

7.1 Slope-Intercept Form

Math 10

Slope-Intercept Form

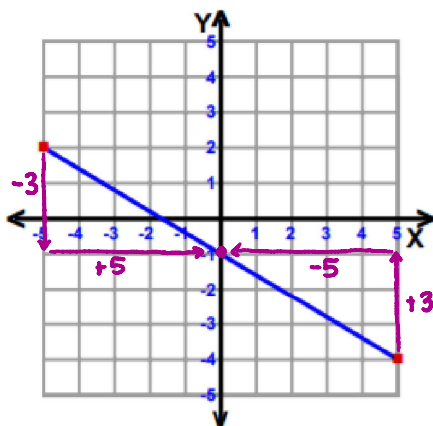
Review: Use graphing technology, such as Desmos, to graph each linear relation. Complete the table.

Linear Relation	y-intercept	slope	Function?
$y = 3x + 2$	2	3	yes
$y = 3x - 4$	-4	3	yes
$y = 3x$	0	3	yes
$y = 2x - 1$	-1	2	yes
$y = -2x - 1$	-1	-2	yes
$y = x - 1$	-1	1	yes
$y = \frac{1}{2}x - 1$	-1	$\frac{1}{2}$	yes
horizontal line $\rightarrow y = 2$	2	0	yes
vertical line $\rightarrow x = 3$	none	undefined	no

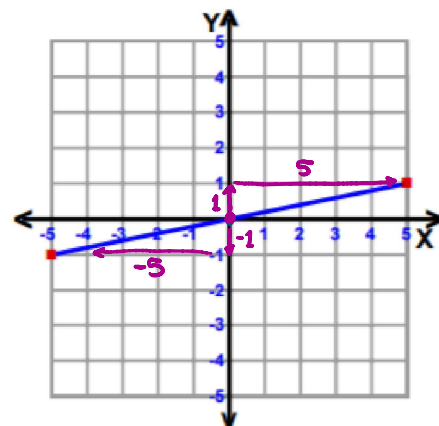
Most linear relations can be written in the form $y = mx + b$ where m represents the slope and b represents the y -intercept. (The exception is vertical lines such as $x = 5$ or $x = -8$.)

Determine the Equation of a Line

What is the equation of each linear relation shown below?



y-int: -1 slope: $\frac{-3}{5} = -\frac{3}{5}$
 $y = -\frac{3}{5}x - 1$



y-int: 0 slope: $\frac{1}{5} = \frac{1}{5}$
 $y = \frac{1}{5}x$

Graphing Linear Relations

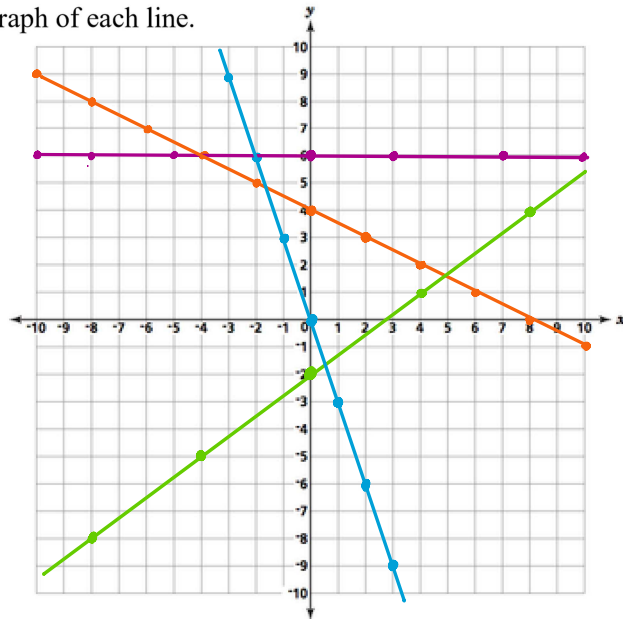
Use the slope and y-intercept to sketch a graph of each line.

a) $y = \frac{3}{4}x - 2$
 starting point
 ↳ go up 3 and right 4

b) $y = -3x$ y-int = 0
 ↳ $-\frac{3}{1}$ or $\frac{3}{-1}$

c) $y = -\frac{1}{2}x + 4$
 ↳ $-\frac{1}{2}$ or $\frac{1}{-2}$

d) $y = 6$
 ↳ doesn't matter what x is
 y is always 6



Converting Equations to Slope-Intercept Form

Example: Student Council puts on a fundraiser which features a dunk tank. Students pay for the chance to hit a target with a ball and dunk Ms K into a tank of cold water. (Please don't ever do this to me!)

The relationship between the number of tickets bought, x , and the profit, y , in dollars, is represented by the equation $3x - 2y - 600 = 0$.

a) Rewrite the equation in slope-intercept form.

$$\begin{aligned} 3x - 2y - 600 &= 0 \\ \downarrow \quad \downarrow \\ -2y &= -3x + 600 \\ \div -2 \quad \div -2 \\ y &= \frac{3}{2}x - 300 \end{aligned}$$

b) State the slope of the line. What does it represent?

$$\frac{3}{2} = 1.5$$

↳ each ticket costs \$1.50

c) Identify the y-intercept. What does it represent?

$$-300$$

↳ Student Council paid \$300 to rent the dunk tank

d) The break-even point is the point at which the money raised equals the money spent. How many tickets must the students sell to reach the break-even point?

$$\begin{aligned} 0 &= \frac{3}{2}x - 300 \\ +300 \quad \quad +300 \\ 300 &= \frac{3}{2}x \\ \div \frac{3}{2} \quad \div \frac{3}{2} \\ 200 &= x \end{aligned}$$

200 tickets must be sold.

Working with Data

Submarines must withstand tremendous pressure exerted on all sides by the water. The table shows the linear relationship between pressure and water depth.

a) What is the slope of the line? What does it represent?

$$\frac{250}{25} = 10$$

Depth (m)	Pressure (kPa)
0	100
25	350
50	600
75	850

The pressure increases by 10 kPa for every metre you descend.

b) Determine the value of the y -intercept. What does it represent?

$$100$$

The pressure at the surface of the water is 100 kPa.

c) Write an equation that models the relationship between pressure, P , in kilopascals, and water depth, d , in metres. Express the equation in slope-intercept form.

$$P = 10d + 100$$

d) The deepest point on Earth is Challenger Deep in the Mariana Trench, located in the Pacific Ocean. In 1960, the research submarine *Trieste* reached the bottom of Challenger Deep. At this depth the walls protecting the two crew members had to withstand a pressure of 109 300 kPa. What is the approximate depth of Challenger Deep?

$$109\ 300 = 10d + 100$$

$$109\ 200 = 10d$$

$$10\ 920 = d$$

The depth is about 10 920m.
(10.92 km)

Assignment: p.143 #1 – 3, 4af, 5acd, 6 – 8, 11bcde