Algebra 1 5.2 *MS 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

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

$-2 < 0$

$-10 < 0$

$5 > 3$

$10 > 6$

$5 > 3$

$-10 > -6$

$-10 < -6$

$-2 < 0$

$6 < 0$

$6 > 0$

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

flip sign

p292

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 $3.1 < 5.2$ $3.1(-4) > 5.2(-4)$ $-12.4 > -20.8$

$x > 4$

$\frac{2x}{2} > \frac{8}{2}$

$\frac{2x}{2} = \frac{8}{2}$

$x = 4$

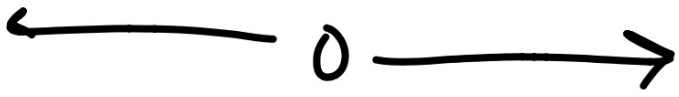
The DIGITS get bigger as you move away from zero in either direction.

BUT:

When move to the right, the values *increase.* Move to the left, the values *decrease.*

$\frac{-2x}{-2} < \frac{6}{-2}$

$x > -3$



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

$1m \geq -15$

$\frac{1}{5}m = -3$

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

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

$\frac{8 \cdot 3}{3 \ 8}t = \frac{5}{1} \cdot \frac{8}{3}$

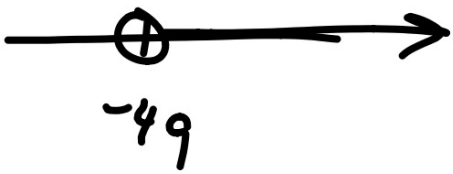
$t = \frac{40}{3}$

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. $-\frac{n}{6} \leq 8$

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

$\frac{6}{-1} \cdot \frac{-1n}{6} \leq 8 \cdot \frac{6}{-1}$

$n \geq -48$

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

$p < 7.5$

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

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

$$3 > 1$$

$$\frac{-40}{-5} < \frac{10}{-5}$$

$$8 > -2$$

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

Same same...

Example 3 Divide to Solve an Inequality

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

a. $60t > 8$

$\frac{60}{60} \quad \frac{60}{60}$

$t > 0.13$



b. $-7d \leq 147$

$\frac{-7}{} \quad \frac{-7}{}$

$d \geq -21$

GuidedPractice

3A. $8p \leq 58$

$\frac{}{8} \quad \frac{}{8}$

$p \leq 7.25$



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

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?