

Objectives:

After reading and completing this module, you will be able to do these:

- ✓ Show relationships between and among sets using Venn Diagram i.e. union, intersection and complementation.
- ✓ Define relationships between and among sets given in Venn diagram i.e. intersection and union of sets.



LESSON PROPER

VENN DIAGRAM

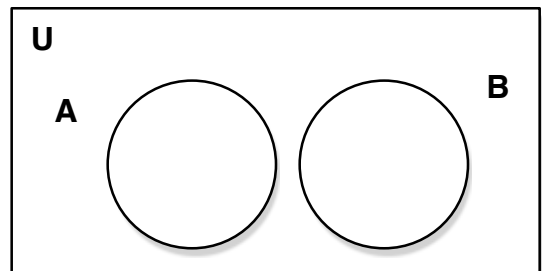
- The Venn diagram, named after the English logician **James Venn**, is a pictorial representation involving relations between and among the sets. It consists of a rectangle that represents the universal set and circles that represent the subsets.

UNIVERSAL SET

- The Universal set, or the **universe**, denoted by **U**, is the set that contains all elements being discussed in a given discussion.

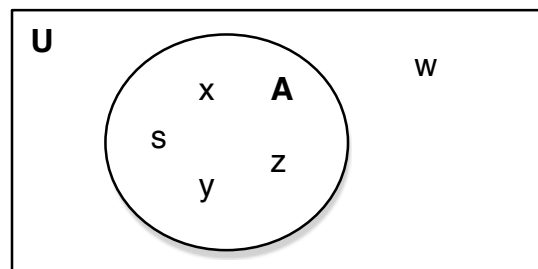
Example 1

Given: Universal set **U** with its subsets A and B.



Example 2

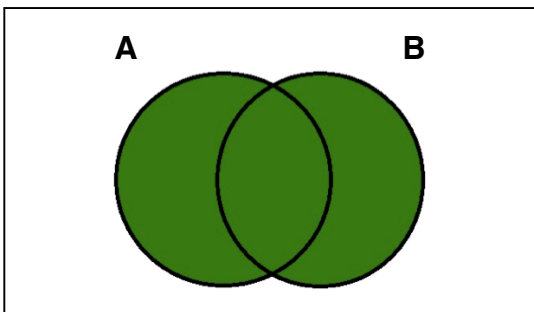
Given: $U = \{s, w, x, y, z\}$
 $A = \{s, x, y, x\}$



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Union of Sets

The union of two sets A and B, written $A \cup B$, is the set of all elements in A or in B. That is, $A \cup B = \{x \mid x \in A \text{ or } x \in B\}$.



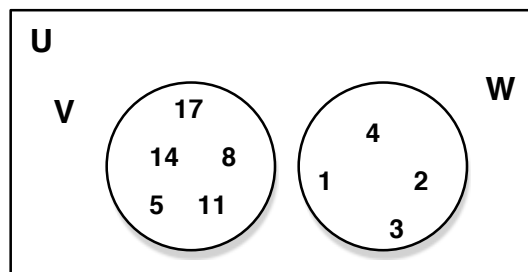
Example 3

Given: $V = \{5, 8, 11, 14, 27\}$

$W = \{1, 2, 3, 4\}$

Find: $V \cup W$

Answer: $V \cup W = \{1, 2, 3, 4, 5, 8, 11, 14, 17\}$



Example 4

Given: $G = \{2, 3, 4, 5\}$

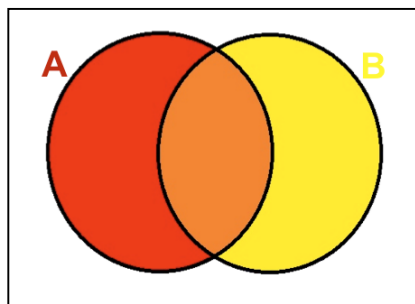
$H = \{3, 6, 9, 12\}$

Find: $G \cup H$

Answer: $G \cup H = \{2, 3, 4, 5, 6, 9, 12\}$

Intersection of Sets

The intersection of two sets A and B, written $A \cap B$, is the set of all elements common to both A and B. That is, $A \cap B = \{x \mid x \in A \text{ and } x \in B\}$.



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Example 5

Given: $G = \{2, 3, 4, 5\}$

$H = \{3, 6, 9, 12\}$

Find: $G \cap H$

Answer: $G \cap H = \{3\}$

Complement of a Set

The complement of set A, denoted by A' (read as A prime) or A^c , is the set of all elements in the universal set U that are not in A. That is, $A' = \{x \mid x \in U \text{ and } x \notin A\}$.

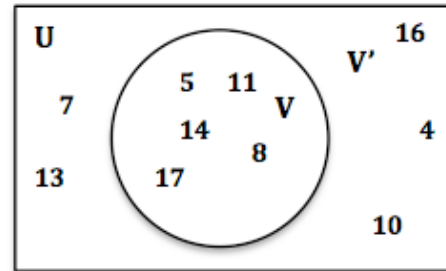
Example 6

Given: $U = \{4, 5, 7, 8, 10, 11, 13, 14, 16, 17\}$

$V = \{5, 8, 11, 14, 17\}$

Find: V' or V^c

Answer: $V' = \{4, 7, 10, 13, 16\}$



Example 7

Given: $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$

$A = \{2, 4, 6, 8, 10, 12\}$

$B = \{1, 3, 5, 7, 9, 11\}$

$C = \{4, 8, 12\}$

Find: $A \cup B$

$A \cap C$

$B \cap C$

C'

$(A \cup B)'$

Answer:

$A \cup B = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$

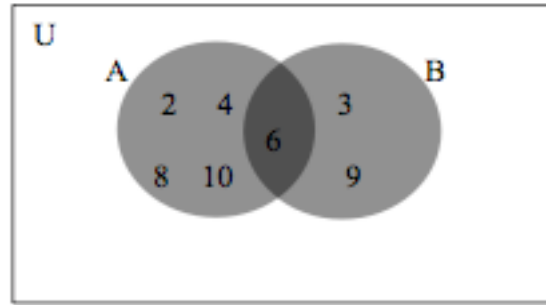
$A \cap C = \{4, 8, 12\}$

$B \cup C = \{1, 3, 4, 5, 7, 8, 9, 11, 12\}$

$C' = \{1, 2, 3, 5, 6, 7, 9, 10, 11\}$

$(A \cup B)' = \{ \}$

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Example 8

Find: $A \cup B$

$A \cap B$

A'

B'

$(A \cup B)'$

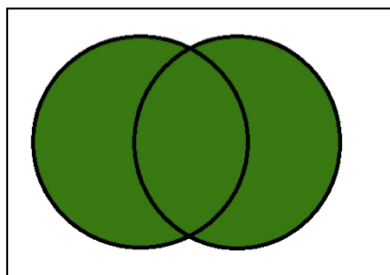
Answer: $A \cup B = \{2, 3, 4, 6, 8, 9, 10\}$

$A \cap B = \{6\}$

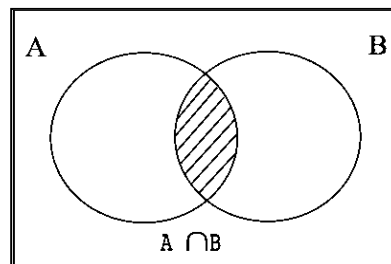
$A' = \{3, 9\}$

$B' = \{2, 4, 8, 10\}$

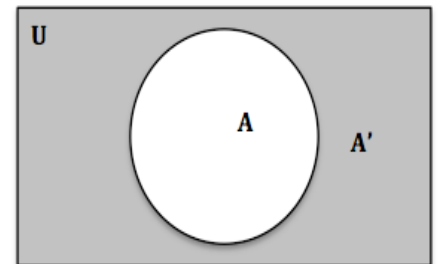
$(A \cup B)' = \{ \}$



Union



Intersection



Complement