

**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  $n\{\text{Factors of } 10\} = 4$  is observing that the number 10 has 4 factors.

**3.2 Example**

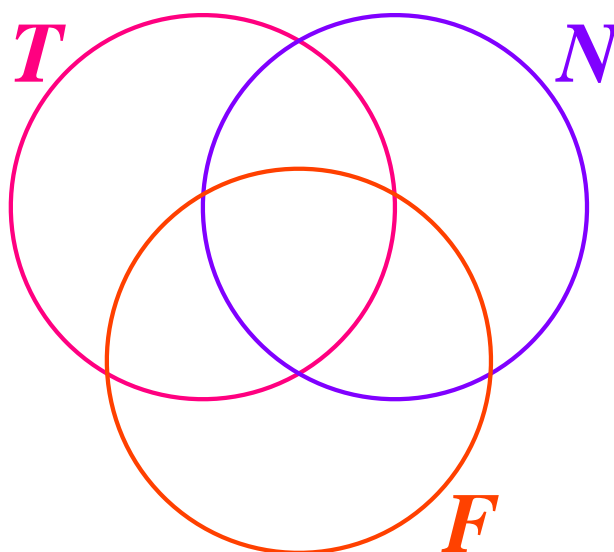
Let  $T$ ,  $N$  and  $F$  be the following sets,

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

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

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

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



- (ii) Shade in  $N \cup F$  [ 3 marks ]
- [ 1 mark ]
- (iii)  $N \cup F = \{ \text{_____, _____, _____, _____, _____} \}$  [ 1 mark ]
- (iv)  $n(N \cup F) = \text{_____}$  [ 1 mark ]

### 3.3 Exercise

Marks Available : 47

#### Question 1

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

(i) List the elements of set  $T$

[ 1 mark ]

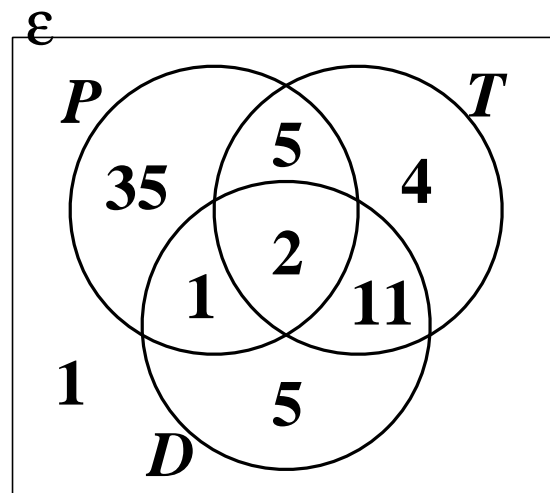
(ii) What is  $n\{\text{factors of } 22\}$

[ 1 mark ]

#### Question 2

In the Venn Diagram,

$\varepsilon = \{\text{people at a nightclub}\}$   
 $P = \{\text{people who like } \textit{Pop} \text{ music}\}$   
 $T = \{\text{people who like } \textit{Techno} \text{ music}\}$   
 $D = \{\text{people who like } \textit{Drum \& Bass} \text{ music}\}$



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

[ 1 mark ]

(b) Determine the following,

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

[ 1 mark ]

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

[ 1 mark ]

(iii)  $n(D)$

[ 1 mark ]

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

[ 1 mark ]

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

[ 1 mark ]

### 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,

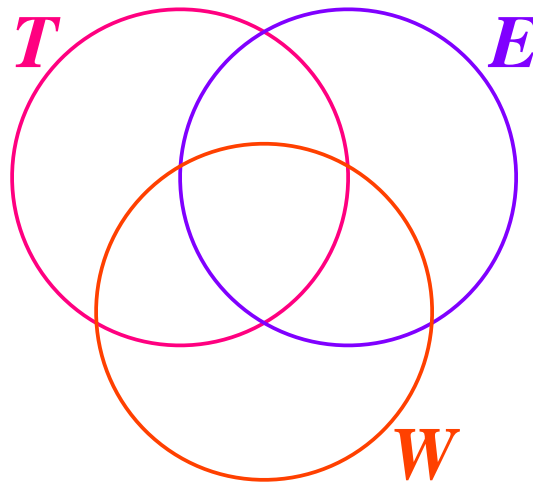
$$T = \{ \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}} \}$$

$$E = \{ \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}} \}$$

$$W = \{ \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}} \}$$

[ 3 marks ]

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



[ 3 marks ]

- (c) Determine the following,

(i)  $n(T) = \underline{\hspace{1cm}}$                       (ii)  $n(E) = \underline{\hspace{1cm}}$

(iii)  $n(T \cap E) = \underline{\hspace{1cm}}$                       (iv)  $n(T \cup E) = \underline{\hspace{1cm}}$

(v)  $n(E \cap W) = \underline{\hspace{1cm}}$                       (vi)  $n(E \cup W) = \underline{\hspace{1cm}}$

(vii)  $n(T \cap E \cap W) = \underline{\hspace{1cm}}$                       (viii)  $n(T \cup E \cup W) = \underline{\hspace{1cm}}$

[ 8 marks ]

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

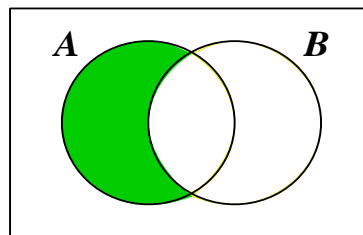
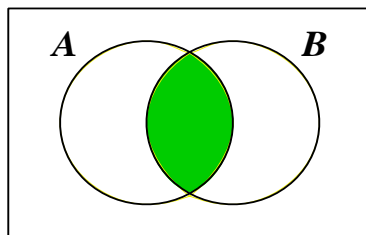
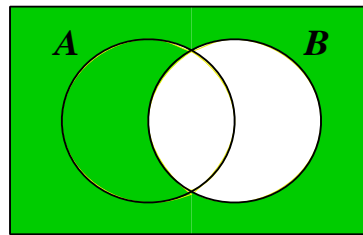
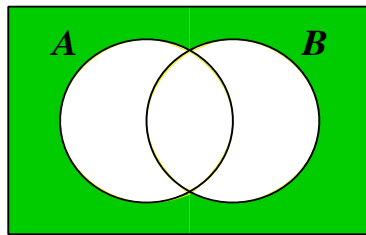
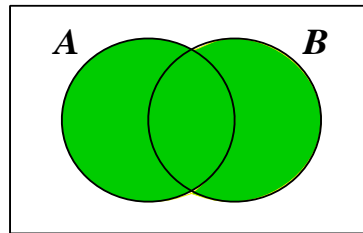
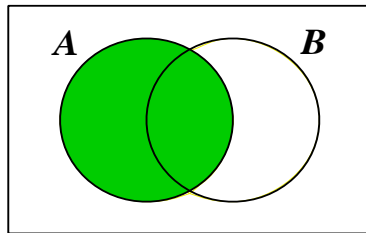
[ 1 mark ]

- (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 ]

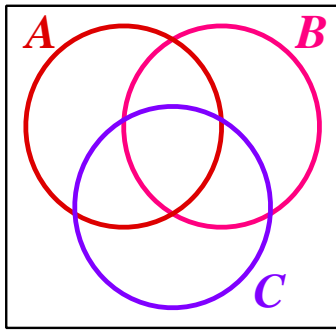
### Question 5

TRUE or FALSE ?

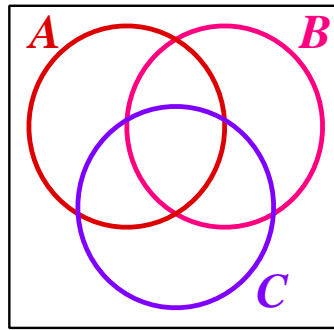
- (i)  $n \{ \text{factors } 14 \} = 4$
- (ii)  $n \{ \text{factors of } 19 \} = 3$
- (iii)  $n \{ \text{factors of a prime number} \} = 2$
- (iv)  $n \{ \text{factors of square number} \} = 3$
- (v)  $n \{ \text{common factors of } 12 \text{ and } 16 \} = 4$

[ 5 marks ]

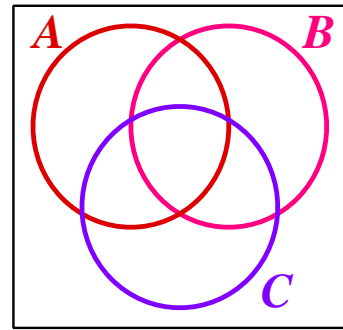
**Question 6**



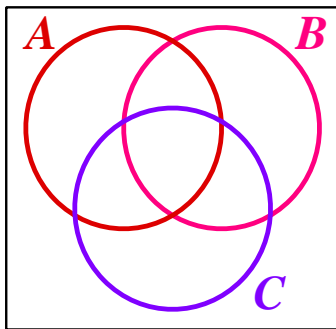
**Shade :  $B'$**



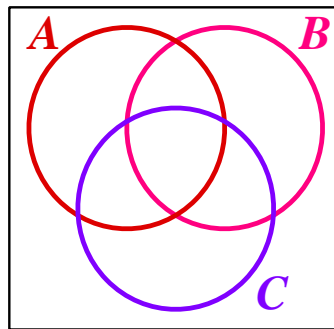
**Shade :  $A \cap B'$**



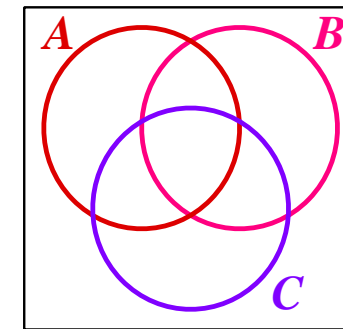
**Shade :  $A \cup B'$**



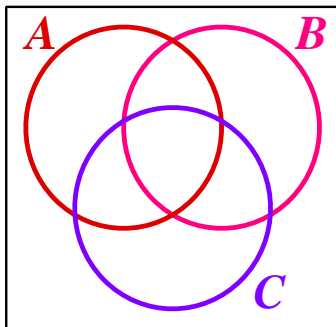
**Shade :  $A \cup C$**



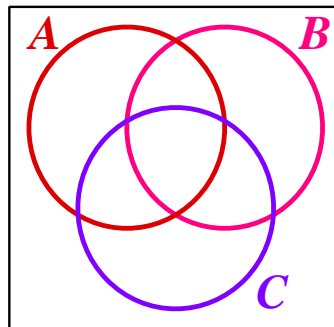
**Shade :  $(A \cup C)'$**



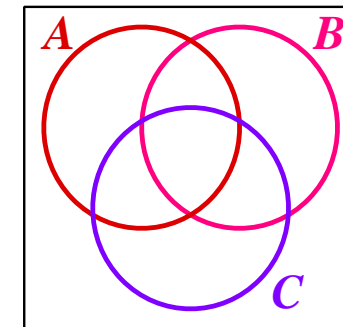
**Shade :  $A \cap B \cap C'$**



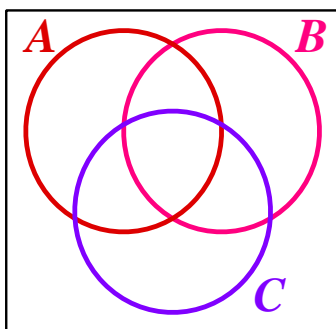
**Shade :  $A \cap C$**



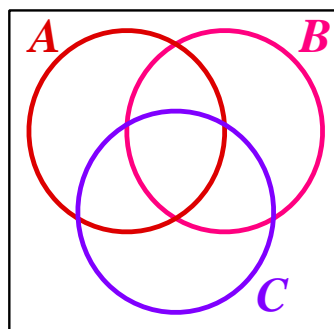
**Shade :  $(A \cap C)'$**



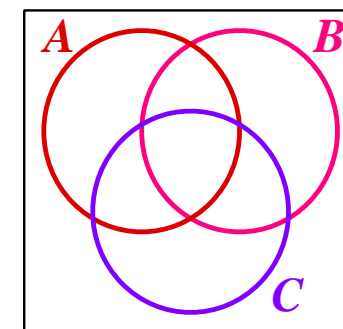
**Shade :  $B \cup B'$**



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



**Shade :  $C \cap C$**



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

**[ 12 marks ]**

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In October 2020, Shrewsbury School was voted "**Independent School of the Year 2020**"

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