

Algebra I
Lesson 2.5 Notes
Compound Inequalities

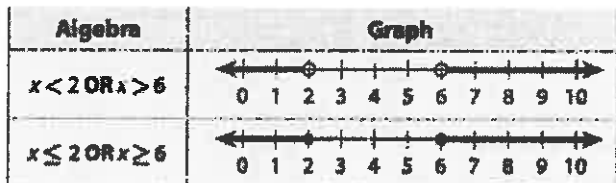
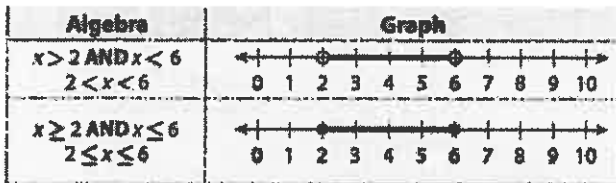
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Key Definitions:

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.

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



Fill out the following truth tables.

P	Q	P	Q	P OR Q
		True or False?	True or False?	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
1 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

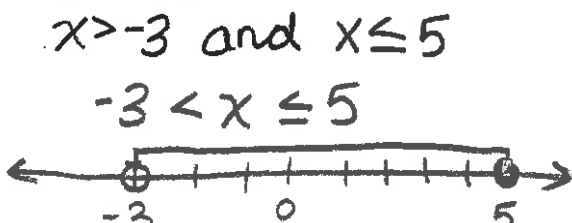
What do you notice? With "OR" if one statement is true, the whole statement is true

P	Q	P	Q	P AND Q
		True or False?	True or False?	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

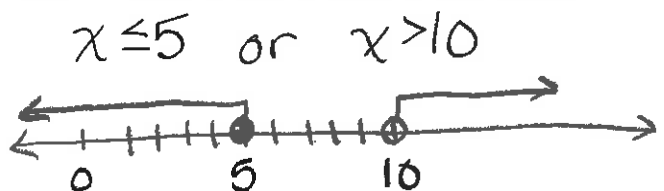
What do you notice? With "AND" if one statement is false, then the whole statement is false

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.



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



Solve each compound inequality. Graph your solutions.

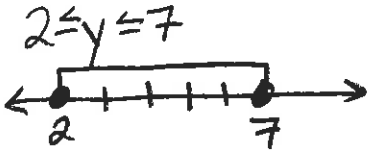
3. $5 < k - 2 < 11$

$$\begin{aligned} 5 < k - 2 & \text{ and } k - 2 < 11 \\ +2 & \quad +2 \qquad +2 \quad +2 \\ 7 < k & \text{ and } k < 13 \end{aligned}$$



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

$$\begin{aligned} 4 \leq y + 2 & \text{ and } y + 2 \leq -3(y - 2) + 24 \\ 2 \leq y & \text{ and } y + 2 \leq -3y + 6 + 24 \\ & y + 2 \leq -3y + 30 \\ & 4y \leq 28 \\ & y \leq 7 \end{aligned}$$

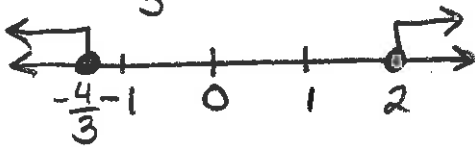


7. $5 - m \geq 4$ or $7m > \frac{35}{7}$
 $-5 \quad -5 \quad 7 \quad 7$
 $-m \geq -1 \quad m > 5$
 $m < 1$ or $m > 5$



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

$$\begin{aligned} 3d & \leq -4 & 5d & \geq 10 \\ d & \leq -\frac{4}{3} & \text{ or } d & \geq 2 \end{aligned}$$



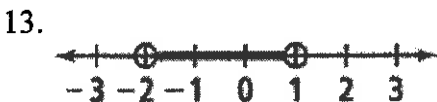
Write a compound inequality that each graph could represent.



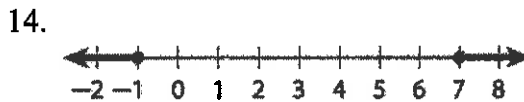
$x < -4$ or $x \geq 2$



$-3 \leq x \leq 2$



$-2 < x < 1$



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

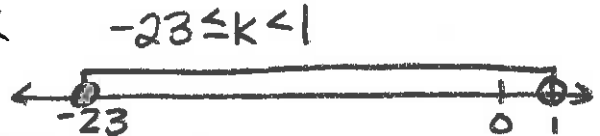
4. $-3p + 2 < 2p - 3 \leq 12 - 3p$

$$\begin{aligned} -3p + 2 < 2p - 3 & \text{ and } 2p - 3 \leq 12 - 3p \\ -5p < -5 & \qquad 5p \leq 15 \\ p > 1 & \text{ and } p \leq 3 \end{aligned}$$



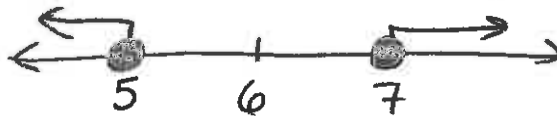
6. $3 > \frac{11+k}{4} \geq -3$

$$\begin{aligned} 3 > \frac{11+k}{4} & \text{ and } \frac{11+k}{4} \geq -3 \\ 12 > 11+k & \qquad 11+k \geq -12 \\ 1 > k & \qquad k \geq -23 \end{aligned}$$



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

$$\begin{aligned} 6b & \geq 42 & 2b & \leq 10 \\ b & \geq 7 & b & \leq 5 \\ b & \geq 7 & \text{ or } b & \leq 5 \end{aligned}$$



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

$$\begin{aligned} \frac{1}{2}s < 5s - 4 & \qquad \frac{2}{3}s \geq s + 2 \\ s < 10s - 8 & \qquad 2s \geq 3s + 6 \\ -9s < -8 & \qquad -1s \geq 6 \\ s > \frac{8}{9} & \qquad s \leq -6 \end{aligned}$$

