Que3E:

In a survey of 60 people, it was found that 25 people read newspaper H, 26 read newspaper T, 26 read newspaper I, 9 read both H and I,11 read both H and T, 8 read both T and I, 3 read all three newspapers. Find:

(i) the number of people who read at least one of the newspapers.

(ii) The number of people who read exactly one newspaper.

Ans:

Number of people who read newspaper H = $n(H) = 25$,

Number of people who read newspaper T = $n(T) = 26$,

Number of people who read newspaper I = $n(I) = 26$,

Number of people who read both H & I = $n(H \cap I) = 9$,

Number of people who read both H & T = $n(H \cap T) = 11$

Number of people who read both T & I = $n(T \cap I) = 8$

Number of people who read all H ,T & I = $n(H \cap T \cap I) = 3$

Number of people who read at least one of the newspapers

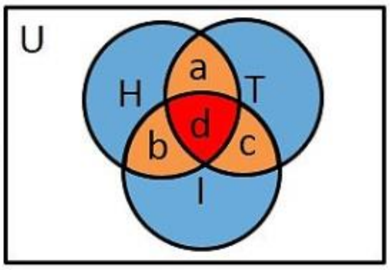
$$= n(H \cup T \cup I)$$

We know that

$$n(H \cup T \cup I) = n(H) + n(T) + n(I) - n(H \cap T) - n(H \cap I) - n(T \cap I)$$
$$+ n(H \cap T \cap I)$$
$$= 25 + 26 + 26 - 11 - 8 - 9 + 3$$
$$= 52$$

Hence, **52 people** read at least one of the newspapers.

Let us draw a Venn diagram



Let **a denote** the number of people who read

newspapers H and T but **not I.**

Let **b denote** the number of people who read

newspapers I and H but **not T**

Let **c denote** the number of people who read

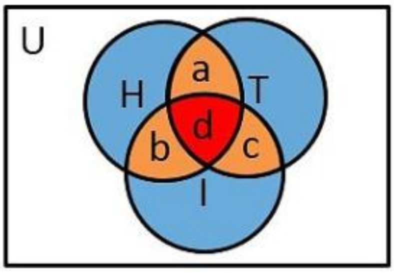
newspapers T and I but **not H**

Let **d denote** the number of people who read **all three** newspapers.

People who read exactly one news paper

$$= n(H \cup T \cup I) - a - b - c - d$$

$d = n(H \cap T \cap I) = 3$



$n(H \cap T) = a + d$

$n(I \cap T) = c + d$

$n(H \cap I) = b + d$

Adding the three equations

$n(H \cap I) + n(I \cap T) + n(H \cap I) = 11 + 8 + 9$

$(a + d) + (c + d) + (b + d) = 11 + 8 + 9$

$a + b + c + d + d + d = 28$

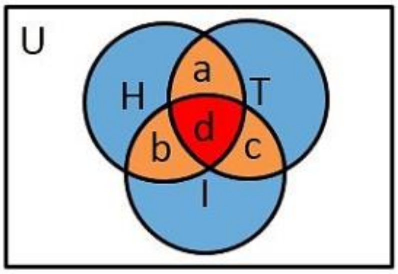
$a + b + c + d + 2d = 28$

$a + b + c + d = 28 - 2d$

$$a + b + c + d = 28 - 2 \times 3$$

$$a + b + c + d = 28 - 6$$

$$a + b + c + d = 22$$



People who read exactly one news paper

$$= n(H \cup T \cup I) - a - b - c - d$$

$$= 52 - (a + b + c + d)$$

$$= 52 - 22$$

$$= 30$$

Hence, **30 people** read exactly one newspaper.