Unit 5 Notes

What do the following symbols mean?

$<$	
$\leq$	
$>$	
$\geq$	
$\neq$	
$=$	

Graphing Inequalities

Closed dot 	**Open Circle** 
Use a closed dot when graphing… $\leq \quad \geq$	Use an open circle when graphing… $< \quad >$

If the variable is **greater** than the number, shade to the _____ .

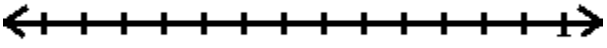
If the variable is **less** than the number, shade to the _____ .

!!!!!!!!!!!! Make sure the variable is on the LEFT of the inequality before you graph!!!!!!!!!!!!

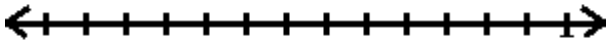
Examples

Graph the following inequalities on the number line provided.

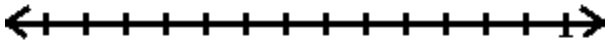
1. $x \leq 3$



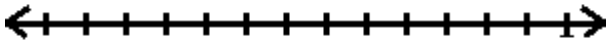
2. $y > -2$



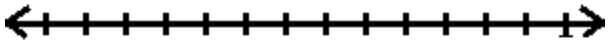
3. $4 < w$



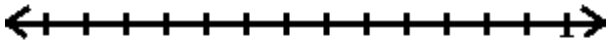
4. $-3 > b$



5. $x \leq 0$



6. $-2 \leq a$



Graphing Compound Inequalities

Compound Inequality	A statement with two inequality statements joined together with either the word "or" or the word "and".

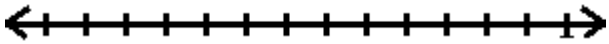
Conjunction	**Disjunction**

Examples

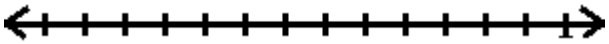
Graph each compound inequality.

1. $-3 < x$ **AND** $x < 5$

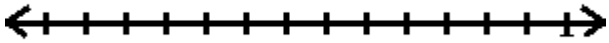
Another way to write:



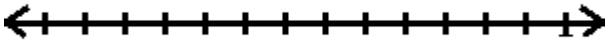
2. $x \leq -3$ **OR** $x > 5$



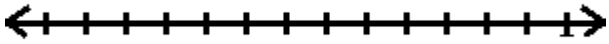
3. $-1 \leq w < 4$



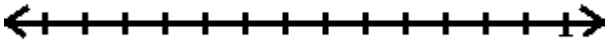
4. $n \geq 8$ **OR** $n \leq 6$



5. $x > -2$ **OR** $x < 3$



6. $4 \leq a \leq 7$



Solving Inequalities

Solving an inequality is just like solving an equation; however, there are times when you must reverse the inequality sign.

Reverse the Inequality Sign when…	• Multiplying by a negative number • Dividing by a negative number • Switching the left and right side of the inequality

Examples – One-Step Inequalities

Solve each inequality, check your answer, and graph your solution.

1. $a + 6 > -5$

2. $-2w < 12$

3. $5g > -25$

4. $-4 \geq -\frac{x}{5}$

Try These

5. $18 \geq 13 + b$

6. $\frac{a}{2} \leq 3$

7. $-4x < -2$

8. $5 \leq -\frac{2}{3}n$

Examples – Two-Step Inequalities

Solve each inequality, check your answer, and graph your solution.

7. $-6n + 4 > 22$

8. $42 \geq 30 - 4p$

9. $\frac{x}{2} + 10 < -1$

10. $3 \leq -\frac{1}{2}w + 8$

Examples – Multi-Step Inequalities

Solve each inequality, check your answer, and graph your solution.

11. $8a - 6 < 3a + 24$

12. $-2(m + 4) \geq 3m - 10$

13. $10w - 12 - 4w < 2w + 12$

14. $3p - 2(4 + 2p) \geq 7$

Try These

15. $5 - \frac{1}{2}w \leq -2$

16. $2(4r - 3) - 5r > -9$

17. $3 - 3(m - 4) < 6 - 4m$

18. $2(4 + k) \geq 3(k - 6)$

Solving Compound Inequalities

Conjunction	Disjunction
AND	OR
The solution must satisfy **both** inequalities for the conjunction to be true.	The solution must satisfy either of the inequalities for the disjunction to be true.
Look for the **overlap** or intersection in the graph of the two inequalities to be our solution.	The two inequalities **together** on the same graph or the union of the graphs will be our solution.

Examples – Conjunction

Solve each compound inequality and then graph the solution.

1. $-2 \leq 5x + 8 < 18$

2. $-6 < 2x - 4 \leq 10$

3. $-2 < 4x + 6 < 22$

4. $5 \leq 2 - 3x \leq 10$

Examples – Disjunction

Solve each compound inequality and then graph the solution.

1. $6x \leq -30$ or $4x + 9 \geq -3$

2. $7x + 8 \leq 43$ or $x - 16 > -13$

3. $6x - 8 > 4$ or $-4 > 6x + 2$

Modeling with Inequalities

Examples of Writing inequalities	
The age of the tree is **at least** 70 years old.	$t \geq 70$
The rent is **no less than** \$600 per month.	$r \geq 600$
The price of the paperback is **between** \$5.95 and \$7.95 **inclusive**.	$5.95 \leq p \leq 7.95$
The number of children is **at most** 50 and **more than** 20.	$n \leq 50$ and $n > 20$ $20 < n \leq 50$
Her time in the race was **no more than** 40 minutes.	$t \leq 40$
The value of the car is **at most** \$2,500.	$v \leq 2500$

Try These…

1. The house is at least 10 yards away. 1. _____
2. The temperature cannot exceed 78° F. 2. _____
3. The weight is at most 150 pounds. 3. _____
4. The trip takes between 3 and 5 hours. 4. _____
5. The cost is not less than $17. 5. _____
6. The gap is smaller than 2 cm. 6. _____
7. Her score was no more than 340 points. 7. _____
8. Joes owns at least 80 CDs. 8. _____

Steps for Solving Inequality Word Problems	**For each of the following:** • Underline key words in the problem • Define the Variable • Write Inequality • Solve inequality • Write your answer in a sentence

Examples

1. Mike wants to rent a car for his vacation. The rental costs $125 per week plus $0.15 a mile. How far to the nearest mile can Mike travel if he wants to spend at most $200.

Let x =

Inequality:

Sentence:

2. A video store charges $19.99 for a lifetime membership. Members pay $2.00 to rent a movie, while nonmembers pay $2.25. At least how many movies would a member have to rent in order to pay less, overall, than a nonmember?

Let x =

Inequality:

Sentence:

3. Carlos has $50 to spend at the book store, but he wants to have at least $10 left over for dinner. Each book he wants to buy costs $4.50. What is the maximum number of books that he can buy?

Let $x =$

Inequality:

Sentence:

Try These…

4. Jeff wants to raise at least $500 for his soccer fundraiser. He already raised $125 and earns $15 for each ticket he sells. What is the minimum number of tickets he has to sell to meet his goal?

5. Jane is at an amusement park. The admission cost is $25. Jane also wants to ride some of the rides, which are $2 each. Jane can spend no more than $56. What is the maximum number of rides that she can go on?

6. You rent a car and are offered 2 payment options. You can pay $25 a day plus 15¢ a mile (option A) or you can pay $10 a day plus 40¢ a mile (option B). For what amount of daily miles will option A be the cheaper plan?

7. Jeff is thinking of joining a Ski Club but has to think about the cost. He is willing to spend no more than $700. He must buy skis, which will cost $220. In addition, Jeff will have to pay $35 for each day he goes skiing. What is the maximum number of times Jeff can go skiing if he doesn't go over his budget?