

Solve each of the linear inequalities. Write out the elements of the solution set; if there are an infinite number of elements, write out the first 3 elements. An example has been done for you.

Example:

$$\begin{aligned} 1. \quad x + 3 &< 7, x \in \mathbb{N} \\ -3 &< -3 \\ x &< 5 = \text{answer} \\ \{4, 3, 2, 1\} &= \text{answer} \end{aligned}$$

$$\begin{aligned} 2. \quad 5x - 7 &> 3, x \in \mathbb{N} && \text{Goal: get } x \text{ on its own} \\ +7 &+7 \\ \hline 5x &> 10 && \text{I have 5 } x\text{'s - I only want} \\ \div 5 &\div 5 && 1x \dots \text{if I divide both sides} \\ x &> 2 = \text{ans} && \text{by 5 I will get } 1x \\ \{3, 4, 5, \dots\} &= \text{ans} \end{aligned}$$

$$\begin{aligned} 3. \quad 2x + 5 &< x + 11, x \in \mathbb{Z} && \text{Goal: Get } x \text{ on its own} \\ -x &-x \\ \hline x + 5 &< 0 + 11 \\ x + 5 &< 11 && \text{I have } x + 5 \dots \text{I want just } x \\ -5 &-5 && \dots \text{if I subtract 5 from both} \\ x &< 6 = \text{ans} && \text{sides I'll get } x \text{ on its own } \smile \\ \{3, 4, 5\} &= \text{ans} \end{aligned}$$

$$\begin{aligned} 4. \quad 7x + 1 &\leq 3x - 15, x \in \mathbb{R} && \text{Goal: get } x \text{ on its own} \\ -3x &-3x \\ \hline 4x + 1 &\leq 0 - 15 \\ 4x + 1 &\leq -15 && \text{To get } x \text{ on own, subtract 1} \\ -1 &-1 && \text{from both sides} \\ 4x &\leq -16 && \text{I have 4 } x\text{'s } \dots \text{I want 1 } x \dots \text{so} \\ \div 4 &\div 4 && \text{divide both sides by 4} \\ x &\leq -4 \end{aligned}$$

Questions taken from page 50, exercise 7.1 in textbook if you would like to look up answers.

$$\boxed{\begin{aligned} x &\leq -4 \\ x &\text{ is a real number} \\ x &\text{ is any number less than } -4 \end{aligned}} = \text{Ans}$$

5.

greater than  
OR equal to

$$3y - 1 \geq 4y + 3, y \in \mathbb{R}$$

$$\begin{array}{r} -3y \quad -3y \\ \hline 0 - 1 \geq y + 3 \\ -1 \geq y + 3 \\ -3 \quad -3 \\ \hline -4 \geq y + 0 \\ \boxed{-4 \geq y} \end{array}$$

Goal  
Get  $y$  on its own

Ans

$$\begin{array}{l} -4 \geq y \\ -y \text{ is a real number} \\ -y \text{ is any value} \\ \text{less than or equal to} \\ -4 \end{array}$$

12.

$$9(x+1) - 1 \geq 2(5x+6), x \in \mathbb{Z}$$

$$\begin{array}{l} 9(x+1) - 1 \geq 2(5x+6) \\ \text{distribute} \quad \text{distribute} \\ 9x + 9 - 1 \geq 10x + 12 \\ \text{combine} \end{array}$$

$$\begin{array}{r} 9x + 8 \geq 10x + 12 \\ -9x \quad -9x \\ \hline \end{array}$$

\* want to get  
x on its own  
\* combine x's

$$\begin{array}{r} 8 \geq x + 12 \\ -12 \quad -12 \\ \hline \end{array}$$

$$\boxed{-4 \geq x}$$

x is any value  
less than OR equal  
to -4

ans.