

A1

How to solve absolute value equations

1) Isolate the absolute value.

2) Split into two separate equations, setting one to the negative and one to the positive.

Example:

$$|2x + 6| - 3 = 13$$

$$|2x + 6| = 16$$

$$\textcircled{a} \quad \begin{array}{r} 2x + 6 = 16 \\ -6 \quad -6 \\ \hline 2x = 10 \end{array}$$

$$2x = 10$$

$$\boxed{x = 5}$$

$$\textcircled{b} \quad \begin{array}{r} 2x + 6 = -16 \\ -6 \quad -6 \\ \hline 2x = -22 \end{array}$$

$$\frac{2x}{2} = \frac{-22}{2}$$

$$\boxed{x = -11}$$

Practice:

$$3|6x - 12| + 5 = 59$$

$$\frac{3}{3}|6x - 12| = \frac{54}{3}$$

$$|6x - 12| = 18$$

$$\textcircled{a} \quad \begin{array}{r} 6x - 12 = 18 \\ +12 \quad +12 \\ \hline 6x = 30 \end{array}$$

$$\frac{6x}{6} = \frac{30}{6}$$

$$\boxed{x = 5}$$

$$\textcircled{b} \quad \begin{array}{r} 6x - 12 = -18 \\ +12 \quad +12 \\ \hline 6x = -6 \end{array}$$

$$\frac{6x}{6} = \frac{-6}{6}$$

$$\boxed{x = -1}$$

$$4|5x - 10| + 23 = 3$$

$$\frac{4}{4}|5x - 10| = \frac{-20}{4}$$

$$|5x - 10| = -5$$

No Solution

$$|-7x + 4| = 18$$

$$\textcircled{a} \quad \begin{array}{r} -7x + 4 = 18 \\ -4 \quad -4 \\ \hline -7x = 14 \end{array}$$

$$\frac{-7x}{-7} = \frac{14}{-7}$$

$$\boxed{x = -2}$$

$$\textcircled{b} \quad \begin{array}{r} -7x + 4 = -18 \\ -4 \quad -4 \\ \hline -7x = -22 \end{array}$$

$$\frac{-7x}{-7} = \frac{-22}{-7}$$

$$\boxed{x = \frac{22}{7}}$$

$$\frac{|3v - 2|}{5} = 4 \cdot 5$$

$$|3v - 2| = 20$$

$$\textcircled{a} \quad \begin{array}{r} 3v - 2 = 20 \\ +2 \quad +2 \\ \hline 3v = 22 \end{array}$$

$$\frac{3v}{3} = \frac{22}{3}$$

$$\boxed{v = \frac{22}{3}}$$

$$\textcircled{b} \quad \begin{array}{r} 3v - 2 = -20 \\ +2 \quad +2 \\ \hline 3v = -18 \end{array}$$

$$\frac{3v}{3} = \frac{-18}{3}$$

$$\boxed{v = -6}$$