

SETS

WHAT IS A SET? A COLLECTION OF ITEMS / OBJECTS "ELEMENTS"

HOW DO WE DESCRIBE SETS?

• LIST OF ELEMENTS

eg. $\{2, 4, 8, 16\}$

WE USE "CURLY BRACKETS"

• RULES eg. $\{\text{EVEN NUMBERS BETWEEN 1 AND 10}\}$

↓
COULD BE WRITTEN

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

EQUAL SETS HAVE SAME "ELEMENTS"

eg. $A = \{1, 3, 5, 7\}$ $B = \{3, 7, 1, 5\}$

So, $A = B$

NULL SET / EMPTY SET HAS NO ELEMENTS
SYMBOL = \emptyset OR $\{\}$

SUBSET = "A SET WITHIN A SET"

eg. $\{\text{"THE COUNTIES OF MUNSTER"}\}$ IS A SUBSET OF $\{\text{"THE COUNTIES OF IRELAND"}\}$

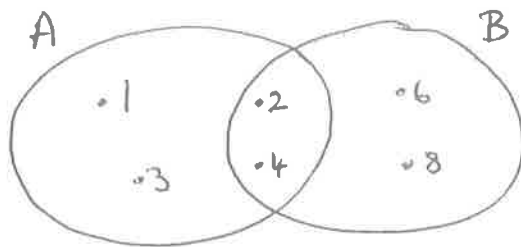
EACH ELEMENT OF THE SUBSET IS AN ELEMENT OF THE ORIGINAL SET

VENN DIAGRAMS

PICTURES/DIAGRAMS THAT REPRESENT SETS / AREAS OF SETS.

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

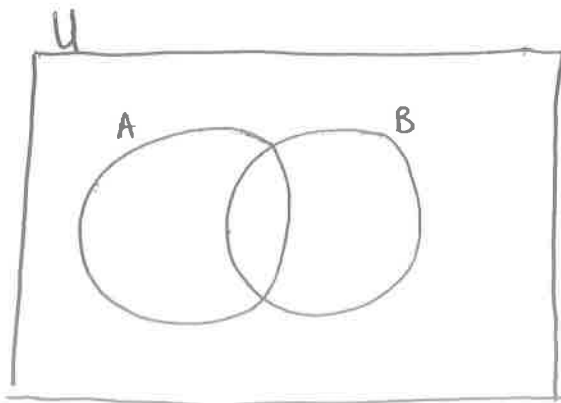
$B = \{2, 4, 6, 8\}$



THE "UNIVERSAL SET" U (NOT TO BE CONFUSED WITH "UNION")

- CONTAINS "ALL" THE ELEMENTS.
- DEFINES "BOUNDARIES" / LIMITS TO PARTICULAR QUESTIONS.

eg IF WE'RE DOING A QUESTION ON A PARTICULAR CLASS, THE UNIVERSAL SET IS EVERY "ELEMENT" / MEMBER OF THE CLASS.



IMPORTANT

IF YOU ARE ASKED TO FILL IN A VENN DIAGRAM, ALWAYS TRY TO START IN THE MIDDLE AND WORK OUTWARDS.

IMPORTANT TERMS

UNION

"ALL" THE ELEMENTS THAT ARE IN EITHER / BOTH OF THE SETS.

SYMBOL \cup



REMEMBER "TEACHERS UNION IS ALL THE TEACHERS"

INTERSECTION

~~ANY~~ ANY ELEMENTS WHICH ARE IN BOTH SETS. ie. WHERE THEY CROSS OVER

SYMBOL



CARDINAL NUMBER

(#)

NUMBER OF ELEMENTS IN THE SET.

COMPLEMENT

ANY ELEMENT [^]NOT IN[^] THE SET

SYMBOL

A'



- ANYTHING NOT IN A / "EVERYTHING ELSE"

"LESS"



eg A/B

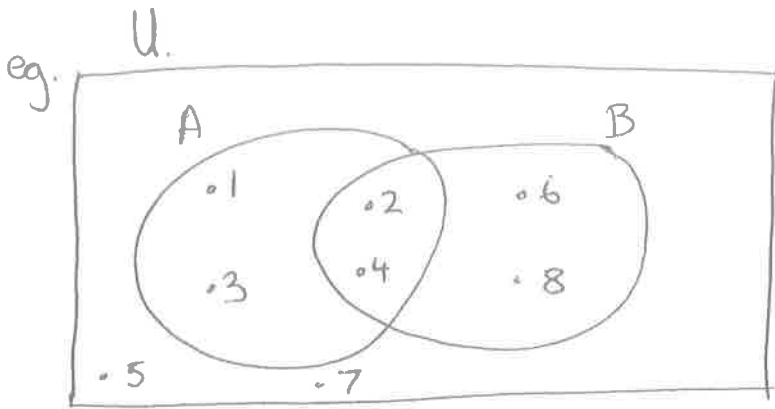
MEANS ANYTHING IN A THAT IS NOT IN B AS WELL.

SYMBOL



Sets Symbols

Symbol	Symbol Name	Meaning / definition	Example
$\{ \}$	Set	a collection of elements	$A=\{3,7,9,14\}$, $B=\{9,14,28\}$
$A \cap B$	intersection	objects that belong to set A and set B	$A \cap B = \{9,14\}$
$A \cup B$	Union	objects that belong to set A or set B	$A \cup B = \{3,7,9,14,28\}$
$A \subseteq B$	subset	subset has less elements or equal to the set	$\{9,14,28\} \subseteq \{9,14,28\}$
$A = B$	equality	both sets have the same members	$A=\{3,9,14\}$, $B=\{3,9,14\}$, $A=B$
A'	complement	all the objects that do not belong to set A	
$A \setminus B$	"less"	objects that belong to A and not to B	$A=\{3,9,14\}$, $B=\{1,2,3\}$, $A \setminus B = \{9,14\}$
$a \in A$	element of	set membership	$A=\{3,9,14\}$, $3 \in A$
$x \notin A$	not element of	no set membership	$A=\{3,9,14\}$, $1 \notin A$
$\#A$	cardinality	the number of elements of set A	$A=\{3,9,14\}$, $\#A=3$
\emptyset	empty set	$\emptyset = \{ \}$	$C = \{\emptyset\}$
U	universal set	set of all possible values	
\mathbb{N}	natural numbers set	$\mathbb{N} = \{1,2,3,4,5,\dots\}$	$6 \in \mathbb{N}$
\mathbb{Z}	integer numbers set	$\mathbb{Z} = \{\dots-3,-2,-1,0,1,2,3,\dots\}$	$-6 \in \mathbb{Z}$
\mathbb{R}	real numbers set	$\mathbb{R} = \{x \mid -\infty < x < \infty\}$	$6.343434 \in \mathbb{R}$



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

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

$$A' = \{5, 6, 7, 8\}$$

$$A \setminus B = \{1, 3\}$$

← NOTE : $A \setminus B$ IS NOT SAME AS $B \setminus A$

$$B \setminus A = \{6, 8\}$$

$$A \cup B = \{1, 2, 3, 4, 6, 8\}$$

$$A \cap B = \{2, 4\}$$

$$(A \cup B)' = \{5, 7\}$$

← TRICKY : THE COMPLEMENT OF $A \cup B$

$$\# A = 4$$

USING VENN DIAGRAMS (CAN ALSO BE USED FOR PROBABILITY)

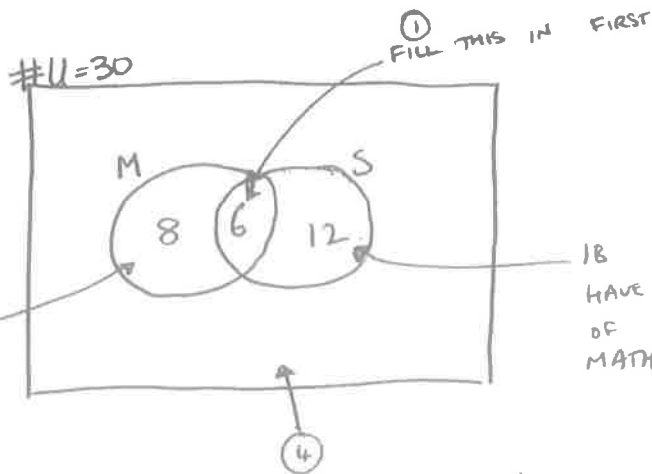
WE OFTEN USE VENN DIAGRAMS TO SHOW THE NUMBER OF ELEMENTS, RATHER THAN THE ACTUAL ELEMENTS THEMSELVES.

- TRY TO START IN THE MIDDLE
- READ THE QUESTION CAREFULLY.

eg THERE ARE 30 STUDENTS IN A CLASS.
18 LIKE SCIENCE
14 LIKE MATHS
6 LIKE BOTH MATHS AND SCIENCE

FILL THIS INFORMATION INTO A VENN DIAGRAM AND USE THIS TO WORK OUT HOW MANY STUDENTS DON'T LIKE MATHS OR SCIENCE

ANSWER



② 14 LIKE MATHS BUT WE HAVE ALREADY FILLED IN 6 OF THESE WHO LIKE BOTH SUBJECTS
 $14 - 6 = 8$

③ 18 LIKE SCIENCE, BUT WE HAVE ALREADY FILLED IN 6 OF THESE WHO ALSO LIKE MATHS, SO $18 - 6 = 12$

THIS IS THE "NICE" BIT.
WE KNOW THERE ARE 30 IN THE CLASS.
WE'VE ALREADY FILLED IN
 $8 + 6 + 12 = \boxed{26}$ OF THEM.

SO THERE MUST BE

$30 - 26 = \boxed{4}$ WHO DON'T LIKE MATHS OR SCIENCE.