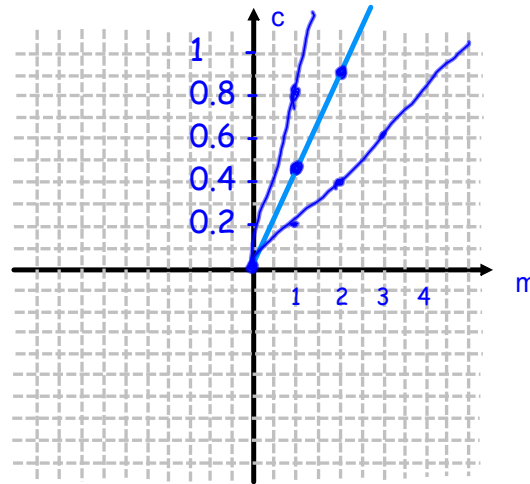


ChitChat, a cellular-phone-service provider, has no monthly fee for cellular-phone service but does charge a \$0.45 per minute usage fee. You would like to know what your monthly bill will cost depending on how many minutes you talk. Call the cost c , and the minutes used m , and represent the relationship between the two. Graph c in terms of m .

$$c = 0.45 \cdot m$$



Can you determine how much your bill would be if you talk 432 minutes one month?

$$c = 432 \cdot 0.45 = 432 \cdot \frac{1}{2} - \frac{1}{10} \left(432 \cdot \frac{1}{2} \right) = 216 - 21.6 = 194.4$$

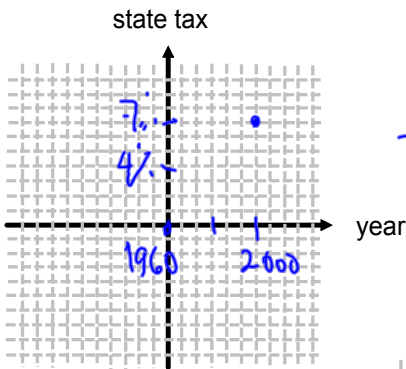
Can you determine how many minutes you've used if your bill was \$146.25?

$$146.25 = 0.45 m \quad / \div 0.45$$

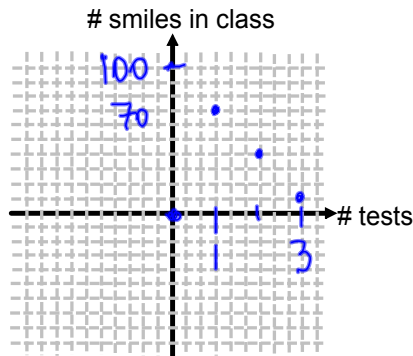
$$m = 325$$

How would your graph change if cost per minute changed?

Slope means something:

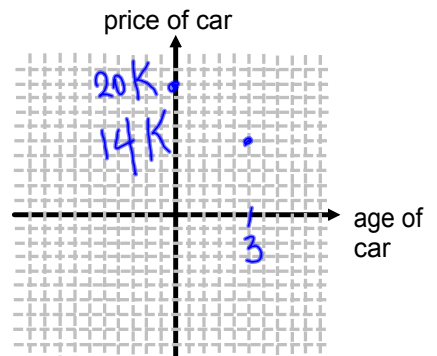


$$\frac{3\%}{40y} = \frac{3}{40} \%/year$$



$$\frac{30 \text{ smiles}}{\text{test}}$$

$$\frac{\$6000}{3 \text{ yrs}} = \frac{\$2000}{\text{yr}}$$



What does this mean?

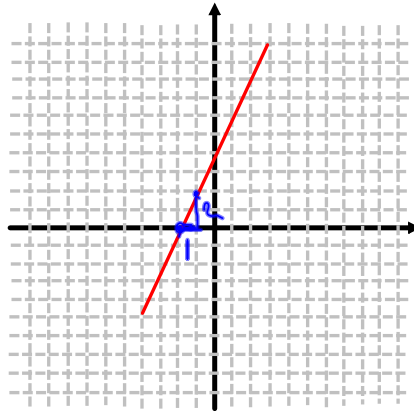
$$10\% = \text{slope} \cdot 100$$

$$= \frac{1 \text{ ft}}{10 \text{ ft}} \cdot 100 = 10\%$$



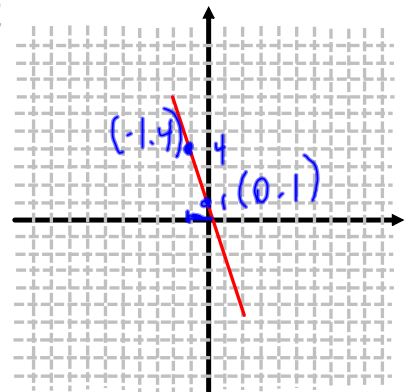
$$\text{slope} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\frac{\Delta y}{\Delta x} = \frac{2}{1} = 2$$

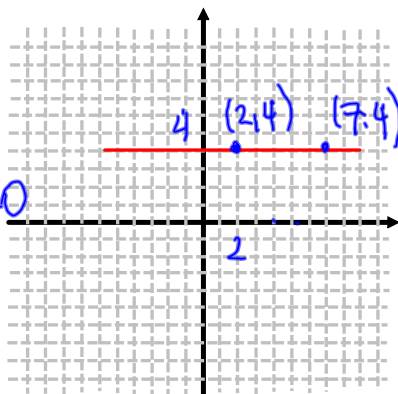


$$\frac{\Delta y}{\Delta x} = \frac{-3}{1} = -3$$

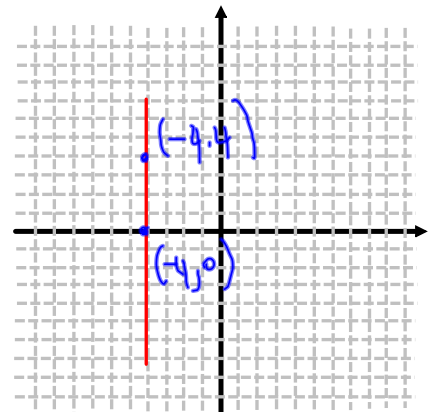
$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - 4}{0 - (-1)} = \frac{-3}{1}$$



$$m = \frac{4 - 4}{7 - 2} = \frac{0}{5} = 0$$



$$m = \frac{4 - 0}{-4 - (-4)} = \frac{4}{0} \text{ undefined}$$



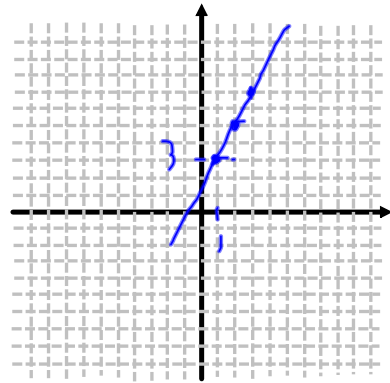
Point-slope form:

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

$$(x_1, y_1) = (1, 3)$$

$$m = 2$$

$$(x, y): \frac{y - y_1}{x - x_1} = m$$



Slope intercept form: $y = mx + b$

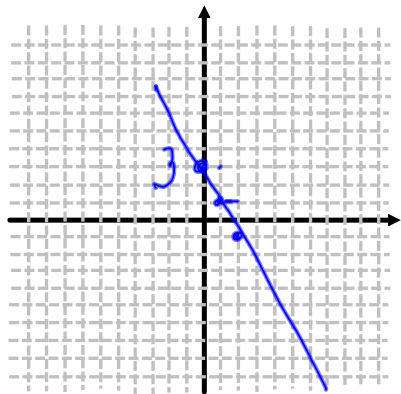
$$m = -2$$

$$y\text{-intercept } b = 3$$

$$x: 0 \quad y: b$$

$$x: 1 \quad y: m + b$$

$$x: 2 \quad y: 2m + b$$

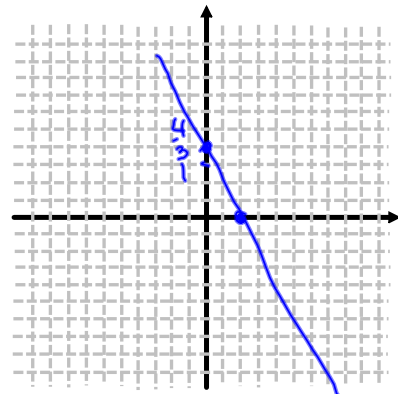


General form: $Ax + By = C$ (A, B, C are real numbers)

$$2x + 3y = 4$$

$$x\text{-int } y: 0 \quad 2x = 4 \quad \boxed{x = 2}$$

$$y\text{-int } x: 0 \quad 3y = 4 \quad \boxed{y = \frac{4}{3}}$$



1) Find the slope and the y-intercept of these lines

a) $y = -\frac{3}{2}x + 4$

$$m: -\frac{3}{2}$$

$$b = 4$$

b) $2x + 3y = 9$ $\quad | -2x$
 $3y = 9 - 2x$ $\quad | \div 3$
 $y = 3 - \frac{2}{3}x$

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

$$b = 3$$

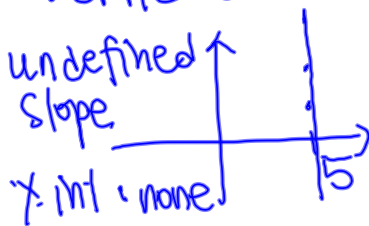
c) $x - 5 = 0$

$$x = 5$$

vertical line

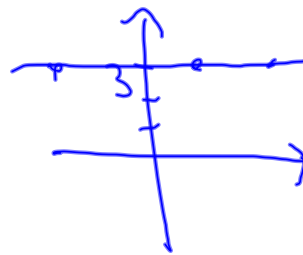
undefined
slope

x-int: none



d) $y = 3$

horizontal line



$$b = 3$$

$$m = 0$$

2) Find the slope of these lines:

a) The line between (x_1, y_1) (x_2, y_2)
a) The line between $(7/8, 3/4)$ and $(5/4, -1/4)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-\frac{1}{4} - \frac{3}{4}}{\frac{5}{4} - \frac{7}{8}} = \frac{-\frac{1-3}{4}}{\frac{5 \cdot 2 - 7}{8}} = \frac{-\frac{2}{4}}{\frac{10-7}{8}} = \frac{-\frac{1}{2}}{\frac{3}{8}} = -\frac{1}{2} \cdot \frac{8}{3} = -\frac{4}{3}$$

b) $(2.1, -3.4)$ and $(5, -2)$

$$m = \frac{-2 - (-3.4)}{5 - 2.1} = \frac{-2 + 3.4}{2.9} = \frac{1.4}{2.9} = 0.4828$$

3) Determine the equation of the lines with the given information.

a) Through $(-1, -6)$ with slope $-1/2$

$$m = \frac{y - y_1}{x - x_1}$$

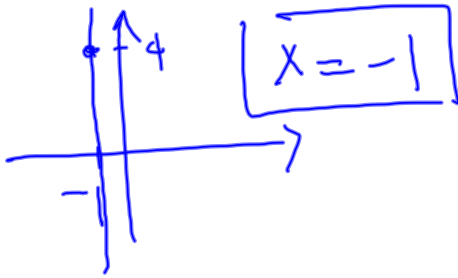
$$-\frac{1}{2} = \frac{y - (-6)}{x - (-1)}$$

$$-\frac{1}{2} = \frac{y+6}{x+1} \quad | \cdot 2(x+1)$$

$$-x-1 = 2y+12$$

$$-x-2y = 13$$

b) Through $(-1, 4)$ with undefined slope



parallel lines
have equal slopes

c) Through $(2, -5)$ perpendicular to $3x - 2y = 6$

$$\begin{aligned} 3x - 2y &= 6 & | -3x \\ -2y &= -3x + 6 & | \div (-2) \\ y &= \frac{3}{2}x - 3 \end{aligned}$$

perpendicular lines
have slopes whose
product is -1

$$\frac{3}{2} \cdot m = -1$$

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

$$y - (-5) = -\frac{2}{3}(x - 2)$$

$$y + 5 = -\frac{2}{3}x + \frac{4}{3} \quad | -5$$

$$y = -\frac{2}{3}x - \frac{11}{3}$$

