

Ques 1: if X and Y are two sets such that $X \cup Y$ has 50 elements, X has 28 elements and Y has 32 elements, how many elements does $X \cap Y$ have?

Solution: -

Given that
 $n(X \cup Y) = 50$, $n(X) = 28$, $n(Y) = 32$
 $n(X \cap Y) = ?$

By using the formula,

$$n(X \cup Y) = n(X) + n(Y) - n(X \cap Y)$$

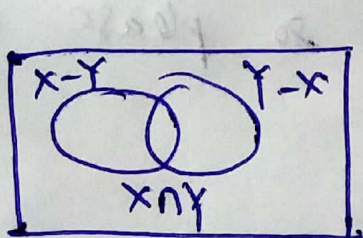
we find that

$$\begin{aligned} n(X \cap Y) &= n(X) + n(Y) - n(X \cup Y) \\ &= 28 + 32 - 50 = 10 \end{aligned}$$

Alternatively, suppose $n(X \cap Y) = k$, then

$$n(X - Y) = 28 - k, \quad n(Y - X) = 32 - k$$

use venn diagram.



then.

$$\begin{aligned} n(X - Y) &= 28 - k, \\ n(Y - X) &= 32 - k \end{aligned}$$

$$\begin{aligned} 50 &= n(X \cup Y) = n(X - Y) + n(X \cap Y) + n(Y - X) \\ &= 28 - k + k + (32 - k) \end{aligned}$$

$$k = 10.$$