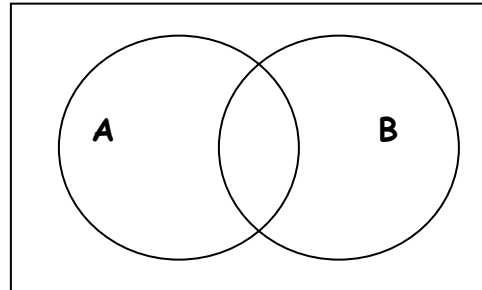


- A. **Set Intersection:** The intersection of two sets A and B , denoted _____, is the set of all elements **common to both** A and B .

Venn Diagram:

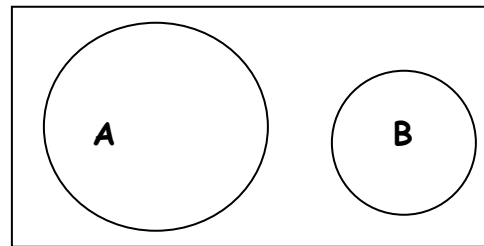
Note: $A \cap B = \{x \mid x \in A \text{ and } x \in B\}$

U



- B. **Disjoint Sets:** Two sets that have **no elements** in common; that is $A \cap B$ would be the empty set.

Venn Diagram:



Can you think of two sets that are disjoint?

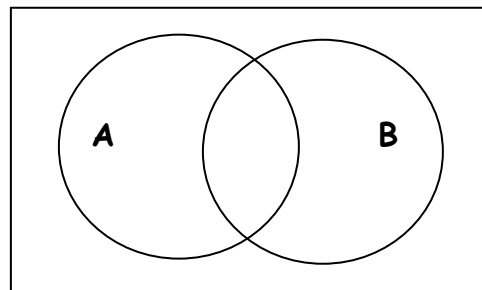
Two infinite sets that are disjoint?

- C. **Set Union:** The union of two sets A and B , denoted _____, is the set of **all elements in A or B**.

Venn Diagram:

Note: $A \cup B = \{x \mid x \in A \text{ or } x \in B\}$

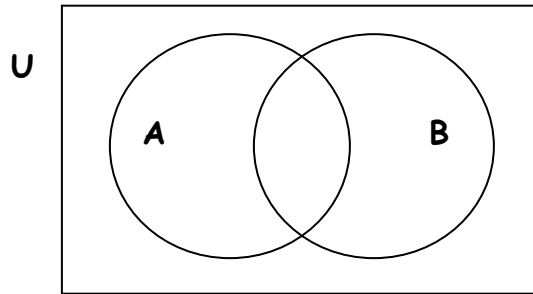
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D. **Set Difference:** The difference of two sets **B** and **A**, denoted _____,
Complement of A relative to B: is the set of all elements in **B** that are not in **A**.

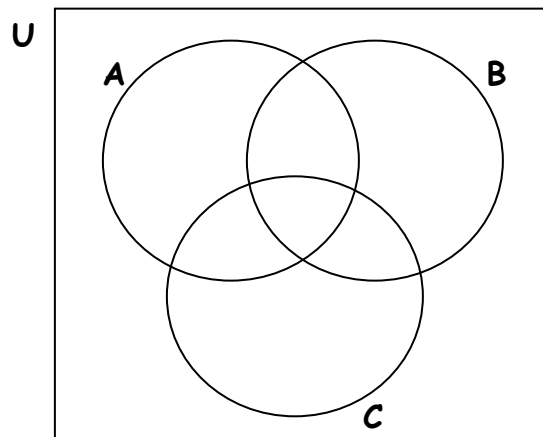
Venn Diagram:

Note: $B - A = \{x \mid x \in B \text{ and } x \notin A\}$



E. **EXAMPLES:** Given the universal set $U = \{u, n, i, v, e, r, s, a, l\}$ $A = \{s, i, l, v, e, r\}$
 $B = \{l, a, n, e\}$ $C = \{s, i, r\}$

Draw a Venn Diagram:



Find the following:

$A \cup B$

$B \cup C$

$A \cap B$

$A \cap C$

$B - A$

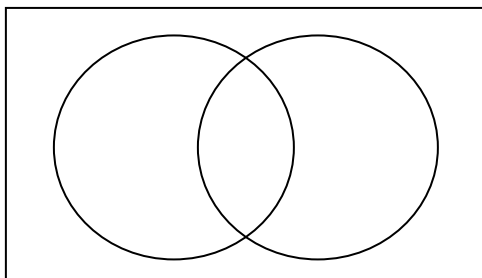
$A - B$

$B \cap C$

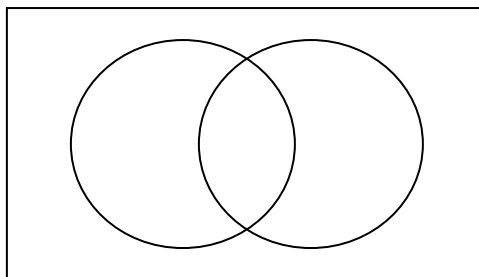
$n(A \cap C)$

$n(B \cap C)$

If $n(U) = 100$, $n(A) = 40$, $n(B) = 50$, and $n(A \cap B) = 15$, then draw a Venn diagram showing the cardinal number of each section of the diagram.



In a fraternity with 60 members, 35 take math, 10 take both math and biology, and 16 take neither math nor biology. How many take biology, but not math?



F. Cartesian Product

Another way to produce a set from two given sets is by forming the **Cartesian product**. This type of set is formed by pairing the elements of one set with the elements of another set in a specific way.

For any sets A and B , the **Cartesian product of A and B** , denoted _____, is the set of all **ordered pairs** such that the first component of each pair is an element of A and the second component of each pair is an element of B . $A \times B = \{ (x, y) \mid x \in A \text{ and } y \in B \}$

If $A = \{x, y, z\}$ and $B = \{O, \Delta\}$, find:

$A \times B$

$B \times A$

$A \times A$

TAKE HOME PROBLEM:

A survey of 80 sophomores at IUS showed that:

36 take English

32 take History

32 take Math

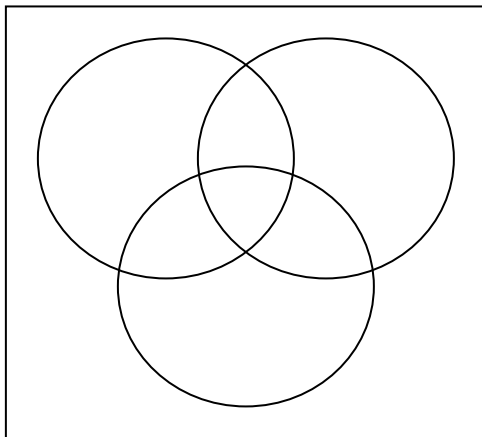
16 take History & English

16 take Math & History

14 take Math & English

6 take all three

- How many students take English and neither of the other two?
- How many students take none of the three courses?
- How many students take History and neither of the other two?
- How many students take Math & History, but not English?
- How many students do not take Math?



Answers: a. 12	b. 20	
c. 6	d. 10	e. 48