

3-7

Reteaching

Absolute Value Equations and Inequalities

Both 5 and -5 are solutions of the equation $|a| = 5$. Many absolute value equations have two solutions. The equation $|a| = -7$ has no solution because an absolute value cannot equal a negative number.

Problem

What are the solutions of $|t - 7| = 8$?

The equation $|t - 7| = 8$ is the same as $t - 7 = 8$ or $t - 7 = -8$.

$$t - 7 = 8 \quad \text{or} \quad t - 7 = -8 \quad \text{Write the absolute value equation as two equations.}$$

$$t - 7 + 7 = 8 + 7 \quad \text{or} \quad t - 7 + 7 = -8 + 7 \quad \text{Add 7 to each side.}$$

$$t = 15 \quad \text{or} \quad t = -1 \quad \text{Simplify.}$$

The solutions are 15 and -1 .

Problem

What are the solutions of $|5p| + 25 = 15$?

First isolate the absolute value.

$$|5p| + 25 = 15 \quad \text{Original equation}$$

$$|5p| + 25 - 25 = 15 - 25 \quad \text{Subtract 25 from each side.}$$

$$|5p| = -10 \quad \text{Simplify.}$$

The absolute value cannot have a negative value, so there is no solution for the equation.

Exercises

Solve each equation. If there is no solution, write *no solution*.

1. $|m + 8| = 5$

$$m = -3 \text{ or } m = -13$$

2. $|3b - 1| = 11$

$$b = 4 \text{ or } b = -\frac{10}{3}$$

3. $|y + 17| - 25 = -10$

$$y = -2 \text{ or } y = -32$$

4. $|4s + 1| + 7 = 5$

no solution

5. $|2w - 4| + 18 = 15$

no solution

6. $\left|\frac{h}{3} + 4\right| - 2 = 5$

$$h = 9 \text{ or } h = -33$$

3-7 **Reteaching** (continued)

Absolute Value Equations and Inequalities

The inequality $|a| < 5$ is the same as $a < 5$ and $a > -5$.

The inequality $|a| > 5$ is the same as $a > 5$ or $a < -5$.

Problem

What are the solutions of $|2n - 3| \geq 9$? Graph the solutions.

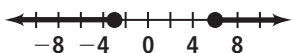
$2n - 3 \geq 9$ or $2n - 3 \leq -9$ Write the absolute value inequality as two inequalities.

$2n - 3 + 3 \geq 9 + 3$ or $2n - 3 + 3 \leq -9 + 3$ Add 3 to each side.

$2n \geq 12$ or $2n \leq -6$ Simplify.

$\frac{2n}{2} \geq \frac{12}{2}$ or $\frac{2n}{2} \leq \frac{-6}{2}$ Divide each side by 2.

$n \geq 6$ or $n \leq -3$ Simplify.



Exercises

Solve and graph each inequality.

7. $|x - 3| > 5$ $x > 8$ or $x < -2$



8. $|d + 4| < 3$ $-7 < d < -1$



9. $|n + 1| \leq 7$ $-8 \leq n \leq 6$



10. $|f - 5| \geq 1$ $f \geq 6$ or $f \leq 4$



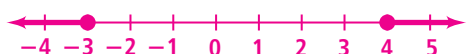
11. $|2v| > 16$ $v < -8$ or $v > 8$



12. $\left|\frac{z}{3}\right| < 2$ $-6 < z < 6$



13. $|2k - 1| \geq 7$ $k \leq -3$ or $k \geq 4$



14. $|4r + 1| \leq 9$ $-\frac{5}{2} \leq r \leq 2$



15. $\left|\frac{2}{3}p\right| < 8$ $-12 < p < 12$



16. $|8s - 16| > 16$ $s < 0$ or $s > 4$



17. $\left|\frac{b}{2} - 1\right| \geq 2$ $b \leq -2$ or $b \geq 6$



18. $|5g + 10| \leq 40$ $-10 \leq g \leq 6$

