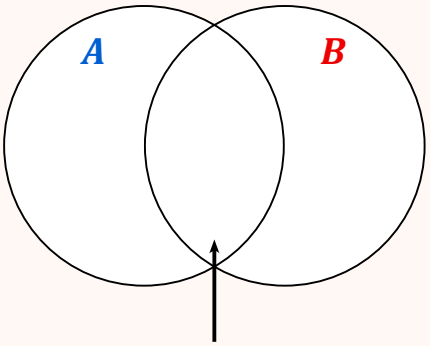
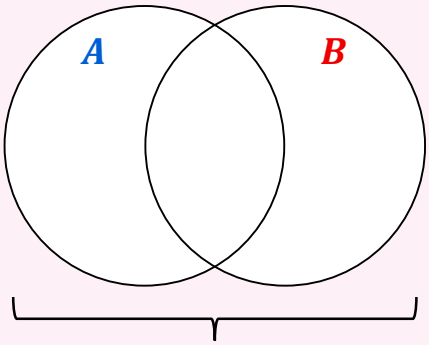
TOPIC: SET OPERATIONS AND COMPOUND INEQUALITIES

Intersection and Union of Sets

◆ Solving more advanced inequalities will involve the **intersection** (____) or **union** (____) of sets.

EXAMPLE If $A = \{1, 3, 5, 7, 9\}$ and $B = \{7, 9, 11, 13\}$, find $A \cap B$ and $A \cup B$.

INTERSECTION	UNION
	
$A \cap B$	$A \cup B$
"_____"	"_____"
Elements in **[BOTH | EITHER]** set(s)	Elements in **[BOTH | EITHER]** set(s)
(the _____)	*(_____ elements)*
$A \cap B =$	$A \cup B =$

◆ The *empty* set has ____ elements and is denoted by empty brackets { } of by the symbol ∅.

TOPIC: SET OPERATIONS AND COMPOUND INEQUALITIES

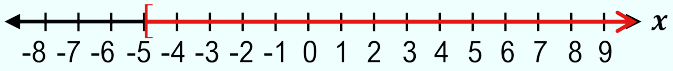
PRACTICE Given $A = \{2, 4, 6, 8\}$, $B = \{4, 8, 12, 16\}$, $C = \{8\}$, find the following:

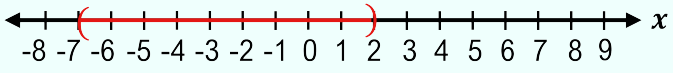
(A) $A \cap C$

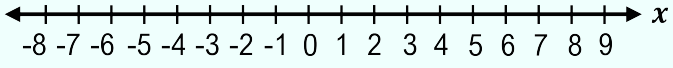
(B) $A \cup B$

(C) $C \cap \varnothing$

EXAMPLE Sketch the intersection of each of these pairs of sets.

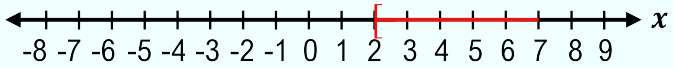


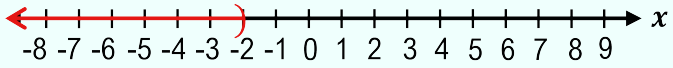


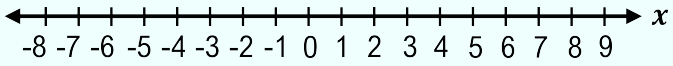


TOPIC: SET OPERATIONS AND COMPOUND INEQUALITIES

EXAMPLE Sketch the union of each of these pairs of sets.







TOPIC: SET OPERATIONS AND COMPOUND INEQUALITIES

Solving Compound Inequalities Containing "and"

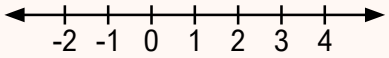
◆ A compound inequality is two inequalities linked by either "_____" or "_____".

► The solution of an *"and"* compound inequality is the _____ of the two solution sets.

EXAMPLE Solve the compound inequality $3x < 6$ and $x + 1 \geq 0$.

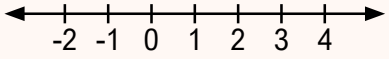
New **Compound Inequalities: "and"**

$3x < 6$

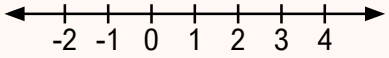


and

$x + 1 \geq 0$



Graph of Intersection:



Interval Notation:

Recall

$\geq$ or $\leq$ → Include with **[**or**]**
$>$ or $<$ → Exclude with **(**or**)**

(Interval Notation)

TOPIC: SET OPERATIONS AND COMPOUND INEQUALITIES

PRACTICE Solve the compound inequality. Express the answer in interval notation.

$(\boldsymbol{A})$ $-3x + 1 \leq 4$ and $x - 2 < 3$

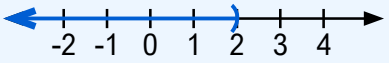
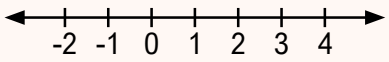
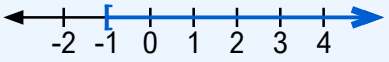
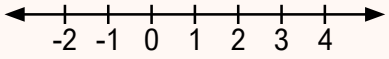
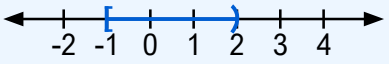
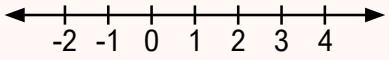
$(\boldsymbol{B})$ $x + 1 \leq 9$ and $x + 2 > 3$

TOPIC: SET OPERATIONS AND COMPOUND INEQUALITIES

Solving Compound Inequalities Containing "or"

◆ Recall: A compound inequality is two inequalities linked by either "***and***" or "***or***".

► The solution of an *"or"* compound inequality is the _____ of the two solution sets.

Recall — Compound Inequalities: "and"	New — Compound Inequalities: "or"
$x < 2$ 	$x \geq 3$ 
and	**or**
$x \geq -1$ 	$x < 0$ 
Intersection: 	**Union:** 
Interval Notation: $[1, 2)$	**Interval Notation:**

TOPIC: SET OPERATIONS AND COMPOUND INEQUALITIES

PRACTICE Solve the compound inequality. Express the answer in interval notation.

$(\boldsymbol{A})$

$\frac{x}{3} > 2$ or $4x + 1 < 5$

$(\boldsymbol{B})$

$2x - 3 \leq 1$ or $-x + 4 \leq 10$

EXAMPLE Translate the following into a compound inequality and solve.

A movie theatre offers a student discount to customers under 18 years old, and a senior discount to customers aged 60 up. If a represents a person's age, write and solve a compound inequality to represent the ages that qualify for a discount.

TOPIC: SET OPERATIONS AND COMPOUND INEQUALITIES

Solving Three Part Inequalities

◆ In a **Three Part Inequality**, the variable expression is between ____ inequality symbols.

► To solve, follow the same steps for simple inequalities on all ____ sides to isolate the variable.

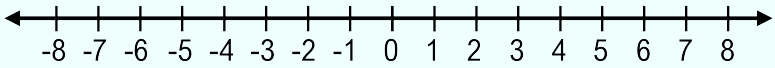
EXAMPLE Solve the three part inequality and graph the solution.

$-14 \leq 2x - 10 < 2$

New
$a < x < b$

Solution Set: Interval Notation:

Graph:



PRACTICE Solve the following inequalities and express the answer in interval notation.

(A)

$-4 \leq 2x + 1 \leq 7$

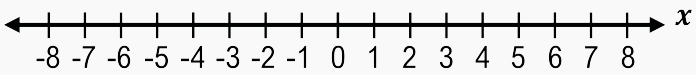
(B)

$1 < \frac{x-2}{2} \leq 4$

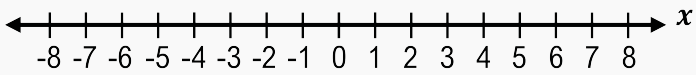
TOPIC: SET OPERATIONS AND COMPOUND INEQUALITIES

PRACTICE Solve the following inequalities and graph the solution.

(A) $-6 < 2x - 4 < 4$



(B) $-6 \leq 0.5(x - 4) < -3$



EXAMPLE Solve the following inequality and express the solution in interval notation. Then, graph the solution.

$4 < 6 - x \leq 8$