Solve algebraically and graph using a number line.

1. $|x| \leq 6$

→ AND

$x \geq -6$ and $x \leq 6$

$-6 \leq x \leq 6$

And → middle

Or → outside

Steps

1. |stuff| → get by itself
2. Case #1: |stuff| > #
   - ↳ OR problem
   - "stuff" <- # OR "stuff" > #

Case #2: |stuff| < #

- ↳ AND problem

2. $|4x - 8| < 12$

3. $|8x| - 36 < 12$

$+36 \quad +36$

$|8x| < 48$

→ AND

$\frac{8x}{8} > \frac{-48}{8}$ and $\frac{8x}{8} < \frac{48}{8}$

$x > -6$ and $x < 6$

$-6 < x < 6$

4. $\frac{3|2x-1|}{3} > \frac{27}{3}$

$|2x-1| > 9$

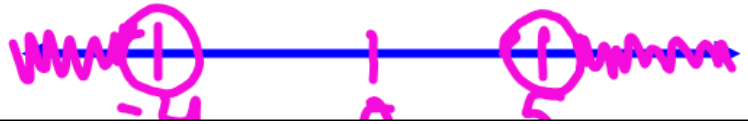
↳ OR

$2x-1 < -9$ or $2x-1 > 9$

$+1 \quad +1$ $\qquad$ $+1 \quad +1$

$\frac{2x}{2} < \frac{-8}{2}$ $\qquad$ $\frac{2x}{2} > \frac{10}{2}$

$x < -4$ or $x > 5$



or outside

5. $4|x| + 16 \geq 8$

$-16 \quad -16$

$4|x| \geq -8$

$\frac{4|x|}{4} \geq \frac{-8}{4}$

$|x| \geq -2$ ←

Note: We will always be greater than a negative number.

Infinitely many solutions

6. $-2|x+5| < -10$

7. $-|x+5|+6<-5$

$-6 \quad -6$

$-|x+5| < -11$

$\frac{-|x+5|}{-1} < \frac{-11}{-1}$ "Flip!"

$|x+5| > 11$

↳ OR

$x+5<-11$ OR $x+5>11$

$-5 \quad -5 \qquad -5 \quad -5$

$x<-16$ or $x>6$

8. $-4|3x+1|+3 \geq 13$

$-3 \quad -3$

$\frac{-4|3x+1|}{-4} \geq \frac{9}{-4}$

$|3x+1| \leq \frac{-9}{4} = -2.25$

always positive

Note: We can't be less than a negative number

No Solution

9. $6|5x+1|+7>7$

$-7 \quad -7$

$\frac{6|5x+1|}{6} > \frac{0}{6}$

$|5x+1|>0$

$5x+1>0$

$-1 \quad -1$

$\frac{5x}{5} > \frac{-1}{5}$

$x > -\frac{1}{5}$

$$\frac{4|6-2x|}{4} \leq \frac{16}{4}$$

$$|6-2x| \leq 4$$

↳ AND

$6-2x \geq -4$ AND $6-2x \leq 4$

$-6 \quad -6$ $\quad$ $-6 \quad -6$

$-2x \geq -10$ $\quad$ $-2x \leq -2$

$\frac{-2x}{-2} \geq \frac{-10}{-2}$ $\quad$ $\frac{-2x}{-2} \leq \frac{-2}{-2}$

$x \leq 5$ $\quad$ $x \geq 1$