9.1 GN Name: _____

Solving Inequalities

$<$

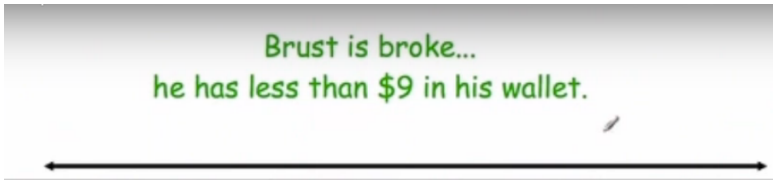
$>$

$\geq$

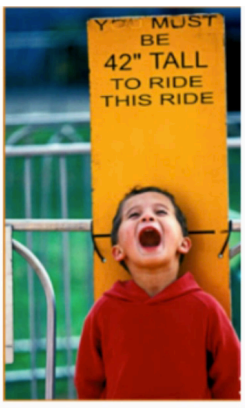
$\leq$

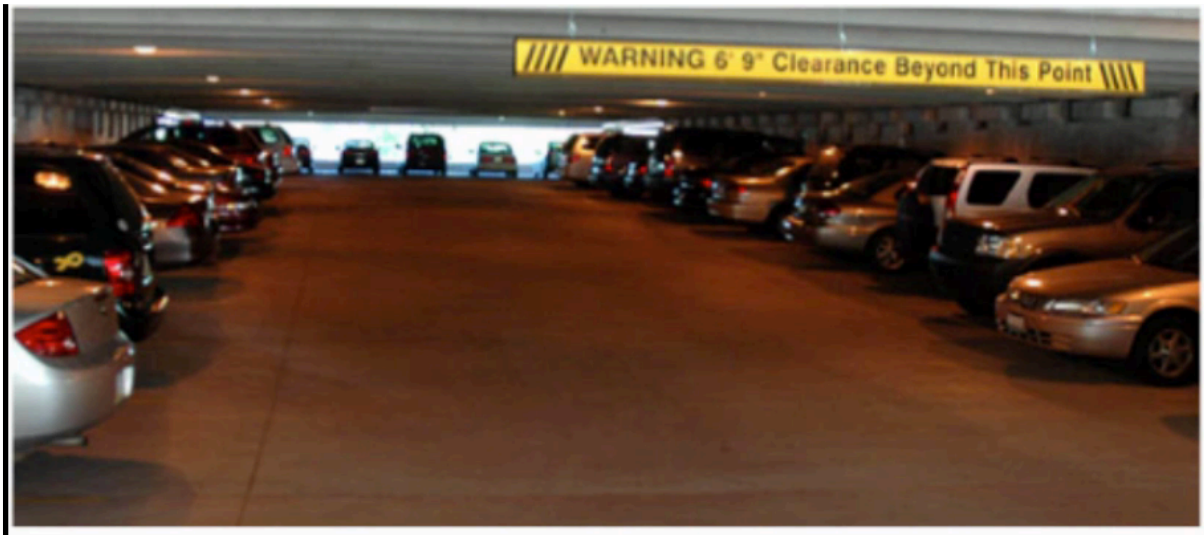
$\neq$

Brust is broke...
he has less than $9 in his wallet.



Ex 1: In order to ride the ride a person must have a height, *h*, that is:





Ex 2: In order to drive beyond this point a car must have a height, *h*, that is:

Ex 3: In order buy a ticket for a rated R movie a guest must be age, *a*.

Kelly has no less than $5 in his wallet.

Sully does not have $8.

Inequality Graphing

When should you have an open dot?

When should you have a closed dot?

INVESTIGATION: When do the signs switch?

Adding a Pos Num	Adding a Neg Num	Subtracting a Pos Num	Subtracting a Neg Num	Mult by a Pos Num	Mult by a Neg Num
$-6 < 2$	$-6 < 2$	$-6 < 2$	$-6 < 2$	$-6 < 2$	$-6 < 2$
$+7 \quad +7$	$+ -3 \quad + -3$	$-2 \quad - 2$	$-(-3) \quad -(-3)$	$\times 3 \quad \times 3$	$\times -2 \quad \times -2$

Divide by a Pos Num	Divide by a Neg Num
$-6 < 2$	$-6 < 2$
$\div 2 \quad \div 2$	$\div -1 \quad \div -1$

In what cases do we have to switch the signs?

Inequality Graphing

When should you have an open dot?

When should you have a closed dot?

Reflexive Property of Algebra

If $a > b$, then $b < a$.

If $a < b$, then $b > a$.

$x > -7$

$-7 < x$

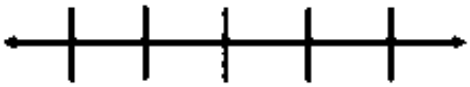
$g \leq 14$

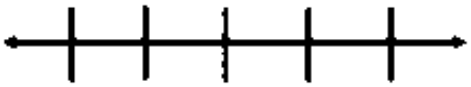
$14 \geq g$

WHAT IS THE SOLUTION SET TO THE INEQUALITY? EXPRESS THE SOLUTION GRAPHICALLY AND IN SET NOTATION.

Ex. 1 $1{:}5q+10>20$

Ex. 2 $4(x - 3) \leq 2(x - 2)$

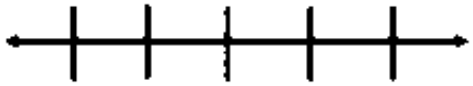




Ex 3: Find the solution set, graph it and check your answer.

Ex. 3 $3x - 4 < 8$

Check:



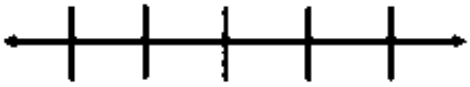
Will performing the following operations change the solution set?

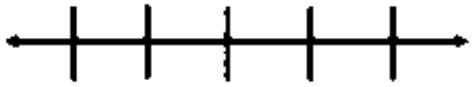
Start by adding 10 to both sides. Solve, graph and check.

$3x - 4 < 8$

Start by multiplying by -2 to both sides. Solve, graph, and check.

$3x - 4 < 8$





SO FOR INEQUALIIES WE CAN:

1) Use the addition property of inequalities

If $A > B$, then $A + C > B + C$.

2) Use the addition property of inequalities

If $A > B$, then $A(C) > B(C)$ but only when $C > 0$!

Ex 4: Solve using only properties allowed for inequalities.

$-H < -7$

Shortcut: $-H < -7$

EX 5: $-3(2x+4) > -20$

EX 6: $-10 \neq 4x + 10$

YOU TRY!

A) $6 - 2v \leq -20$

B) $6x - 5 < 7x + 4$

SUMMARY:

9.1 Problem Set

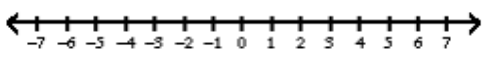
Part 1 – Intro to Inequalities

Directions: Write each situation as an inequality and then graph it.

1) Ktown has less than 50 teachers.	2) Ramstein has no less than 1050 students.	3) Baumholder does not have 400 students.
4) The Cavs will win no more than 44 games next season.	5) The Browns will not win 6 games.	6) The Buckeyes will win more than 9 games this season.

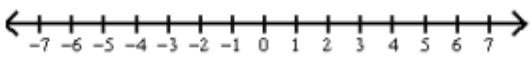
Directions: Graph each inequality.

7) $n \geq -5$

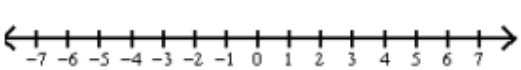


8) $5 \geq n$

9) $1 > k$

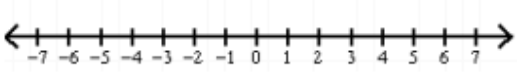


10) $v < 2$



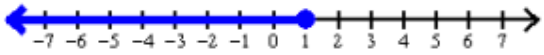
11) $x \leq 5$

12) $-5 \leq x$

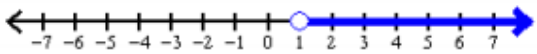


Directions: Write the inequality for the given graph.

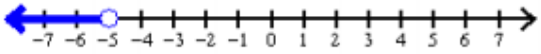
13)



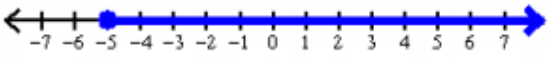
14)



15)



16)



Directions: Describe and correct the error in solving the inequality.

17) $17 - 3x \geq 56$

$-3x \geq 39$

$x \geq -13$

Part 2 – Solve Multistep Inequalities

Directions: Solve each inequality. Express the solution graphically and in set notation.

1) $7 < \frac{x}{9} + 6$

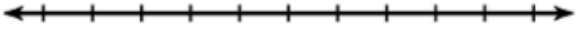
2) $-7 + \frac{h}{3} \leq -13$

3) $50.32 < -6.29(8.5 + x)$

4) $-3 - 3a + 6a \neq 9$

5) $-5(1 - 2n) \geq -17 + 8n$

6) $30 - 4a \geq -2(7a - 5)$



7) $\frac{b+5}{22} > 1$ 	8) $-36 > -3x + 6$ 
9) $11 \neq 2b - 1 - 6b$ 	10) $-5.7x - 10.3 < 7.3x + 14.4$
11) $16 + 4x \leq -4(x + 8)$ 	12) $-27 - 7h \geq -2h - (8h + 6)$ 

Check whether the given number is a solution of the equation or inequality.

13) Check whether -2 is a solution of the inequality $3p + 12 > 8$.

14) **Match the verbal sentence with its equation or inequality.**

I. ___ The difference of 4 and a number n is equal to 14.

II. ___ The difference of a number n and 4 is no more than 14.

III. ___ The difference of 4 and a number n is at least 14.

IV. ___ The difference of a number n and 14 is at most 4.

A. $n - 4 \leq 14$

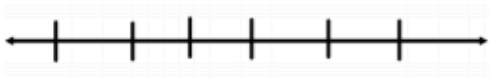
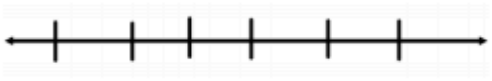
B. $n - 14 \leq 4$

C. $4 - n = 14$

D. $4 - n \geq 14$

15) **Write an equation or an inequality.**

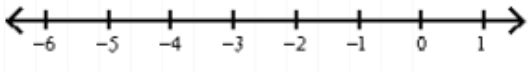
The sum of 8 and a number n is equal to 15.	The product of 5 and a number y is at least 22.
The difference of a number x and 6 is 19.	The quotient of a number b and 7 is more than 25.
3 less than twice a number n is 12.	The product of 5 and a number k is no more than 30.

Directions: Write the verbal sentence as an inequality. Then solve the inequality and graph your solution.	
16) The product of -15 and y is less than or equal to 90.	17) The quotient of w and 24 is greater than or equal to $-\frac{1}{6}$
	

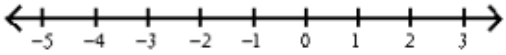
9.1 APPLICATION

Directions: Solve and graph each inequality.

1) $40 \leq -10b$

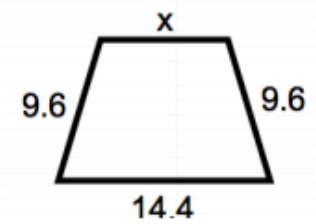


2) $x + 13.1 \geq 10.9$

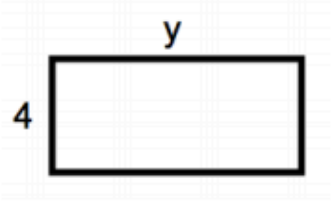


Write and solve an inequality to find the possible values of x.

3) Perimeter ≤ 44.5 feet.



4) Area < 64 meters squared.



5) Write an Inequality using sentences.

a)	The restaurant can seat at most 172 people.
b)	A person must be at least 35 years old to be elected President of the United States.
c)	A law clerk has earned more than $20,000 since being hired.

Write and solve an inequality for each scenario below.

6) Mr Vander Tuig is UNSTOPPLE! He throws three touchdowns every game. How many games until he throws at least 60 touchdowns? Write and solve for all possible number of games.

7) How many bracelets can Caitlin buy for herself and her friends if she wants to spend no more than $22?

8) The unit cost for a piece of fabric is $4.99 per yard. You have $30 to spend on material. How many feet of material could you buy?

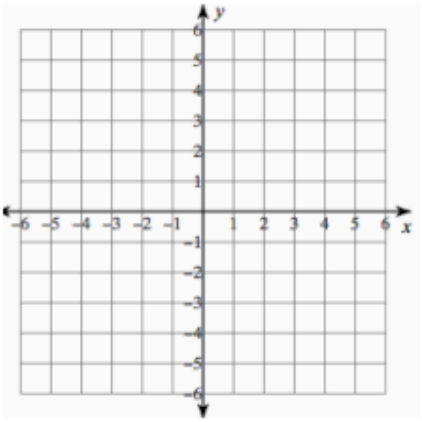
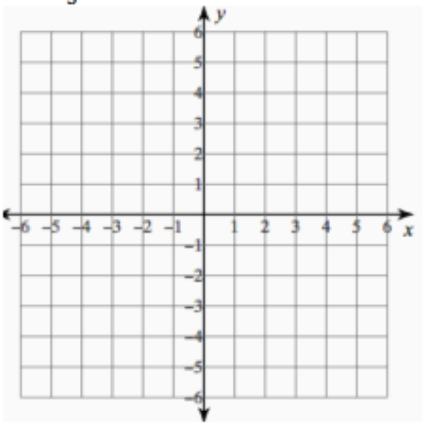
9) Write and solve your own made up example of a one-step inequality.

10) So far you have a MP3 Player with 0.5 GB of music already stored on the MP3 player and know that each song is about 0.002 GB of memory. What are the possible numbers additional songs that you can put on the MP3 player if it holds at most 2 GB?

11) Benito has $6 to spend. A sundae costs $3.25 plus $0.65 per topping. How many toppings can he order?

12) You wonder if you can save money by using your cell phone for all long distance calls. Long distance call cost $0.05 per minute on your cell phone. The basic plan for your cell phone is $29.99 each month. The cost of a regular phone service with unlimited long distance is $39.99. Define a variable and write an inequality that will help you find the number of long-distance call minutes you may make and still save money.

13) Write and solve your own made up "multi-step" inequality example.

Skillz Review		
Graph the line.	Evaluate.	Solve.
1) $x = 4$ 	2) $b^3 - a^2, when\ a = -4\ and\ b = -3$	3) $-129 = 3b - 3(1 - 5b)$
4) $y = \frac{1}{3}x - 5$ 	5) $-2g^2 - 3g, when\ g = -4$	6) $-5n + 3n = 6 - 3n$

Directions: Solve each inequality. Express the solution graphically and in set notation.	
1) $-17.92 > -0.7n - 2.5n$	2) $-(3 + 3g) \leq 5g + 5$
	

3) Brust takes his cut (one-fourth) of the Algebros profit from selling fidget spinners to the store and bought 10 donuts for $12. He came home with more than $3.00.

a) Write an inequality that represents the situation and use it to find out how much money the Algebros had made from selling fidget spinners. Make sure you define your variables.

SMP #4

b) How would the solution set change if the number of Algebros went from four to six? Construct a viable argument to support your reasoning.

SMP #7

4) Make an inequality that will have the given solution set and conditions.

a) $\{x\ real | x \geq 3\}$ with at least one operation.

b) $\{x\ real | x \geq 3\}$ with at least one distribution.

c) $\{x\ real | x \geq 3\}$ with variables on both sides

d) $\{\ \}$

EXIT TICKET –

1) Find the solution set. Express the solution in set notation and graphically.

$$-15 + 7m > 6m + 7(6 - 8m)$$

2) We're doing the following problem in class, $-10x \geq 40$ and Sully says that the shortcut to get $x \leq -4$ is to always flip the inequality symbol when dividing by a negative. Explain or demonstrate why the shortcut works.