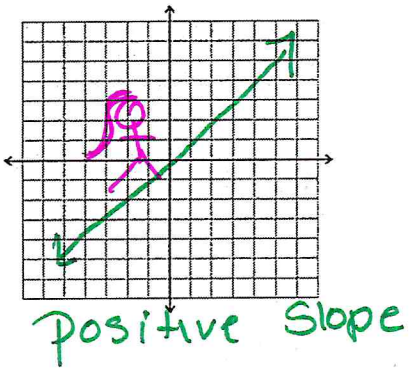
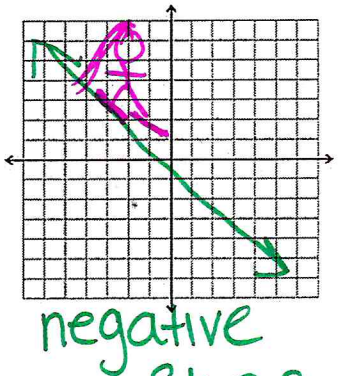
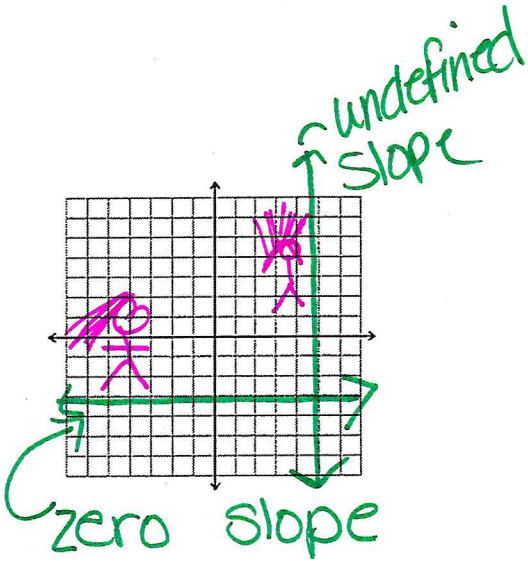
3.4 The slope of a line

10:50
11:15

1. Use two ordered pairs to find the slope of a line
2. Graph a line given a point and a slope
3. Use slope as a rate of change
4. Determine if two lines are parallel or perpendicular







Left to Right

Slope = m = rate of change = $\frac{\Delta y}{\Delta x} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$

$x_1\ y_1 \quad x_2\ y_2$

1. Find the slope of a line between points (1,2) and (3,5).
2. Find the slope of a line between (-2,1) and (5, -4)

$x_1 y_1 \quad x_2\ y_2$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5-2}{3-1} = \frac{3}{2}$$

$m = 3/2$

$$m = \frac{-4-1}{5--2} = \frac{-5}{7}$$

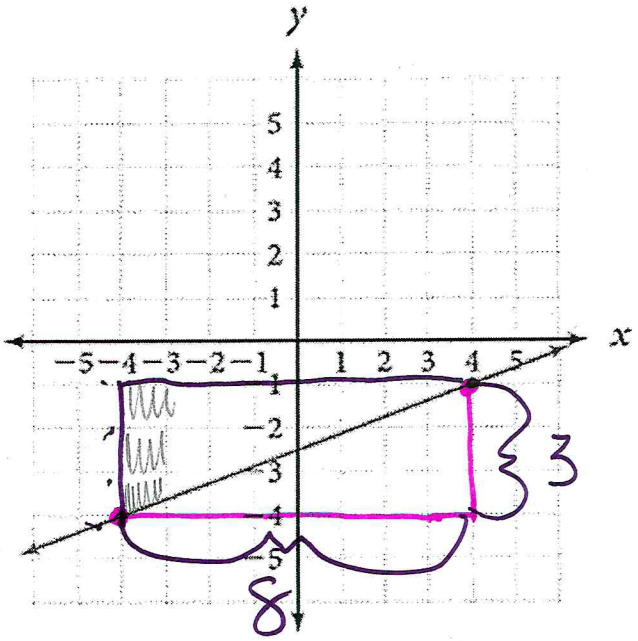
m

1. Identify the slope of the line.

① Pick 2 points from the line

② Draw triangle

③ Count rise & run



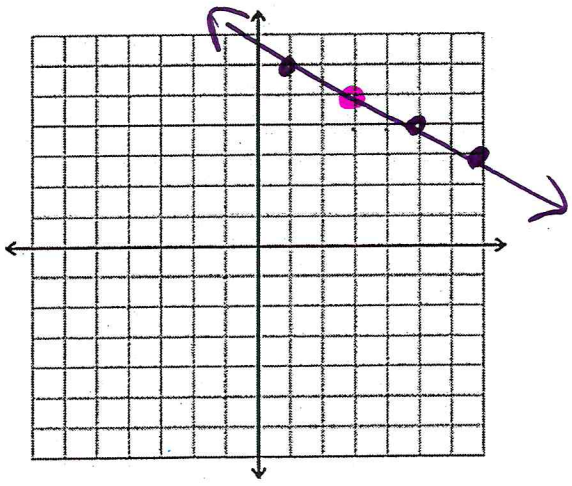
$$\frac{3}{8}$$

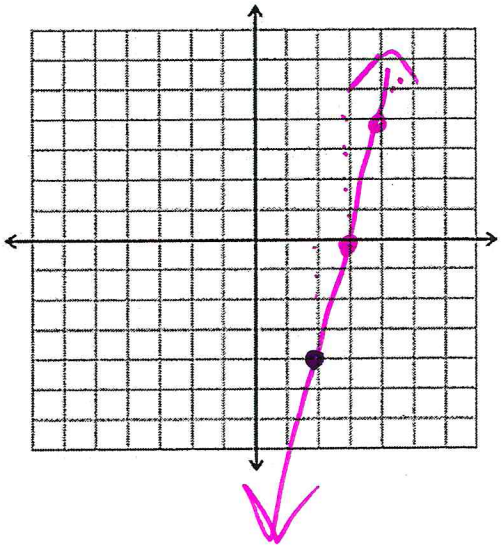
$m = -3/8 = 3/8$

$$m = \frac{\text{up } + \quad \text{down } -}{\text{right } + \quad \text{left } -} = \frac{\text{rise}}{\text{run}}$$

☆ 1. Graph the line with a point (3,5) and a slope of -1/2 $m = -\frac{1}{2} = \frac{1}{-2}$

2. Graph a line with a point (2,-4) and a slope of 4.





Slope as a rate of Change:

EXAMPLE 6 The graph in Figure 14 shows the rise in U.S. retail e-commerce sales over a five-year period, which is approximately linear. Use the graph to find the slope of the line, and then interpret the slope as a rate of change.

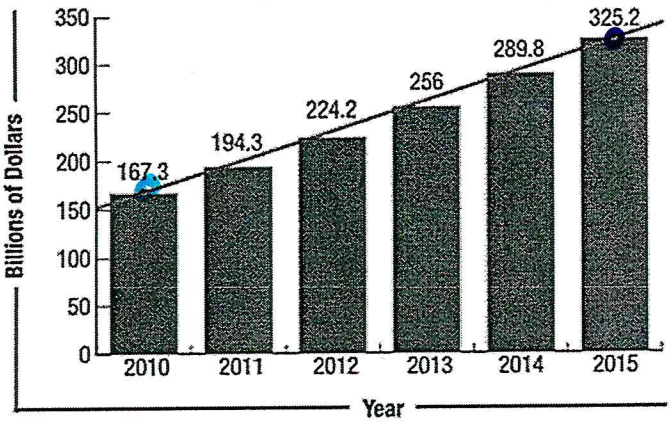


FIGURE 14

2010 x_1 y_1
$(2010, 167.3)$

2015 x_2 y_2
$(2015, 325.2)$

Use the graph to find the rate of change in e-commerce from 2010 to 2015. Use a sentence to describe what the slope mean in this situation.

$$\frac{\Delta y}{\Delta x} = \frac{325.2 - 167.3}{2015 - 2010} = \frac{157.9}{5} = \frac{31.58}{1}$$

The slope represents an increase of 31.58 billons of $ each year.

Parallel and Perpendicular lines.

1. Parallel lines have the same slope and different y- intercepts.

$y = \frac{1}{2}x$
$y = .5x +$

2. Perpendicular lines: their slopes multiply to equal -1.

Find the slope of a line parallel and perpendicular to $y = 3/4x + 2$

$m = 3/4$ $\quad$ $m = 3/4$

$m_{\parallel} = 3/4$ or .75 $\quad$ $m_{\perp} =$

$y = 2x + 5$
$y = -\frac{1}{2}x +$

$2 \cdot -\frac{1}{2} = -1$

$\frac{3}{4} \cdot \frac{-4}{3} = -1$