

Name Key

Period _____

Chapter 6B Notes **(Inequalities)**

6.6 – One Step Inequalities (Add/Subtract)

6.7 – One Step Inequalities (Multiply/Divide)

6.8 – Two Step Inequalities

Lesson 6.6 (One Step Inequalities with Addition and Subtraction)

Inequality – an open sentence that compares quantities (contains $<$, $>$, \leq , or \geq)

Inequalities				
Words	<ul style="list-style-type: none"> • is less than • is fewer than 	<ul style="list-style-type: none"> • is greater than • is more than • exceeds 	<ul style="list-style-type: none"> • is less than or equal to • is no more than • is at most 	<ul style="list-style-type: none"> • is greater than or equal to • is no less than • is at least
Symbols	$<$	$>$	\leq	\geq

One-Step Inequalities (Addition and Subtraction)

- Basic inequalities involving addition and subtraction can be solved using the same method as equations.
- **Hint:** Put the variable on the *left* side before graphing.

Addition and Subtraction Properties of Inequalities

For any inequality, if the same quantity is added or subtracted to each side, the resulting inequality is true.

If $a > b$, then $a + c > b + c$. If $a < b$, then $a + c < b + c$.

If $a > b$, then $a - c > b - c$. If $a < b$, then $a - c < b - c$.

Examples: Solve each inequality.

1. $x + 3 > 10$
 $\frac{-3 \quad -3}{x > 7}$

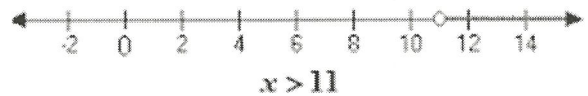
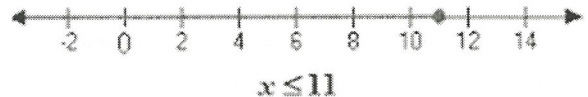
3. $a - 3 < 8$
 $\frac{+3 \quad +3}{a < 11}$

2. $-6 \geq n - 5$
 $\frac{+5 \quad +5}{-1 \geq n} \Rightarrow n \leq -1$

4. $0.4 + y \geq 7$
 $\frac{-0.4 \quad -0.4}{y \geq 6.6}$

Graphing Inequalities:

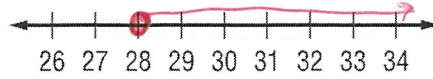
- **Open Dot** – used when the value should not be included in the solution
 - $>$ or $<$ inequalities
- **Closed Dot** – indicates the value is included in the solution
 - \geq or \leq inequalities



Examples: Solve each inequality. Then, graph the solution set on a number line.

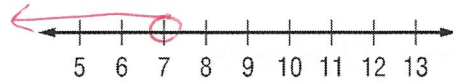
$$1. \quad t - 12 \geq 16$$

$$\quad \quad \quad \begin{array}{r} +12 \quad +12 \\ \hline t \geq 28 \end{array}$$



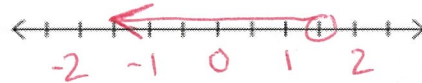
$$2. \quad 16 > h + 9$$

$$\quad \quad \quad \begin{array}{r} -9 \quad -9 \\ \hline 7 > h \rightarrow h < 7 \end{array}$$



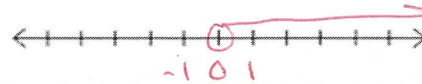
$$3. \quad a + \frac{1}{2} < 2$$

$$\quad \quad \quad \begin{array}{r} -\frac{1}{2} \quad -\frac{1}{2} \\ \hline a < 1\frac{1}{2} \end{array}$$



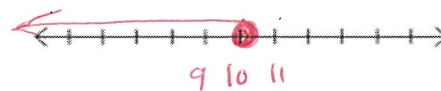
$$4. \quad h + 4 > 4$$

$$\quad \quad \quad \begin{array}{r} -4 \quad -4 \\ \hline h > 0 \end{array}$$



$$5. \quad x - 6 \leq 4$$

$$\quad \quad \quad \begin{array}{r} +6 \quad +6 \\ \hline x \leq 10 \end{array}$$



6. Dylan has \$18 to ride go-carts and play games at the state fair. Suppose the go-carts cost \$5.50. Write and solve an inequality to find the most he can spend on games.

x = amount spent on games

$$5.50 + x \leq 18$$

$$\begin{array}{r} 5.50 + x \leq 18 \\ -5.50 \quad -5.50 \\ \hline x \leq 12.50 \end{array}$$

$$x \leq \$12.50$$

Lesson 6.7 (One Step Inequalities with Multiplication and Division)**Multiplication Property of Inequality:**

- You can multiply each side of an inequality by the same number, just as you did with equations.
 - Multiply by a **positive number** → direction of the inequality **stays the same**
 - Multiply by a **negative number** → direction of the inequality **reverses direction**

Division Property of Inequality:

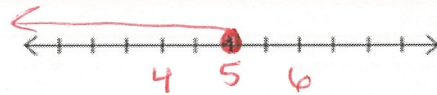
- You can divide each side of an inequality by the same number, just as you did with equations.
 - Divide by a **positive number** → direction of the inequality **stays the same**
 - Divide by a **negative number** → direction of the inequality **reverses direction**

$$\begin{array}{l}
 10 > -5 \\
 \frac{10}{-5} > \frac{-5}{-5} \quad \text{Divide both sides by } -5. \\
 -2 > 1 \quad * \quad \text{False}
 \end{array}$$

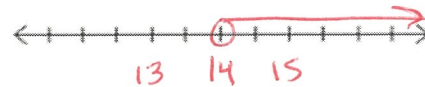
$$\begin{array}{l}
 10 > -5 \\
 \frac{10}{-5} < \frac{-5}{-5} \quad \text{Reverse the inequality.} \\
 -2 < 1 \quad \checkmark \quad \text{True}
 \end{array}$$

Examples: Solve each inequality. Graph the solution set on a number line.

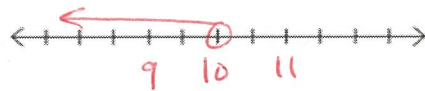
$$\begin{array}{l}
 1. \quad 8x \leq 40 \\
 \quad \quad \frac{8x}{8} \leq \frac{40}{8} \\
 \quad \quad \boxed{x \leq 5}
 \end{array}$$



$$\begin{array}{l}
 2. \quad \frac{d}{2} > 7.2 \\
 \quad \quad \frac{d}{2} > 7.2 \\
 \quad \quad \boxed{d > 14}
 \end{array}$$

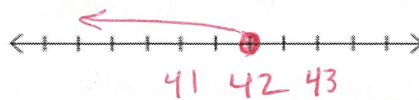


$$\begin{array}{l}
 3. \quad 4x < 40 \\
 \quad \quad \frac{4x}{4} < \frac{40}{4} \\
 \quad \quad \boxed{x < 10}
 \end{array}$$



4. $76 \geq \frac{x}{7}$

$42 \geq x \Rightarrow x \leq 42$



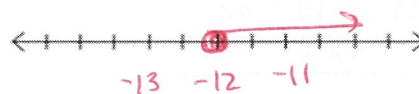
5. $-2g < 10$

$g > -5$



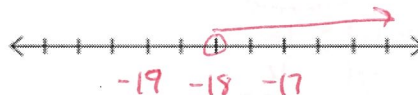
6. $3 \frac{x}{-3} \leq 4 \cdot -3$

$x \geq -12$



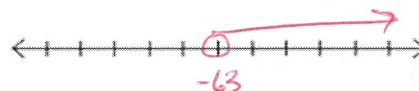
7. $2 \frac{k}{-2} < 9 \cdot -2$

$k > -18$



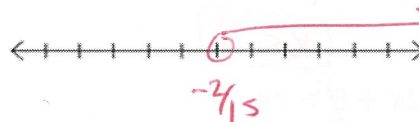
8. $2 \frac{b}{7} > -9 \cdot 7$

$b > -63$



9. $60t > -8$

$t > -2/15$



10. Ling earns \$8 per hour working at the zoo. Write and solve an inequality that can be used to find how many hours she must work in a week to earn at least \$120. Interpret the solution.

$h = \# \text{ of hours}$

$$8h \geq 120 \rightarrow \frac{8h}{8} \geq \frac{120}{8}$$

$$h \geq 15$$

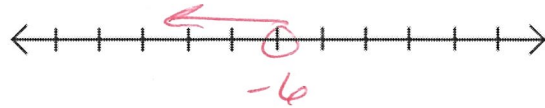
At least 15 hours

$$6. \quad \frac{x}{2} - 5 < -8$$

$$\quad \quad \quad \begin{array}{r} +5 \\ +5 \end{array}$$

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

$$\quad \quad \quad \textcircled{x < -6}$$



$$7. \quad \frac{x}{2} + 9 \geq 5$$

$$\quad \quad \quad \begin{array}{r} -9 \\ -9 \end{array}$$

$$2 \cdot \frac{x}{2} \geq -4 \cdot 2$$

$$\quad \quad \quad \textcircled{x \geq -8}$$



$$8. \quad 8 - \frac{x}{3} \leq 7$$

$$\quad \quad \quad \begin{array}{r} -8 \\ -8 \end{array}$$

$$-3 \cdot \frac{x}{3} \leq -1 \cdot -3$$

$$\quad \quad \quad \textcircled{x \geq 3}$$



9. Halfway through the bowling league season, Stewart has 34 strikes. He averages 2 strikes per game. Write and solve an inequality to find how many more games it will take for Stewart to have at least 61 strikes, the league record.

$g = \# \text{ of games}$

$$\boxed{34 + 2g \geq 61}$$

$$\begin{array}{r} 34 + 2g \geq 61 \\ -34 \quad \quad -34 \\ \hline 2g \geq 27 \end{array}$$

$$\frac{2g}{2} \geq \frac{27}{2}$$

$$g \geq 13.5 \rightarrow$$

$\boxed{\text{At least 14 games}}$

