$y = mx + b$

Lesson 3: Slope-Intercept Form of a Linear Equation

Example 1: Graph $y = 2x - 3$

x	y
-2	-7
-1	-5
0	-3
1	-1
2	1

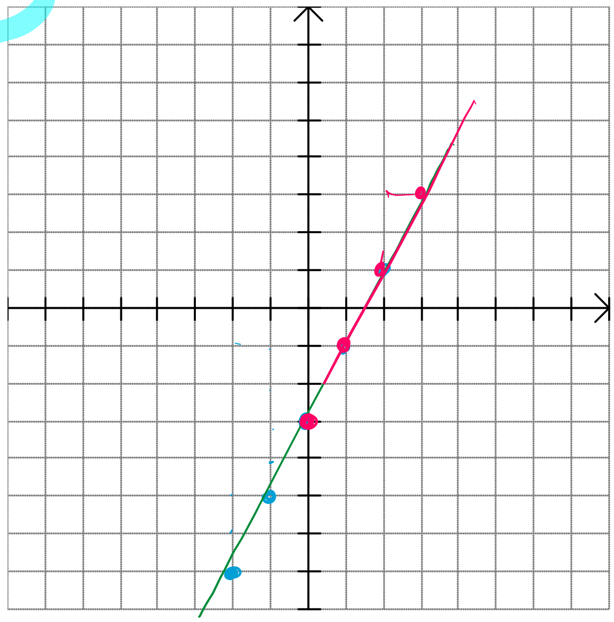
+1 +1 +1 +1

+2 +2 +2 +2

$y = 2(-2) - 3$
$= -4 - 3$

$y = 2(-1) - 3$
$= -2 - 3$

$y = 2(0) - 3$
$= 0 - 3$



$m = 2$ $\quad$ $y-\text{int} = -3$

$\frac{2}{1}$ up 2 right 1

Example 2: Graph $y = -\frac{3}{2}x + 4$

x	y
-4	10
-2	7
0	4
2	1
4	-2

You choose

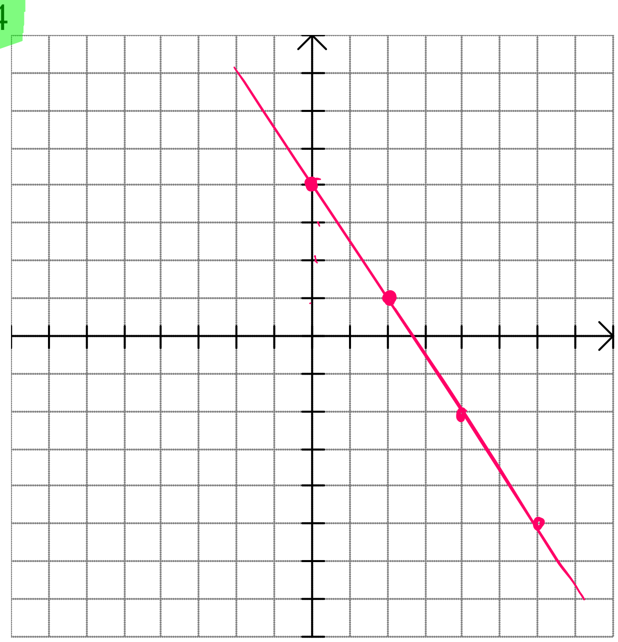
+2 +2

-3

$y = -\frac{3}{\cancel{2}}(\cancel{-4}^{2}) + 4$
$= +6 + 4$

$y = -\frac{3}{\cancel{2}}(\cancel{-2}^{1}) + 4$
$= +3 + 4$

$y = -\frac{3}{2}(0) + 4$
$= 0 + 4$



$m = -\frac{3}{2}$ $\quad$ $y-\text{int} = 4$

slope (m) = steepness of line

$\frac{\text{rise}}{\text{run}}$

The equation of any line can be written in the form

$y = mx + b$ (called slope-intercept form)

Where $m =$ slope and $b =$ y-intercept

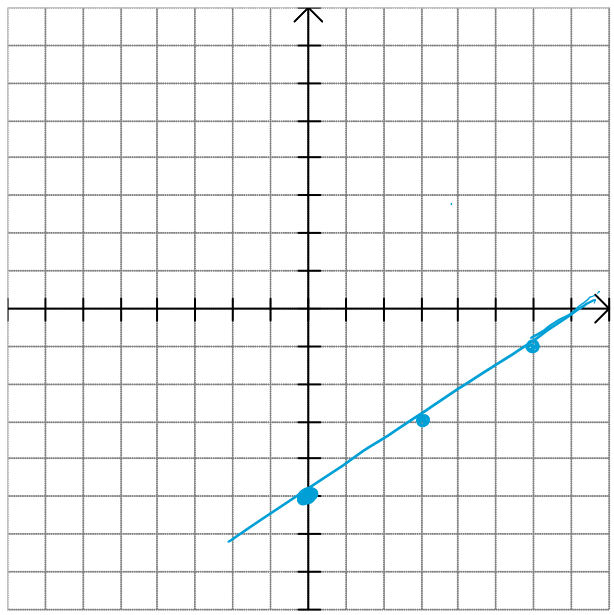
when graphing from the equation – start with the y-int and use the slope to find other points.

Example 3: Graph $y = \frac{2}{3}x - 5$

1) plot y-intercept
$(0, -5)$

2) use slope $(m) = \frac{2}{3}$

up 2
right 3



$y = mx + b$

Example 4: Graph $2x + y = 4$

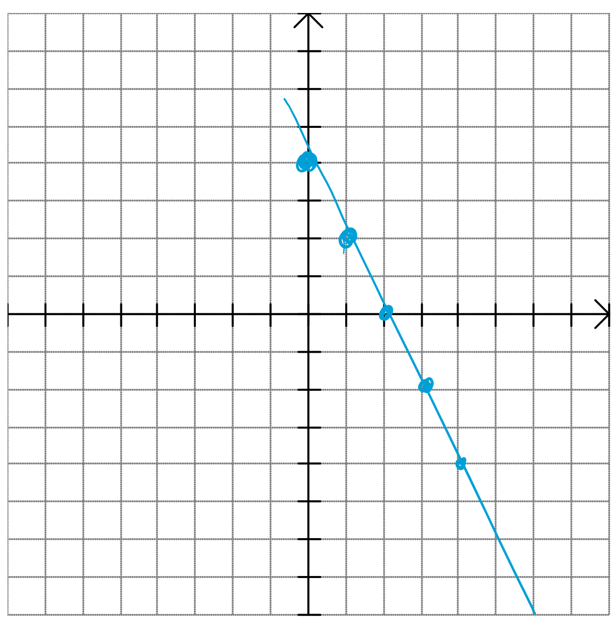
* rearrange formula

$$\cancel{2x} + y = 4$$
$$-\cancel{2x} \qquad -2x$$
$$y = -2x + 4$$

$b = +4$

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

down 2
right 1



If we know the slope of a line and the y-intercept, we can easily write the equation of the line.

Ex. $m = -2$, $b = 6$. What is the equation of the line?

$+6$

$y = mx + b$

$y = -2x + 6$

- **A point on a line will make the equation of that line "work". (In other words, if a point is on a line, it is a solution for that line!)**

Ex. The equation of a line is $y = 2x - 3$. Determine if the point (3,3) is on the line. What about point (4,2)?

① $y = 2x - 3$

$3 = 2(3) - 3$

$3 = 6 - 3$

✓ $3 = 3$ (3,3) IS ON THE LINE!

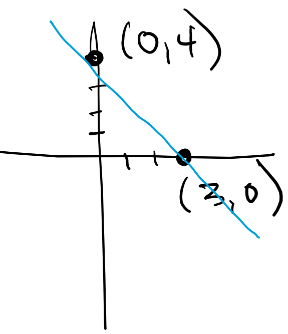
② $y = 2x - 3$

$2 = 2(4) - 3$

$2 = 8 - 3$

$2 \neq 5$ (4,2) IS NOT ON THE LINE

- **If we know the y-intercept and another point on the line, we can determine the equation of the line.**



Ex. What is the equation of a line that has a y-intercept of 4, and an x-intercept of 3?

(3,0) (0,4)

$b = 4$

$y = mx + b$

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

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 0}{0 - 3} = \frac{4}{-3}$

- **If we know the slope of the line and a point on the line, we can write the equation of the line.**

Ex. Write the equation of a line that passes through (2,5) and (4,2).

FIND SLOPE

① $m = \frac{y_2 - y_1}{x_2 - x} = \frac{2 - 5}{4 - 2} = \frac{-3}{2}$

② FIND b

$y = mx + b$

$5 = -\frac{3}{\cancel{2}}(\cancel{2}) + b$

$5 = -3 + b$

$+3 \quad +3$

$8 = b$

③ WRITE EQUATION

$y = mx + b$

$y = -\frac{3}{2}x + 8$

~~Example 5:~~ To join the local gym, Kari pays a start-up fee of $99, plus a monthly fee of $29.

$y = mx + b$

a) Write an equation for the total cost, C dollars, for n months at the gym.

$n = \#$ of months

C = Cost

$C = 29n + 99$ OR $C = 99 + 29n$

b) Suppose Kari went to the gym for 23 months. What was the total cost?

$$C = 29(23) + 99$$
$$= 667 + 99$$
$$= 766$$

THE COST IS $766 FOR 23 MONTHS.

c) Suppose the total cost was $505. For how many months did Kari use the gym?

$$505 - 99 = 29n + \cancel{99} - \cancel{99}$$
$$\frac{406}{29} = \frac{\cancel{29}n}{\cancel{29}}$$

$n = 14$

KARI USED THE GYM FOR 14 MONTHS.

d) Could the total cost be exactly $600? Justify your answer.

$$600 - 99 = 29n + 99 - 99$$
$$\frac{501}{29} = \frac{\cancel{29}n}{\cancel{29}}$$
$$17.27\ldots = n$$

SHOULD BE A WHOLE #

NO, KARI IS NOT CHARGE FOR PART OF A MONTH.

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