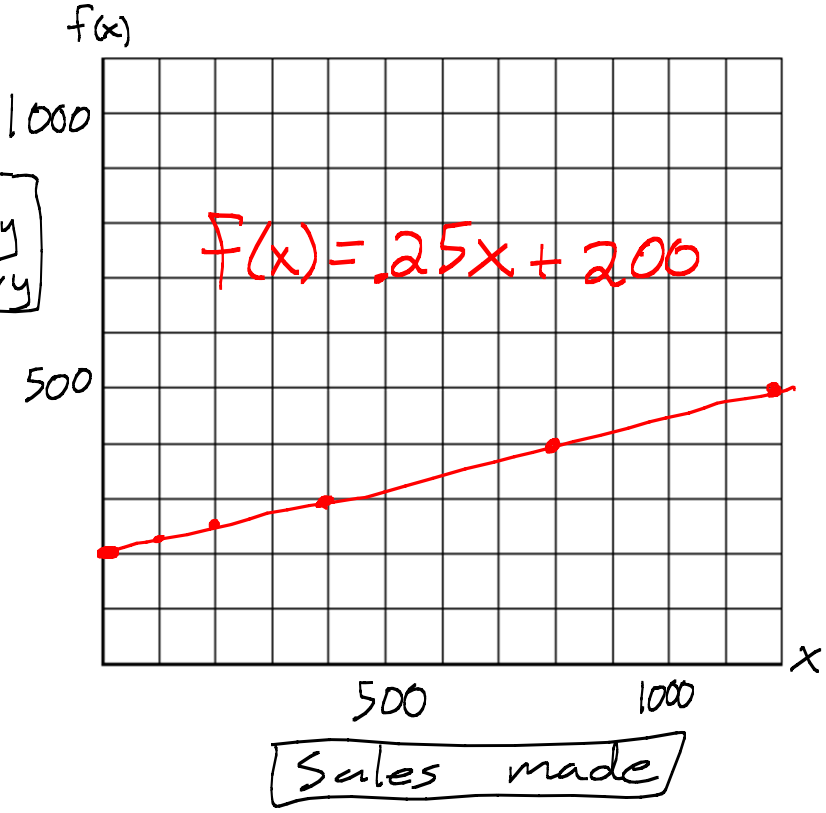
Equations of Lines (3.5, 3.6)

Note Title

Looking at our comission based salary example from last section, can you find relevant information about the graph from the equation?



SLOPE-INTERCEPT FORM

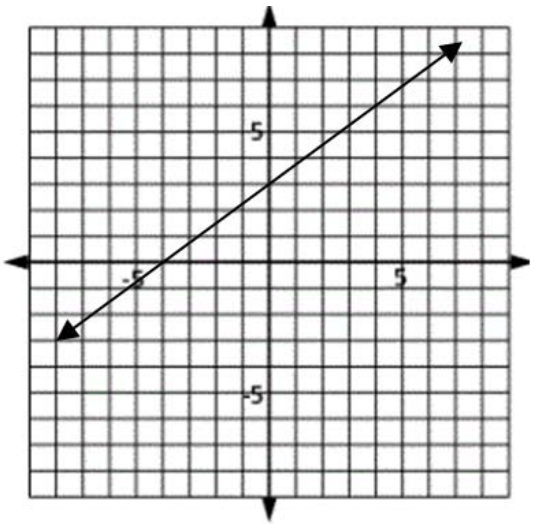
The line with slope m and y-intercept b is given by

$$y = mx + b,$$

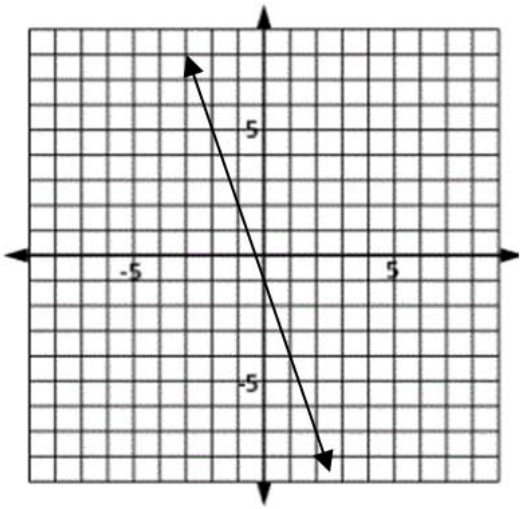
the **slope–intercept form** of a line.

(1) Find the slope-intercept form of the line

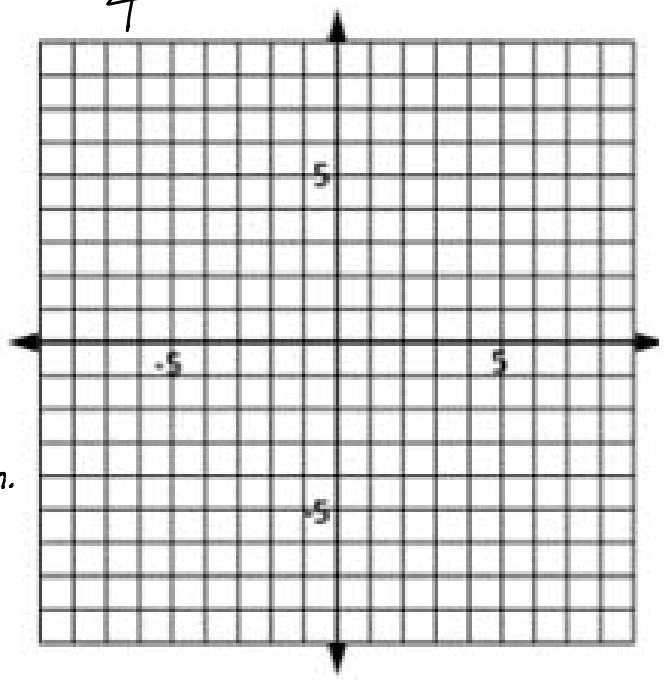
a)



b)



② Sketch a line with slope $m = -\frac{3}{4}$ and y-int (0,5)
Write slope-intercept form.



③ Write $4x + 3y = 9$ in slope-intercept form & graph.

④ An amusement park charges $5 for entrance and $1.25 for each ride you go on.

a) If you ride 13 rides, how much do you spend?

b) Write the slope-intercept form that models this.

c) If the total cost is $13.75, how many rides did you go on?

Parallel & Perpendicular lines

(6) Find the equation of the line perpendicular to $y = -\frac{3}{4}x - 2$ and through the point $(3, 4)$.

We can find an equation if we have a y-int. and a slope. What if we don't have either, but we have two points on the line?

Start with slope formula:

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

POINT-SLOPE FORM

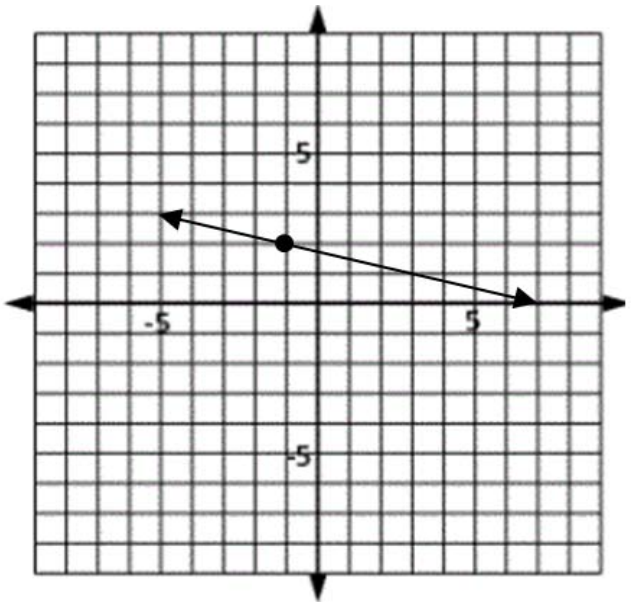
The line with slope m passing through the point (x_1, y_1) is given by

$$y - y_1 = m(x - x_1), \quad \text{or equivalently,}$$

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

the **point–slope form** of a line.

⑦ Use the graph & the point given to write the point-slope form of the line, then simplify to slope intercept form.



⑧ Find the point-slope form of the line, then simplify to slope-intercept form.

a) through $(3,4)$ with slope $m=\frac{1}{2}$.

b) through $(2,5)$ and $(5,4)$.

How are these forms used?

point-slope form:

slope-intercept form:

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(9) (From last section) A company makes a profit of $1250 when it sells 500 shirts, and $3000 when it sells 1000 shirts. Find the function that models this.

(10) A small swimming pool is being emptied by a pump that removes water at a constant rate. After 1 hour the pool contains 5000 gallons, and after 3 hours it contains 3000 gallons.

(a) How fast is the pump removing water?

(b) Find the slope–intercept form of a line that models the amount of water in the pool. Interpret the slope.

(c) Find the y-intercept and the x-intercept. Interpret each.

(11) Average tuition and fees at public 4-year colleges were $4081 in 2002 and $5133 in 2004.

a) Find a linear function that models this data.

b) Predict the average tuition and fees at public 4-year colleges in 2012 with this model!

c) Find the x-intercept and interpret it. Is it reasonable?

Review

SLOPE

The **slope** m of the line passing through the points (x_1, y_1) and (x_2, y_2) is

$$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1},$$

where $x_1 \neq x_2$. That is, slope equals rise over run.

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