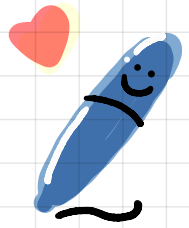
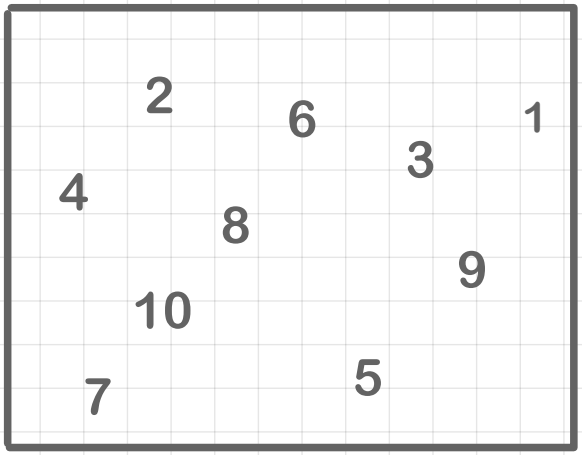
1.8) Set and Venn diagram



Sets and Venn Diagrams.

1) $\mathscr{E} \leftrightarrow \mathscr{E}$ [Universal set]

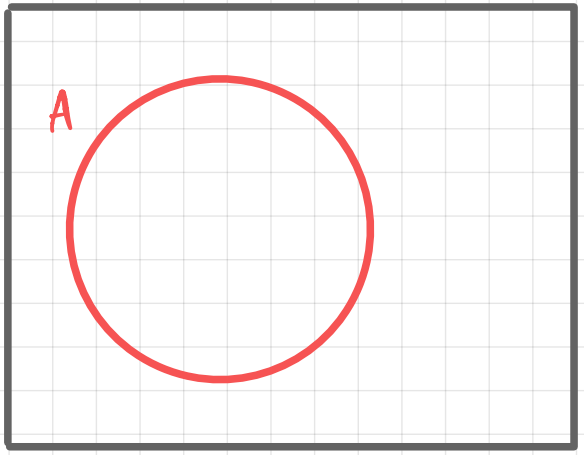
$\mathscr{E} = \{1, 2, 3, \ldots, 10\}$



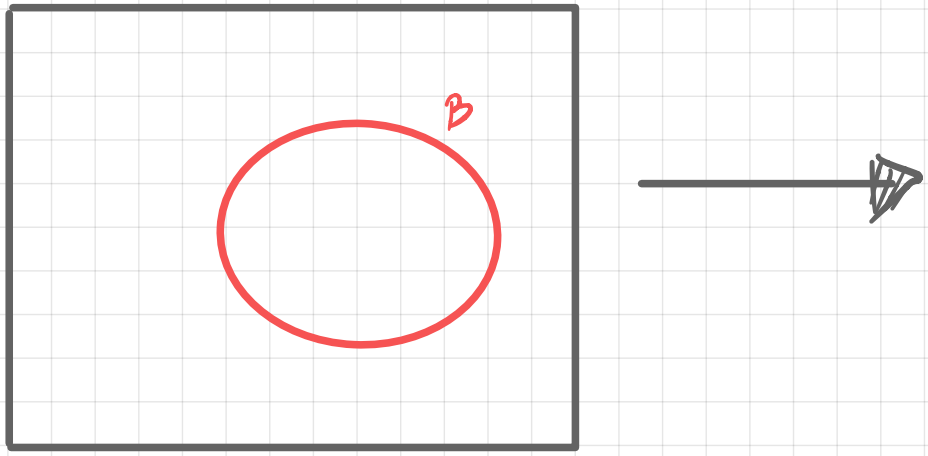
Sets and Venn Diagrams.

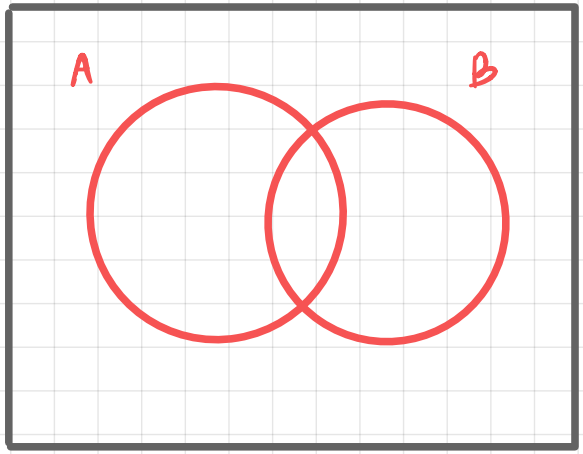
2) $A \leftrightarrow$ [set A]

$A = \{x : x \text{ is even numbers}\}$



$B = \{x : x \text{ is multiple of } 3\}$





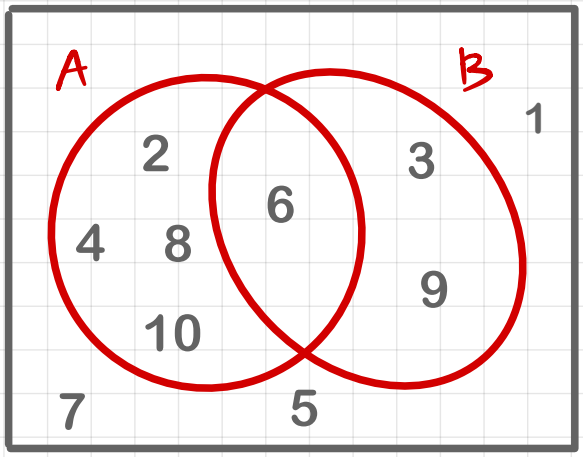
Sets and Venn Diagrams.

3) $n(A) \longleftrightarrow$ [The number of element in A]

$n(A) = 5$

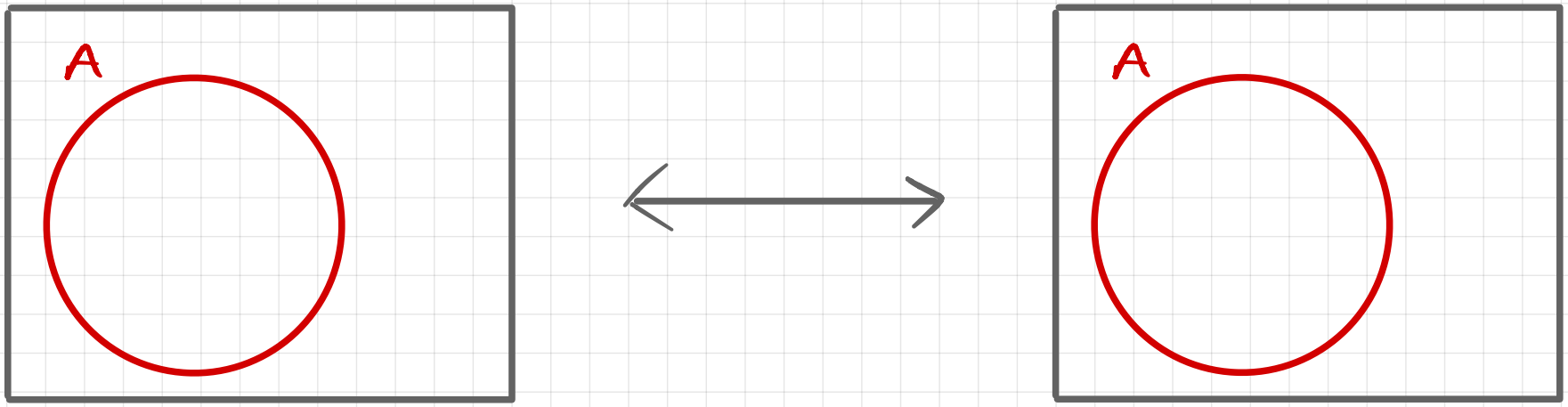
$n(B) = 3$

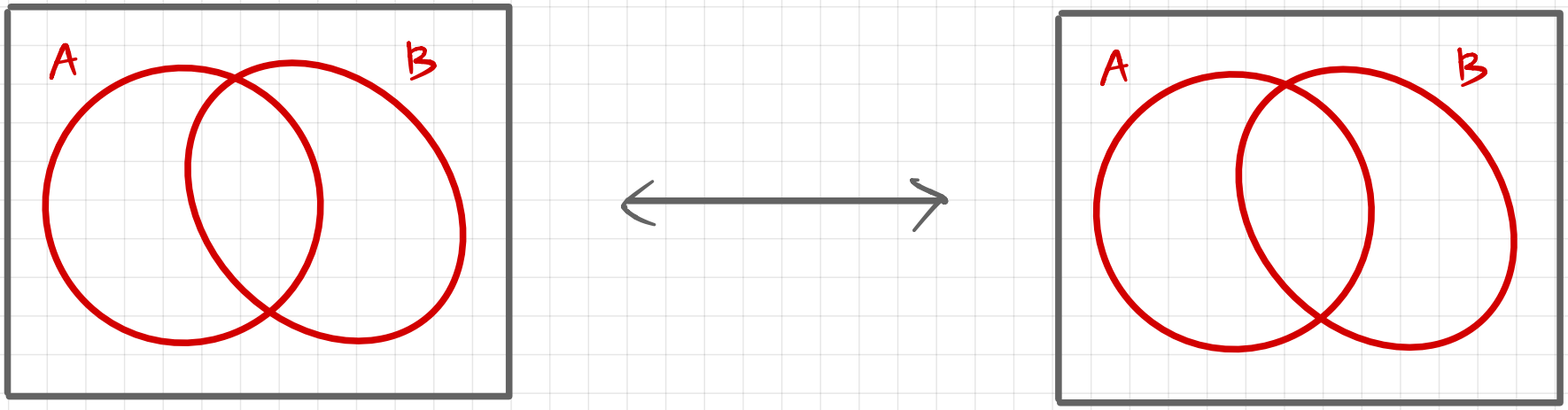
$n(\mathcal{E}) = 10$



Sets and Venn Diagrams.

4) Venn diagrams





Sets and Venn Diagrams.

5) $\in$ ↔ [is a element (member) of]

$2 \in A$

$2 \notin B$

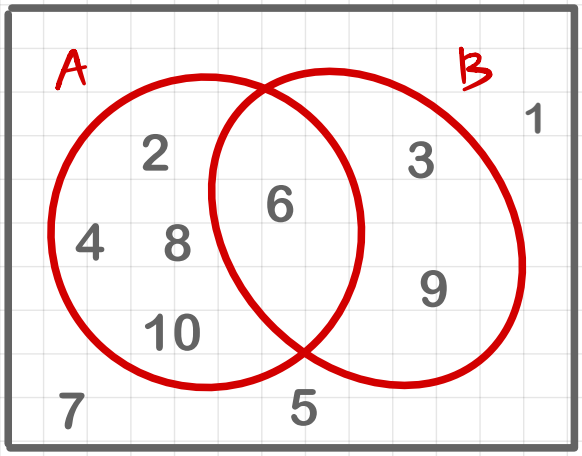
$3 \in B$

$6 \in A$

$6 \in B$

$5 \notin A$

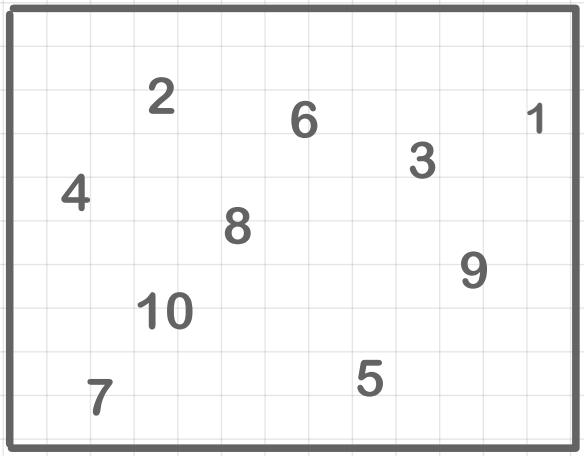
$5 \notin B$



6) ϕ or $\{\ \}$ $\longleftrightarrow$ [Empty set]

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

$D = \phi$ or $D = \{\ \}$



Sets and Venn Diagrams.

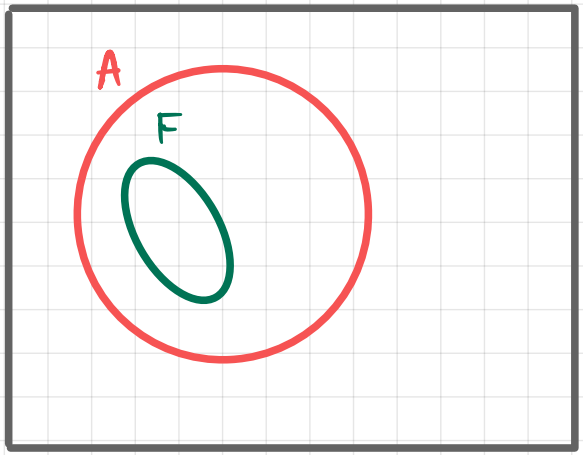
7) $\subset$ [is a subset of]

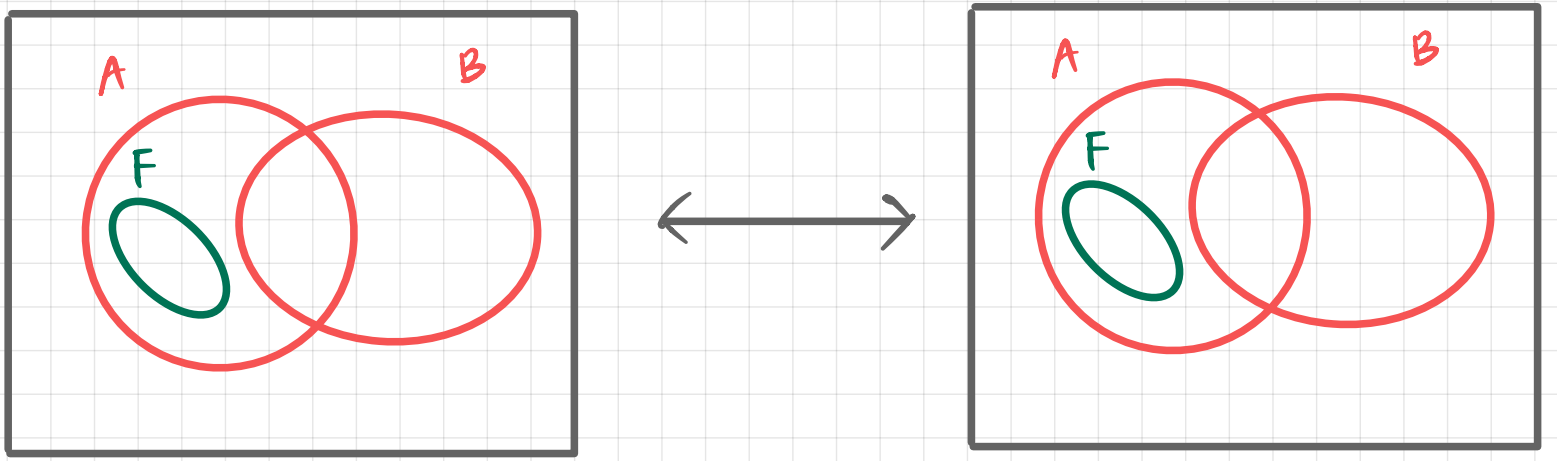
$F = \{2, 4\}$

$F \subset A$

$A \not\subset F$

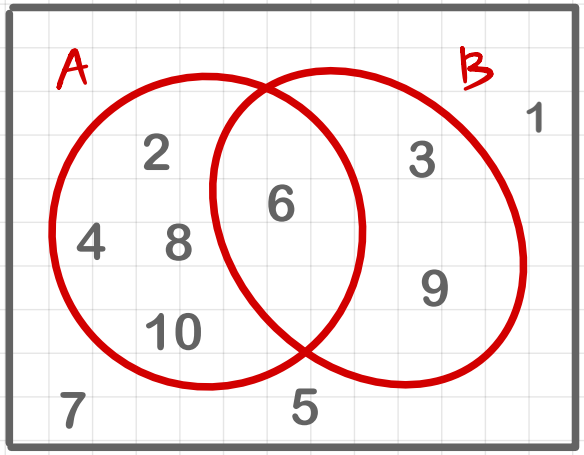
$F \not\subset B$



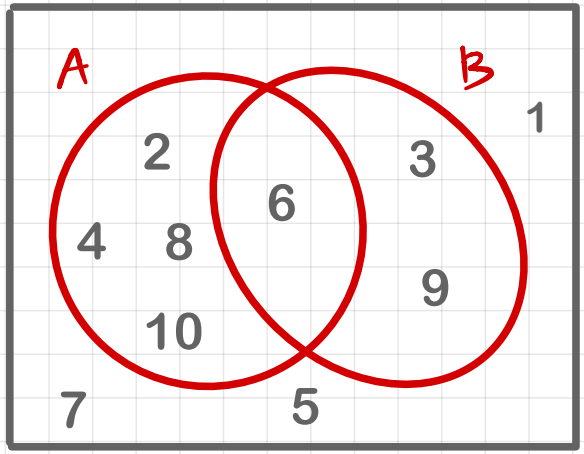


8) $A' \leftrightarrow$ [Complement of A]

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



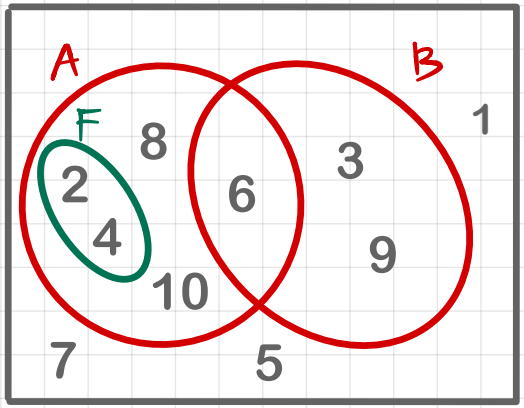
$B' = \{1, 2, 4, 5, 7, 8, 10\}$



Sets and Venn Diagrams.

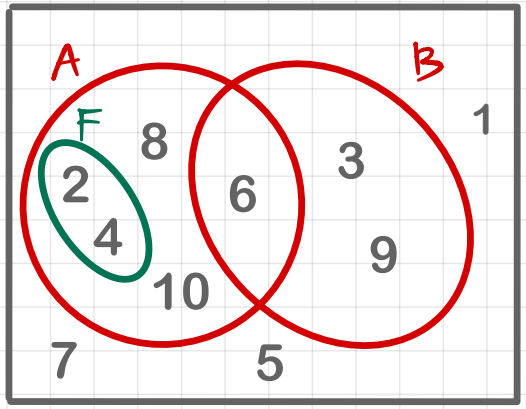
9) $\cup \leftrightarrow$ [union] $\rightarrow$ or

$A \cup B = \{2, 3, 4, 6, 8, 9, 10\}$

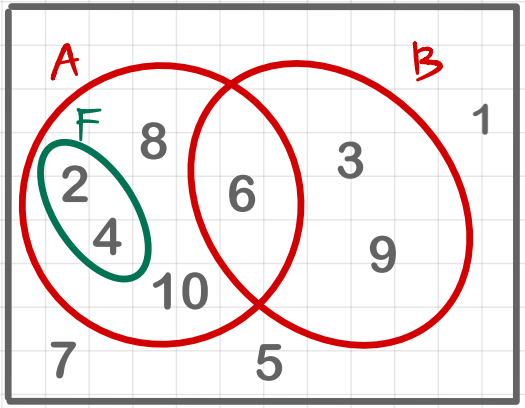


$A \cup F = \{2, 4, 6, 8, 10\}$

$F \subset A \rightarrow A \cup F = F \cup A = A$



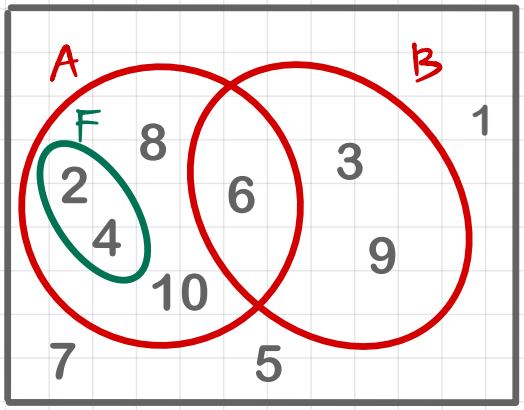
$B \cup F = \{2, 3, 4, 6, 9\}$



Sets and Venn Diagrams.

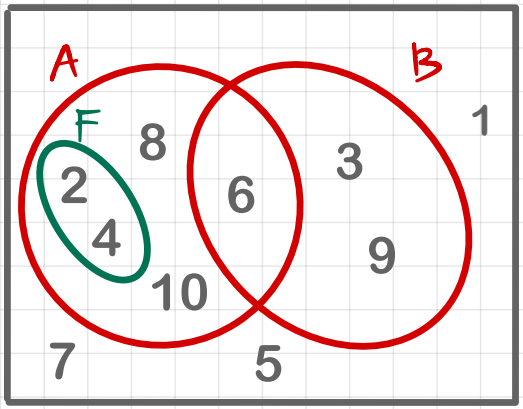
10) $\cap \leftrightarrow$ [Intersection] → and

$A \cap B = \{6\}$

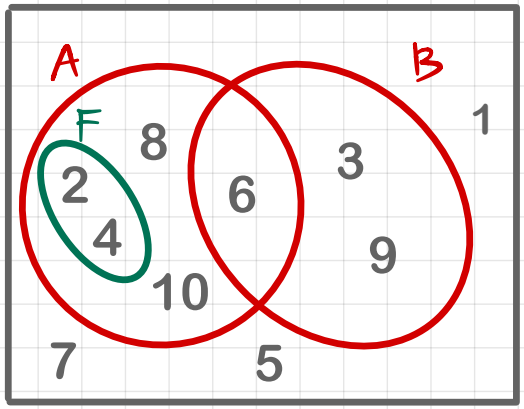


$A \cap F = \{2, 4\}$

$F \subset A \leftrightarrow A \cap F = F \cap A = F$

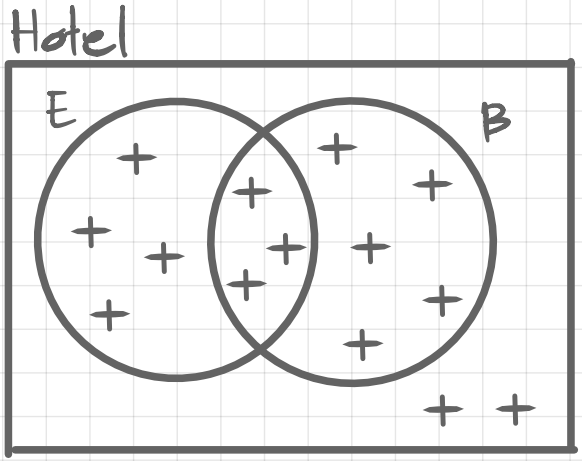


$B \cap F = \phi$



Sets and Venn Diagrams.

Example:



1) Bacon

2) Egg but not bacon

3) Bacon and egg

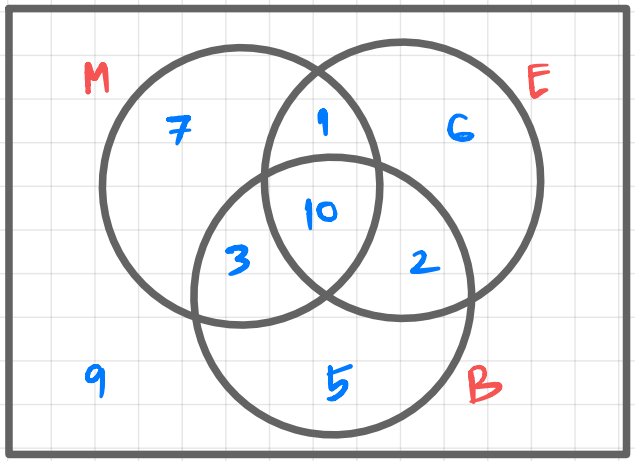
4) Egg or bacon

5) Hotel

6) Not egg

Sets and Venn Diagrams.

Example:



1) M

2) M and E and B

3) M and E

4) M but not E

5) B and E

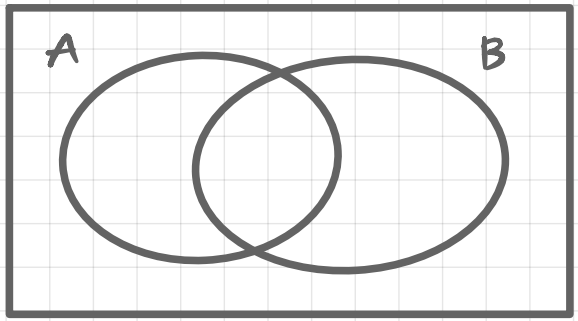
6) Not B

7) E

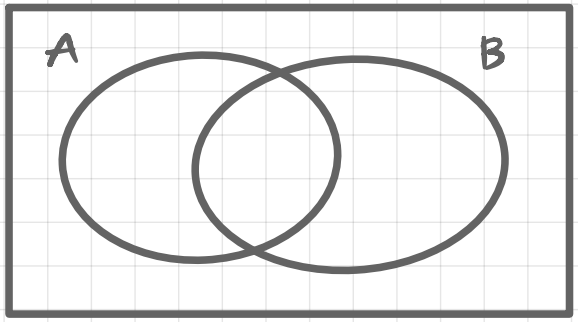
Sets and Venn Diagrams.

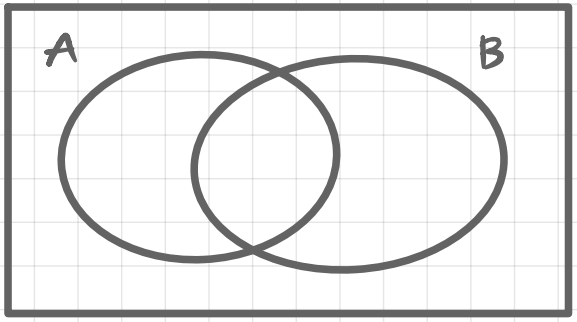
Example: Shaded

1) $A' \cap B$



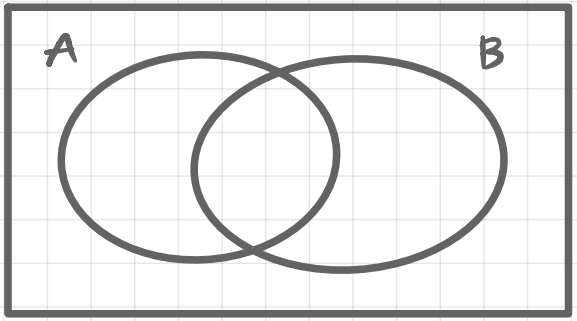
2) $(A \cap B)'$



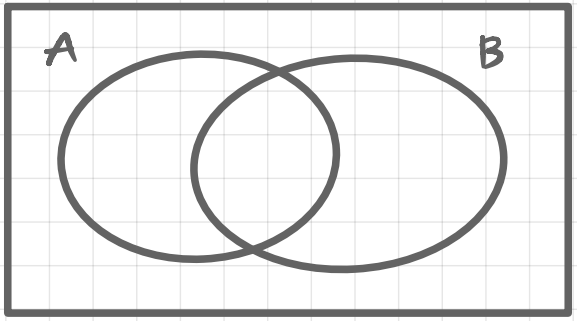


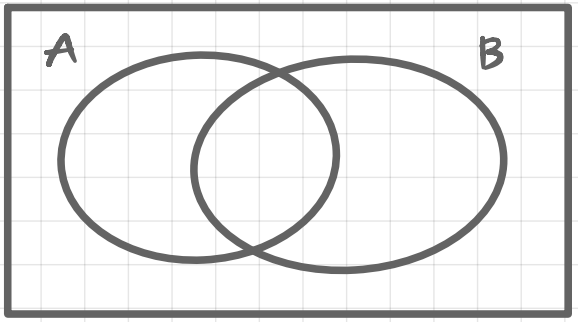
Sets and Venn Diagrams.

3) $A \cup B'$

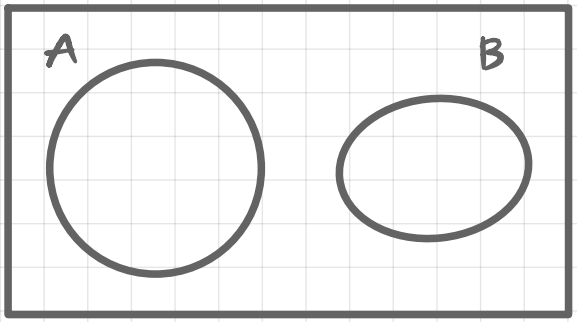


4) $(A \cup B)'$

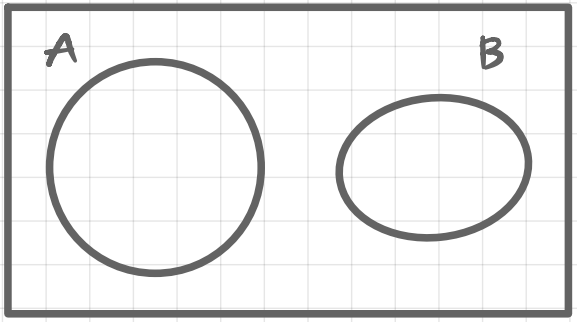




5) $A \cup B$

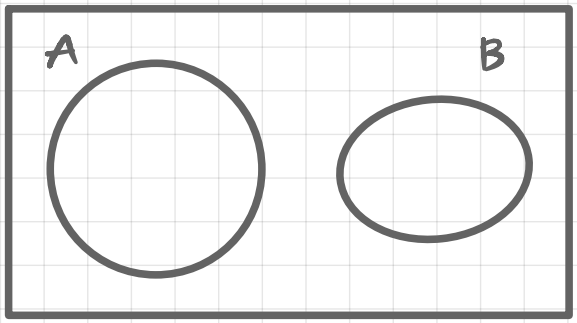


6) $A \cap B$

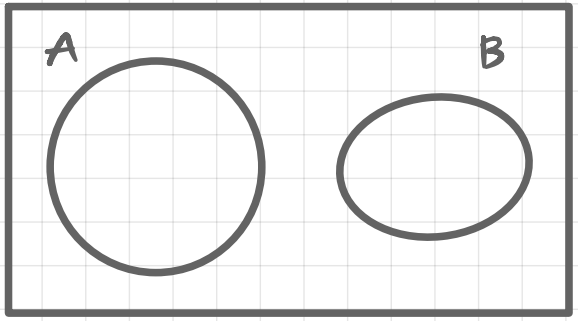


Sets and Venn Diagrams.

7) A'

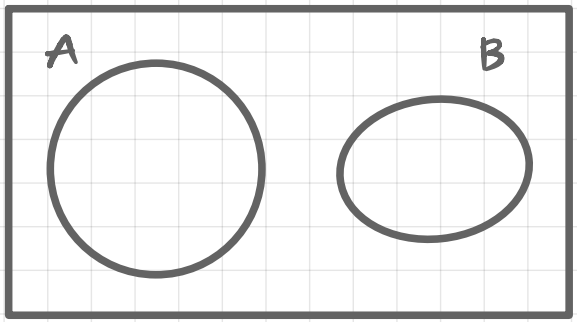


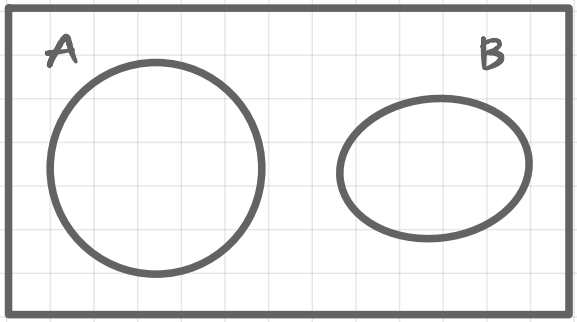
8) $A' \cap B$



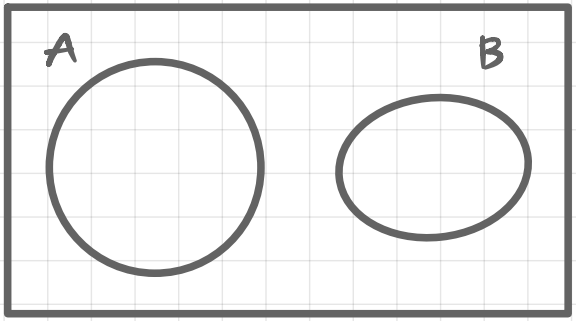
Sets and Venn Diagrams.

9) $(A \cup B)'$

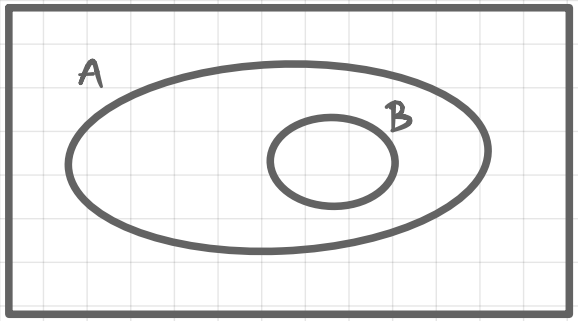




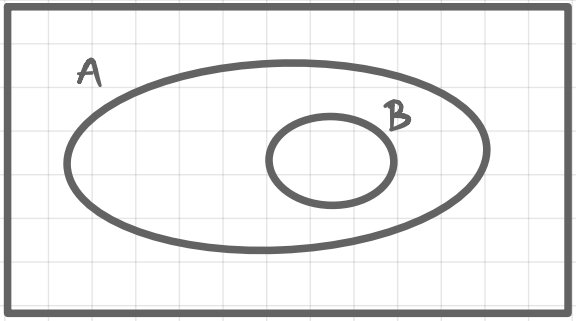
10) $A \cup B'$



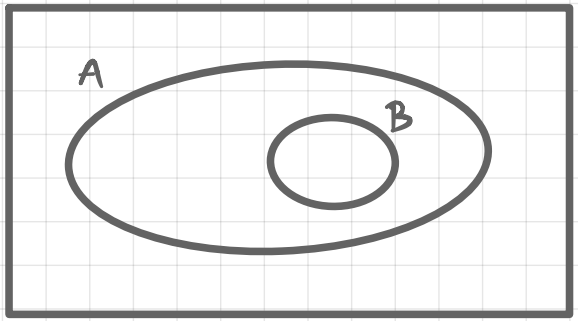
11) $A \cup B$



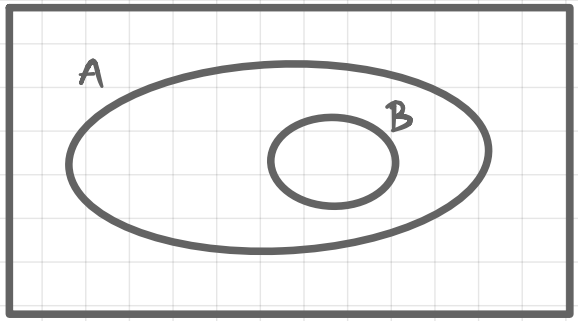
12) $A \cap B$



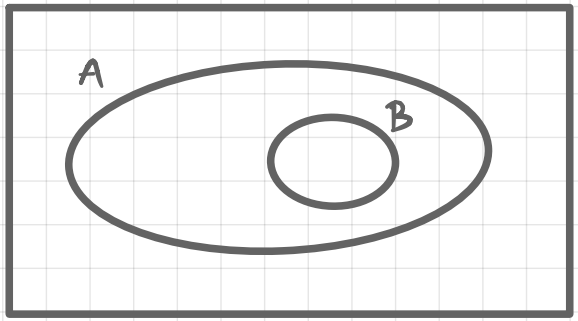
13) $A \cap B'$



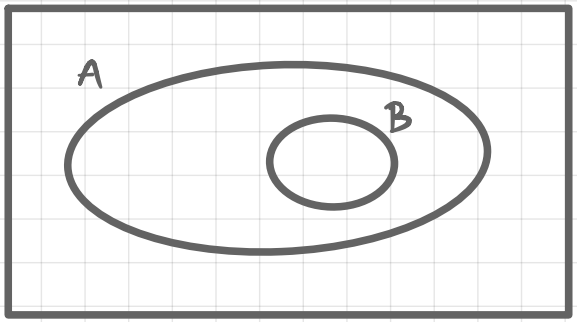
14) $A' \cap B$

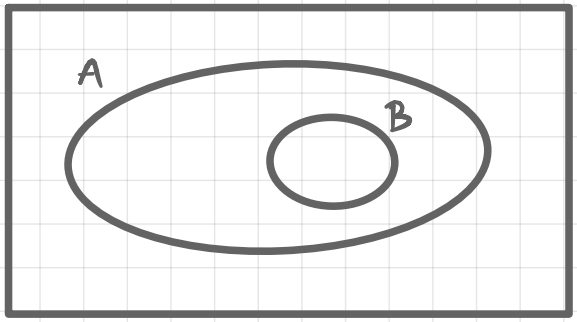


15) $A' \cup B$



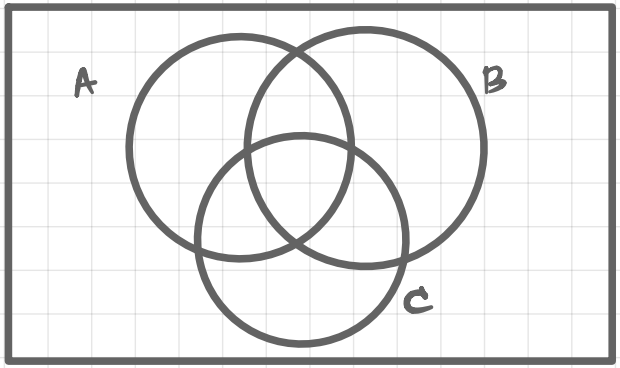
16) $(A \cap B)'$



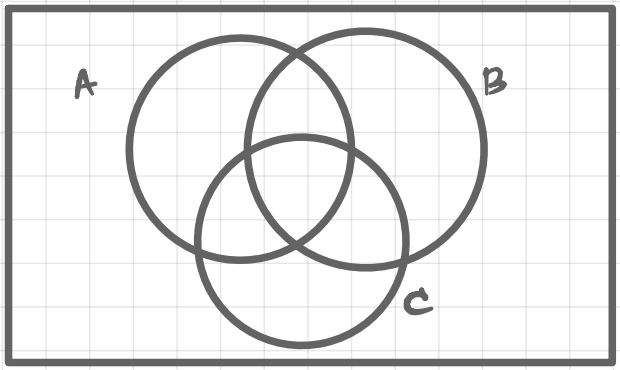


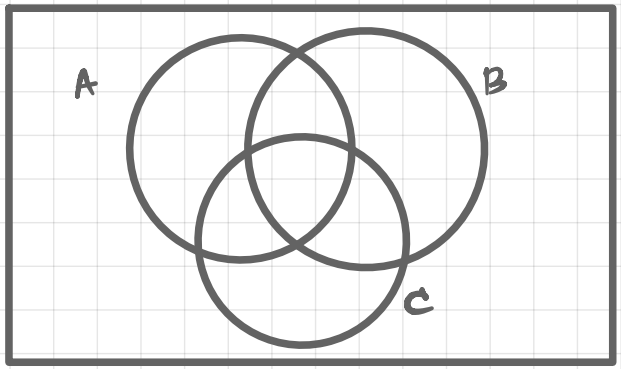
Sets and Venn Diagrams.

17) $A \cap B \cap C$



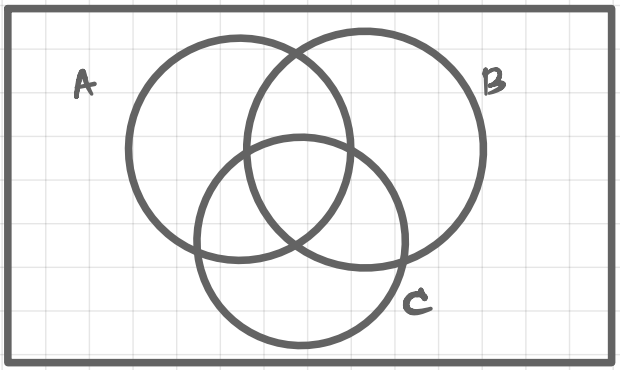
18) $(A \cap B) \cup C$

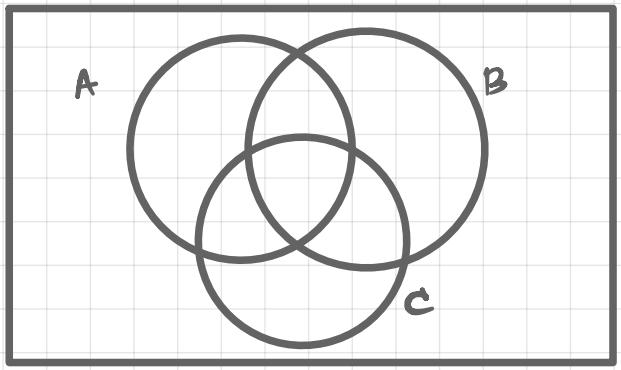




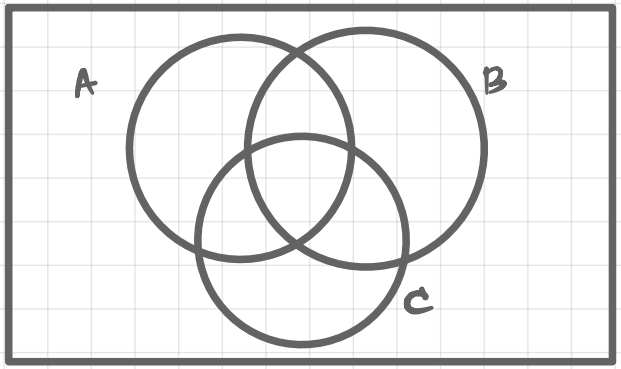
Sets and Venn Diagrams.

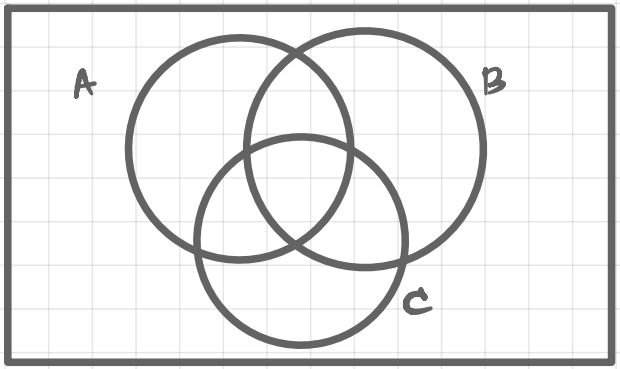
19) $(A \cup B) \cap C$





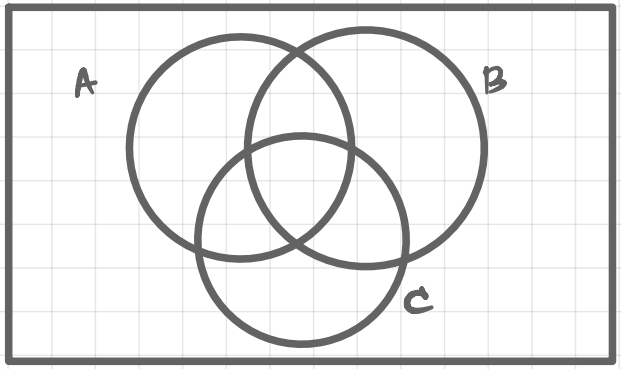
20) $(A \cup C) \cap B'$

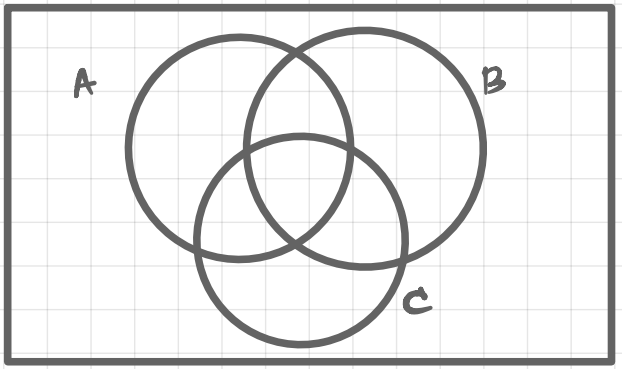




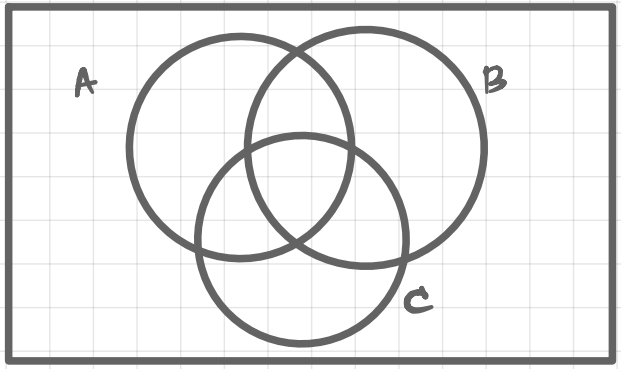
Sets and Venn Diagrams.

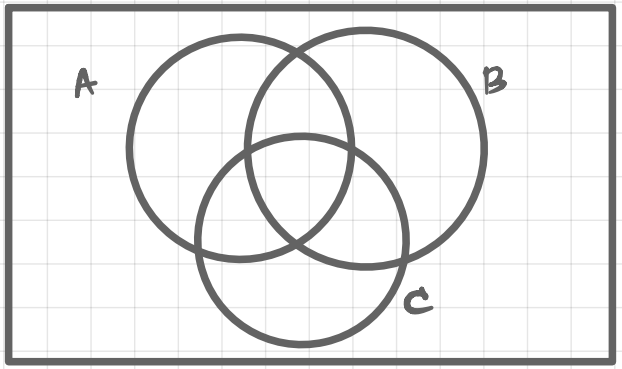
* 21) $B' \cup (A \cap C)$





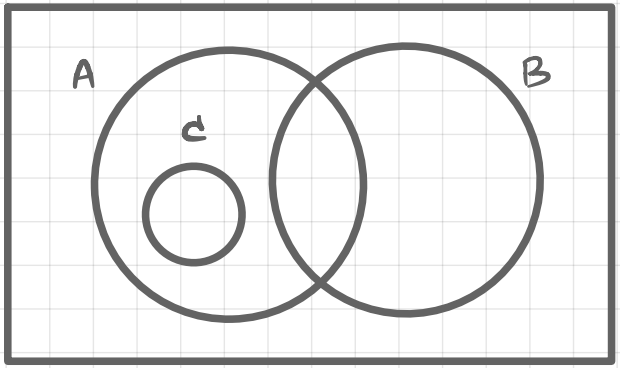
22) $A \cap (B \cup C)'$

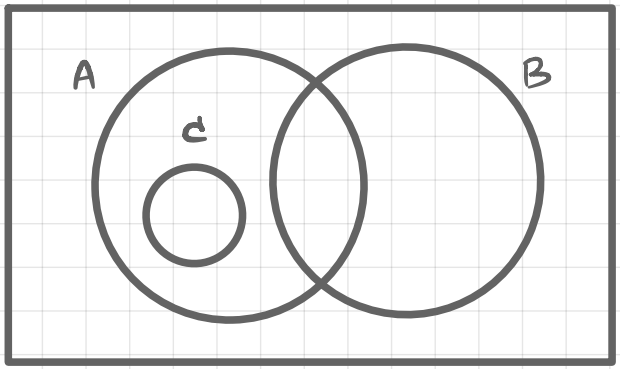




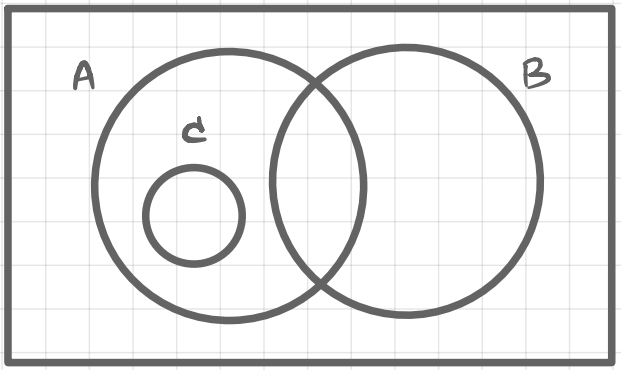
Sets and Venn Diagrams.

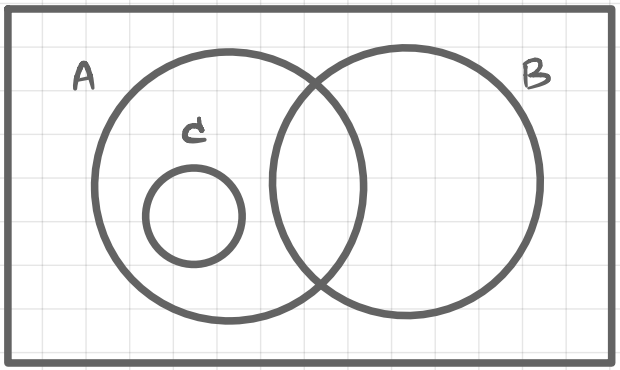
23) $(A \cap C) \cup B$



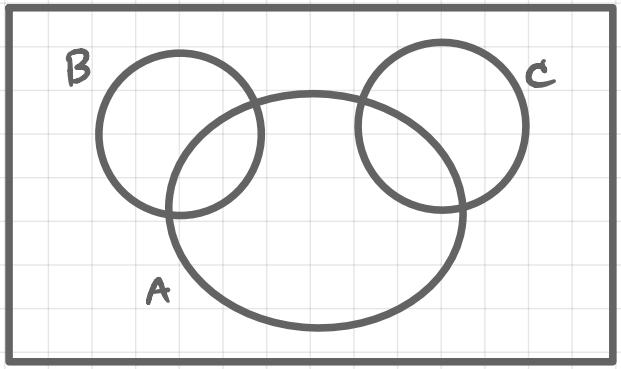


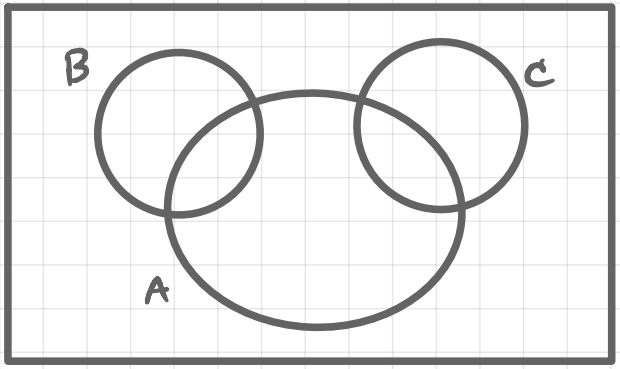
24) $(A \cup B) \cap C'$





25) $(C \cup B) \cap A'$





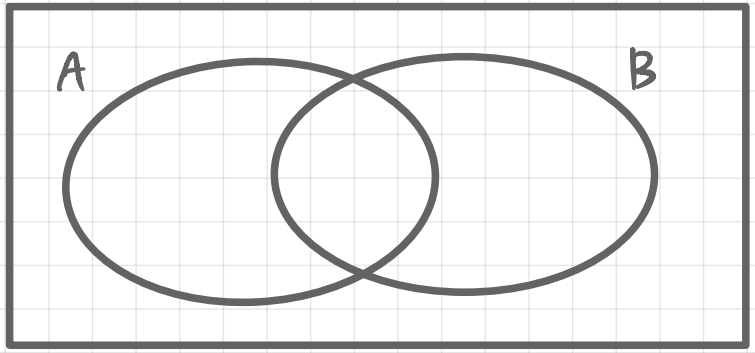
Sets and Venn Diagrams.

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

$A = \{\text{even numbers}\}$

$B = \{\text{factors of } 10\}$

i) Complete the Venn diagram



ii) Find $n(A \cap B')$

Sets and Venn Diagrams.

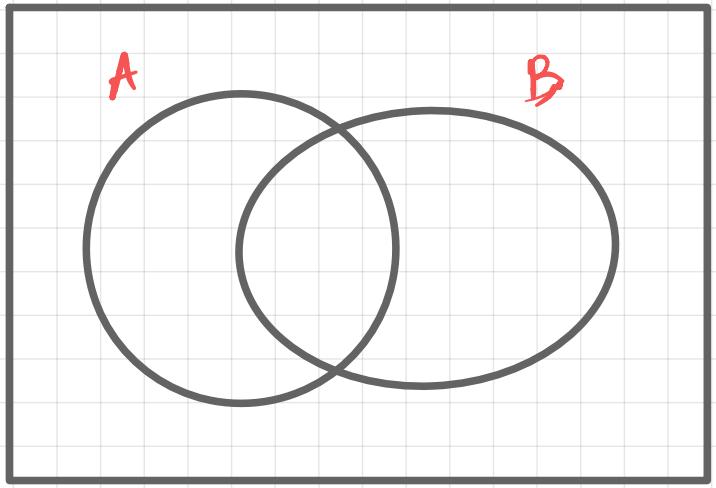
$\mathcal{E} = \{4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15\}$

$A \cap B = \{5, 10, 15\}$

$B' = \{7, 8, 9, 11, 12, 13, 14\}$

$A' = \{4, 6, 7, 8, 14\}$

Draw a Venn diagram.



Sets and Venn Diagrams.

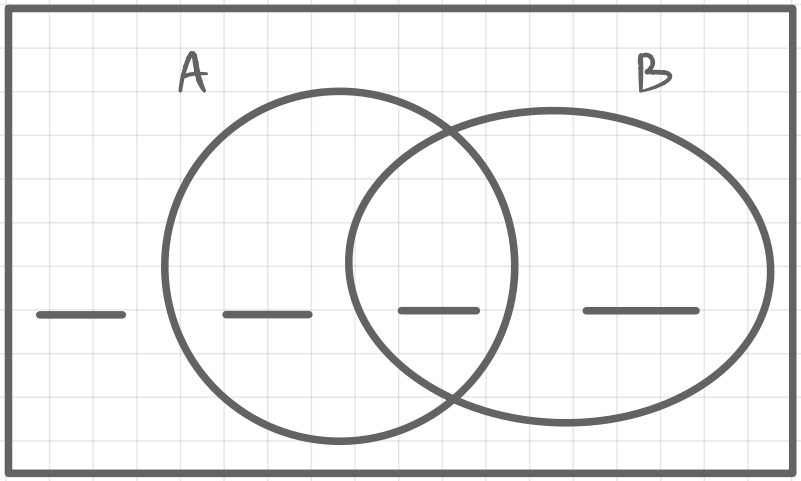
$n(\xi) = 21$

$n(A \cup B) = 19$

$n(A \cap B') = 8$

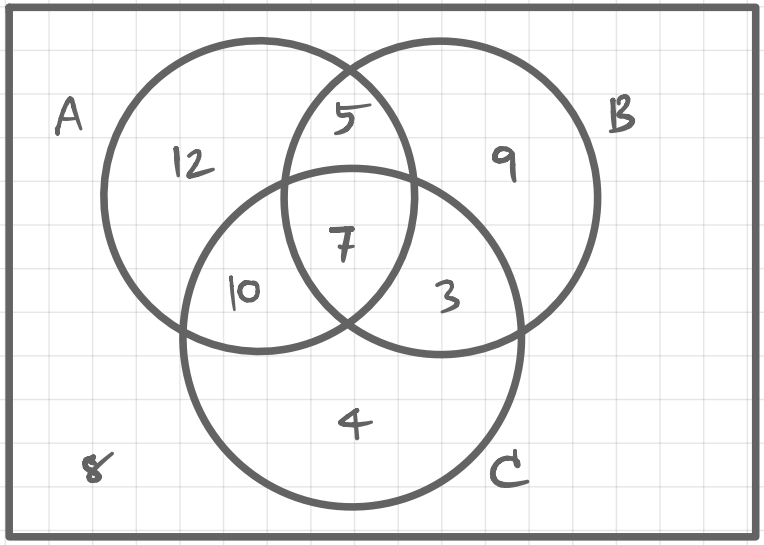
$n(A) = 12$

Complete the Venn diagram



Sets and Venn Diagrams.

The Venn diagram : Find



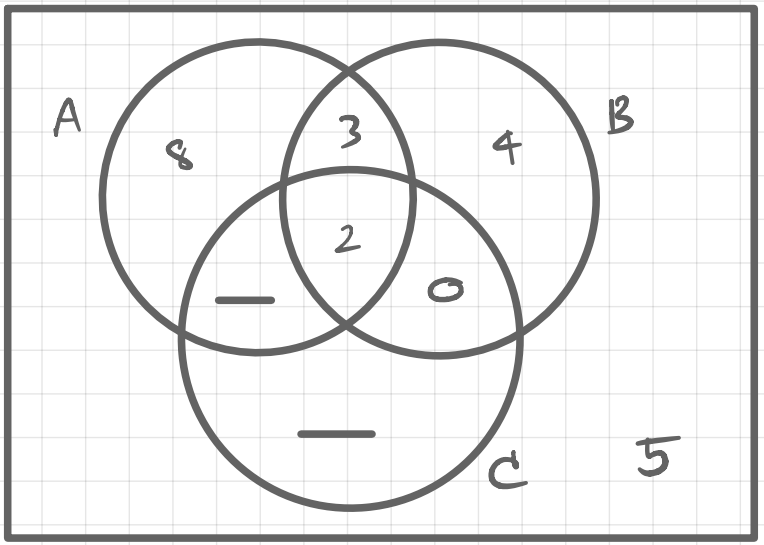
(i) $n(A \cup B)$

(ii) $n(A' \cap B')$

(iii) $n([A \cup B] \cap C)$

Sets and Venn Diagrams.

The Venn diagram



i) Complete the Venn diagram

ii) Find $n(A \cup (B \cap C'))$

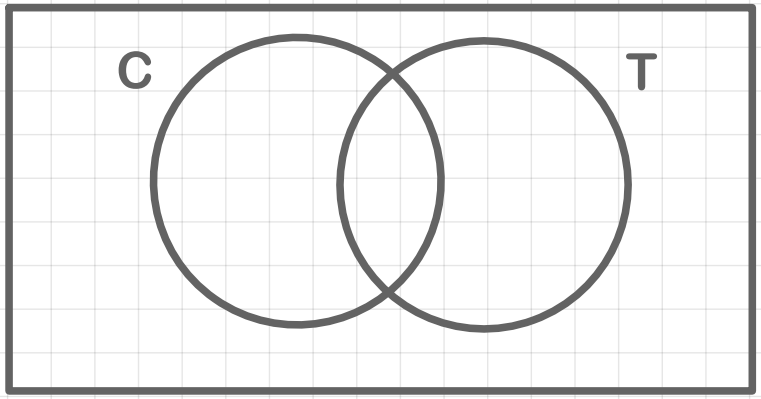
$n(A \cap C) = 9$

$n(A') = 15$

Sets and Venn Diagrams.

Example: In a class of 24 students, 18 students like coffee (C), 15 students like tea (T) and 1 student does not like coffee and does not like tea.

a) Draw a Venn diagram to show this information.



b) Write down the number of students who like both coffee and tea.

c) Find $n(C' \cap T)$

Sets and Venn Diagrams.

A college has 80 students in Year 11

23 students study Biology (B)

28 students study Chemistry (C)

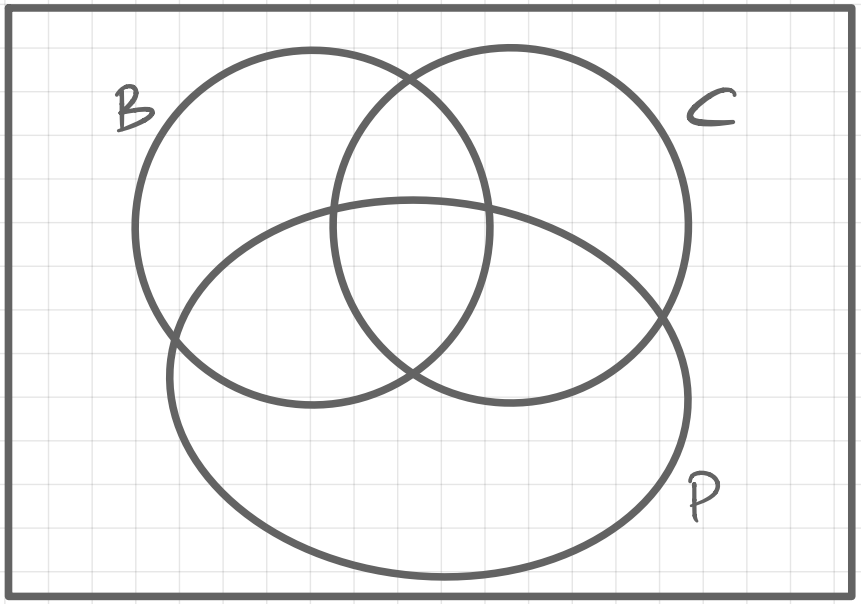
25 students study Physics (P)

7 students study both B and C

9 students study both C and P

5 students study both P and B

2 students study all of these subjects.



Draw a Venn diagram to show this information.

Sets and Venn Diagrams.

Exercise

Sets and Venn Diagrams.

18 have a dog (D)

28 have a cat (C)

20 have a rabbit (R)

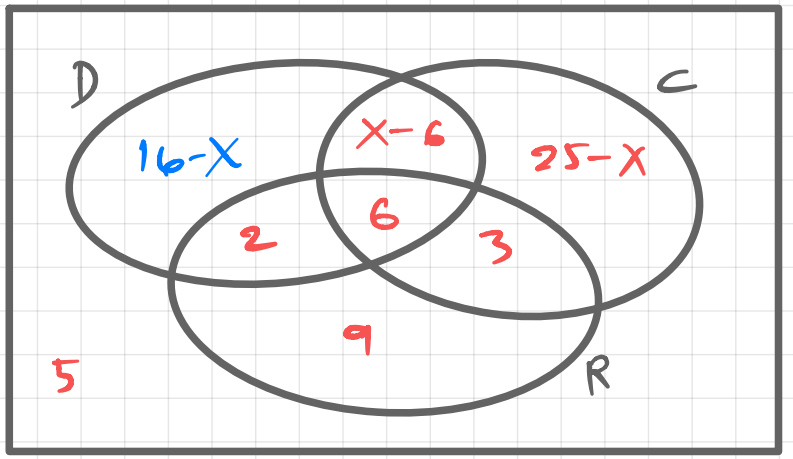
8 have both a dog and a rabbit.

9 have both a cat and a rabbit

x have both a dog and a cat

6 have a dog, a cat and a rabbit

5 have not got a dog or a cat or a rabbit.



(C) → $28-(6+3+x-6)$

$28-(3+x)$

$28-3-x=25-x$

(D) → $18-(2+6+x-6)$

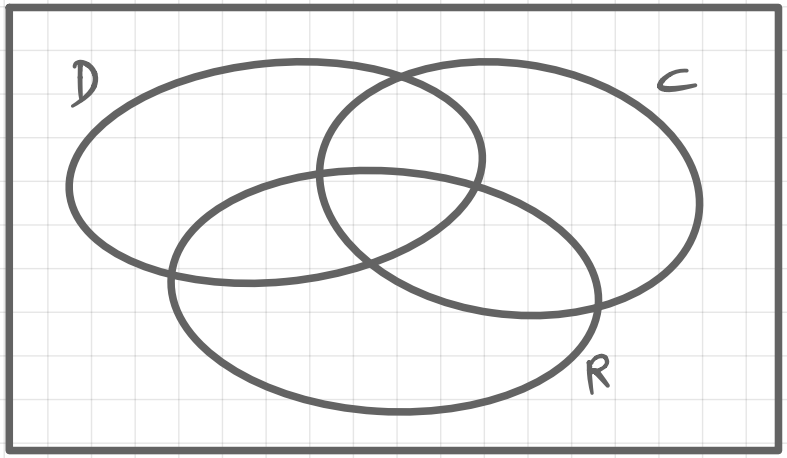
$18-(2+x)$

$18-2-x=16-x$

i) Complete the Venn diagram in terms of x.

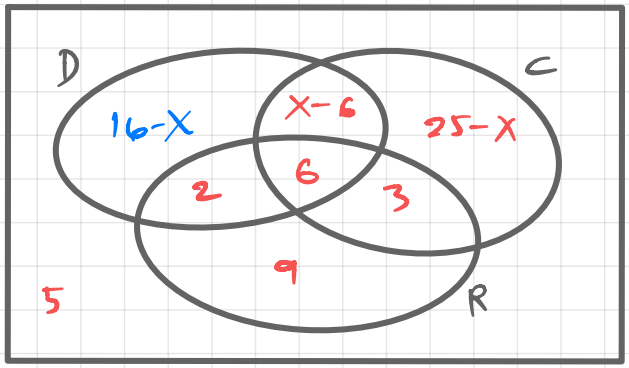
Sets and Venn Diagrams.

i) Complete the Venn diagram in terms of x.



ii) Work out the value of x

Given that a total of 50 students answered the question.



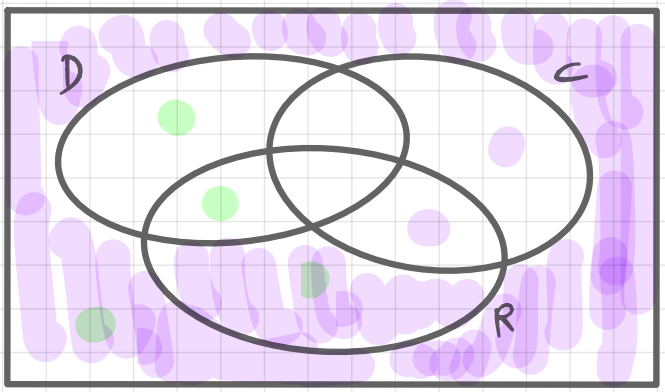
$16-\cancel{X}+\cancel{X}-6+25-X+2+6+3+9+5=50$

$60-X=50$

$60-50=X$

$10=X$

iii) Find $n(C' \cap D')$



→ $5+9=14$