Algebra 1   5.2 < > ≤ ≥

Solve linear inequalities by using multiplication*
Solve linear inequalities by using division*

multiplication property of (in)equality
division property of (in)equality
✳ triangle puzzles

Mult by positive #
5>3
-2<0
Is it still true?

$2 \cdot 5 > 3 \cdot 2$

$-2 \cdot 8 > 6 \cdot -2$

$-16 < -12$

$10 > 6$

$5 \cdot -2 < 0 \cdot 5$

$-3 \cdot 5 > 1 \cdot -3$

$-10 < 0$

$-15 < -3$

But....Mult by negative #
5>3
-2<0
Is it still true?
What must happen to make it work?

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These examples demonstrate the **Multiplication Property of Inequalities**.

KeyConcept Multiplication Property of Inequalities

Words	Symbols	Examples
If both sides of an inequality that is true are multiplied by a positive number, the resulting inequality is also true.	For any real numbers a and b and any positive real number c, if $a > b$, then $ac > bc$. And, if $a < b$, then $ac < bc$.	$6 > 3.5$ $6(2) > 3.5(2)$ $12 > 7$ and $2.1 < 5$ $2.1(0.5) < 5(0.5)$ $1.05 < 2.5$
If both sides of an inequality that is true are multiplied by a negative number, the direction of the inequality sign is reversed to make the resulting inequality also true.	For any real numbers a and b and any negative real number c, if $a > b$, then $ac < bc$. And, if $a < b$, then $ac > bc$.	$7 > 4.5$ $7(-3) < 4.5(-3)$ $-21 < -13.5$ and $3.1 < 5.2$ $3.1(-4) > 5.2(-4)$ $-12.4 > -20.8$

The DIGITS get bigger as you move away from zero in either direction.
BUT:
When move to the right, the values *increase.*
Move to the left, the values *decrease.*

2C. $\frac{5}{1} \cdot \frac{1}{5}m \geq -3 \cdot \frac{5}{1}$

$m \geq -15$

2D. $\frac{3}{8}t < 5$

$\frac{-4}{1} \cdot -\frac{1}{4}x > 3 \cdot \frac{-4}{1}$

$x < -12$

Example 2 Solve by Multiplying

Solve $-\frac{3}{7}r < 21$. Graph the solution on a number line.

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

$$\frac{21}{21} \; r > -49$$

whiteboards

2A. $-\dfrac{n}{6} \leq 8$ **2B.** $-\dfrac{4}{3}p > -10$

$\dfrac{6}{-2} < \dfrac{10}{-2}$

$-3 > -5$

$\dfrac{10}{2} > \dfrac{6}{2}$

$5 > 3$

$\dfrac{15}{5} > \dfrac{5}{5}$

$3 > 1$

Divide by positive
6>2
-40<10
Is it still true?

$$\frac{-2x}{-2} > \frac{10}{-2}$$

$$x < -5$$

Divide by negative
12>6
-4<20
Is it still true?
What do we need to do for it to work?

These examples demonstrate the **Division Property of Inequalities**.

KeyConcept Division Property of Inequalities		
Words	**Symbols**	**Examples**
If both sides of a true inequality are divided by a positive number, the resulting inequality is also true.	For any real numbers a and b and any positive real number a, if $a > b$, then $\frac{a}{c} > \frac{b}{c}$. And, if $a < b$, then $\frac{a}{c} < \frac{b}{c}$.	$4.5 > 2.1$ $1.5 < 5$ $\frac{4.5}{3} > \frac{2.1}{3}$ and $\frac{1.5}{0.5} < \frac{5}{0.5}$ $1.5 > 0.7$ $3 < 10$
If both sides of a true inequality are divided by a negative number, the direction of the inequality sign is reversed to make the resulting inequality also true.	For any real numbers a and b, and any negative real number c, if $a > b$, then $\frac{a}{c} < \frac{b}{c}$. And, if $a < b$, then $\frac{a}{c} < \frac{b}{c}$.	$6 > 2.4$ $-1.8 < 3.6$ $\frac{6}{-6} < \frac{2.4}{-6}$ and $\frac{-1.8}{-9} < \frac{3.6}{-9}$ $-1 < -0.4$ $0.2 > -0.4$

Same same…

Example 3 Divide to Solve an Inequality

Solve each inequality. Graph the solution on a number line.

a. $60t > 8$

b. $-7d \leq 147$

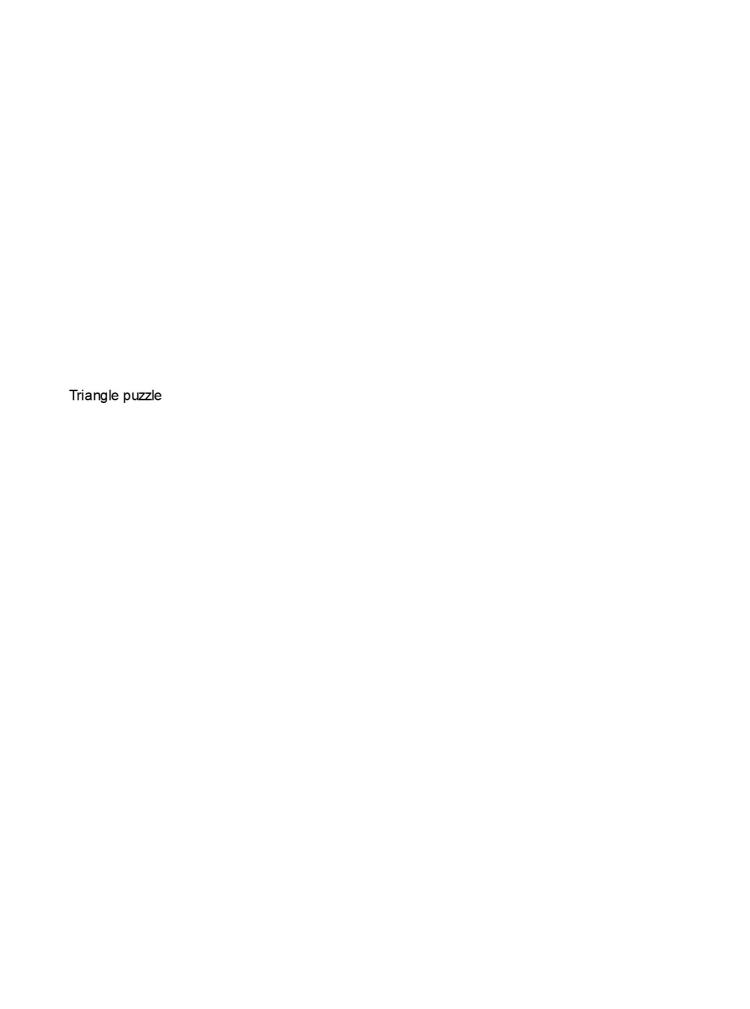**3A.** $8p \leq 58$ **3B.** $-42 \geq 6r$

3C. $-12h > 15$

3D. $-\frac{1}{2}n \leq 6$

Triangle puzzle

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