

## Exercise 57

For the following exercises, solve the inequality.

$$\left| -2x - \frac{2}{3}(x + 1) \right| + 3 > -1$$

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### Solution

Isolate the absolute value term. Subtract 3 from both sides.

$$\left| -2x - \frac{2}{3}(x + 1) \right| > -4$$

Simplify the left side by distributing and combining like terms.

$$\left| -2x - \frac{2}{3}x - \frac{2}{3} \right| > -4$$

$$\left| -\frac{8}{3}x - \frac{2}{3} \right| > -4$$

Remove the absolute value sign by breaking up the inequality into two; using the logical operators, “and” or “or,” if you have  $<$  or  $>$ , respectively; and solving for  $x$ .

$$-\frac{8}{3}x - \frac{2}{3} > -4 \quad \text{or} \quad -\frac{8}{3}x - \frac{2}{3} < 4$$

$$-\frac{8}{3}x > -4 + \frac{2}{3} \quad \text{or} \quad -\frac{8}{3}x < 4 + \frac{2}{3}$$

$$-\frac{8}{3}x > -\frac{10}{3} \quad \text{or} \quad -\frac{8}{3}x < \frac{14}{3}$$

$$-8x > -10 \quad \text{or} \quad -8x < 14$$

$$x < \frac{10}{8} \quad \text{or} \quad x > -\frac{14}{8}$$

$$x < \frac{5}{4} \quad \text{or} \quad x > -\frac{7}{4}$$

All values of  $x$  satisfy this condition, so  $x \in (-\infty, \infty)$ .