

Solving Absolute Value Equations

Unit 2: Equations and Inequalities

Solve each equation:

<p>1. $m = 5$</p> $ m = 5$ $\begin{array}{l} m = 5 \\ m = -5 \end{array}$	<p>2. $n + 4 = 6$</p> $\begin{array}{l} -4 -4 \\ n = 2 \end{array}$ $\begin{array}{l} n = 2 \\ n = -2 \end{array}$
<p>3. $5 + 3 x = 35$</p> $\begin{array}{l} -5 -5 \\ 3 x = 30 \end{array}$ $\begin{array}{l} 3 3 \\ x = 10 \end{array}$ $\begin{array}{l} x = 10 \\ x = -10 \end{array}$	<p>4. $\left \frac{n}{10}\right = 3$</p> $\begin{array}{l} 10 \cdot \left[\frac{n}{10} = 3\right] \cdot 10 \\ 10 \cdot \left[\frac{n}{10} = -3\right] \cdot 10 \end{array}$ $\begin{array}{l} n = 30 \\ n = -30 \end{array}$
<p>5. $n - 6 = 13$</p> $\begin{array}{l} n - 6 = 13 \\ +6 +6 \\ n = 19 \end{array}$ $\begin{array}{l} n - 6 = -13 \\ +6 +6 \\ n = -7 \end{array}$	<p>6. $2r = 8$</p> $\begin{array}{l} 2r = 8 \\ 2 2 \\ r = 4 \end{array}$ $\begin{array}{l} 2r = -8 \\ 2 2 \\ r = -4 \end{array}$
<p>7. $10p + 4 = 34$</p> $\begin{array}{l} -4 -4 \\ 10p = 30 \end{array}$ $\begin{array}{l} \frac{10p}{10} = 30 \\ p = 3 \end{array}$ $\begin{array}{l} \frac{10p}{10} = -30 \\ p = -3 \end{array}$	<p>8. $\left \frac{n}{2}\right - 6 = -5$</p> $\begin{array}{l} +6 +6 \\ \left \frac{n}{2}\right = 1 \end{array}$ $\begin{array}{l} 2 \cdot \left[\frac{n}{2} = 1\right] \cdot 2 \\ n = 2 \end{array}$ $\begin{array}{l} 2 \cdot \left[\frac{n}{2} = -1\right] \cdot 2 \\ n = -2 \end{array}$
<p>9. $5v - 10 = 20$</p> $\begin{array}{l} +10 +10 \\ 5v = 30 \end{array}$ $\begin{array}{l} \frac{5v}{5} = \frac{30}{5} \\ v = 6 \end{array}$ $\begin{array}{l} \frac{5v}{5} = \frac{-30}{5} \\ v = -6 \end{array}$	<p>10. $-7 m - 8 + 6 = -1$</p> $\begin{array}{l} -6 -6 \\ -7 m - 8 = -7 \end{array}$ $\begin{array}{l} m - 8 = 1 \\ +8 +8 \\ m = 9 \end{array}$ $\begin{array}{l} m - 8 = -1 \\ +8 +8 \\ m = 7 \end{array}$

$$11. -4 + 8|-6x| = 44$$

$$\begin{array}{r} +4 \\ \hline 8|-6x| = 48 \\ \hline 8 \end{array}$$

$$|-6x| = 6$$

$$\begin{array}{l} -6x = 6 \\ \hline -6 \\ \hline x = -1 \end{array}$$

$$\begin{array}{l} -6x = -6 \\ \hline -6 \\ \hline x = 1 \end{array}$$

$$12. 3 - 3|10 + v| = -12$$

$$\begin{array}{r} -3 \\ \hline -3|10 + v| = -15 \\ \hline -3 \end{array}$$

$$|10 + v| = 5$$

$$\begin{array}{l} 10 + v = 5 \\ \hline -10 \\ \hline v = -5 \end{array}$$

$$\begin{array}{l} 10 + v = -5 \\ \hline -10 \\ \hline v = -15 \end{array}$$

$$13. |7x - 8| = 36$$

$$\begin{array}{l} 7x - 8 = 36 \\ \hline +8 \quad +8 \\ \hline 7x = 44 \\ \hline 7 \\ \hline x = \frac{44}{7} \end{array}$$

$$\begin{array}{l} 7x - 8 = -36 \\ \hline +8 \quad +8 \\ \hline 7x = -28 \\ \hline 7 \\ \hline x = -4 \end{array}$$

$$14. |3 + 8m| = 51$$

$$\begin{array}{l} 3 + 8m = 51 \\ \hline -3 \quad -3 \\ \hline 8m = 48 \\ \hline 8 \\ \hline m = 6 \end{array}$$

$$\begin{array}{l} 3 + 8m = -51 \\ \hline -3 \quad -3 \\ \hline 8m = -54 \\ \hline 8 \\ \hline m = -\frac{27}{4} \end{array}$$

$$15. |10 - 7x| = 80$$

$$\begin{array}{l} 10 - 7x = 80 \\ \hline -10 \quad -10 \\ \hline -7x = 70 \\ \hline -7 \quad -7 \\ \hline x = -10 \end{array}$$

$$\begin{array}{l} 10 - 7x = -80 \\ \hline -10 \quad -10 \\ \hline -7x = -90 \\ \hline -7 \quad -7 \\ \hline x = \frac{90}{7} \end{array}$$

$$16. -7|2m + 6| = -98$$

$$\begin{array}{l} -7|2m + 6| = -98 \\ \hline -7 \quad -7 \\ \hline |2m + 6| = 14 \end{array}$$

$$\begin{array}{l} 2m + 6 = 14 \\ \hline -6 \quad -6 \\ \hline 2m = 8 \\ \hline 2 \\ \hline m = 4 \end{array}$$

$$\begin{array}{l} 2m + 6 = -14 \\ \hline -6 \quad -6 \\ \hline 2m = -20 \\ \hline 2 \\ \hline m = -10 \end{array}$$

$$17. -10|5 - 5b| = -50$$

$$\begin{array}{l} -10|5 - 5b| = -50 \\ \hline -10 \quad -10 \\ \hline |5 - 5b| = 5 \end{array}$$

$$\begin{array}{l} 5 - 5b = 5 \\ \hline -5 \quad -5 \\ \hline -5b = 0 \\ \hline -5 \quad -5 \\ \hline b = 0 \end{array}$$

$$\begin{array}{l} 5 - 5b = -5 \\ \hline -5 \quad -5 \\ \hline -5b = -10 \\ \hline -5 \quad -5 \\ \hline b = 2 \end{array}$$

$$18. |9v - 9| - 9 = 18$$

$$\begin{array}{l} +9 \quad +9 \\ \hline |9v - 9| = 27 \end{array}$$

$$\begin{array}{l} 9v - 9 = 27 \\ \hline +9 \quad +9 \\ \hline 9v = 36 \\ \hline 9 \\ \hline v = 4 \end{array}$$

$$\begin{array}{l} 9v - 9 = -27 \\ \hline +9 \quad +9 \\ \hline 9v = -18 \\ \hline 9 \\ \hline v = -2 \end{array}$$

$$19. 2|4n + 5| + 1 = 43$$

$$\begin{array}{l} -1 \quad -1 \\ \hline 2|4n + 5| = 42 \\ \hline 2 \end{array}$$

$$|4n + 5| = 21$$

$$\begin{array}{l} 4n + 5 = 21 \\ \hline -5 \quad -5 \\ \hline 4n = 16 \\ \hline 4 \\ \hline n = 4 \end{array}$$

$$\begin{array}{l} 4n + 5 = -21 \\ \hline -5 \quad -5 \\ \hline 4n = -26 \\ \hline 4 \\ \hline n = -\frac{13}{2} \end{array}$$

$$20. 3|3x + 4| + 3 = 18$$

$$\begin{array}{l} -3 \quad -3 \\ \hline 3|3x + 4| = 15 \\ \hline 3 \end{array}$$

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

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

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