NAME _____ DATE _____ PERIOD _____

2-5 Study Guide and Intervention

Solving Equations Involving Absolute Value

Absolute Value Expressions Expressions with absolute values define an upper and lower range in which a value must lie. Expressions involving absolute value can be evaluated using the given value for the variable.

Example **Evaluate $|t - 5| - 7$ if $t = 3$.**

$|t - 5| - 7 = |3 - 5| - 7$ Replace t with 3.

$= |-2| - 7$ $3 - 5 = -2$

$= 2 - 7$ $|-2| = 2$

$= -5$ Simplify.

Exercises

Evaluate each expression if $r = -2$, $n = -3$, and $t = 3$.

1. $|8 - t| + 3$

2. $|t - 3| - 7$

3. $5 + |3 - n|$

4. $|r + n| - 7$

5. $|n - t| + 4$

6. $-|r + n + t|$

Evaluate each expression if $n = 2$, $q = -1.5$, $r = -3$, $v = -8$, $w = 4.5$, and $x = 4$.

7. $|2q + r|$

8. $10 - |2n + v|$

9. $|3x - 2w| - q$

10. $v - |3n + x|$

11. $1 + |5q - w|$

12. $2|3r - v|$

13. $|-2x + 5n| + (n - x)$

14. $4w - |2r + v|$

15. $3|w - n| - 5|q - r|$

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2-5 Study Guide and Intervention *(continued)*

Solving Equations Involving Absolute Value

Absolute Value Equations When solving equations that involve absolute value, there are two cases to consider.

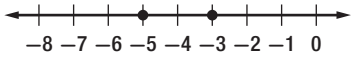
Case 1: The value inside the absolute value symbols is positive.
Case 2: The value inside the absolute value symbols is negative.

Example 1 **Solve $|x + 4| = 1$. Then graph the solution set.**

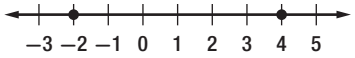
Write $|x + 4| = 1$ as $x + 4 = 1$ or $x + 4 = -1$.

$$\begin{array}{rcl} x + 4 = 1 & \text{or} & x + 4 = -1 \\ x + 4 - 4 = 1 - 4 & & x + 4 - 4 = -1 - 4 \\ x = -3 & & x = -5 \end{array}$$

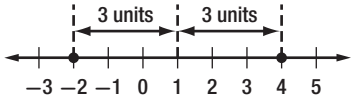
The solution set is $\{-5, -3\}$.
The graph is shown below.



Example 2 **Write an equation involving absolute value for the graph.**



Find the point that is the same distance from -2 as it is from 4.

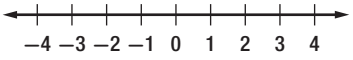


The distance from 1 to -2 is 3 units. The distance from 1 to 4 is 3 units.
So, $|x - 1| = 3$.

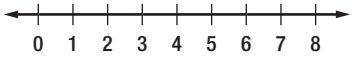
Exercises

Solve each equation. Then graph the solution set.

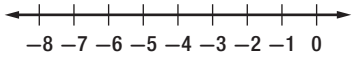
1. $|y| = 3$



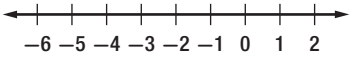
2. $|x - 4| = 4$



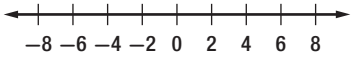
3. $|y + 3| = 2$



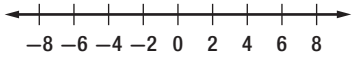
4. $|b + 2| = 3$



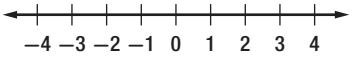
5. $|w - 2| = 5$



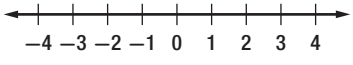
6. $|t + 2| = 4$



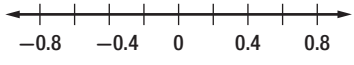
7. $|2x| = 8$



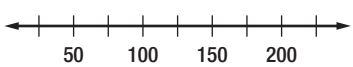
8. $|5y - 2| = 7$



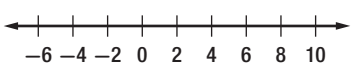
9. $|p - 0.2| = 0.5$



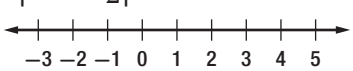
10. $|d - 100| = 50$



11. $|2x - 1| = 11$

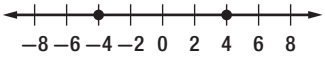


12. $\left|3x + \frac{1}{2}\right| = 6$

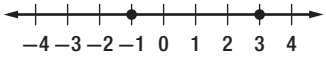


Write an equation involving absolute value for each graph.

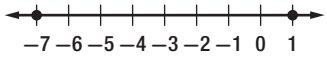
13.



14.



15.



Lesson 2-5