

Set Notation and Venn diagrams

Starter

1. **(Review of last lesson)** A passcode has 5 entries and each entry can be the letters A, B, C or D. How many different pass codes are there?

Notes

A set is made up of **elements** (or **members**) and the elements are written in **curly brackets**. The elements are separated by commas.

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

N.B. Elements can be numbers, letters, words etc.
Elements of a set are not listed twice

E.g. List the set of letters, S, of the word PEOPLE.

Working: $S = \{P, E, O, L\}$

Set notation

\in – “is a member of”

E.g. $3 \in A$ (“3 is an element of A”)

\notin – “is not a member of”

E.g. $7 \notin B$ (“7 is not an element of B”)

$n(A)$ – the number of elements in set A

E.g. $n(A) = 4$ (“there are 4 elements in set A”)

\cap – **intersection** (or overlap, AND)

E.g. $A \cap B = \{4, 5\}$
(the elements 4 and 5 are in **both A and B**)

\cup – **union** (or combine, OR)

E.g. $A \cup B = \{2, 3, 4, 5, 6\}$
(the elements 2, 3, 4, 5 and 6 are **either in A or in B or both**)

$'$ – **complement**, NOT

$A' \Rightarrow$ what is not in A

\mathcal{E} – universal set

The universal set is the set of values from which the sets can be chosen

\emptyset or $\{ \}$ – empty set

The empty set is the set with no members

The members of sets are usually shown in Venn diagrams.

E.g. 1 Simplify: (a) $\{a, b, c\} \cup \{c, d\}$ (b) $\{a, b, c\} \cap \{c, d\}$

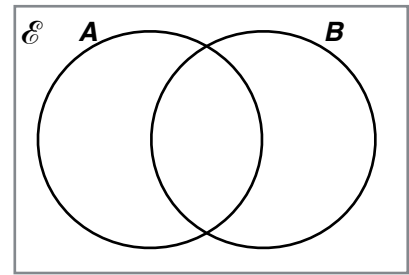
Working: (a) \cup means union i.e. elements either in one or both sets
So $\{a, b, c, d\}$

(b) \cap means intersection i.e. elements in the both sets
So $\{c\}$

Visual representation of key set notation

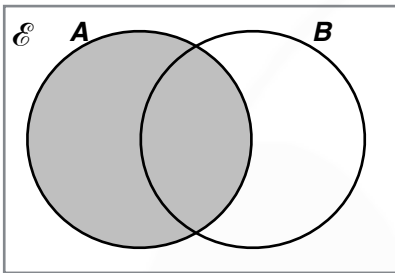
E.g. 2 In diagrams like the one to the right, shade the region given by:

- | | |
|-------------------|-------------------|
| (a) A | (b) $A \cup B$ |
| (c) $A \cap B$ | (d) A' |
| (e) $(A \cup B)'$ | (f) $(A \cap B)'$ |



Working:

- (a) Shade the set A



E.g. 3 Let \mathcal{E} = the digits from 0 to 9.

Let $P = \{1, 2, 3, 4, 5\}$

Let $Q = \{4, 5, 6, 7, 8\}$

- (a) Draw a Venn diagram to show this information.

List the sets:

- | | | |
|----------------|----------------------|-------------------|
| (b) $P \cap Q$ | (c) $P \cup Q$ | (d) P' |
| (e) $n(Q')$ | (f) $n((P \cup Q)')$ | (g) $(P \cap Q)'$ |

Video: [Set notation](#)

[Solutions to Starter and E.g.s](#)

Exercise

- | | |
|----------------------|------------------|
| 9-1 class textbook: | p244 M8.5 Qu 1-7 |
| A*-G class textbook: | No exercise |
| 9-1 homework book: | p83 M8.5 Qu 1-5 |
| A*-G homework book: | No exercise |

Summary

A set is made up of **elements** (or **members**) and the elements are written in **curly brackets**. The elements are separated by commas.

\in – “is a member of”

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$n(A)$ – the number of elements in set A

\cap – **intersection** (or overlap, AND)

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[Homework book answers \(only available during a lockdown\)](#)