

Solving Absolute Value Equations

Step 1: Isolate the absolute value.

Step 2: Set up two equations. One equation is equal to the positive value and the other is equal to the negative value.

Step 3: Solve both equations.

1. Solve the following equations.

a) $|2x-1|=7$

$$\begin{array}{r} 2x-1=7 \\ +1 \quad +1 \end{array}$$

$$\frac{2x}{2} = \frac{8}{2}$$

$$\boxed{x=4}$$

$$\begin{array}{r} 2x-1=-7 \\ +1 \quad +1 \end{array}$$

$$\frac{2x}{2} = \frac{-6}{2}$$

$$\boxed{x=-3}$$

b) $-3|8-2a|+9=1$

$$-9-9$$

$$\frac{-3|8-2a|}{-3} = \frac{-8}{-3}$$

$$|8-2a| = \frac{8}{3}$$

$$\frac{8-2a}{1} = \frac{8}{3}$$

$$3(8-2a) = 8$$

$$24-6a = 8$$

$$-24 \quad -24$$

$$\frac{-6a}{-6} = \frac{-16}{-6}$$

$$a = \frac{16}{6} \div 2 = \frac{8}{3}$$

$$\boxed{a = \frac{8}{3}}$$

$$\frac{8-2a}{1} = \frac{-8}{3}$$

$$3(8-2a) = -8$$

$$24-6a = -8$$

$$-24 \quad -24$$

$$\frac{-6a}{-6} = \frac{-32}{-6}$$

$$a = \frac{32}{6} \div 2 = \frac{16}{3}$$

$$\boxed{a = \frac{16}{3}}$$

$$c) |3x-6|+9=5$$

$$-9-9$$

$$|3x-6|=-4$$

NO SOLUTION

$$d) \left| -\frac{2}{3}m-8 \right| = 10-m$$

$$-\frac{2}{3}m - \frac{8 \cdot 3}{1 \cdot 3} = \frac{10 \cdot 3}{1 \cdot 3} - \frac{m \cdot 3}{1 \cdot 3}$$

$$LCD=3$$

$$\frac{-2m}{3} - \frac{24}{3} = \frac{30}{3} - \frac{3m}{3}$$

$$-2m-24=30-3m$$

$$+3m \qquad +3m$$

$$m-24=30$$

$$+24 \quad +24$$

$$\boxed{m=54}$$

$$-\frac{2}{3}m - 8 = -1(10-m)$$

$$-\frac{2m}{3} - \frac{8 \cdot 3}{1 \cdot 3} = \frac{-10 \cdot 3}{1 \cdot 3} + \frac{1m \cdot 3}{1 \cdot 3}$$

$$LCD=3$$

$$-\frac{2m}{3} - \frac{24}{3} = \frac{-30}{3} + \frac{3m}{3}$$

$$-2m-24=-30+3m$$

$$+2m \qquad +2m$$

$$-24=-30+5m$$

$$+30 \quad +30$$

$$\frac{6}{5} = \frac{5m}{5}$$

$$\boxed{m=6/5}$$

$$e) |2x-3| = |-3x-6|$$

$$2x-3 = -3x-6$$

$$+3x \quad +3x$$

$$5x-3 = -6$$

$$+3 \quad +3$$

$$\frac{5x}{5} = \frac{-3}{5}$$

$$\boxed{x=-3/5}$$

$$2x-3 = -1(-3x-6)$$

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

$$-2x \quad -2x$$

$$-3 = x+6$$

$$-6 \quad -6$$

$$\boxed{x=-9}$$