

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**UNIT 3 LESSON 3: COMPOUND INEQUALITIES**

**Do Now:** Consider each of the following **compound** (meaning more than one) inequality statements. Determine the truth value of both inequalities and then determine the overall truth value (or at least what you think it is).

Example:

(a)  $7 > 3$  and  $2 < 10$   
 True      True

(b)  $5 < 10$  and  $11 > 20$   
 True      False

Overall truth value: TRUE

Overall truth value: FALSE

(c)  $-4 < 7$  or  $8 < 2$   
 True      False

Overall truth value: TRUE

(d)  $3 > 6$  or  $8 < 5$   
 False      False

Overall truth value: FALSE

**TRUTH VALUES FOR AND AND OR**

1. A compound AND statement will be **true** only if all of the individual statements are TRUE

2. A compound OR statement will be **true** if at least one of the individual statements are TRUE

**Exercise #1:** Which of the following compound inequalities is false? Explain your reasoning by showing the truth values of each of the individual inequalities.

(1)  $5 > 2$  or  $4 < 1$   
 T      F

(3)  $10 > 0$  or  $-3 < 9$   
 T      T

(2)  $-6 < 5$  and  $7 \geq 7$   
 T      T

(4)  $-2 \leq 4$  and  $5 > 7$   
 T      F

(T)

(F)

Now we can start to judge the truth values of inequalities that involve algebraic expressions and replacement values. Don't ever forget that:

SOLUTIONS SETS OF EQUATIONS AND INEQUALITIES

A value of a variable is **in the solution set** of an **equation** or **inequality** if it makes it **true** and is **not** in the solution set if it makes the value **false**.

**Exercise #2:** Determine if each of the following values of  $x$  is in the solution set to the compound inequalities given below?

(a) Is  $x=2$  part of the solution set of  $x > -3$  and  $x < 5$ ? Justify your answer.

$2 > -3$  and  $2 < 5$   
 True True  
**TRUE**

(b) Is  $x=-4$  part of the solution set of  $x \leq -4$  or  $x > 0$ ? Justify your answer.

$-4 \leq -4$  or  $-4 > 0$   
 True False  
**TRUE**

(c) Determine if  $x=1$  part of the solution set of:

$3x+8 > 9$  and  $-2x+10 < 7$

Justify.

$3(1)+8 > 9$  and  $-2(1)+10 < 7$   
 $3+8 > 9$        $-2+10 < 7$   
 $11 > 9$            $8 < 7$   
 True      **FALSE**      False

Justify.

(d) Determine if  $x=5$  part of the solution set of:

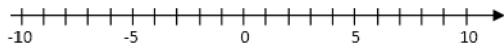
$2x-1 < 3$  or  $\frac{x+7}{2} = 6$

We would also like to be able to produce number line graphs of compound inequalities. For now, we will stick with a few simple ones.

**Exercise #3:** On the number lines below, shade in all values of  $x$  that solve the compound inequality. In other words, shade in the compound inequalities **solution set**. If you need a good place to start, try listing some  $x$  values that make the compound inequalities true.

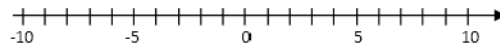
(a)  $x < 7$  and  $x \geq -2$

List some values:



(b)  $x \geq 5$  or  $x < -1$

List some values:



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**COMPOUND INEQUALITIES  
HOMEWORK**

1. Determine the truth value of each of the following compound inequalities by first determining the truth value of each of the individual inequalities.

(a)  $5 \leq 10$  and  $3 < -4$

(b)  $2 < 7$  or  $-20 > -18$

(c)  $-6 < -7$  or  $-2 \leq -2$

(d)  $-5 > -8$  and  $5 < 8$

2. Which of the following compound inequalities is true? Explain your reasoning by showing the truth values of each of the individual inequalities.

(1)  $5 > 2$  and  $4 < 1$

(3)  $-2 > 0$  or  $-6 \square 6$

(2)  $5 \leq 5$  and  $-6 \square -5$

(4)  $-2 \square -4$  and  $3 > 0$

HW:

3. When at a carnival there are height restrictions to go on each ride. Determine which rides each member of this family can go on by filling out the table below:

	The Swings: $h > 24$ and $h < 70$	The Twister: $h > 48$ or $h \leq 60$	Wooden Rollercoaster: $h > 42$ and $h < 72$	Tea cups: $h \leq 35$ or $h \geq 60$
Tracey: $h = 47$ inches				
Mark: $h = 70$ inches				
Marissa: $h = 28$ inches				

Which ride can every family member go on?

4. Determine if each of the following values of  $x$  is in the solution set to the compound inequalities given below? Justify each of your choices by showing your calculations.

(a)  $x = 0$  for:

$$3x + 2 \leq 12 \text{ or } 3(x + 1) < -4(3x + 1)$$

(b)  $x = 2$  for:

$$\frac{2(x + 1)}{3} \leq 6 \text{ and } -2(3 - 2x) < 2$$

(c)  $x = -1$  for:

$$3x + 7 < -11 \text{ or } 4 - 2x \leq 18$$

(d)  $x = 5$  for:

$$\frac{2x - 4}{2} \geq 3 \text{ and } \frac{x - 3}{4} = 2$$