) $y = 3x - 5$

(c) $3x - y = 5$

3. Find an equation of the line, in standard form, that passes through the points $(-4,0)$ and $(2,3)$.

$(-4,0)$

$m = \frac{3-0}{2-(-4)} = \frac{1}{2}$

$y - 0 = \frac{1}{2}(x+4)$

$y = \frac{1}{2}(x+4)$

$2y = x + 4 \rightarrow -x + 2y = 4$

$(2,3)$

$y - 3 = \frac{1}{2}(x-2)$

$y = \frac{1}{2}(x-2) + 3$

$2y = x - 2 + 6$

$2y = x + 4$

$-x + 2y = 4$

4. State an equation of a line that contains the point whose coordinates are $(2,-3)$ and is parallel to the line whose equation is $2x + y - 6 = 0$.

$y = -2x + b$

$m = -2$ $\quad$ ∥ lines have = slopes

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

5. State an equation of a line that contains the point whose coordinates are $(1,-2)$ and perpendicular to the line whose equation is $x+3y=6$.

$3y = -x + 6$

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

$m = -\frac{1}{3}$

$\perp$ lines: slopes are negative reciprocals

$m = 3$

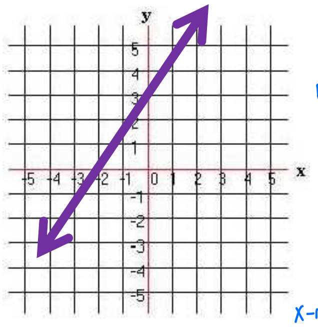
$y+2 = 3(x-1)$

6. State an equation of a line that contains the point whose coordinates are $(3,-2)$ and is parallel to the line whose equation is $3x+7y=9$.

7. State an equation of a line that contains the point whose coordinates are $(-5,1)$ and is perpendicular to the line whose equation is $3x-8y=2$.

Write the equation of the line from graph and also write domain and range. Find *x* and *y*-intercepts. Determine whether or not each is a function.

8.



$m = \frac{3}{2}$

$b = 3$

$y = \frac{3}{2}x + 3$

D: $(-\infty, \infty)$

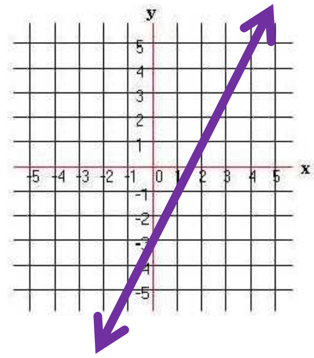
R: $(-\infty, \infty)$

Yes

x-int: $(-2, 0)$

y-int: $(0, 3)$

9.



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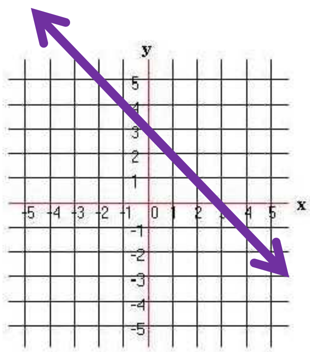

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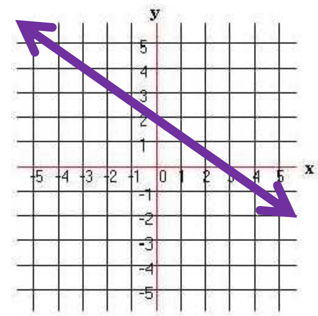

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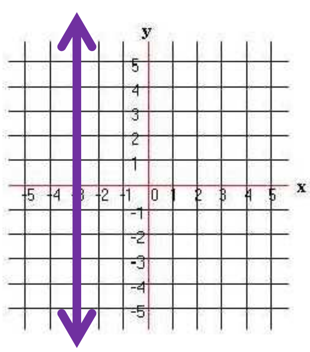


$x = -3$

D: $\{-3\}$

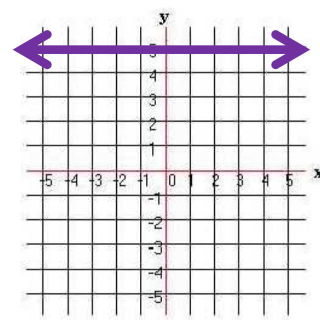
R: $(-\infty, \infty)$ or $\{x \mid x \in \mathbb{R}\}$

x-int: $(-3, 0)$

y-int: none

No, fails VLT

13.



$y = 5$

D: $(-\infty, \infty)$

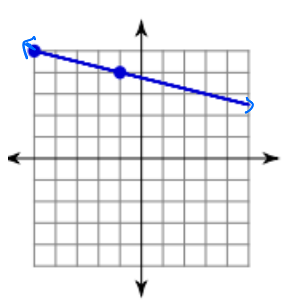
R: $\{5\}$

x-int: none

y-int: $(0, 5)$

yes

14.



$m = -\frac{1}{4}$ $(-1, 4)$

$y - 4 = -\frac{1}{4}(x + 1)$

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

$y = -\frac{1}{4}x + \frac{15}{4}$

D: $(-\infty, \infty)$

R: $(-\infty, \infty)$

yes

x-int (let $y = 0$)

$0 = -\frac{1}{4}x + \frac{15}{4}$

$-\frac{15}{4} = -\frac{1}{4}x$

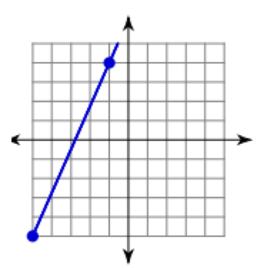
$-15 = -x$

$15 = x$

x-int: $(15, 0)$

y-int: $(0, \frac{15}{4})$

15.



Homework 10-05

4. $f(x) = 6x - x^2$

$$\frac{6(x+h) - (x+h)^2 - (6x - x^2)}{h}$$

$$\frac{\cancel{6x} + 6h - \cancel{x^2} - 2xh - h^2 - \cancel{6x} + \cancel{x^2}}{h}$$

$$\frac{6h - 2xh - h^2}{h} = 6 - 2x - h \quad , \quad h \neq 0$$

$(x+h)^3 = x^3 + 3x^2h + 3xh^2 + h^3$

6. $f(x) = 2x^3$

$$\frac{\cancel{2x^3} + 6x^2h + 6xh^2 + 2h^3 - \cancel{2x^3}}{h}$$

$$\frac{\cancel{h}(6x^2 + 6xh + 2h^2)}{\cancel{h}} = 6x^2 + 6xh + 2h^2 \quad , \quad h \neq 0$$

8. $f(x) = \dfrac{1}{x+2}$

$x \neq -2, -h-2$

$h \neq 0$

$$\frac{\dfrac{1}{x+h+2}(\cancel{x+h+2})(x+2) - \dfrac{1}{x+2}(x+h+2)(\cancel{x+2})}{h(x+h+2)(x+2)}$$

$$\frac{\cancel{x} + \cancel{2} - \cancel{x} - h - \cancel{2}}{h(x+h+2)(x+2)} = \frac{-\cancel{h}}{\cancel{h}(x+h+2)(x+2)} = \frac{-1}{(x+h+2)(x+2)}$$

9. $f(x)=\dfrac{1}{2x^2}$

$$\frac{\dfrac{1}{2(x+h)^2}\,2(x+h)^2x^2 - \dfrac{1}{\cancel{2x^2}}\,\cancel{2}(x+h)^2\cancel{x^2}}{h\,2(x+h)^2x^2}$$

$x \neq 0, -h$

$$\frac{x^2-(x+h)^2}{2x^2h(x+h)^2}$$

$$\frac{\cancel{x^2}-\cancel{x^2}-2xh-h^2}{2x^2h(x+h)^2}$$

$$\frac{\cancel{h}(-2x-h)}{2x^2\cancel{h}(x+h)^2} = \frac{-2x-h}{2x^2(x+h)^2}$$

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

$h \neq 0$

$$\frac{-5}{\sqrt{5x+5h+6} + \sqrt{5x+6}}$$