

Practice 1-5

Absolute Value Equations and Inequalities

Solve each equation. Check for extraneous solutions.

1. $|4x| = 28$

$$\begin{array}{l|l} 4x = 28 & 4x = -28 \\ \hline \boxed{x = 7} & \boxed{x = -7} \end{array}$$

2. $|3x + 6| = -12$

No solution

3. $|z - 1| = 7z - 13$

$$\begin{array}{l|l} z - 1 = 7z - 13 & z - 1 = -(7z - 13) \\ -7z + 13 & -7z + 13 \\ \hline 12 = 6z & z - 1 = -7z + 13 \\ \hline \boxed{z = 2} & +7z & +7z \\ \hline & 8z - 1 = 13 \\ & +1 & +1 \\ \hline & 8z = 14 \\ & \boxed{z = \frac{14}{8} = \frac{7}{4}} \end{array}$$

4. $|s + 12| = 15$

$$\begin{array}{l|l} s + 12 = 15 & s + 12 = -15 \\ -12 & -12 \\ \hline \boxed{s = 3} & \boxed{s = -27} \end{array}$$

5. $|-3x| = 63$

$$\begin{array}{l|l} -3x = 63 & -3x = -63 \\ \hline \boxed{x = -21} & \boxed{x = 21} \end{array}$$

6. $2|5x + 3| = 16$

$$\begin{array}{l|l} |5x + 3| = 8 & \\ \hline 5x + 3 = 8 & 5x + 3 = -8 \\ -3 & -3 \\ \hline 5x = 5 & 5x = -11 \\ \hline \boxed{x = 1} & \boxed{x = -\frac{11}{5}} \end{array}$$

7. $|6x + 7| = 5x + 2$

$$\begin{array}{l|l} 6x + 7 = 5x + 2 & 6x + 7 = -(5x + 2) \\ -5x - 7 & -5x - 2 \\ \hline \boxed{x = -5} & 6x + 7 = -5x - 2 \\ +5x - 7 & +5x - 7 \\ \hline 11x = -9 & \\ \hline \boxed{x = -\frac{9}{11}} & \end{array}$$

8. $|7r - 4| = 24$

$$\begin{array}{l|l} 7r - 4 = 24 & 7r - 4 = -24 \\ \hline 7r = 28 & 7r = -20 \\ \hline \boxed{r = 4} & \boxed{r = -\frac{20}{7}} \end{array}$$

9. $|3c| + 2 = 11 \rightarrow |3c| = 9$

$$\begin{array}{l|l} 3c = 9 & 3c = -9 \\ \hline \boxed{c = 3} & \boxed{c = -3} \end{array}$$

$$10. 5|x+1| + 6 = 21$$

$$5|x+1| = 15$$

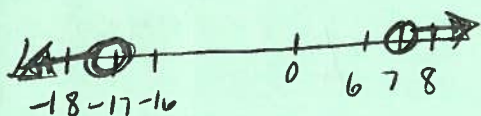
$$|x+1| = 3$$

$$\begin{array}{l|l} x+1=3 & x+1=-3 \\ \hline +1 & +1 \\ -1 & -1 \\ \hline x=2 & x=-4 \end{array}$$

Solve each inequality. Graph the solutions.

$$12. |x+5| > 12$$

$$\begin{array}{l|l} x+5 > 12 & x+5 < -12 \\ \hline -5 & -5 \\ \hline x > 7 & x < -17 \end{array}$$



$$11. |3x+5| - 7x = 3x+4$$

$$+2x \quad +2x$$

$$|3x+5| = 5x+4$$

$$\begin{array}{l} 3x+5 = 5x+4 \\ -3x \quad -4 \quad -3x \quad -4 \\ \hline 1 = 2x \end{array}$$

$$\frac{1}{2} = \frac{2x}{2}$$

$$x = \frac{1}{2}$$

$$3x+5 = -(5x+4)$$

$$\begin{array}{l} 3x+5 = -5x-4 \\ +5x \quad -5 \quad +5x \quad -5 \\ \hline 8x = -9 \end{array}$$

$$8x = -9$$

$$x = -\frac{9}{8}$$

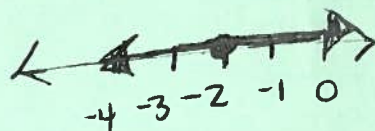
$$13. |k-3| \leq 19$$

$$\begin{array}{l|l} k-3 \leq 19 & k-3 \geq -19 \\ +3 & +3 \\ \hline k \leq 22 & k \geq -16 \end{array}$$



$$14. |x+2| \geq 0$$

$$\begin{array}{l|l} x+2 \geq 0 & x+2 \leq 0 \\ \hline x \geq -2 & x \leq -2 \end{array}$$



$$15. 2|t-5| < \frac{14}{2}$$

$$|t-5| < 7$$

$$\begin{array}{l|l} t-5 < 7 & t-5 > -7 \\ \hline +5 & +5 \\ \hline t < 12 & t > -2 \end{array}$$



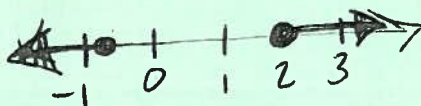
$$16. |3x-2| + 7 \geq 11$$

$$|3x-2| \geq 4$$

$$\begin{array}{l|l} 3x-2 \geq 4 & 3x-2 \leq -4 \\ \hline 3x \geq 6 & 3x \leq -2 \end{array}$$

$$x \geq 2$$

$$x \leq -\frac{2}{3}$$



$$17. 5|2b+1| - 3 \leq 7$$

$$5|2b+1| \leq 10$$

$$|2b+1| \leq 2$$

$$\begin{array}{l|l} 2b+1 \leq 2 & 2b+1 \geq -2 \\ \hline -1 & -1 \\ \hline 2b \leq 1 & 2b \geq -3 \end{array}$$

$$b \leq \frac{1}{2}$$

$$b \geq -\frac{3}{2}$$

