

1. Determine if the given number is a solution to  $x > 1$  and  $x \leq 2$ .

a. 2  
Yes,  $2 > 1$  &  $2 \leq 2$  ✓

b. 1  
No  $1 > 1$   
is false

c. 5  
No  $5 > 1$  but  
 $5 \not\leq 2$

2. Determine if the given number is a solution to  $x > 1$  or  $x \leq 2$ .

a. 2  
Yes,  $2 > 1$  &  $2 \leq 2$

b. 1  
Yes  $1 \leq 2$  ✓

c. 5  
Yes,  $5 > 1$  ✓

3. Determine if the given number is a solution to  $x \leq 1$  or  $x > 2$ .

a. 2  
No  $2 \not\leq 1$   
&  $2 \not> 2$

b. 1  
Yes  $1 \leq 1$  ✓

c. 5  
Yes,  $5 > 2$  ✓

4. Write the following compound inequalities as triple inequalities or state that it cannot be done.

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

b.  $x < 1$  and  $x \geq 2$   
Can't be done!  
(no solutions)

c.  $x < 1$  or  $x \geq 2$   
Can't be a triple  
inequality  
 $(-\infty, 1) \cup [2, \infty)$

5. Write the following compound inequalities in interval, set, and number-line notation. Condense when possible.

a.  $-8 < x \leq 5$   
 $\{x \mid -8 < x \leq 5\}$   
 $= (-8, 5]$

c.  $x < -4$  or  $x \leq 1$   
  
 $(-\infty, 1]$   
 $= \{x \mid x \leq 1\}$

b.  $-6 > x$  or  $x \geq 8$   
  
 $(-\infty, -6) \cup [8, \infty)$   
 $= \{x \mid x > -6\}$

d.  $-2 < x$  and  $x \geq 4$   
  
 $[4, \infty)$   
 $= \{x \mid x \geq 4\}$

6. Solve the following compound inequalities.

a.  $-7 < 20 - x \leq -2$

$$\begin{array}{r} -20 \quad -20 \quad -20 \\ \hline \end{array}$$

$$\begin{array}{r} -27 < -x \leq -22 \\ \hline \end{array}$$

flip

$$27 > x \geq 22$$

The sol set is  $\{x \mid 22 \leq x < 27\}$   
 $= [22, 27)$

b.  $12 \leq x + 6 < 17$

$$\begin{array}{r} -6 \quad -6 \quad -6 \\ \hline 6 \leq x < 11 \end{array}$$

The sol set is  $\{x \mid 6 \leq x < 11\}$   
 $= [6, 11)$

c.  $16x + 10 \leq -17$  and  $5x - 1 < 3$

$$\begin{array}{r} -10 \quad -10 \qquad \qquad +1 \quad +1 \\ \hline \end{array}$$

$$16x \leq -27 \quad \& \quad 5x < 4$$

$$x \leq \frac{-27}{16} \quad \& \quad x < \frac{4}{5}$$

The sol set is  $\{x \mid x \leq \frac{-27}{16}\}$   
 $= (-\infty, \frac{-27}{16}]$

d.  $-4x + 20 > -7$  and  $14x - 13 \geq -5$

$$\begin{array}{r} -20 \quad -20 \qquad \qquad +13 \quad +13 \\ \hline \end{array}$$

$$\begin{array}{r} -4x > -27 \quad \& \quad 14x \geq 8 \\ \hline -4 \quad -4 \qquad \qquad \hline 14 \quad 14 \end{array}$$

$$x < \frac{27}{4} \quad \& \quad x \geq \frac{4}{7}$$

The sol set is  $\{x \mid \frac{4}{7} \leq x < \frac{27}{4}\}$   
 $= [\frac{4}{7}, \frac{27}{4})$

e.  $5x - 20 \geq -4$  or  $-4x - 15 \geq 15$

$$\begin{array}{r} +20 \quad +20 \qquad \qquad +15 \quad +15 \\ \hline \end{array}$$

$$5x \geq 16 \quad \text{or} \quad -4x \geq 30$$

$$x \geq \frac{16}{5} \quad \text{or} \quad x \leq -\frac{15}{2}$$

The sol set is  $\{x \mid x \leq -\frac{15}{2} \text{ or } x \geq \frac{16}{5}\}$   
 $= (-\infty, -\frac{15}{2}] \cup [\frac{16}{5}, \infty)$

f.  $12 > -3 - \frac{5}{4}x \geq -23$

$$\begin{array}{r} +3 \quad +3 \qquad \qquad +3 \\ \hline \end{array}$$

$$15 > -\frac{5}{4}x \geq -20$$

$$\begin{array}{r} \cdot \frac{-4}{5} \quad \cdot \frac{-4}{5} \quad \cdot \frac{-4}{5} \\ \hline \end{array}$$

$$-12 < x \leq 16$$

The sol set is  $\{x \mid -12 < x \leq 16\} = (-12, 16]$