CLASSWORK/NOTES NAME: _____

Warm Up:

Algebra 1: 1.7a Modeling Inequalities (textbook section 2.4)

DOK 2: Model

You will: Create and use inequalities that model real-world situations

An **inequality** is a statement that _____ two expressions by using one of the following inequality signs.

<	≤	>	≥	≠
Less than	Less than or equal to	Greater than	Greater than or equal to	Not equal to

1) You are shopping for a new cell phone plan. The table represents the various plans that you can purchase from a local communications store.

Plan	x =Gigabytes of Data	Cost per month
A	$x < 1$	$ 45
B	$1 \le x < 2.5$	$ 65
C	$2.5 \le x < 4$	$ 95
D	Unlimited	$ 120

a) Describe two different months of possible gigabytes of data that someone could use in Plan A and not be charged overage fees.

b) Think back to your knowledge of the real number system (Natural numbers, Whole Numbers, Integers, Rational, Irrational), would <u>all</u> numbers less than 1 be possible under plan A? Explain.

c) Could a customer use exactly 1 gigabyte of data in plan A and pay $45? Explain.

d) If we were to graph all of the possible values that would work under plan A, how many points would you have to plot?

e) On the number lines below, shade all of the possible gigabytes of data that could be used in each plan without being charged overage fees. Be sure to label points of reference on your number lines.

Plan A

Plan B

Plan C

Plan D

2) Write an inequality for each situation described:
   a) You must be at least 48 inches tall to ride this ride
   b) At most you can take 21 credit hours in college
   c) Applicants may be up to 18 years old

3) Nora is planning a party on which she can spend no more than $50. She is purchasing a cake for $10 and a yet-to-be determined party favor (at a cost of c each) for each of her eight guests.

   a) Which inequality symbol should be used in this problem?_____ Why?

   b) Model this scenario with an inequality: _____

   c) Determine if Nora can spend the following amounts for party favors. Justify your answers mathematically.

      i. $4

      ii. $ 5

      iii. $6

4) Maria is going to the county fair with her friends. Her parents sent her with $40 to spend there. It costs $7 to enter the carnival and $4 per game.
   a) Which inequality symbol should be used in this problem? _____ Why?

   b) Model this scenario with an inequality: _____

   c) Determine if Maria can play the following number of carnival games. Justify your answers mathematically.

      i. 7

      ii. 8

      iii. 9

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Warm Up:

Algebra 1: 1.7b Solving Two-Step Inequalities (textbook section 2.4)

DOK 3: Model

You will: Create and use inequalities that model real-world situations

Exploration: Assign one member of your pair to be person A, and the other, person B. Complete the operation for each row and agree on the direction of the inequality symbol between your two numbers. Find the next row in the table using the current row's value. Continue until the table is complete.

Operation	Person A's Number	Inequality Symbol	Person B's Number
Starting	2	<	4
Add 2			
Subtract 3			
Add -2			
Subtract -4			
Multiply by 2			
Subtract 7			
Multiply by -3			
Add 5			
Divide by -4			
Subtract 2			
Multiply by -1			

1. Does anything happen to the direction of the inequality symbol when we add or subtract a positive number?

   A negative number?

2. Does anything happen to the direction of the inequality symbol when we multiply or divide by a positive number?

   A negative number?

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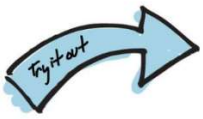
Follow the SAME rules as equations	Flips the direction of the inequality sign.

Ex 1: $5q+10>20$ Ex 2: $-5r+10>20$

How can we check our answers?

3) $2y-3\le -5$ 4) $-8<5n-23$ 5) $-3x-4\ge 14$



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Warm Up:

Algebra 1: 1.7c Solving Multi-Step Inequalities (textbook section 2.4)

DOK 3: Model

You will: Create and use inequalities that model real-world situations

1. Explain what steps you would need to do to the first inequality to get to the second:

a) $8-4x>16$ / $-4x>8$

b) $3g+7\geq 9$ / $3g\geq 2$

c) $2y-5>9+y$ / $y>14$

d) $\frac{z}{-5}-2<-8$ / $z>30$

Notice how the inequality sign flipped in problem d above.
The rules we discovered in our last lesson apply to multi-step inequalities

Follow the SAME rules as equations	Flips the direction of the inequality sign.

2. Consider this equation: $4z+11<6z-15$

Solve by moving the variables to the left

$4z+11<6z-15$

Solve by moving the variables to the right

$4z+11<6z-15$

Which strategy do you prefer? Why?

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Think about efficiency as you solve the following multi-step inequalities. Be sure to test your solutions!

3.

4.

5.

6. Trina is buying 12 shirts for the drama club. She will choose a style for the blank shirts and then pay an additional charge of $2.75 for each shirt to have the club logo. If Trina cannot spend more than $99, how much can she spend on each blank shirt? Write and solve an inequality to find the possible cost of each blank shirt.

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Warm Up:

Algebra 1: 1.8a Solving Literal Equations (textbook section 2.3)

DOK 1: Apply

You will: Use the properties of equality to solve equations for specified variables.

1) Consider the two equations: $2x - 5 = 13$ and $mx - n = k$

   a) What is the same about the equations?

   b) What's different?

   c) Solve both equations below for x, showing and justifying each step that you did to isolate the variable.

$2x - 5 = 13$	Justifications	$mx - n = k$

   d) What was the same about the process of solving the two equations?

   e) What was different about the process of solving the two equations?

   f) What is different about the final solution?

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Examples: SOLVING EQUATIONS FOR A SPECIFIC VARIABLE

2)

3)

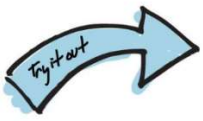
4)

5)

6)

7)

Try It Out



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Warm Up:

Algebra 1: 1.8b Literal Equations Applications (textbook section 2.3)

DOK 2: Apply

You will: Solve equations for specified variables in real-world situations

1) The volume of a rectangular prism is given by the formula length times width times height or $V = lwh$
   a. Rearrange the formula to solve for height of the prism.

   b. Find the height of a prism with width = 4in, length = 3in and a volume of 78 in^3

2) The formula for density is $D = \frac{m}{V}$ where $m =$ mass and $V =$ volume.
   a. Rearrange the formula for mass.
   b. Rearrange the formula for Volume

   Use the formulas above to solve these problems:

   c. A sinker on a fishing line is made of lead and has a volume of 0.000015 m^3. Lead has a very high density of 11,340 kg/m^3. What is the mass of the sinker?

   d. The design for a life preserver requires 0.3 kilogram of plastic foam to provide proper buoyancy. Plastic foam has a very low density of 75 kg/m^3. What is the volume of the plastic foam required?

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3) For altitudes up to 36,000 feet, the relationship between ground temperature and atmospheric temperature can be described by the formula $t = -0.0035a + g$, in which t is the atmospheric temperature in degrees Fahrenheit, a is the altitude, in feet, at which the atmospheric temperature is measured, and g is the ground temperature in degrees Fahrenheit. Determine the altitude in feet when the atmospheric temperature is -27.5°F and the ground temperature is 60°F .

4) $I = Prt$ is another example of a literal equation. In the formula, I represents interest, P the principle or the initial amount to which interest will be applied, r the rate at which interest will be paid, and t is the time in years.

a. Rearrange the formula for each of the variables:

i. Rate ii. Principle iii. Time

b. Find the number of years used in the calculation of a $1000 loan at an interest rate of 5% with interest totaling $600.

c. Determine the interest rate for a $2000 loan that will be paid off in 4 years with interest totaling $640.

d. How much would you need to invest to earn $200 in interest at a rate of 2.3% for one year?

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Warm Up:

Algebra 1: 1.8c Solving Literal Equations Performance Task (textbook section 2.3)

You and your friend are backpacking through Europe this summer. As you're getting ready to pack, you check the temperatures in Europe and realize that Europe shows temperatures in Celsius. Since in the United States, temperature is shown in Fahrenheit, you want to convert everything.

Fahrenheit to Celsius	
Fahrenheit (*F*)	**Celsius (*C*)**
50°	10°
59°	15°
77°	25°
86°	?

Celsius to Fahrenheit	
Celsius (*C*)	**Fahrenheit**
5°	?
10°	50°
15°	59°
25°	77°

1. In your research, you find the tables above showing various temperatures converted from Celsius to Fahrenheit and vice versa. Use the patterns in the table to find the missing temperatures:

   a) Degrees in Celsius when it's 86°F.

   b) Degrees in Fahrenheit when it's 5°C.

2. What strategy did you use to find the missing values?

3. On another website you find an equation to convert any Fahrenheit temperature to Celsius. $C = (F - 32) \bullet \frac{5}{9}$.
   Unfortunately all the temperatures you need are reported in Celsius. Rearrange the formula to find convert any Celsius temperature to Fahrenheit.

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4. Would it ever be possible for the temperature in Celsius to have a greater value than the temperature in Fahrenheit? Explain why or why not.

5. "Double a Celsius value and then add 30" is a good shortcut for estimating a temperature in Fahrenheit. Try to find a similar method for estimating a temperature in Celsius given the temperature in Fahrenheit

6. The formula for converting degrees Celsius (*C*) to degrees Fahrenheit (*F*) is $F = \frac{9}{5}C + 32.$ A chemistry student knows that the temperature in degrees Kelvin (*K*) is 273.15 degrees greater than in degrees Celsius, so the formula to convert degrees Kelvin to degrees Fahrenheit is $F = \frac{9}{5}(K - 273.15) + 32.$ What formula can you use to convert degrees Fahrenheit to degrees Kelvin? (hint: solve for K)