4.3 Graph Using Intercepts

RAPID

Goal · Graph a linear equation using intercepts.

Your Notes

Yintercept
$(0, b)$
↑
x is always zero

Xintercept
$(a, 0)$
↑
y is always zero
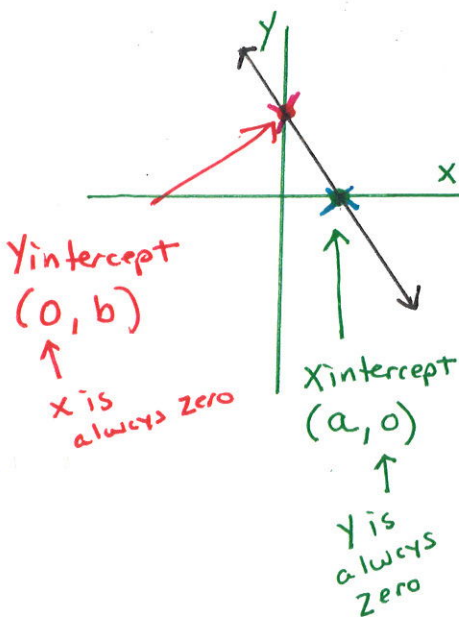
VOCABULARY

x-intercept THE X-COORDINATE OF A POINT WHERE THE LINE CROSSES THE X AXIS.

* The variable **a** represents the X-INT

y-intercept THE Y-COORDINATE OF A POINT WHERE THE LINE CROSSES THE Y-AXIS

* The variable **"b"** represents the y-INT.

Example 1 *Find the intercepts of the graph of an equation*

Find the x-intercept and the y-intercept of the graph of $8x - 2y = 32$.

Solution **X INTERCEPT** $(X, 0)$

1. Substitute __0__ for y and solve for x.

$$8x - 2y = 32$$ Write original equation.

$$8x - 2(0) = 32$$ Substitute __0__ for y.

$$\frac{8x}{8} = \frac{32}{8}$$

$$\boxed{X = 4}$$ Solve for __X__.

2. Substitute __0__ for x and solve for y.   **Y-INTERCEPT** $(0, Y)$

$$8x - 2y = 32$$ Write original equation.

$$8(0) - 2y = 32$$ Substitute __0__ for x.
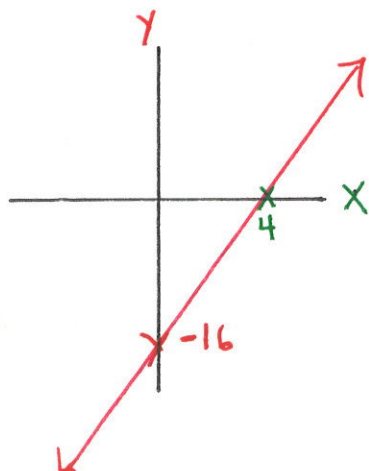
$$\frac{-2y}{-2} = \frac{32}{-2}$$

$$\boxed{Y = -16}$$ Solve for __Y__.

The x-intercept is __4__. The y-intercept is __-16__.

✔ *Checkpoint* **Find the x-intercept and y-intercept of the graph of the equation.**

1. $2x + 3y = 18$	2. $-12x - 4y = 36$

Can write intercepts
1) X: Y:
2) ordered pairs

$\boxed{X: 9}$ $\boxed{Y: 6}$ $\boxed{X: -3}$ $\boxed{Y: -9}$

$(9, 0)$ $(0, 6)$ $(-3, 0)$ $(0, -9)$

Example 2   *Use intercepts to graph an equation*

Graph $3.5x + 2y = 14$. Label the points where the line crosses the axis.

Solution

Step 1 Find the **INTERCEPTS**

XINT
$$3.5x + 2y = 14$$
$$3.5x + 2(\underset{0}{0}) = 14$$
$$x = \frac{14}{3.5} = 4$$

YINT
$$3.5x + 2y = 14$$
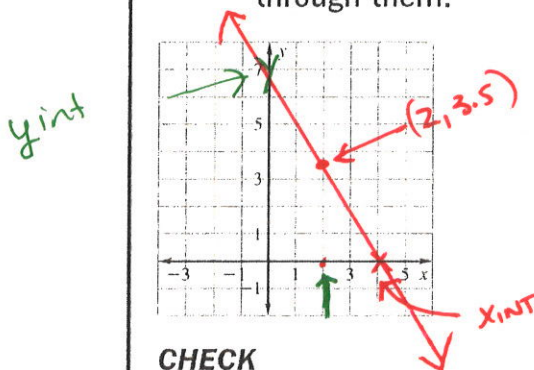$$3.5(\underset{0}{0}) + 2y = 14$$
$$y = \frac{14}{2} = 7$$

Step 2 Plot the points that correspond to the intercepts.

The x-intercept is 4, so plot the point $(4, 0)$

The y-intercept is 7, so plot the point $(0, 7)$.

Step 3 **Connect** the points by drawing a line through them.

yint

$(2, 3.5)$

XINT

pick an X-value
(ie   X=2)
Solve for y
$$3.5(2) + 2y = 14$$
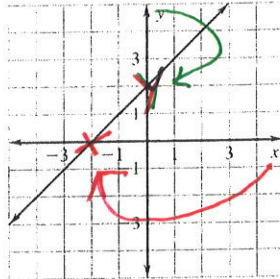$$\vdots$$
$$\boxed{y = 3.5}$$

CHECK

You can check the graph of the equation by using a third point. When $x = 2$, $y = 3.5$, so the ordered pair $(2, 3.5)$ is a third solution of the equation. You can see that $(2, 3.5)$ lies on the graph, so the graph is correct.

THIS POINT

Example 3 *Use a graph to find the intercepts*

Identify the *x*-intercept and *y*-intercept of the graph.
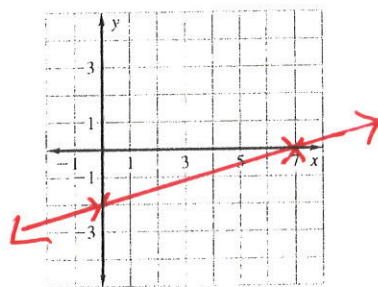

Solution

To find the *x*-intercept, look to see where the graph crosses the ~~X-axis~~. The *x*-intercept is **-2** . To find the *y*-intercept, look to see where the graph crosses the ~~Y axis~~ . The *y*-intercept is **2** .

✓ **Checkpoint** **Complete the following exercises.**

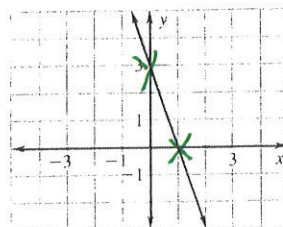3. Graph $2x - 7y = 14$. Label the points where the line crosses the axes.

$2x - 7y = 14$

$x : 7$

$y : -2$

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4. IDENTIFY THE X AND Y INTERCEPTS.

$x : 1$

$y : 3$

FIND INTERCEPTS

(*) FIRST PUT EQUATIONS IN STANDARD FORM $\rightarrow$ $AX + BY = C$ where A, B, C are INTEGERS

EXAMPLE Graph with intercepts

$$Y = 2X - 8$$

PUT IN STANDARD FORM $\rightarrow$

$$\underline{-2x \qquad -2x}$$

$$-2x + Y = -8$$

THEN FIND INTERCEPTS

X: 4	(4, 0)
Y: -8	(0, -8)