

## 1-5 Notes

### 5 Minute Check for 1-4

1. Solve:  $12f - 4 = 7 + f$

2. Solve:  $8(2n + 3) = 12$

3.  $|8| =$

4.  $|-2|$

5. There are 2 values that make this true. What are they?

$$|x + 1| = 4$$

5-min check

### 5 Minute Check for 1-4

1. Solve:  $12f - 4 = 7 + f$   
 $-f + 4 + 4 - f \quad f = 1$   
 $11f = 11$

2. Solve:  $8(2n + 3) = 12$   
 $16n + 24 = 12 \quad n = \frac{-12}{16} = \frac{-3}{4}$   
 $16n = -12$

3.  $|8| = 8$

4.  $|-2| = 2$

5. There are 2 values that make this true. What are they?

$$|x + 1| = 4$$

3 and -5

5-min check sol

## Lesson 1-5 Absolute Value Equations

**Objective:**

Evaluate Expressions Containing Absolute Values

Solve Absolute Value Equations

1-5

Absolute Value- the distance a number is from zero on the number line

$$|x|$$

(This is the notation for the absolute value of x)

for any real number a:

if  $a \geq 0$  then  $|a| = a$  (don't need to change the sign)

if  $a < 0$  then  $|a| = -a$  (you change the sign)

Definitions

Example 1: Evaluate

$$\text{a) } |-6| = 6$$

$$\text{b) } |-4 + 2| = |-2| = 2$$

$$\text{c) } -|5 + (-2)^2 - 7|$$

$$\begin{aligned} & -|5 + 4 - 7| \\ & -|9 - 7| = -|2| = -2 \end{aligned}$$

ex 1

Example 7:

Evaluate  $|3x - 2| + 4$  if  $x = -5$

$$|3(-5) - 2| + 4$$

$$|-15 - 2| + 4$$

$$|-17| + 4$$

$$17 + 4$$

$$21$$

ex 7

Example 2: Find the absolute value of  $x+2$

If  $x+2 \geq 0$  then  $|x+2| = x+2$

If  $x+2 < 0$  then the  $|x+2| = -(x+2)$

ex 2

Example 3:

Solve  $|x+6| = 9$

Case 1:

$$\begin{array}{r} x+6=9 \\ -6 \quad -6 \\ \hline x=3 \end{array}$$

check it in original

$$\begin{array}{r} |3+6| \stackrel{?}{=} 9 \\ |9| = 9 \\ 9 \checkmark = 9 \end{array}$$

Case 2:

$$\begin{array}{r} x+6=-9 \\ -6 \quad -6 \\ \hline x=-15 \end{array}$$

check:

$$\begin{array}{r} |-15+6| = 9 \\ |-9| = 9 \\ 9 \checkmark = 9 \end{array}$$

ex 3

Example 4:

$$\text{Solve } |x+1| = -4$$

NO SOLUTION

(Absolute values will NEVER be negative!)

ex 4

Example 5:

$$\text{Solve } |x+6| = 2x$$

Case 1:

$$\begin{array}{r} x+6 = 2x \\ -x \quad -x \\ \hline 6 = x \end{array}$$

Case 2:

$$\begin{array}{r} x+6 = -2x \\ -x \quad -x \\ \hline 6 = -3x \\ -2 = x \end{array}$$

Check both cases in the original problem:

$$\begin{array}{l} |x+6| = 2x \\ |6+6| = 2 \cdot 6 \\ |12| = 12 \\ 12 = 12 \end{array}$$

$$\begin{array}{l} |x+6| = 2x \\ |-2+6| = 2(-2) \\ |4| = -4 \\ 4 \neq -4 \end{array}$$

ex 5

Example 6: Solve  $|2x+7| + 5 = 0$

Solve for the absolute value:

$$|2x + 7| = -5$$

NO SOLUTION!

ex 6

Example 8:

Solve  $|x-2| = 2x - 10$

Case 1:

$$x-2 = 2x - 10$$

$$\begin{array}{r} -x \quad -x \\ -2 = x - 10 \\ +10 \quad +10 \\ \hline 8 = x \end{array}$$

Check both cases:

$$\begin{array}{l} |8-2| = 2 \cdot 8 - 10 \\ |6| = 16 - 10 \\ 6 = 6 \end{array}$$

Case 2:

$$x-2 = -(2x - 10)$$

$$\begin{array}{r} x-2 = -2x+10 \\ +2x \quad +2x \\ 3x-2 = 10 \\ +2 \quad +2 \\ 3x = 12 \\ x = 4 \end{array}$$

$$\begin{array}{l} |4-2| = 2 \cdot 4 - 10 \\ |2| = 8 - 10 \\ 2 \neq -2 \end{array}$$

ex 8

Assignment:

p. 41 #16-42

assignment