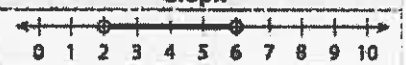
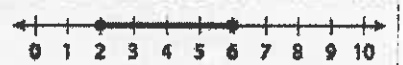
Algebra I
Lesson 2.5 Notes
Compound Inequalities

Name: _____

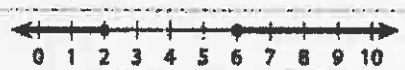
Key Definitions:

A Compound inequality is used to represent the relationships between two numbers.

One example of a compound inequality involves the word "*and*" and is true when both statements are true.

Algebra	Graph
$x > 2$ AND $x < 6$ $2 < x < 6$	
$x \geq 2$ AND $x \leq 6$ $2 \leq x \leq 6$	

Another example of a compound inequality involves the word "*or*" and is true when either **OR** both statements are true.

Algebra	Graph
$x < 2$ OR $x > 6$	
$x \leq 2$ OR $x \geq 6$	

Fill out the following truth tables.

P	Q	P True or False?	Q True or False?	P OR Q True or False?
1 is an odd number.	2 is an even number.	True	True	True
1 is an odd number.	2 is an odd number.	True	False	True
is an even number.	2 is an even number	False	True	True
1 is an even number.	2 is an odd number.	False	False	False

What do you notice? With "OR" if one statement is true, the whole statement is true

P	Q	P True or False?	Q True or False?	P AND Q True or False?
A dog is a mammal.	Red is a color.	True	True	True
A dog is a mammal.	Red is not a color.	True	False	False
A dog is a fish.	Red is a color.	False	True	False
A dog is a fish.	Red is not a color.	False	False	False

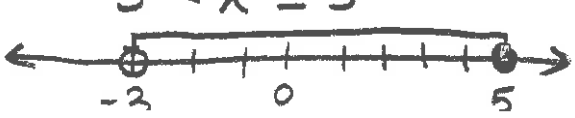
What do you notice? With "AND" if one statement is false, then the whole statement is false

Write a compound inequality that represents each phrase. Graph the solutions.

1. All real numbers that are greater than –3 and less than or equal to 5.

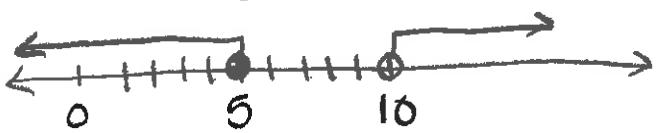
$x > -3$ and $x \leq 5$

$-3 < x \leq 5$



2. A runner must travel less than or equal to 5 miles or more than 10 miles to end up back at their house.

$x \leq 5$ or $x > 10$



Solve each compound inequality. Graph your solutions.

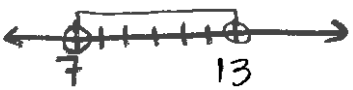
3. $5 < k - 2 < 11$

$5 < k-2$ and $k-2 < 11$

$+2 \quad +2 \qquad +2 \quad +2$

$7 < k$ and $k < 13$

$7 < k < 13$



4. $-3p + 2 < 2p - 3 \leq 12 - 3p$

$-3p+2 < 2p-3$ and $2p-3 \leq 12-3p$

$-5p < -5$ $\qquad 5p \leq 15$

$p > 1$ and $p \leq 3$

$1 < p \leq 3$

5. $4 \leq y + 2 \leq -3(y - 2) + 24$

$4 \leq y+2$ and $y+2 \leq -3(y-2)+24$

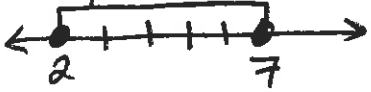
$2 \leq y$ and $y+2 \leq -3y+6+24$

$y+2 \leq -3y+30$

$4y \leq 28$

$y \leq 7$

$2 \leq y \leq 7$



6. $3 > \frac{11+k}{4} \geq -3$

$3 > \frac{11+k}{4}$ and $\frac{11+k}{4} \geq -3$

$12 > 11 + k$ $\qquad 11 + k \geq -12$

$1 > k$ $\qquad k \geq -23$

$-23 \leq k < 1$

7. $5 - m \geq 4$ or $7m > 35$

$-5 \quad -5 \qquad \frac{7m}{7} > \frac{35}{7}$

$-m \geq -1$ $\qquad m > 5$

$m \leq 1$ or $m > 5$

8. $6b - 1 \geq 41$ or $2b + 1 \leq 11$

$6b \geq 42$ $\qquad 2b \leq 10$

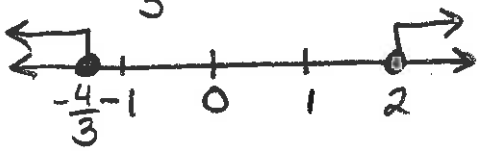
$b \geq 7$ $\qquad b \leq 5$

$b \geq 7$ or $b \leq 5$

9. $3d + 3 \leq -1$ or $5d + 2 \geq 12$

$3d \leq -4$ $\qquad 5d \geq 10$

$d \leq -\frac{4}{3}$ or $d \geq 2$



10. $\frac{1}{2}s + 3 < 5s - 1$ or $\frac{2}{3}s \geq s + 2$

$\frac{1}{2}s < 5s - 4$ $\qquad \frac{2}{3}s \geq s + 2$

$s < 10s - 8$ $\qquad 2s \geq 3s + 6$

$-9s < -8$ $\qquad -1s \geq 6$

$s > \frac{8}{9}$ $\qquad s \leq -6$

Write a compound inequality that each graph could represent.

11.

$x \leq -4$ or $x \geq 2$

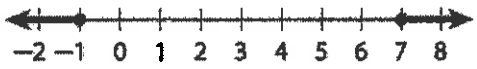
12.

$-3 \leq x \leq 2$

13.

$-2 < x < 1$

14.



$x \leq -3$ or $x \geq 7$