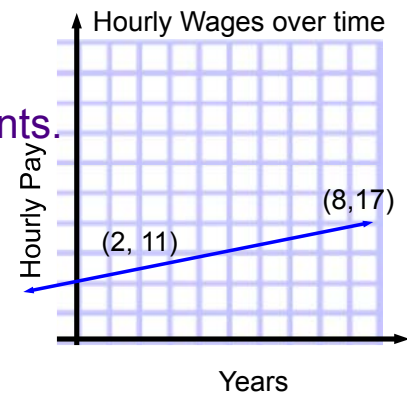


**Warm-up 10-1****\*Have your homework out on your desk.**

1. Over the last 50 years, the average temperature has decreased by 2.5 degrees worldwide (I made this up). What is the rate of change in worldwide temperatures per year?

2. Find the slope and explain what the slope represents.



3. Find the slope of the line represented by the equation  $5y = 125 + 25x$

### Warm-up 10-2

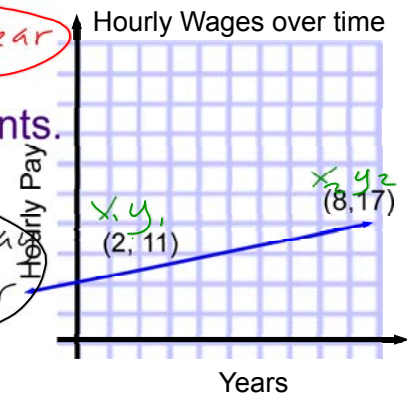
\*Have your homework out on your desk.

1. Over the last  $50$   <sup>$\Delta x$</sup>  years, the average temperature has increased by  $2.5$   <sup>$\Delta y$</sup>  degrees worldwide (I made this up). What is the rate of change in  $\frac{\Delta y}{\Delta x}$  worldwide temperatures per year?

$$\frac{2.5 \text{ deg}}{50 \text{ years}} = 0.05 \text{ degrees per year}$$

2. Find the slope and explain what the slope represents.

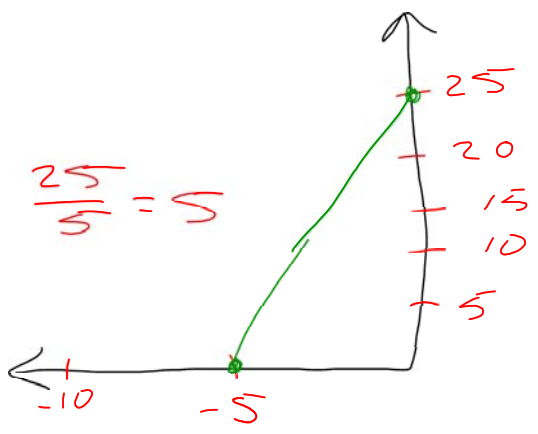
$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{17 - 11}{8 - 2} = \frac{6}{6} = 1 \text{ hourly pay per year}$$



3. Find the slope of the line represented by the equation  $5y = 125 + 25x$

$$m = 5$$

$$\begin{aligned} \frac{5y}{5} &= \frac{125}{5} + \frac{25x}{5} \\ y &= 25 + 5x \\ y &= 5x + 25 \end{aligned}$$



$$\begin{aligned} &(-4, 3) \quad m=2 \\ &y - y_1 = m(x - x_1) \\ &y - 3 = 2(x - (-4)) \\ &y - 3 = 2(x + 4) \end{aligned}$$

$$\begin{aligned} &y - 6 = -5(x - 1) \\ &y - 6 = -5x + 5 \\ &\quad +6 \qquad \qquad +6 \\ &\hline &y = -5x + 11 \end{aligned}$$

# Quiz

If you are finished, please make sure that your chromebook is up and then grab a board, marker, and eraser.

$$y = mx + b$$

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

$$(1, -3) (2, 4)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad y = mx + b$$

$$\begin{matrix} x_1 & y_1 & x_2 & y_2 \\ (1, -3) & (2, 4) \end{matrix}$$

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

$$\frac{4 - (-3)}{2 - 1} = \frac{4 + 3}{1} = 7$$

$$y - (-3) = 7(x - 1)$$

$$y + 3 = 7(x - 1)$$

$$y + 3 = 7(x - 1)$$

$$y + 3 = 7x - 7$$

$$\begin{array}{r} y + 3 = 7x - 7 \\ -3 \quad -3 \\ \hline y = 7x - 10 \end{array}$$

$$y = 7x + b$$

$$-3 = 7(1) + b$$

$$-3 = 7 + b$$

$$\begin{array}{r} -7 \quad -7 \\ \hline -10 = b \end{array}$$

$$y = 7x - 10$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad y = mx + b$$

$x_1 \quad y_1$   
 $(1, -3)$

$x_2 \quad y_2$   
 $(2, 4)$

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

$$\frac{4 - (-3)}{2 - (1)} = \frac{4 + 3}{2 - 1} = \frac{7}{1}$$

$= 7$

$$y - (-3) = 7(x - 1)$$

$$y + 3 = 7(x - 1)$$

$$y + 3 = 7x - 7$$

$$\begin{array}{r} -3 \quad -3 \\ \hline \end{array}$$

$$y = 7x - 10$$

$$y = 7x + b$$

$$-3 = 7(1) + b$$

$$-3 = 7 + b$$

$$\begin{array}{r} -7 \quad -7 \\ \hline \end{array}$$

$$-10 = b$$

$$y = 7x - 10$$



$$y = mx + b$$

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

$$(-2, 4) (1, 10)$$

$$y = mx + b$$

$$\begin{matrix} x_1 & y_1 & x_2 & y_2 \\ (-2, 4) & (1, 10) \end{matrix}$$

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

$$\frac{10 - 4}{1 - (-2)} = \frac{6}{1 + 2} = \frac{6}{3}$$

2

$$y - 4 = 2(x - (-2))$$

$$y - 4 = 2(x + 2)$$

$$\begin{array}{r} y - 4 = 2x + 4 \\ +4 \qquad \qquad +4 \\ \hline y = 2x + 8 \end{array}$$

$$y = 2x + b$$

$$4 = 2(-2) + b$$

$$4 = -4 + b$$

$$8 = b$$

$$y = 2x + 8$$

$$y = mx + b$$

$$\begin{matrix} x_1 & y_1 & x_2 & y_2 \\ (-2, 4) & & (1, 10) \end{matrix}$$

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

$$\frac{10 - 4}{1 - (-2)} = \frac{10 - 4}{1 + 2} = \frac{6}{3}$$

②

$$y - 4 = 2(x - (-2))$$

$$y - 4 = 2(x + 2)$$

$$\begin{array}{r} y - 4 = 2x + 4 \\ +4 \qquad \qquad +4 \\ \hline \end{array}$$

$$y = 2x + 8$$

$$y = 2x + b$$

$$4 = 2(-2) + b$$

$$4 = -4 + b$$

$$\begin{array}{r} +4 \qquad +4 \\ \hline 8 = b \end{array}$$

$$y = 2x + 8$$

14. (8,2) and (11,3)

14.  $\overset{x_1}{(8,2)}$  and  $\overset{x_2}{(11,3)}$   $\frac{3-2}{11-8} = \frac{1}{3}$

15. (8,0) and (8, 6)

15.  $\overset{x_1}{(8,0)}$  and  $\overset{x_2}{(8,6)}$   $\frac{6-0}{8-8} = \frac{6}{0}$  undefined



A climber is on a hike. After 2 hours, he is at an altitude of 400 feet. After 6 hours, he is at an altitude of 700 feet. What is the average rate of change? Write an equation in slope-intercept form and explain what the parts mean.

A climber is on a hike. After 2 hours, he is at an altitude of 400 feet. After 6 hours, he is at an altitude of 700 feet. What is the average rate of change? Write an equation in slope-intercept form and explain what the parts mean.

$$\frac{\text{feet}}{\text{hour}} = \frac{300}{4} = 75 \text{ ft per hour}$$

$$(2, 400)(6, 700)$$

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

$$y - 400 = 75(x - 2)$$

$$\begin{array}{r} y - 400 = 75x - 150 \\ +400 \qquad +400 \\ \hline \end{array}$$

$$y = 75x + 250$$

$$y = 75x + b$$

$$400 = 75(2) + b$$

$$400 = 150 + b$$

$$\begin{array}{r} -150 \quad -150 \\ \hline \end{array}$$

$$250 = b$$

$$y = 75x + 250$$

8. A rocket is 1 mile above the earth in 30 **seconds** and 5 miles above the earth in 2.5 **minutes**. What is the rockets rate of change in miles per second? What about miles per minute.

8. A rocket is  $y_1$  1 mile above the earth in  $x_1$  30 seconds and 5 miles above the earth in 2.5 minutes. What is the rockets rate of change in miles per second? What about miles per minute.

$$\frac{2.5 \text{ min}}{1} \cdot \frac{60 \text{ sec}}{1 \text{ min}} = 150 \text{ sec}$$

$$\frac{4 \text{ miles}}{120 \text{ sec}} \approx 0.033 \text{ m/s} = \frac{1 \text{ mile}}{30 \text{ sec}}$$

$$\frac{30 \text{ sec}}{60 \text{ sec}} \left( \frac{1 \text{ min}}{60 \text{ sec}} \right) = 0.5 \text{ min}$$

$$\frac{4 \text{ miles}}{2 \text{ min}} = 2 \text{ m/min}$$

(0.5, 1)

$$y = mx + b$$

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

$$y = 2x + b$$

$$1 = 2(0.5) + b$$

$$1 = 1 + b$$

$$\frac{-1 \quad -1}{0 = b}$$

$$y - 1 = 2(x - 0.5)$$

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


---


$$y = 2x$$



8. A rocket is 1 mile above the earth in 30 seconds and 5 miles above the earth in 2.5 minutes. What is the rockets rate of change in miles per second? <sup>150 sec</sup> What about miles per minute.

$$\frac{1 \text{ mile}}{30 \text{ sec}} \quad \text{m/s}$$

$$\frac{2.5 \text{ min}}{1} \cdot \frac{60 \text{ s}}{1 \text{ min}}$$

$$\frac{4}{120} = \frac{1}{30} \approx 0.033 \text{ miles/sec} \quad 150 \text{ sec}$$

$$\frac{1 \text{ mile}}{30 \text{ sec}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} = \frac{60 \text{ mile}}{30 \text{ min}} = 2 \text{ miles/min}$$

$$\frac{2 \text{ miles}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} = \frac{120 \text{ miles}}{\text{hr}}$$

$$y = 120x + b$$

$$1 = 120\left(\frac{1}{120}\right) + b$$

$$\begin{array}{r} 1 = 1 + b \\ -1 \quad -1 \\ \hline 0 = b \end{array}$$

$$y = 120x$$

$$\frac{30 \text{ sec}}{1} \cdot \frac{1 \text{ min}}{60 \text{ sec}} \cdot \frac{1 \text{ hr}}{60 \text{ min}}$$

$$\frac{30}{60(60)} = \frac{30}{3600} = \frac{1}{120}$$

8. A rocket is  $y_1$  1 mile above the earth in  $x_1$  30 seconds and  $y_2$  5 miles above the earth in  $x_2$  2.5 minutes. What is the rocket's rate of change in miles per second? What about miles per minute.

$$\frac{1}{30} \text{ miles/sec} \approx 0.03$$

$$\frac{\Delta y}{\Delta x} = \frac{\text{miles}}{\text{sec}}$$

$$(x_1, y_1) (x_2, y_2)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 1}{150 - 30} = \frac{4}{120} = \frac{1}{30}$$

x	y
30	1
150	5

$\frac{4}{120} = \frac{1}{30}$

$$\frac{1 \text{ miles}}{30 \text{ sec}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} = 2 \text{ miles/min}$$

11. Michael started a savings account with \$300. After 4 weeks, he had \$350 dollars, and after 9 weeks, he had \$400. What is the rate of change of money in his savings account per week?

11. Michael started a savings account with \$300. After 4 weeks, he had \$350 dollars, and after 9 weeks, he had \$400. What is the rate of change of money in his savings account per week?

\$10 per week

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

$$y - 350 = 10(x - 4)$$

$$y - 350 = 10x - 40$$

$$\begin{array}{r} y - 350 = 10x - 40 \\ +350 \qquad \qquad +350 \\ \hline y = 10x + 310 \end{array}$$

$$\frac{\Delta y}{\Delta x} = \frac{\$}{\text{week}}$$

x	y
4	350
9	400

5 < 4      350 > 50

$$\frac{50}{5} = \$10/\text{week}$$

$$m = \frac{400 - 350}{9 - 4} = \frac{50}{5}$$

12. A plane left Chicago at 8:00 A.M. At 1: P.M., the plane landed in Los Angeles, which is 1500 miles away. What was the average speed of the plane for the trip?

12. A plane left Chicago at 8:00 A.M. At 1: P.M., the plane landed in Los Angeles, which is  $\overset{\Delta y}{1500}$  miles away. What was the average speed of the plane for the trip?

$$\frac{1500 \text{ m}}{5 \text{ h}} = 300 \text{ m/h} \quad \frac{\text{m}}{\text{h}} \quad \frac{\Delta y}{\Delta x}$$



13. After  $x_1$  30 baseball games, A-Rod had  $y_1$  25 hits. If after  $x_2$  100 games he had  $y_2$  80 hits, what is his average hits per baseball game.

$$y = \frac{11}{14}x + 1.43$$

$$\frac{h}{g}$$

$$\frac{\Delta y}{\Delta x} = \frac{\text{dep}}{\text{ind}}$$

$(30, 25)$   $(100, 80)$

$70 <$	x	y	$> 55$
	30	25	
	100	80	

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

$$= \frac{80 - 25}{100 - 30} = \frac{55}{70}$$

$$\frac{55}{70} = \frac{11}{14} \text{ hits/game} \approx 1.27$$

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

$$y - 25 = \frac{11}{14}(x - 30)$$

$$y - 25 = \frac{11}{14}x - \frac{330}{14}$$

$$\begin{array}{r} +25 \qquad \qquad +25 \\ \hline \end{array}$$

$$y = \frac{11}{14}x + 1.43$$