

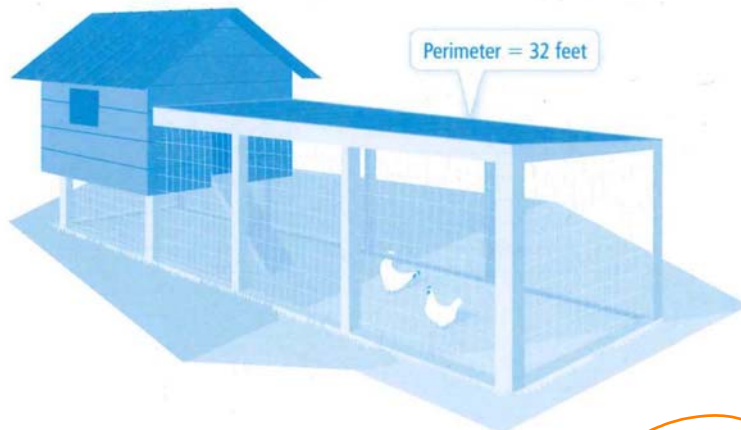
# 1-5

## Solving Equations and Inequalities by Graphing

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### MODEL & DISCUSS

A homeowner has 32 feet of fencing for a rectangular chicken run.

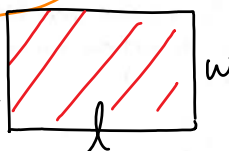


A. Make a table of values for the length, width, and area of different rectangles with perimeter 32 ft. Then write a function for the area, in terms of width of rectangles with this perimeter.

$$P = 2l + 2w$$

$$32 = 2l + 2w$$

$$16 = l + w \rightarrow 16 - w = l$$



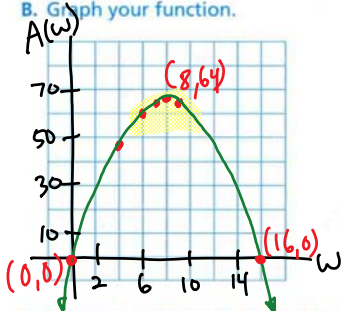
$$A = l \cdot w$$

$$A(w) = (16 - w)w$$

or

$$A(w) = 16w - w^2$$

B. Graph your function.



w	l	A	P
4	12	48	32
6	10	66	↓
7	9	63	
8	8	64	
9	7	63	
0	16	0	

C. Communicate Precisely Explain what happens where the graph intersects the x-axis. © MP.6

→ Chicken run has an area of 0

#### HABITS OF MIND

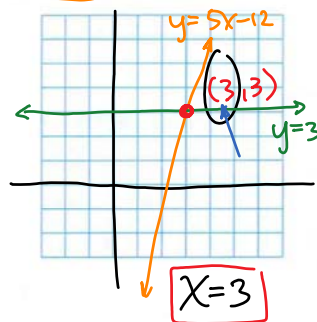
**Make Sense and Persevere** For what widths will the area of the chicken run be at least 55 ft<sup>2</sup>? © MP.1

$$(16 - w)w \geq 55$$

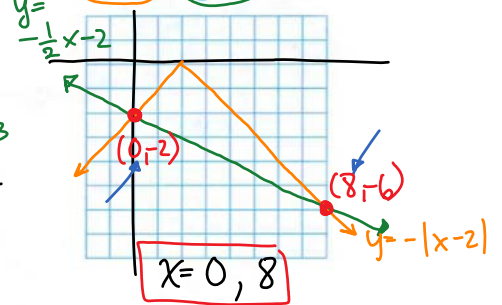
**EXAMPLE 1** Try It! Use a Graph to Solve an Equation

1. Use a graph to solve the equation.

a.  $5x - 12 = 3$  for  $x$

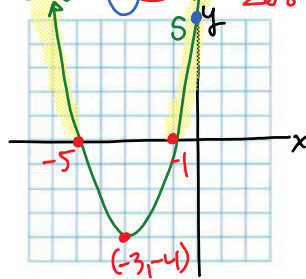


b.  $-|x - 2| = \frac{1}{2}x - 2$


**EXAMPLE 2** Try It! Solve a One-Variable Inequality by Graphing

2. Use a graph to solve each inequality.

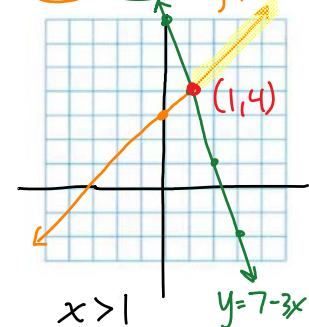
a.  $x^2 + 6x + 5 \leq 0$



$$x \leq -5 \text{ or } x \geq 1$$

$$\text{or } (-\infty, -5] \cup [1, \infty)$$

b.  $x + 3 > 7 - 3x$



$$x > 1$$

$$\text{or } (1, \infty)$$

**HABITS OF MIND**

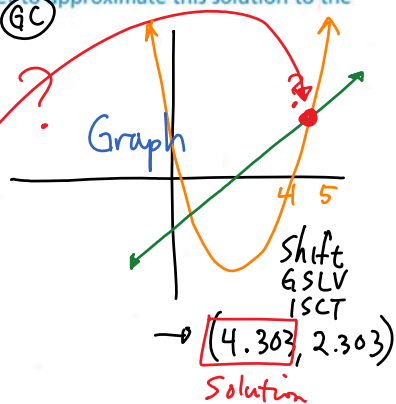
Use Structure How does a graph show the solution to an equation? MP.7

**EXAMPLE 3** Try It! Use a Table to Solve an Equation

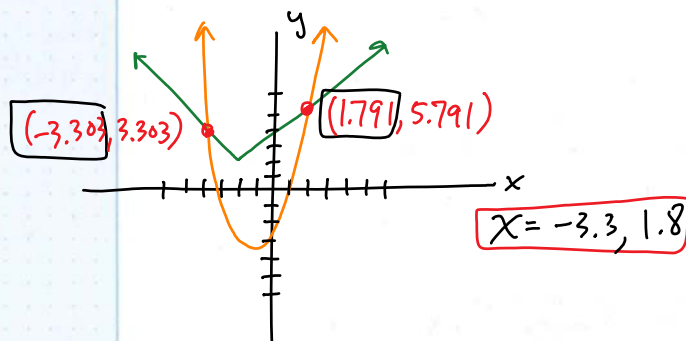
3. The equation  $x^2 - 4x + 1 = x - 2$  has a second solution in the interval  $4 < x < 5$ . Use a spreadsheet to approximate this solution to the nearest thousandth.

$x$	$y_1$	$y_2$
4		
4.1		
4.2	1.84	2.2
4.3	2.29	2.3
4.4	2.76	2.4
5		

Table

**EXAMPLE 4** Try It! Use Graphing Technology to Solve Equations

4. Use graphing technology to approximate the solutions of the equation  $x^2 + 2x - 1 = |x + 2| + 2$  to the nearest tenth.

**HABITS OF MIND**

**Use Appropriate Tools** What are the advantages and disadvantages of using spreadsheets and graphing technology? © MP.5

### Do You UNDERSTAND?

1. **ESSENTIAL QUESTION** How can you solve an equation or inequality by graphing?

2. **Communicate Precisely** What is an advantage of solving an equation graphically by finding the points of intersection? © MP.6

3. **Error Analysis** Ben said the graph of the inequality  $-x^2 + 9 > 0$  shows the solution is  $x < -3$  or  $x > 3$ . Is Ben correct? Explain. © MP.3

### Do You KNOW HOW?

4. Using the graph below, what is the solution to  $-2x + 4 = -2$ ? How can you tell?

