

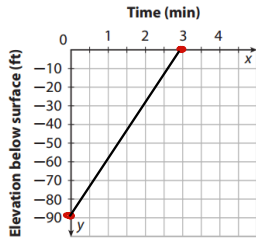
Algebra 1
5.2 Intercepts

Explore Identifying Intercepts

Miners are exploring 90 feet underground. The miners ascend in an elevator at a constant rate over a period of 3 minutes until they reach the surface. In the coordinate grid, the horizontal axis represents the time in minutes from when the miners start ascending, and the vertical axis represents the miners' elevation relative to the surface in feet.

A What point represents the miners' elevation at the beginning of the ascent?
 $(0, -90)$ Plot this point.

B What point represents the miners' elevation at the end of the ascent?
 $(3, 0)$ Plot this point.



C Connect the points with a line segment.

D What is the point where the graph crosses the y-axis? $(0, -90)$ the x-axis? $(3, 0)$

intersect

The y-intercept of a graph is the y-coordinate of the point where the graph intersects the y-axis.

The x-intercept of a graph is the x-coordinate of the point where the graph intersects the x-axis.

Example 1 Find the x- and y-intercepts.

A $3x - 2y = 6$

y-int: $(0, -3)$

~~$3x - 2y = 6$~~
 $-2y = 6$
 $y = -3$

x-int: $(2, 0)$

~~$3x - 2y = 6$~~
 $3x = 6$
 $x = 2$

B $-5x + 6y = 60$

y-int: $6y = 60$
 $y = 10$

$(0, 10)$

x-int: Plug in 0 for y

$-5x = 60$
 $x = -12$

$(-12, 0)$

Try this:

2. If the point $(5, 0)$ is on a graph, is $(5, 0)$ the y-intercept of the graph? Explain.

No, it's the x-intercept

Find the x- and y-intercepts.

3. $8x + 7y = 28$

x-int: $8x = 28$
 $x = 3.5$
 $(3.5, 0)$

y-int: $7y = 28$
 $y = 4$
 $(0, 4)$

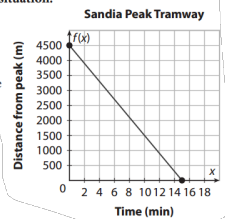
4. $-6x - 8y = 24$

x-int: $-6x = 24$
 $x = -4$
 $(-4, 0)$

y-int: $-8y = 24$
 $y = -3$
 $(0, -3)$

Example 2 Find and interpret the x- and y-intercepts for each situation.

A The Sandia Peak Tramway in Albuquerque, New Mexico, travels a distance of about 4500 meters to the top of Sandia Peak. Its speed is 300 meters per minute. The function $f(x) = 4500 - 300x$ gives the tram's distance in meters from the top of the peak after x minutes.



$f(x) = 4500 - 300x$

x-int: $0 = 4500 - 300x$
 $-4500 = -300x$
 $15 = x$

$(15, 0)$
It took 15 min to get from top to bottom

y-int: $y = 4500 - 300(0)$
 $y = 4500$
 $(0, 4500)$
Where the tram starts at the top of the mountain is 4500 m

Find and interpret the x- and y-intercepts for each situation.

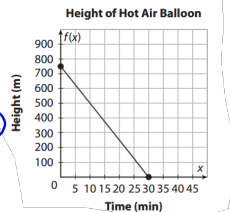
- Ⓑ A hot air balloon is 750 meters above the ground and begins to descend at a constant rate of 25 meters per minute. The function $f(x) = 750 - 25x$ represents the height of the hot air balloon after x minutes.

x-int: $0 = 750 - 25x$
 $-750 = -25x$
 $\frac{-750}{-25} = \frac{-25x}{-25}$
 $30 = x$
(30, 0)

When the hot air balloon is back on the ground it took 30 min to get to the ground

y-int: $y = 750 - 25(0)$
 $y = 750$
(0, 750)

Where the hot air balloon started, the highest point is 750m



Try this:

6. The temperature in an experiment is increased at a constant rate over a period of time until the temperature reaches 0°C . The equation $y = \frac{2}{3}x - 70$ gives the temperature y in degrees Celsius x hours after the experiment begins. Find and interpret the x- and y-intercepts.

x-int: $0 = \frac{2}{3}x - 70$
 $+70 = \frac{2}{3}x - 70 + 70$
 $70 = \frac{2}{3}x$
 $\frac{3}{2} \cdot 70 = \frac{2}{3} \cdot \frac{3}{2} x$
 $105 = x$
(105, 0)
 It takes 105 hrs to reach 0°C

y-int: $y = \frac{2}{3}(0) - 70$
 $y = -70$
(0, -70)
 -70 is the beginning temp for the experiment

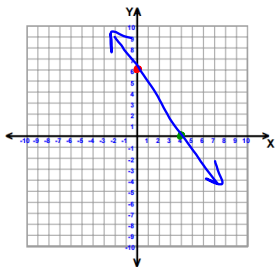
Graphing Linear Equations Using Intercepts

Example 3 Use intercepts to graph the line described by each equation.

Ⓐ $\frac{1}{2}y = 3 - \frac{3}{4}x$

x-int: $\frac{1}{2} \cdot 0 = 3 - \frac{3}{4}x$
 $0 = 3 - \frac{3}{4}x$
 $-\frac{3}{4}x = -3$
 $\frac{4}{3} \cdot \frac{-3}{4} = \frac{4}{3} \cdot \frac{-3}{4}x$
 $-1 = -x$
 $1 = x$
(1, 0)

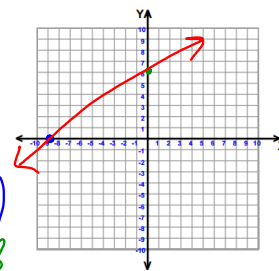
y-int: $\frac{1}{2}y = 3 - \frac{3}{4}(0)$
 $\frac{1}{2}y = 3$
 $y = 6$
(0, 6)



Ⓑ $18y = 12x + 108$

x-int: $18 \cdot 0 = 12x + 108$
 $-108 = 12x + 108$
 $-108 - 108 = 12x + 108 - 108$
 $-216 = 12x$
 $\frac{-216}{12} = \frac{12x}{12}$
 $-18 = x$
(-18, 0)

y-int: $18y = 12(0) + 108$
 $18y = 108$
 $\frac{18y}{18} = \frac{108}{18}$
 $y = 6$
(0, 6)

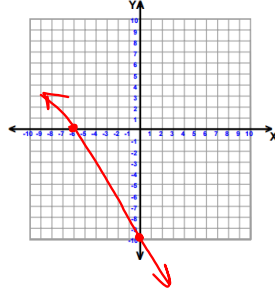


Your Turn

7. Use intercepts to graph $3y = -5x - 30$.

$$\begin{aligned} \text{x-int: } \frac{30}{3} &= -5x \\ x &= -6 \end{aligned}$$

$$\begin{aligned} \text{y-int: } 3y &= -30 \\ y &= -10 \end{aligned}$$



Homework

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ec:20