

## Venn Diagrams

Set - A collection of elements

$$A = \{1, 2, 3, 4, 5\} \quad B = \{2, 4, 6, 8, 10\}$$

Union ( $\cup$ ) - The elements in A, B or both A and B

$$A \cup B: \{1, 2, 3, 4, 5, 6, 8, 10\}$$

Intersection ( $\cap$ ) - The elements in both A and B

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

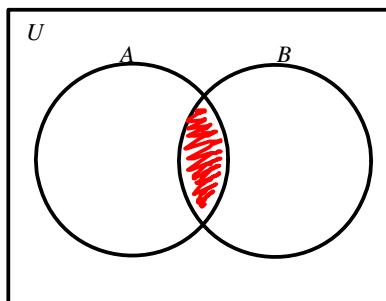
Disjoint / Mutually Exclusive - A and B have no elements in common

$$\emptyset \quad \{ \}$$

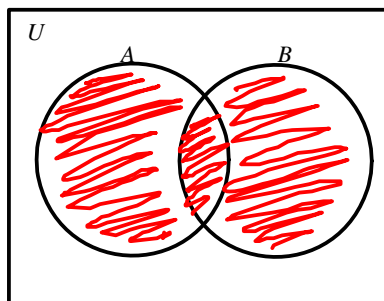
Universal Set ( $U$ ) - The elements in A, B, both A and B and neither

Subset ( $\subset$ ) - Every element in A is also an element of B

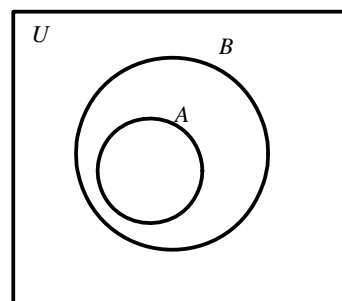
Venn Diagrams - Pictures that represent the union or intersection of sets



$A \cap B$

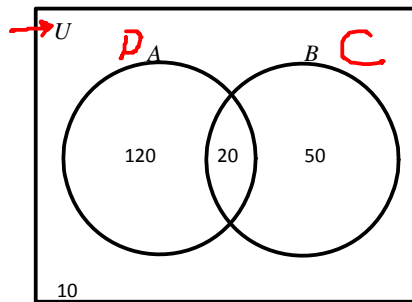


$A \cup B$



$A \subset B$

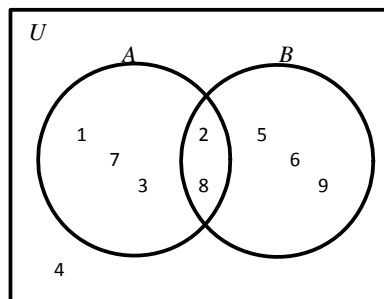
1. The Venn Diagram below shows the students in the junior class who take physics and chemistry. Set  $A$  represents the number of students who take physics and Set  $B$  represents the number of students who take chemistry.



- a) How many students take physics?  $120 + 20 = 140$
- b) How many students take chemistry?  $50 + 20 = 70$
- c) How many students take both classes?  $20$
- d) How many students take either class?  $120 + 50 + 20 = 190$
- e) How many students take neither class?  $10$
- f) How many students are in the junior class?  $120 + 50 + 20 + 10 = 200$

2. For the Venn Diagram, find

- a) Set  $A$   $\{1, 2, 3, 7, 8\}$
- b) Set  $B$   $\{2, 5, 6, 8, 9\}$
- c) Set  $A \cap B$   $\{2, 8\}$
- d) Set  $A \cup B$   $\{1, 2, 3, 5, 6, 7, 8, 9\}$



3. For the Venn Diagram, let  $A$  represent the number of students who play baseball,  $B$  the number of students who play football and  $C$  the number of students who play tennis.

a) How many students play football?

$$5 + 8 + 13 + 7 = 33$$

b) How many students play tennis?

$$12 + 8 + 7 + 10 = 37$$

c) How many students play baseball?

$$25 + 5 + 8 + 12 = 50$$

d) How many students play both football and baseball?

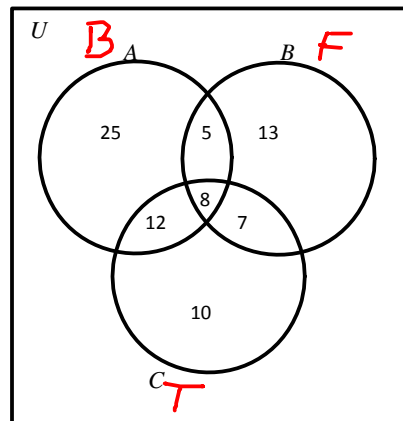
$$5 + 8 = 13$$

e) How many students play only football and baseball?

$$5$$

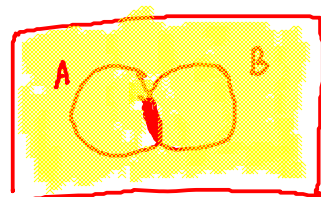
f) How many students play all three sports?

$$8$$



4. Use a Venn Diagram to illustrate each of the following:

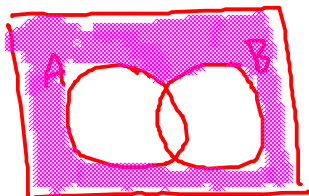
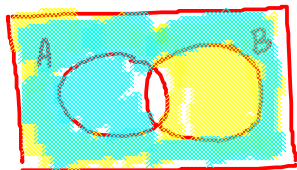
a)  $(A \cap B)$



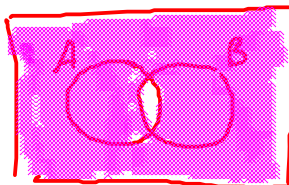
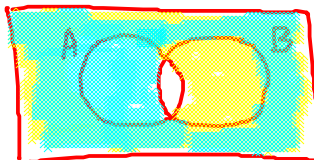
b)  $(A \cup B)$



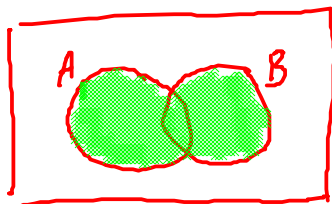
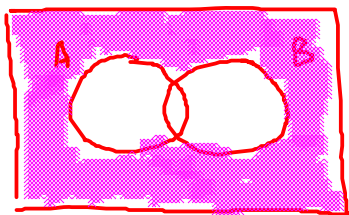
c)  $A \cap B$



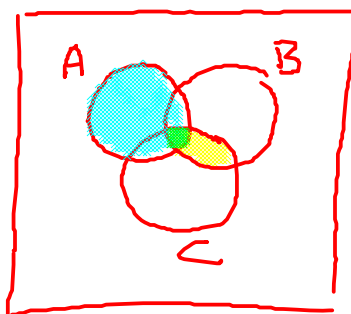
d)  $A \cup B$



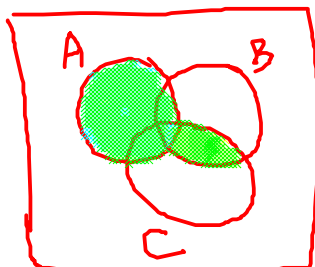
e)  $(A' \cap B')$



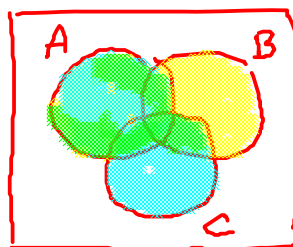
f)  $A \cap (B \cap C)$



g)  $A \cap (B \cap C)$



h)  $(A \cup B) \cap (A \cup C)$



i)  $(A \cap B) \cup (A \cap C)$

