Name_____ Date_____

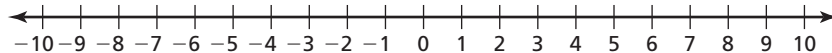## 1.4 Solving Absolute Value Equations
For use with Exploration 1.4

Essential Question How can you solve an absolute value equation?

1 **EXPLORATION:** Solving an Absolute Value Equation Algebraically

Work with a partner. Consider the absolute value equation $|x + 2| = 3$.

a. Describe the values of $x + 2$ that make the equation true. Use your description to write two linear equations that represent the solutions of the absolute value equation.

b. Use the linear equations you wrote in part (a) to find the solutions of the absolute value equation.

c. How can you use linear equations to solve an absolute value equation?

2 **EXPLORATION:** Solving an Absolute Value Equation Graphically

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. Consider the absolute value equation $|x + 2| = 3$.

a. On a real number line, locate the point for which $x + 2 = 0$.

b. Locate the points that are 3 units from the point you found in part (a). What do you notice about those points?

c. How can you use a number line to solve an absolute value equation?

Name _____ Date _____

3 **EXPLORATION:** Solving an Absolute Value Equation Numerically

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. Consider the absolute value equation $|x + 2| = 3$.

a. Use a spreadsheet, as shown,
to solve the absolute value equation.

	A	B
1	**x**	**|x + 2|**
2	-6	4
3	-5	
4	-4	
5	-3	
6	-2	
7	-1	
8	0	
9	1	
10	2	

abs(A2 + 2)

b. Compare the solutions you found using
the spreadsheet with those you found
in Explorations 1 and 2. What do
you notice?

c. How can you use a spreadsheet to
solve an absolute value equation?

Communicate Your Answer

4. How can you solve an absolute value equation?

5. What do you like or dislike about the algebraic, graphical, and numerical methods
for solving an absolute value equation? Give reasons for your answers.

1.4 Notetaking with Vocabulary
For use after Lesson 1.4

In your own words, write the meaning of each vocabulary term.

absolute value equation

extraneous solution

Core Concepts

Properties of Absolute Value

Let a and b be real numbers. Then the following properties are true.

1. $|a| \geq 0$

2. $|-a| = |a|$

3. $|ab| = |a||b|$

4. $\left|\dfrac{a}{b}\right| = \dfrac{|a|}{|b|}, \ b \neq 0$

Notes:

1.4 **Notetaking with Vocabulary** (continued)

Solving Absolute Value Equations

To solve $|ax + b| = c$ when $c \geq 0$, solve the related linear equations

$$ax + b = c \quad \text{or} \quad ax + b = -c.$$

When $c < 0$, the absolute value equation $|ax + b| = c$ has no solution because absolute value always indicates a number that is not negative.

Notes:

Solving Equations with Two Absolute Values
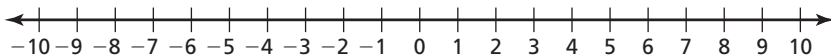
To solve $|ax + b| = |cx + d|$, solve the related linear equations

$$ax + b = cx + d \quad \text{or} \quad ax + b = -(cx + d).$$
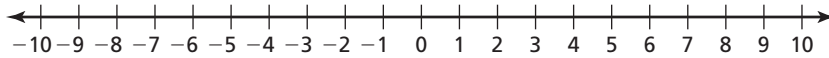
Notes:

Extra Practice

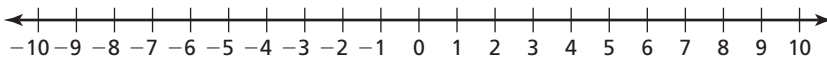**In Exercises 1–5, solve the equation. Graph the solution(s), if possible.**

1. $|3x + 12| = 0$
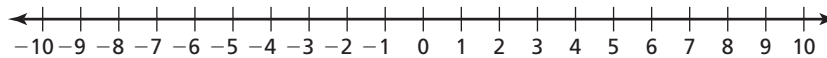
1.4 **Notetaking with Vocabulary** (continued)
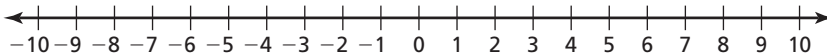
2. $|y + 2| = 8$

3. $-4|7 - 6k| = 14$

4. $\left|\dfrac{d}{3}\right| = 3$

5. $3|2x + 5| + 10 = 37$

In Exercises 6–9, solve the equation. Check your solutions.

6. $|20x| = |4x + 16|$

7. $|p + 4| = |p - 2|$

8. $|4q + 9| = |2q - 1|$

9. $|2x - 7| = |2x + 9|$