Solving Absolute Value Equations

Absolute Value Equations:

- Isolate the absolute value
- Set up 2 equations since what's inside the absolute value can be positive or negative.
- Solve both equations & check using the original equation.

Extraneous Solutions: a solution for an equation derived from an original equation that is not a solution of the original equation.

Ex: Solve and check

1) $|2y-4| = 12$

$2y-4=12$ $\quad 2y=16$ $\quad \boxed{y=8}$

$2y-4=-12$ $\quad 2y=-8$ $\quad \boxed{y=-4}$

Check: $|2(8)-4|=12$

$|12|=12$

$12=12$ ✓

$|2(-4)-4|=12$

$|-12|=12$

$12=12$ ✓

2) $|3x+2| = 7$

$3x+2=7$ $\quad 3x=5$ $\quad \boxed{x=\frac{5}{3}}$

$3x+2=-7$ $\quad 3x=-9$ $\quad \boxed{x=-3}$

3) $3|4w-1|-5 = 10$

$+5 \quad +5$

$\frac{3|4w-1|}{3} = \frac{15}{3}$

$|4w-1| = 5$

$4w-1=5$ $\quad 4w=6$ $\quad \boxed{w=\frac{3}{2}}$

$4w-1=-5$ $\quad 4w=-4$ $\quad \boxed{w=-1}$

4) $2|3x-1|+5 = 33$

$2|3x-1| = 28$

$|3x-1| = 14$

$3x-1=14$ $\quad 3x=15$ $\quad \boxed{x=5}$

$3x-1=-14$ $\quad 3x=-13$ $\quad \boxed{x=-\frac{13}{3}}$

5) $|2x+5| = 3x+4$

$2x+5=3x+4$

$-2x \quad -2x$

$5=x+4$

$-4 \quad -4$

$\boxed{1=x}$

Check:

$7=7$ ✓

$2x+5=-3x-4$

$+3x \quad +3x$

$5x+5=-4$

$-5 \quad -5$

$5x=-9$

$x=-\frac{9}{5}$

extraneous

$1.4=-1.4$ ✗

6) $|2x+3| = 3x+2$

$2x+3=3x+2$

$3=x+2$

$\boxed{1=x}$

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

$5x+3=-2$

$5x=-5$

$x=-1$

extraneous