Absolute Value Inequalities

CASE 1: $|P| \leq Q$

THEN $-Q \leq P \leq Q$

CASE 2: $|P| > Q$

THEN $P < -Q$ OR $P > Q$

11. $|\underbrace{7x+2}_{P}| > \underbrace{19}_{Q}$

$P < -Q$ OR $P > Q$

$7x+2 < -19$ OR $7x+2 > 19$

$7x < -19-2$ $\quad$ $7x > 19-2$

$7x < -21$ $\quad$ $7x > 17$

$\frac{7x}{7} < \frac{-21}{7}$ $\quad$ $\frac{7x}{7} > \frac{17}{7}$

$x < -3$ OR $x > \frac{17}{7}$

$(-\infty, -3) \cup (\frac{17}{7}, \infty)$

13. $3 < |5-x|$

$|\underbrace{5-x}_{P}| > \underbrace{3}_{Q}$

$P < -Q$ OR $P > Q$

$5-x < -3$ OR $5-x > 3$

$-x < -3-5$ $\quad$ $-x > 3-5$

$-x < -8$ $\quad$ $-x > -2$

$\frac{-x}{-1} > \frac{-8}{-1}$ $\quad$ $\frac{-x}{-1} < \frac{-2}{-1}$

$x > 8$ $\quad$ $x < 2$

$x < 2$ OR $x > 8$

$(-\infty, 2) \cup (8, \infty)$

10. $|\underbrace{6x-1}_{P}| < \underbrace{13}_{Q}$

$-Q < P < Q$

$-13 < 6x-1 < 13$

$-13+1 < 6x < 13+1$

$-12 < 6x < 14$

$\frac{-12}{6} < \frac{6}{6}x < \frac{14}{6}$

$-2 < x < \frac{7}{3}$

12. $-4|x+2| \geq -24$

$\frac{-4|x+2|}{-4} \leq \frac{-24}{-4}$

$|\underbrace{x+2}_{P}| \leq \underbrace{6}_{Q}$

$-Q \leq P \leq Q$

$-6 \leq x+2 \leq 6$

$-6-2 \leq x \leq 6-2$

$-8 \leq x \leq 4$