CHAPTER 1 EM Sets

1) Set Notations

a) Listing the elements of a set eg: $S = \{3, 6, 9\}$

b) Describing the elements of a set eg: $S = \{x : x \text{ is a multiple of 3 less than 11}\}$

2) Symbols

Example: $\xi = \{x : x \text{ is a positive integer less than 11}\}$

$A = \{1, 2, 3, 4, 8\}$ $D = \{\ \}$

$B = \{3, 5, 8, 10\}$ $E = \{8, 3, 10, 5\}$

$C = \{9\}$ $F = \{3, 2, 1\}$

Symbol	Meaning	Example	Explanation
ξ	universal set	$\xi = \{x : x \text{ is a positive integer less than 11}\}$	Only positive integers less than 11 are being considered. $\xi = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
$\{\ \}$ or $\emptyset$	Empty set	$D = \{\ \}$ or $D = \emptyset$	Set D contains no elements.
$\in$	an element of	$3 \in B$	3 is an element of B.
$\notin$	not an element of	$7 \notin B$	7 is not an element of B.
$n(\ )$	number of elements	$n(A) = 5$ $n(C) = 1$	Set A contains 5 elements. Set C contains 1 element.
$\subseteq$	subset of	Other possible Eg: $E \subseteq B$ $D \subseteq B$ $D \subseteq F$ $F \subseteq A$ $D \subseteq C$ $\{4, 3\} \subseteq A$	Every element of E is also in B. Every element of F is also in A *subset = smaller OR equal
$\not\subseteq$	not a subset of	$E \not\subseteq A$	Not every element of E is in A.
$\subset$	proper subset of	Other possible Eg: $F \subset A$ $D \subset B$ $\{3\} \subset F$	Every element of F is in A and A has at least one element that is not in F (i.e. $F \neq A$). *proper subset = smaller only
$\not\subset$	not a proper subset of	$E \not\subset B$ $F \not\subset B$	E is equal to B so E cannot be a proper subset of B. F contains elements that are not in B.
$=$	equal sets	$B = E$	B and E contain exactly the same elements.
$\cap$	intersection	$A \cap E = \{3, 8\}$	3 and 8 are common to both A and E
$\cup$	union	$B \cup F = \{1, 2, 3, 5, 8, 10\}$	1, 2, 3, 5, 8, 10 belong to B or F.
$'$	complement	$A' = \{5, 6, 7, 9, 10\}$	5, 6, 7, 9, 10 belong to ξ but not to A.
	disjoint	C and F are disjoint sets	C and F have no elements in common. $C \cap B = \emptyset$

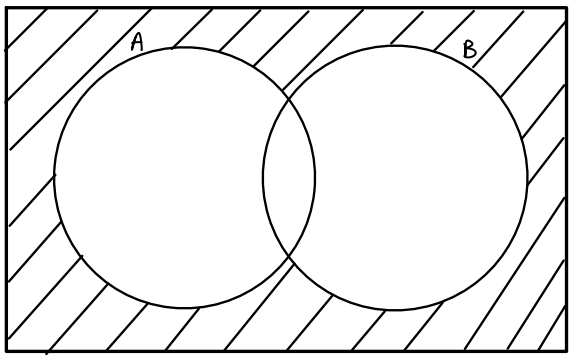
3) Venn Diagram

- use a ruler to shade!

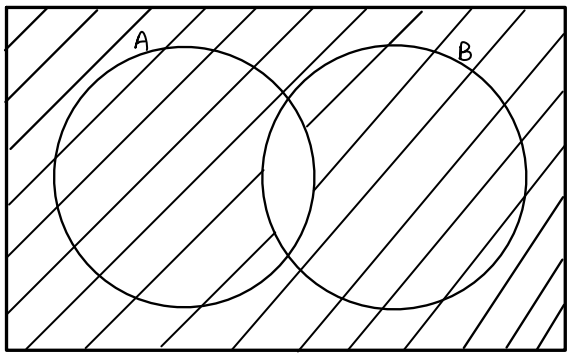
TIP Intersection : shade left, shade right, take overlap

Union : shade left, shade right.

Eg: $A' \cap B'$



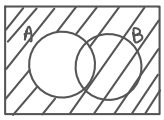
Eg: $A' \cup B'$



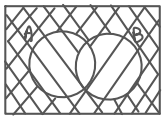
Steps

On a separate diagram,

① Shade A' first



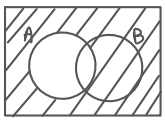
② Shade B' next in another direction



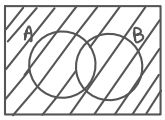
③ The overlapping region is the answer. Shade in the final diagram.

Shade directly in the final diagram

① Shade A' first



② Shade B' next



→ only the intersection is not shaded.

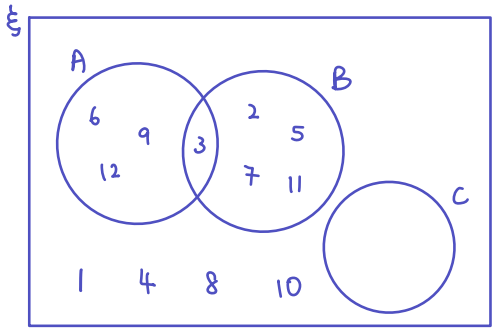
Example:

$\xi = \{x : x \text{ is a positive integer less than } 13\}$

$A = \{x : x \text{ is a multiple of } 3\} = \{3, 6, 9, 12\}$

$B = \{x : x \text{ is a prime number}\} = \{2, 3, 5, 7, 11\}$

$C = \{\ \}$



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

B and C are disjoint sets.

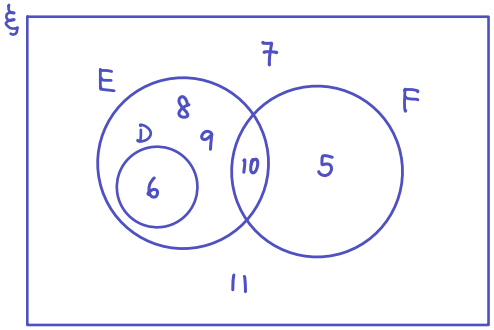
Example:

$\xi = \{x : x \text{ is an integer between 4 and 12}\}$

$D = \{x : x \text{ is a multiple of 6}\} = \{6\}$

$E = \{x : x \text{ is a composite number}\} = \{6, 8, 9, 10\}$

$F = \{x : x \text{ is a multiple of 5}\} = \{5, 10\}$



$D \subset E$ $D' \cap F' = \{7, 8, 9, 11\}$

$11 \notin F$ $D \cup (F \cap E) = \{6, 10\}$