3.1 Counting The Elements

Given a set with a finite number of elements, it's useful to have an instruction to count the number of elements in the set.

The small lower case letter n is used to either state the number of elements in a set or to ask that they be counted.

For example, the statement $n\{$Factors of $10\} = 4$ is observing that the number 10 has 4 factors.
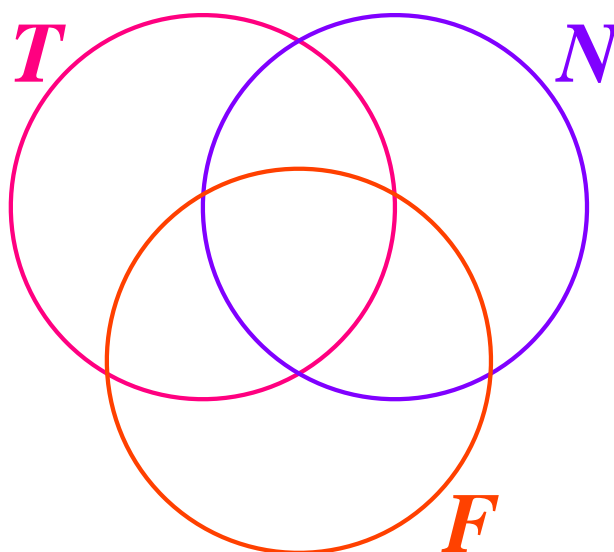
3.2 Example

Let T, N and F be the following sets,

$$T = \{\text{Factors of } 10\}$$

$$N = \{\text{Factors of } 9\}$$

$$F = \{\text{Factors of } 15\}$$

(**i**)   On the Venn Diagram show the relationship between the sets T, N and F

[**3 marks**]

(**ii**)   Shade in $N \cup F$

[**1 mark**]

(**iii**) $N \cup F = \{$ _____, _____, _____, _____, _____ $\}$

[**1 mark**]

(**iv**) $n(\,N \cup F\,) =$ _____

[**1 mark**]

3.3 Exercise

<div align="center">Marks Available : 47</div>

Question 1

Let $T = \{\text{factors of } 22\}$

(i)   List the elements of set T

<div align="right">[1 mark]</div>

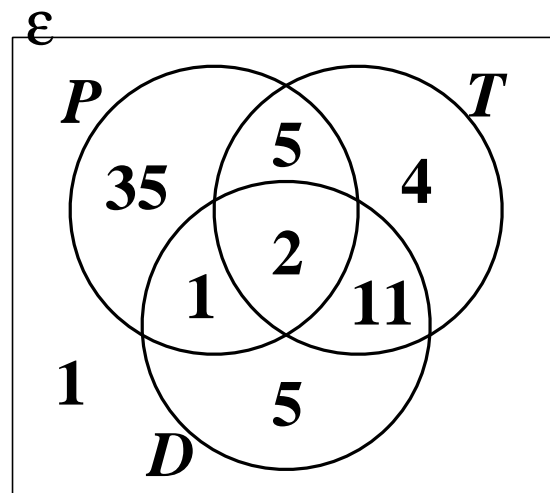**(ii)**   What is $n\{\text{factors of } 22\}$

<div align="right">[1 mark]</div>

Question 2

In the Venn Diagram,

<div align="center">

$\varepsilon = \{\text{people at a nightclub}\}$

$P = \{\text{people who like } \textbf{\textit{Pop}} \text{ music}\}$

$T = \{\text{people who like } \textbf{\textit{Techno}} \text{ music}\}$

$D = \{\text{people who like } \textbf{\textit{Drum \& Bass}} \text{ music}\}$

</div>

(a)   Explain why $n\{\text{people who like } \textbf{\textit{Pop}} \text{ music}\}$ is not 35

<div align="right">[1 mark]</div>

(b)   Determine the following,

   (i) $n\{\text{people who like } \textbf{\textit{Pop}} \text{ music}\}$

<div align="right">[1 mark]</div>

   (ii) $n\{\text{people who like } \textbf{\textit{Techo}} \text{ music}\}$

<div align="right">[1 mark]</div>

   (iii) $n(D)$

<div align="right">[1 mark]</div>

   (iv) $n(P \cap D)$

<div align="right">[1 mark]</div>

   (v) $n(P \cup D)$

<div align="right">[1 mark]</div>

Question 3

Let *T*, *E*, and *W* be the following sets,

$$T = \{\text{the factors of } 33\}$$
$$E = \{\text{the factors of } 18\}$$
$$W = \{\text{the factors of } 12\}$$

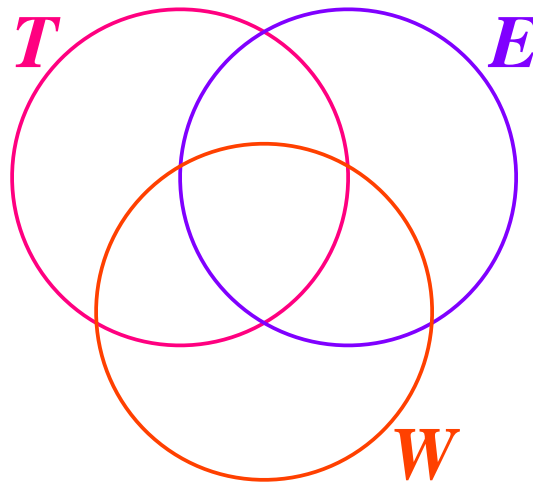(**a**)   List the elements of sets *T*, *E* and *W* below,

T = { _____, _____, _____, _____ }

E = { _____, _____, _____, _____, _____, _____ }

W = { _____, _____, _____, _____, _____, _____ }

[**3 marks**]

(**b**)   On the Venn diagram, show the relationship between *T*, *E* and *W*.

[**3 marks**]

(**c**)   Determine the following,

(**i**) $n(T) =$ _____

(**ii**) $n(E) =$ _____

(**iii**) $n(T \cap E) =$ _____

(**iv**) $n(T \cup E) =$ _____

(**v**) $n(E \cap W) =$ _____

(**vi**) $n(E \cup W) =$ _____

(**vii**) $n(T \cap E \cap W) =$ _____

(**viii**) $n(T \cup E \cup W) =$ _____

[**8 marks**]

(**d**)   Does $n(T) + n(E) = n(T \cup E)$?

[**1 mark**]

(**e**)   What is the HCF of 33, 18 and 12 ?

[**1 mark**]

Question 4

For each of the Venn diagrams use set notation to describe the regions shaded green,
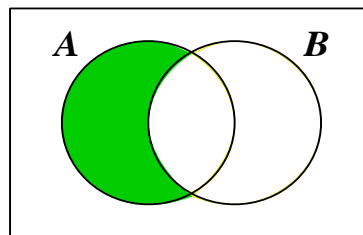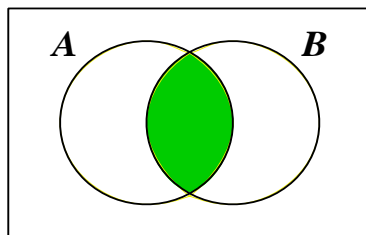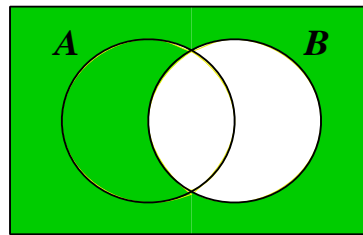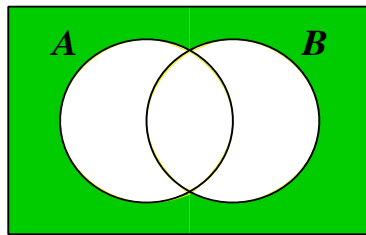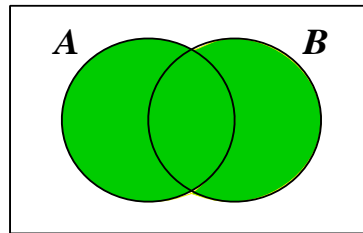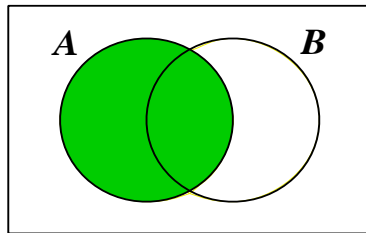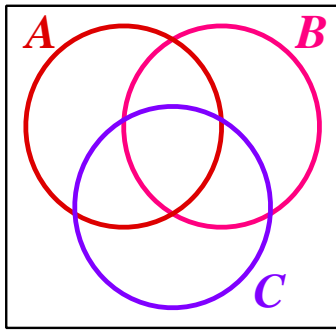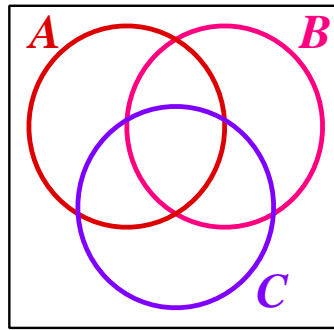
[6 marks]

Question 5

TRUE or FALSE ?

(**i**) n {factors 14} = 4

(**ii**) n {factors of 19} = 3

(**iii**) n {factors of a prime number} = 2

(**iv**) n {factors of square number} = 3
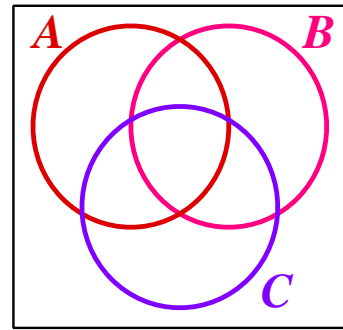
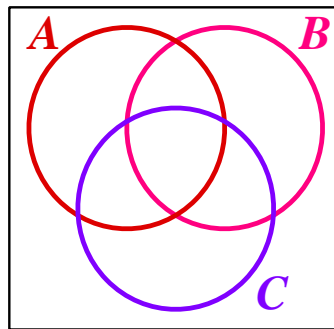(**v**) n {common factors of 12 and 16} = 4
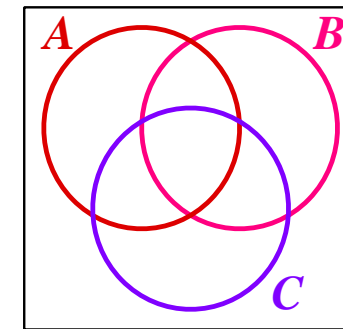
[5 marks]

Question 6

Shade : B'
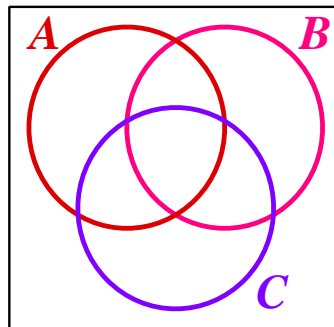
Shade : $A \cap B'$

Shade : $A \cup B'$
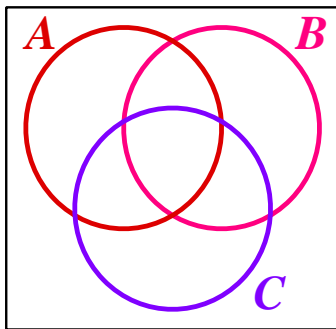
Shade : $A \cup C$

Shade : $(A \cup C)'$

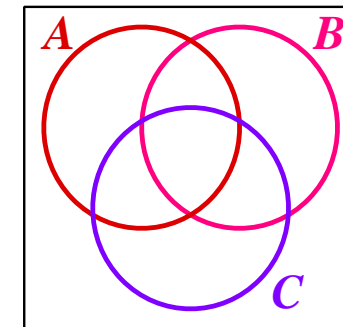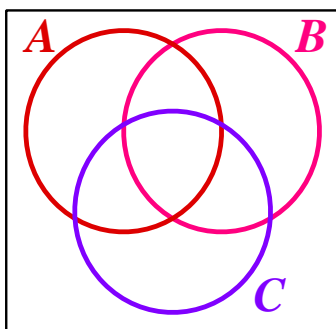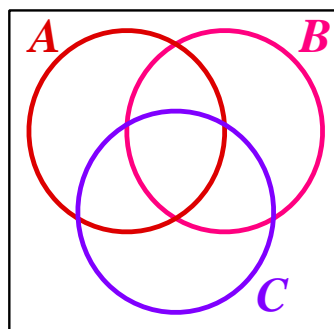Shade : $A \cap B \cap C'$
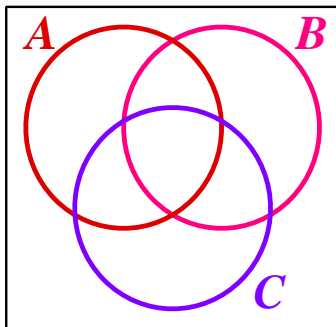
Shade : $A \cap C$

Shade : $(A \cap C)'$

Shade : $B \cup B'$

Shade : $A' \cup C'$

Shade : $C \cap C$

Shade : $C \cup A \cup B'$

[12 marks]