

2-2 Warm-Up

1. In the equation $y = 2x + 17$, what is the value of y when $x = 0$?
2. In the ordered pair $(-3, 7)$, what is the x -coordinate? The y -coordinate?
3. How many points are needed to determine a line?
4. If $y = 3$, what is the value of $-y$?
5. Find the value of each of the following
 - a. $6 - 9$
 - b. $2 - (-5)$
 - c. $-3 - 11$
 - d. $-5 - (-4)$

2-2 Linear Models and Direct Variation - Integrated 2

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2-2 Warm-Up

1. In the equation $y = 2x + 17$, what is the value of y when $x = 0$? **17**
2. In the ordered pair $(-3, 7)$, what is the x -coordinate? The y -coordinate? **$x = -3, y = 7$**
3. How many points are needed to determine a line? **2**
4. If $y = 3$, what is the value of $-y$? **-3**
5. Find the value of each of the following
 - a. $6 - 9 = -3$
 - b. $2 - (-5) = 7$
 - c. $-3 - 11 = -14$
 - d. $-5 - (-4) = -1$

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2-2 Linear Models & Direct Variation

- People attending the Fair buy tokens to pay for rides, games, and food. The money a person spends at the fair is a linear function of the number of tokens the person buys.
 - Fair
 - Admission \$2.00
 - Tokens \$.25 each

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2-2 Linear Models

- A person's expenses at the Fair can be modeled by this function.

$$e = 0.25t + 2$$

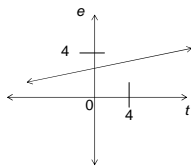
e = expenses (dependent variable)
 t = number of tokens (control variable)

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2-2 Linear Models

- The graph of the function $e = 0.25t + 2$ is a straight line.
- Thus the function is linear.



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2-2 Linear Models

Slope-intercept Form

- The equation $e = 0.25t + 2$ is in slope-intercept form
- $y = mx + b$
 - y is the dependent variable
 - m is the slope
 - b is the vertical intercept
- vertical intercept – the value of the dependent variable (y) when the control variable (x) is 0.

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2-2 Linear Models

Slope

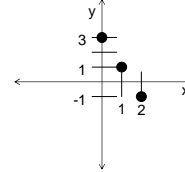
- Using any two points on a line, slope = $\frac{\text{vertical change}}{\text{horizontal change}}$
- or $\frac{\text{rise}}{\text{run}}$
- The slope of a line can be positive, negative, zero, or undefined.

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2-2 Linear Models

- Graph $y = -2x + 3$
- Plot the y intercept first
- Use slope to plot multiple points from the y intercept



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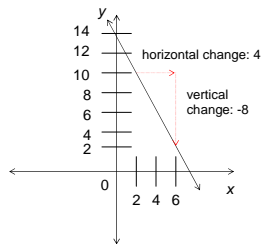
2-2 Linear Models

Find the slope between two points
(2, 10) and (6, 2)

$$\frac{y_2 - y_1}{x_2 - x_1}$$

$$\frac{2 - 10}{6 - 2} = \frac{-8}{4} = -2$$

Slope is -2



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2-2 Linear Models

- Write the equation of the line that passes through the points (2, 10) and (6, 2)

Slope = -2

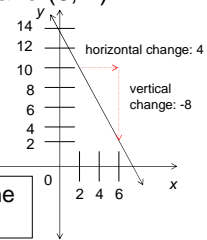
Substitute an ordered pair

$$10 = -2(2) + b$$

$$10 = -4 + b$$

$$b = 14$$

Equation of the line
 $y = -2x + 14$



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2-2 Linear Models

Find the slope between the two points
(8, -1) and (6, 3)

$$\frac{y_2 - y_1}{x_2 - x_1}$$

$$\frac{3 - (-1)}{6 - 8} = \frac{4}{-2} = -2$$

Find the y-intercept

$$3 = -2(6) + b$$

$$b = 15$$

Equation of the line
 $y = -2x + 15$

Substitute an ordered pair into the equation. Should be a true statement

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2-2 Linear Models

Linear models

- The vertical intercept is the point where the graph of the line crosses the vertical axis.
- Both the slope and vertical intercept can be found directly from the slope-intercept form of the equation of the line.
- A vertical line has an undefined slope.
- A horizontal line has a slope of 0.

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2-2 Direct Variation

- Direct Variation
 - An equation in the general form $y = kx$
 - The graph of a direct variation equation is a straight line passing through the origin $(0, 0)$, either increasing (has a positive slope) or decreasing (has a negative slope).
- The formula for the circumference of a circle $C = \pi d$ is a direct variation equation.
- Variation constant
 - The value k in the direct variation equation.
 - $k = \frac{y}{x}$

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2-2 Direct Variation

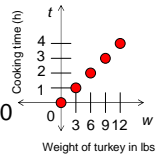
- The instructions on a turkey say to cook it for 20 minutes per pound.
- Write an equation that models the cooking time, in hours, of the turkey.
 - Let w = the weight (in pounds) of the turkey and t = the required cooking time (in hours).
 - 20 min • weight in pounds. Converting 20 minutes to $\frac{1}{3}$ hour.
 - $t = \frac{1}{3}w$

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2-2 Direct Variation

- The instructions on a turkey say to cook it for 20 minutes per pound.
- Draw a graph that models the cooking time, in hours, of the turkey.
 - The equation $t = \frac{1}{3}w$ is in slope-intercept
 - Slope is $\frac{1}{3}$ and y-intercept is 0



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2-2 Direct Variation

- The instructions on a turkey say to cook it for 20 minutes per pound.
- Is the relationship between the weight of the turkey and the cooking time a direct variation?
 - The equation $t = \frac{1}{3}w$ is direct variation.
 - The equation is in the form $y = kx$.
 - The variation constant k is $\frac{1}{3}$

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