Warm UP:
Copy the sentences below. Leave one line between them.
Can you represent the situations mathematically?

- At least 18 people were at the party.

- The crowd was made up of no less than 80 people.

- The Super Bowl is viewed by more than one billion viewers every year.

Hint:

➢   > Greater Than   < Less Than
➢   > Greater Than or Equal to   < Less Than or Equal to

Write the inequality for each situation.

1. There are at least 28 days in a month.
days in a month ≥ 28

2. The temperature is above 72°.
temperature > 72°

3. At most 9 passengers can ride in the van.
passengers ≤ 9

Essential Question

How do you solve inequalities that involve one operation?

Standard

MCC7.EE.4: Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

Steps to Graphing Inequalities

1. Check the order. Rearrange if necessary.

   x > 3 this is OK
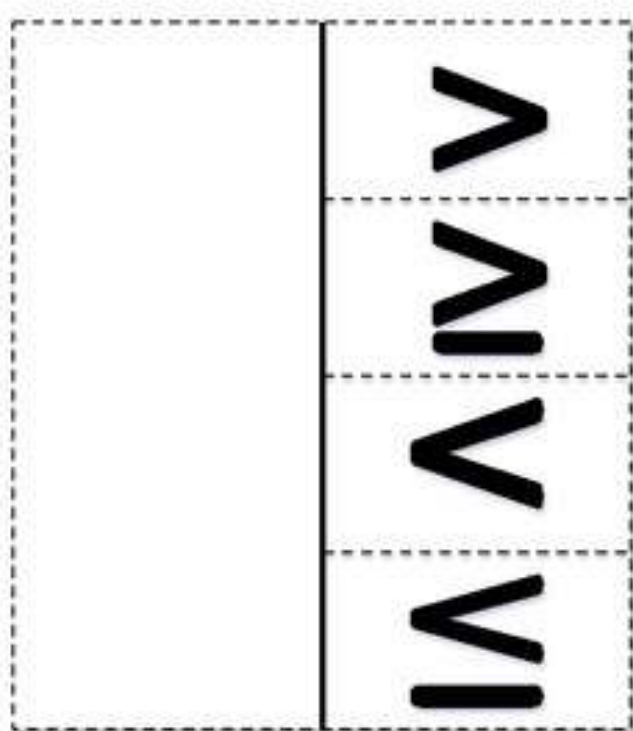
   3 < x Rearrange so the variable comes first.

   x > 3 (mouth should be eating the same thing.)

2. Draw a circle on for the number on the number line. Shade in the direction of the inequality symbol.

Graphing Inequalities

$$>$$

$$\geq$$

$$<$$

$$\leq$$

Greater Than X > 3	Open Circle
Greater Than or Equal To X $\geq$ 3	Closed Circle
Less Than X < 3	Open Circle
Less Than or Equal To X $\leq$ 3	Closed Circle

Video

Solving Inequalities by Adding or Subtracting
Try it on your half sheet

Inequalities

What does each of the symbols mean?

<	≤	>	≥

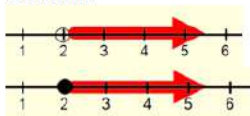When we work with inequalities, we use a _____ to show our solution. Why do you think that is?

Rules for graphing:
≤, ≥ have a _____ circle
<, > have an _____ circle

What is the difference between an open and closed circle? What does filling in the circle mean in terms of the solution?

Graph each inequality below:

1. $x \leq 2$

2. $x < -4$

3. $x \geq 3$

4. $x > 0$

Same as solving equations!!!!!!!!!

Addition and Subtraction Properties of Inequality

You can add or subtract the same number on both sides of an inequality, and the inequality will still be true.

$3 < 5$	$6 > 2$	$4 \leq 7$	$0 \geq -3$
$3 + 2 < 5 + 2$	$6 - 1 > 2 - 1$	$4 + 3 \leq 7 + 3$	$0 - 4 \geq -3 - 4$
$5 < 7$	$5 > 1$	$7 \leq 10$	$-4 \geq -7$

Additional Example 1A: Using the Addition Property of Inequality

Solve. Then graph the solution set on a number line.

$$n - 7 \leq 15$$

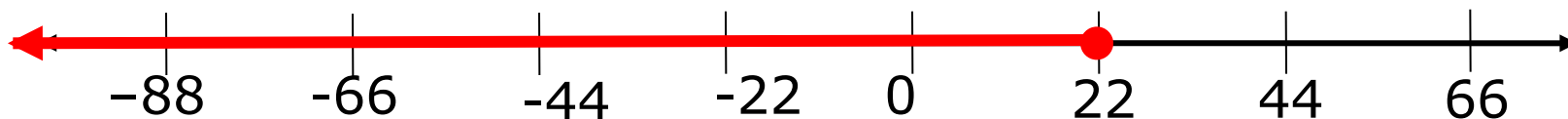$$n - 7 \leq 15$$

$$\underline{+7 \qquad +7}$$ *Add 7 to both sides.*

$$n \qquad \leq 22$$

Draw a closed circle at 22 then shade the line to the left of 22.

Additional Example 1B: Using the Addition Property of Inequality

Solve. Then graph the solution set on a number line.
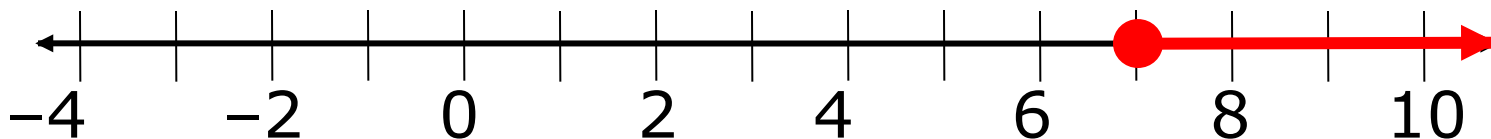
$a - 10 ≥ -3$

$a - 10 ≥ -3$

$\underline{ + 10 \qquad +10}$ *Add 10 to both sides.*

$a \qquad ≥ \qquad 7$ *Draw a closed circle at 7.*
Then shade the line to the right.

Check It Out: Example 1A

Solve. Then graph the solution set on a number line.

$$d - 12 \leq -18$$

$d - 12 \leq -18$

$\underline{+\ 12 \qquad +\ 12}$ *Add 12 to both sides.*

$d \qquad \leq \quad -6$

Draw a closed circle at −6 then shade the line to the left of −6.

Check It Out: Example 1B

Solve. Then graph the solution set on a number line.

$b - 14 ≥ -8$

$$b - 14 ≥ -8$$

$$\underline{+ 14 \qquad +14}$$

Add 14 to both sides.

$$b \qquad ≥ \qquad 6$$

Draw a closed circle at 6. Then shade the line to the right.

Additional Example 2A: Using the Subtraction Property of Inequality

Solve. Check each answer.

$d + 11 > 6$

$$d + 11 > \ \ \ \ 6$$
$$\underline{\ \ \ -11 \ \ \ \ -11}$$
$$d \ \ \ \ \ \ \ > -5$$

Subtract 11 from both sides.

Check

$$d + 11 > 6$$
$$0 + 11 \overset{?}{>} 6$$
$$11 \overset{?}{>} 6 \ \checkmark$$
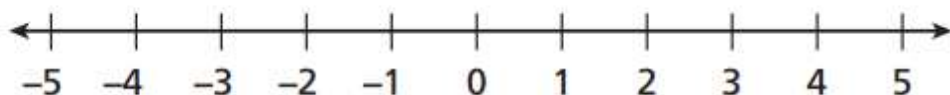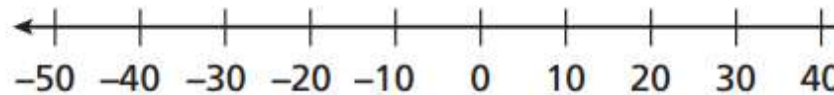
0 is greater than –5.
Substitute 0 for d.
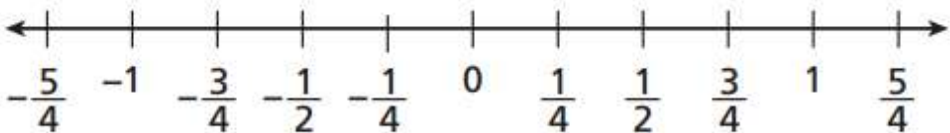
lve each inequality, and graph the solution set.

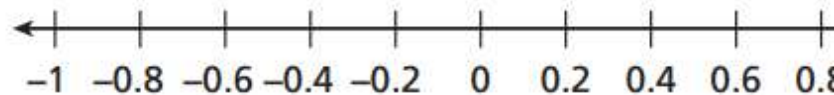$x + 8 \geq 4$ _____

2. $t - 15 < 30$ _____

$k + \frac{1}{4} > \frac{7}{8}$ _____

4. $r - 0.2 \leq 0.6$ _____

lve each inequality, and explain what the solution set means in the
ntext of the situation.

At most, 47 passengers can sit on a bus. There are already 29 passengers seated on the b
The inequality $p + 29 \leq 47$ represents this situation, where p is the number of additiona

TRANSLATING VERBAL PHRASES INTO ALGEBRAIC EXPRESSIONS

9/8/09

ADDITION

sum

SUBTRACTION

difference

MULTIPLICATION

product

DIVISION

quotient
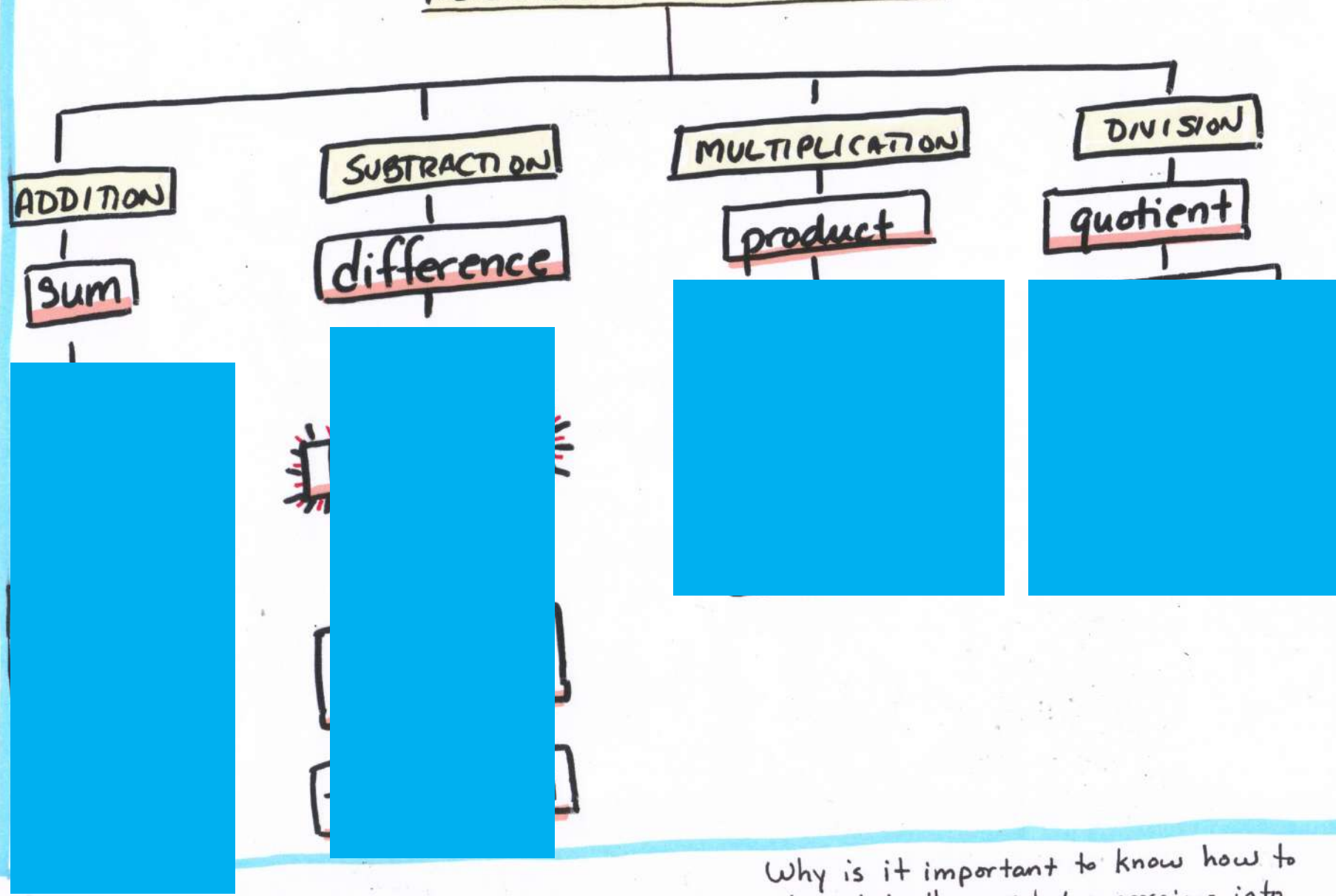
Why is it important to know how to translate these verbal expressions into algebraic expressions?

Complete the tables.

Inequality	Multiply each side by:	New Inequality	New Inequality is True or False?
3 < 4	2		
2 ≥ −3	3		
−1 ≤ 6	5		
5 > 2	−1		
1 ≤ 7	−5		
−8 > −10	−8		

Inequality	Divide each side by:	New Inequality	New Inequality is True or False?
4 < 8	4		
12 ≥ −15	3		
−16 ≤ 12	−4		
15 > 5	−5		

B When both sides of an inequality are multiplied or divided by a _____ number, the inequality is no longer true.

C Complete the tables.

Inequality	Multiply each side by:	New Inequality	Reverse the Inequality Symbol	Reversed symbol makes it True or False?
5 > 2	−1	−5 > −2		
1 ≤ 7	−5	−5 ≤ −35		
−8 > −10	−8	64 > 80		

Inequality	Divide each side by:	New Inequality	Reverse the Inequality Symbol	Reversed symbol makes it True or False?
−16 ≤ 12	−4	4 ≤ −3		
15 > 5	−5	−3 > −1		

REFLECT

1. **Conjecture** When both sides of an inequality are multiplied or divided by a negative

   number, you must _____

   to make the statement true.

Inequalities: Multiplying and Dividing by a Negative Number

Multiplication	Division
$\dfrac{x}{-5} \leq 5$	-3y = 9

When multiplying or dividing by a negative number, I should

_____

_____

Fill in notes then glue into interactive notebook.

Fold example note page in ½ hotdog style.

Label one side FLIP

and the other DON'T FLIP

Are we going to flip or not flip?

Solve.

$$\frac{c}{4} \leq -4$$

$$\frac{c}{4} \leq -4$$

$$(4)\frac{c}{4} \leq (4)(-4) \qquad \textit{Multiply both sides by 4.}$$

$$c \leq -16$$

Are we going to flip or not flip?

Solve.

$$\frac{t}{-4} > 0.3$$

$$\frac{t}{-4} > 0.3$$

$$(-4)\frac{t}{-4} < (-4)0.3$$ *Multiply both sides by –4 and reverse the inequality symbol.*

$$t < -1.2$$

Are we going to flip or not flip?

Solve.

$$\frac{n}{6} \leq -5$$

$$\frac{n}{6} \leq -5$$

$$(6)\frac{n}{6} \leq (6)(-5) \quad \textit{Multiply both sides by 6.}$$

$$n \leq -30$$

Flip or not flip?

Solve.

$$\frac{r}{-3} > \textbf{0.9}$$

$$\frac{r}{-3} > 0.9$$

$$(-3)\frac{r}{-3} < (-3)0.9$$

Multiply both sides by –3 and reverse the inequality symbol.

$$r < -2.7$$

Flip or not flip?

Solve. Check your answer.

$$5a \geq 23$$

$$\frac{5a}{5} \geq \frac{23}{5}$$

Divide both sides by 5.

$$a \geq \frac{23}{5}, \text{ or } 4\frac{3}{5}$$

Check

$$5a \geq 23$$

$$5(5) \overset{?}{\geq} 23$$

$$25 \overset{?}{\geq} 23 \checkmark$$

5 is greater than $4\frac{3}{5}$.
Substitute 5 for a.

Flip or not flip?

Solve. Check your answer.

$$192 < -24b$$

$$\frac{192}{-24} < \frac{-24b}{-24}$$

Divide both sides by −24, and reverse the inequality symbol.

$$-8 > b$$

Check

$$192 < -24b$$

$$192 \overset{?}{<} -24(-10)$$ *−10 is less than −8.*

Substitute −10 for b.

$$192 \overset{?}{<} 240 \quad \checkmark$$
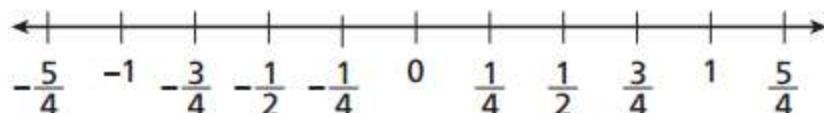
WB: Pg. 152

Video

PRACTICE

Solve each inequality, and graph the solution set.

1. $\frac{x}{3} \leq \frac{1}{4}$ _____
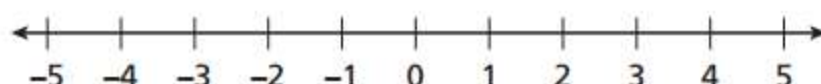

2. $\frac{n}{-6} > 3$ _____
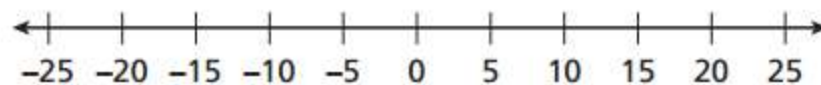
3. $0.4s < 3.6$ _____
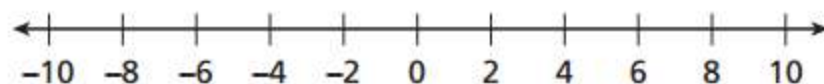
4. $12p \leq -48$ _____

Solve each inequality, and explain what the solution set means in the context of the situation.

5. Sandra has more than 90 baseball cards. She keeps the cards in 6 boxes,

Homework: Workbook Pg. 147 #1-6

Workbook Pg. 153 #1-12