

1. Solve each inequality and express the solution set in interval notation.

a. $3x - 2 < 12$

$$3x < 14$$

$$x < \frac{14}{3}$$

$$\boxed{\left(-\infty, \frac{14}{3}\right)}$$

b. $3(4x - 3) \leq -11$

$$12x - 9 \leq -11$$

$$12x \leq -2$$

$$x \leq -\frac{1}{6}$$

$$\boxed{\left(-\infty, -\frac{1}{6}\right]}$$

c. $3(x + 2) - 4(x - 1) < 6$

$$3x + 6 - 4x + 4 < 6$$

$$-x + 10 < 6$$

$$-x < -4$$

$$x > 4$$

$$\boxed{(4, +\infty)}$$

d. $-3(2x + 1) > -2(x + 4)$

$$-6x - 3 > -2x - 8$$

$$-4x - 3 > -8$$

$$-4x > -5$$

$$x < \frac{5}{4}$$

$$\boxed{\left(-\infty, \frac{5}{4}\right)}$$

e.

$$\frac{x-1}{3} + \frac{x+2}{5} \leq \frac{3}{5}$$

$$15 \left[\frac{x-1}{3} + \frac{x+2}{5} \right] \leq 15 \left[\frac{3}{5} \right]$$

$$15 \left(\frac{1}{3} \right) (x-1) + 15 \left(\frac{1}{5} \right) (x+2) \leq 9$$

$$5(x-1) + 3(x+2) \leq 9$$

$$5x - 5 + 3x + 6 \leq 9$$

$$8x + 1 \leq 9$$

$$8x \leq 8$$

$$x \leq 1$$

$$\boxed{(-\infty, 1]}$$

f.

$$\begin{aligned} \frac{3x+2}{9} - \frac{2x+1}{3} &> -1 \\ 9\left[\frac{3x+2}{9} - \frac{2x+1}{3}\right] &> 9[-1] \\ 9\left(\frac{1}{9}\right)(3x+2) - 9\left(\frac{1}{3}\right)(2x+1) &> -9 \\ (3x+2) - 3(2x+1) &> -9 \\ 3x+2 - 6x - 3 &> -9 \\ -3x - 1 &> -9 \\ -3x &> -8 \\ x &< \frac{8}{3} \\ \boxed{\left(-\infty, \frac{8}{3}\right)} \end{aligned}$$

g. $0.07x + 0.08(x + 100) > 38$

$$\begin{aligned} 0.07x + 0.08x + 8 &> 38 \\ 0.15x &> 30 \\ x &> 200 \\ \boxed{(200, +\infty)} \end{aligned}$$

2. Solve each compound inequality. Express the answer in interval notation.

a. $x > -1$ and $x \leq 2$

$(-1, 2]$

b. $x > -1$ or $x < 2$

$(-\infty, +\infty)$

c. $x > 4$ or $x \leq -2$

$(-\infty, -2] \cup (4, +\infty)$

d. $x > 4$ and $x \leq -2$

no solution

3. Solve each equation.

a. $|3x - 4| = 14$

$3x - 4 = 14$ or $3x - 4 = -14$

$3x = 18$ or $3x = -10$

$x = 6$ or $x = -\frac{10}{3}$

b. $|2s - 3| + 2 = 5$

$|2s - 3| = 3$

$2s - 3 = 3$ or $2s - 3 = -3$

$2s = 6$ or $2s = 0$

$s = 3$ or $s = 0$

4. Solve each inequality. Express the solution in interval notation.

a. $|2 - 3x| < 5$

First solve $|2 - 3x| = 5$.

$$2 - 3x = 5 \text{ or } 2 - 3x = -5$$

$$-3x = 3 \text{ or } -3x = -7$$

$$x = -1 \text{ or } x = \frac{7}{3}$$

Now select and test points:

Check $x = -2$ ($-2 < -1$)

$|2 - 3(-2)| = |2 + 6| = |8| = 8$, and this is not less than 5. Do not include the values less than -1.

Check $x = 0$ ($-1 < 0 < 7/3$)

$|2 - 3(0)| = |2 + 0| = |2| = 2$, and this is less than 5. Include the values between -1 and 7/3.

Check $x = 3$ ($3 > 7/3$)

$|2 - 3(3)| = |2 - 9| = |-7| = 7$, and this is not less than 5. Do not include values greater than 7/3.

Answer: $\left(-1, \frac{7}{3}\right)$

b.

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

First solve $\left|\frac{x-3}{4}\right| = 2$.

$$\frac{x-3}{4} = 2 \text{ or } \frac{x-3}{4} = -2$$

$$x - 3 = 8 \text{ or } x - 3 = -8$$

$$x = 11 \text{ or } x = -5$$

Now select and test points:

Check $x = -6$ ($-6 < -5$)

$\left|\frac{-6-3}{4}\right| = \left|-\frac{9}{4}\right| = \frac{9}{4}$, and this is greater than 2. Include the values less than -5.

Check $x = 0$ ($-5 < 0 < 11$)

$\left|\frac{0-3}{4}\right| = \left|-\frac{3}{4}\right| = \frac{3}{4}$, and this is not greater than 2. Do not include the values between -5 & 11.

Check $x = 12$ ($12 > 11$)

$\left|\frac{12-3}{4}\right| = \left|\frac{9}{4}\right| = \frac{9}{4}$, and this is greater than 2. Include the values greater than 11.

Answer: $(-\infty, -5) \cup (11, +\infty)$