Compound Inequalities

The _____ of sets A and B is set of elements _____ to _____ A ____ B.

This is written $A \cap B$ and read "A intersect B".

In set-builder notation, $A \cap B =$ _____

Ex 1.

$\{6,7,8,9\} \cap \{5,6,8,10\} =$

$\{a,b,c\} \cap \{\} =$

The _____ of sets A and B is set of _____ elements in A ____ B.

This is written $A \cup B$ and read "A union B".

In set-builder notation, $A \cup B =$ _____

Ex 2.

$\{6,7,8,9\} \cup \{5,6,8,10\} =$

$\{m,a,t,h\} \cup \emptyset =$

In summary…

…to **intersect** two sets, take _____ elements.

…to **union** two sets, take _____ elements.

Inequalities joined by _____ or _____ are together called a _____.

ex: $2x - 3 < 4$ and $x + 4 < 10$

ex: $4x + 9 > 0$ or $-x + 3 \leq 7$

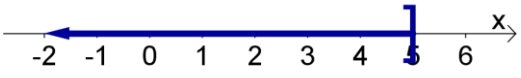
"And"

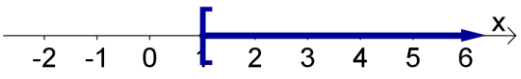
Let's look at the following compound inequality: $x \leq 5$ and $x \geq 1$

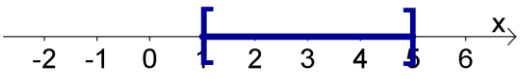
The **solution set** for the compound inequality is the set of all x that satisfy _____.

In other words, it's the *intersection* of the solution sets $(-\infty, 5]$ and $[1, \infty)$.

To find the solution set, graphing helps:

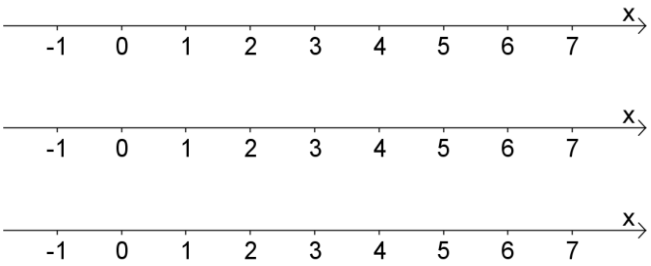






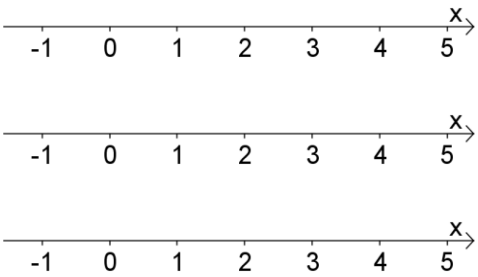
Ex 3.

Solve: $x + 2 < 4$ and $2x - 5 < 7$



Ex 4.

Solve: $4x - 5 > 7$ and $5x - 2 < 3$



Note: "$-2 < 3x + 1 < 7$" is a short way of writing "$-2 < 3x + 1$ and $3x + 1 < 7$"

Ex 5.

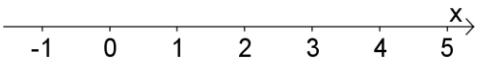
Solve: $-2 < 3x + 1 < 7$

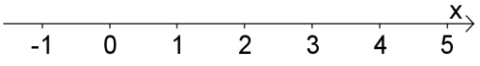
"Or"

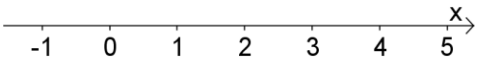
Let's look at the following compound inequality: $x \leq 1$ or $x \geq 4$

The **solution set** for the compound inequality is the set of all x that satisfy _____.
In other words, it's the *union* of the solution sets $(-\infty, 1]$ and $[4, \infty)$, written $(-\infty, 1] \cup [4, \infty)$

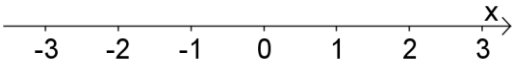
Ex 6.
Solve: $2x + 3 < 5$ or $15 - 2x \leq 9$

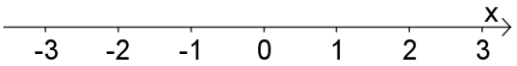


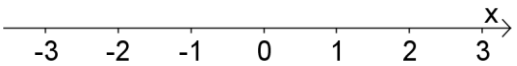




Ex 7.
Solve: $2x + 5 \geq 3$ or $2x + 3 < 3$





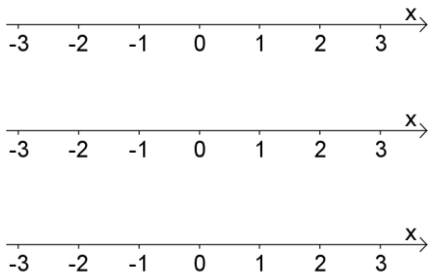


Practice

1. Find the following intersection of sets:
   $\{1, 3, 7\} \cap \{2, 3, 8\} =$
   $\{m, t, s, a, c\} \cap \emptyset =$

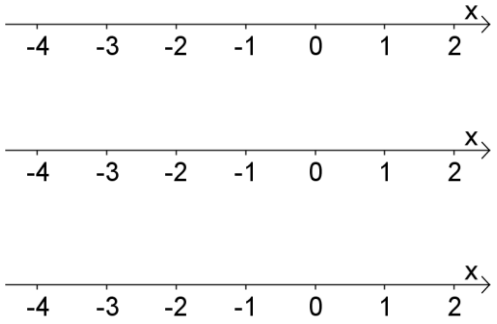
2. Find the following union of sets:
   $\{1, 3, 7\} \cup \{2, 3, 8\} =$
   $\{m, t, s, a, c\} \cup \emptyset =$

3. Solve: $3x + 2 > -4$ and $2x - 1 < 5$

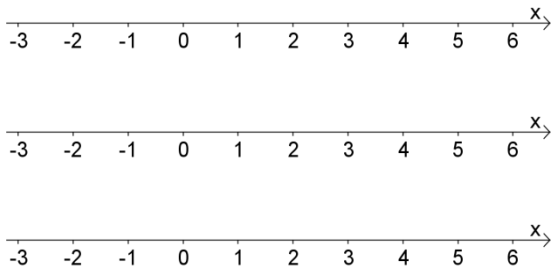


4. Solve: $3 \leq 4x - 3 < 19$

5. Solve: $2x - 5 \leq -11$ or $5x + 1 \geq 6$



6. Solve: $5(x - 2) > 15$ and $\frac{x-6}{4} \leq -2$



7. Solve: $2x + 1 < 15$ or $3x - 4 \geq -1$

Q: What has three feet but no legs or arms?