Name __Key__   Period _____

Lesson 5.2 Notes (Solving Inequalities by Multiplication and Division)

Objectives:
- Solve linear inequalities by using multiplication.
- Solve linear inequalities by using 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 <u>positive number</u> → direction of the inequality <u>stays the same</u>
    - Multiply by a <u>negative number</u> → direction of the inequality <u>reverses direction</u>

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 <u>positive number</u> → direction of the inequality <u>stays the same</u>
    - Divide by a <u>negative number</u> → direction of the inequality <u>reverses direction</u>

$$10 > -5$$
$$\frac{10}{-5} > \frac{-5}{-5} \quad \text{Divide both sides by } -5.$$
$$-2 > 1 \quad \times \quad \text{False}$$

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

Examples: Solve each inequality.

1. $-\frac{7}{3} \cdot -\frac{3}{7}r < 21 \cdot -\frac{7}{3}$

$$\boxed{r > -49}$$

2. $-6 \cdot -\frac{n}{6} \leq 8 \cdot (-6)$

$$\boxed{n \geq -48}$$

3. $7 \cdot \frac{b}{7} > -9 \cdot 7$

$$\boxed{b > -63}$$

4. $60t > -8$
$$\frac{}{60} \qquad \frac{}{60}$$

$$\boxed{t > -\frac{2}{15}}$$

5. $-7d \leq 147$
$$\frac{}{-7} \qquad \frac{}{-7}$$

$$\boxed{d \geq -21}$$

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Application Examples – Define a variable, write an inequality, and solve each problem.

6. Half of a number is at least 14.

$\frac{1}{2}n \geq 14$

$\boxed{n \geq 28}$

7. One fifth of a number is at most negative 30.

$\frac{1}{5}n \leq -30$

$\boxed{n \leq -150}$

8. Negative four times a number is no more than 108.

$\dfrac{-4n}{-4} \leq \dfrac{108}{-4}$

$\boxed{n \geq -27}$

9. The opposite of three times a number is greater than 12.

$\dfrac{-3n}{-3} > \dfrac{12}{-3}$

$\boxed{n < -4}$

10. Negative five times a number is at most 100.

$\dfrac{-5n}{-5} \leq \dfrac{100}{-5}$

$\boxed{n \geq -20}$

11. Of the students surveyed at Madison High School, fewer than 84 said they have never purchased an item online. This is about one-eighth of those surveyed. How many students were surveyed?

$8 \cdot \frac{1}{8}n < 84 \cdot 8$

$n < 672 \Rightarrow \boxed{672 \text{ students surveyed}}$