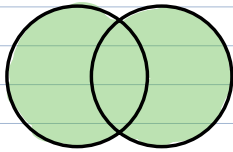


$$A = \{10, 20, 30\}$$

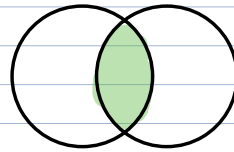
$$10 \in A \quad | \quad 50 \notin A.$$

① Union ② Intersection ③ Difference

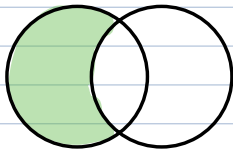
④ Symmetric Difference ⑤ Subset ⑥ Superset



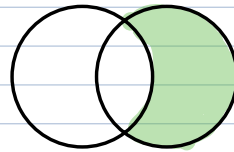
$$A \cup B = \{x : x \in A \text{ or } x \in B\}$$



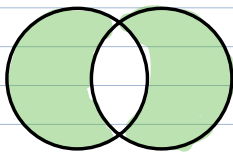
$$A \cap B = \{x : x \in A \text{ and } x \in B\}$$



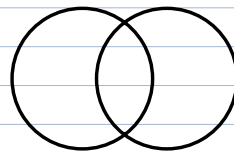
$$A - B = \{x : x \in A \text{ and } x \notin B\}$$



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



$$A \oplus B = (A - B) \cup (B - A)$$



$$A = \{10, 20, 30, 40, 50\} \quad A \cup B = \{10, 20, 30, 40, 50, 60, 70, 80\}$$

$$B = \{40, 50, 60, 70, 80\} \quad A \cap B = \{40, 50\}$$

$$A - B = \{10, 20, 30\}$$

$$B - A = \{60, 70, 80\}$$

$$A \oplus B = (A - B) \cup (B - A)$$

$$= \{10, 20, 30\} \cup \{60, 70, 80\}$$

$$= \{10, 20, 30, 60, 70, 80\}$$

$$A \oplus B = (A - B) \cup (B - A) \dots \text{By definition}$$

$$= (B - A) \cup (A - B) \dots \cup - \text{commutative}$$

$$= B \oplus A \dots \text{By definition.}$$

☞ Proof that the symmetric difference is commutative.

$$A \cup B = (A - B) \cup (B - A) \cup (A \cap B)$$

Subset:

① A is a subset of B.

• If all elements in set A are elements of set B as well then we say that A is a subset of B.

• It is NOT NECESSARY that set B should've at least one element which is not element of A.

$$A = \{10, 20, 30, 40\}, B = \{10, 20, 30, 40, 50\}$$

$$C = \{40, 20, 10, 30\}, D = \{10, 20, 5, 15\}$$

All elements in A are present in B.

$\therefore A \subset B$.
A is Subset of B. | Here B contains element
so which is not in A.

All elements in A are present in C.

$\therefore A \subset C$ | Here C does not have any
element which is not in A

$\therefore A = C$.

$\therefore A \subset A$ Because all elements in A are
present in A.

A is not subset of D.

① A is a subset of B.

All elements in A are also in B.

B has at least one element which is not in A	B does not have any element which is not in A.
--	--

A is a PROPER
SUBSET OF B

A is an IMPROPER
SUBSET OF B

$A \subset B$

$A \subseteq B$

Sometimes mathematicians make
this difference.

⑥ Superset :

A is a Superset of B.

if

B is a Subset of A.

$$B \subseteq A.$$

$$A = \{10, 20, 30, 40\} \quad B = \{10, 20, 30, 40, 50\}$$

A is a Subset of B \equiv True

B is a Superset of A \equiv True.

$$A \subseteq B$$

\therefore A is a Superset A.

$$\forall A, \forall B \quad A \supset B \text{ if } B \subseteq A.$$

A is a Superset of B.

Disjoint sets:

Set A and B are mutually disjoint

$$\text{if } A \cap B = \{\}$$

\hookrightarrow empty set

Empty set notation : \emptyset .

$$\text{if } A \cap B = \emptyset.$$