Algebra 1 5.2 *6th grade standard

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

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

$+ \ \& \ -$

$\times \ \& \ \div$

$=$

$\leq \ \geq$

$< \ >$

Mult by positive # — T

5>3

-2<0

Is it still true?

$-2 \cdot 5 > 3 \cdot -2$

$-10 > -6$

$-10 < -6$

$-3 \cdot -2 < 0 \cdot -3$

$6 < 0$

$6 > 0$

switch symbol

But….Mult by negative #

5>3

-2<0

Is it still true?

What must happen to make it work?

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.*

20. $\frac{1}{5}m \geq -3$

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

$\frac{5}{5}$

$m \geq -15$

21. $\frac{3}{8}t < 5$

$\frac{8}{3} \cdot \frac{\frac{3}{8}t}{\frac{3}{8}} < \frac{5}{\frac{3}{8}} \cdot \frac{8}{3}$

$t < \frac{40}{3}$

Example 2 Solve by Multiplying

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

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

$r > -49$

whiteboards

2A. $-6 \cdot -\frac{n}{6} \le 8 \cdot -6$

$n \ge -48$

2B. $-\frac{3}{4} \cdot -\frac{4}{3}p > -10 \cdot -\frac{3}{4}$

$\frac{-\frac{4}{3}p}{-\frac{4}{3}} \qquad \frac{-10}{-\frac{4}{3}}$

$p \qquad \frac{30}{4} \leftarrow (-1)$

$\frac{15}{2}$

$p < 7.5$

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

$$\frac{6}{2} > \frac{2}{2}$$

$$3 > 1$$

$$\frac{12}{-2} > \frac{6}{-2}$$

$$-6 < -3$$

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 $\frac{a}{c} < \frac{b}{c}$.	$4.5 > 2.1$ and $1.5 < 5$; $\frac{4.5}{3} > \frac{2.1}{3}$ and $\frac{1.5}{0.5} < \frac{5}{0.5}$; $1.5 > 0.7$ and $3 < 10$
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 $\frac{a}{c} < \frac{b}{c}$.	$6 > 2.4$ and $-1.8 < 3.6$; $\frac{6}{-6} < \frac{2.4}{-6}$ and $\frac{-1.8}{-9} < \frac{3.6}{-9}$; $-1 < -0.4$ and $0.2 > -0.4$

Same same…

Example 3 Divide to Solve an Inequality

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

a. $60t > 8$

$$\frac{60t}{60} > \frac{8}{60}$$

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

b. $-7d \leq 147$

$$\frac{-7d}{-7} \geq \frac{147}{-7}$$

$$d \geq -21$$

Guided Practice

3A. $8p \leq 58$

3B. $-42 \geq 6r$

3C. $-12h > 15$

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

Triangle puzzle

Real-World Example 1 Write and Solve an Inequality

PT

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?**