

VENN DIAGRAMS

1. Starter — Quick Review (5 minutes)

Let:

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

True or False:

1. $4 \in A$
2. $5 \in A$
3. $\{2, 4\} \subset A$
4. A has 5 elements.

- **Universal set** — 全集
- **Subset** — 子集
- **Union** — 并集
- **Intersection** — 交集
- **Complement** — 补集
- **Empty set** — 空集
- **Venn diagram** — 维恩图

Universal Set

The **universal set** contains all the elements being considered.

Example:

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

Let:

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

Therefore:

$$A \subset U$$

Empty Set

A set containing **no elements** is called the **empty set**.

Symbols:

$$\emptyset \quad \text{or} \quad \{\}$$

Example:

$$B = \{\text{prime numbers between 8 and 10}\}$$

Therefore:

$$B = \emptyset$$

3. Union of Sets (10 minutes)

The **union** contains everything in either set.

Symbol:

$$A \cup B$$

Example:

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

$$B = \{3, 4, 5, 6\}$$

Therefore:

$$A \cup B = \{1, 2, 3, 4, 5, 6\}$$

Key idea

Union = combine everything.

4. Intersection of Sets (10 minutes)

The **intersection** contains elements common to both sets.

Symbol:

$$A \cap B$$

Using the same example:

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

$$B = \{3, 4, 5, 6\}$$

Therefore:

$$A \cap B = \{3, 4\}$$

Key idea

Intersection = what they have in common.

5. Complement of a Set (10 minutes)

The **complement** contains everything in the universal set that is **not** in the set.

Symbol:

$$A'$$

Example:

$$U = \{1, 2, 3, 4, 5, 6\}$$

$$A = \{2, 4, 6\}$$

Therefore:

$$A' = \{1, 3, 5\}$$

Key idea

Complement = everything outside the set.

Give students:

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

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

$$B = \{2, 3, 5, 7\}$$

Find

$$A \cap B =$$

$$A \cup B =$$

$$A' =$$

$$A \cap B = \{2\}$$

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

$$A' = \{1, 3, 5, 7, 9\}$$

7. Stretch & Challenge 🔥

In a class of 30 students:

- 18 play football.
- 15 play basketball.
- 8 play both.

Ask:

1. How many play **football or basketball**?
2. How many play **only football**?
3. How many play **only basketball**?
4. How many play **neither**?

Using:

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

1. $18 + 15 - 8 = \boxed{25}$

2. $18 - 8 = \boxed{10}$

3. $15 - 8 = \boxed{7}$

4. $30 - 25 = \boxed{5}$

Exit Ticket

Before leaving, students answer:

1. What does $A \cup B$ mean?
2. What does $A \cap B$ mean?
3. What does A' mean?
4. What is the empty set?
5. Draw a simple Venn diagram showing two sets that overlap.

1. $A \cup B \rightarrow$ Union of A and B
2. $A \cap B \rightarrow$ Intersection of A and B
3. $A' \rightarrow$ Complement of A
4. Empty set $\rightarrow \boxed{\emptyset}$
5. Venn diagram $\rightarrow$ Two overlapping circles representing the sets.

TRUE or FALSE

If $A = \{1, 2, 3\}$ and $B = \{3, 4, 5\}$, then $A \cap B = \{3\}$

TRUE or FALSE

If $A \subseteq B$, then $A \cap B = A$

TRUE or FALSE

$$A \cup \emptyset = A$$

TRUE or FALSE

$A \cup A' = U$ for every set A .