

Example 6

If 45% students of a class has taken Mathematics and 85% students has taken Biology, find the percentage of such students of the class who have taken Biology.

Solution :

Let

$$M = \{x/x \text{ is the student taken Mathematics}\}$$

$$B = \{x/x \text{ is the student taken Biology}\}$$

By the question,

$$n(M \cup B) = 100, n(M) = 45, n(B) = 85$$

then

$$n(B) - n(M \cap B) = ?$$

By the formula,

$$n(M \cup B) = n(M) + n(B) - n(M \cap B)$$

or

$$100 = 45 + 85 - n(M \cap B)$$

or

$$n(M \cap B) = 130 - 100 = 30$$

So the percentage of such students who have taken only Biology

$$n(B) - n(M \cap B) = 85 - 30 = 55\%$$

Ans.

In a group of 520 persons, 360 can speak only Hindi and 130 only English. How many persons can speak both Hindi and English?

Solution :

Let

$$A = \{x/x \text{ is the person can speak Hindi}\}$$

$$B = \{x/x \text{ is the person can speak English}\}$$

So by the question,

$$n(A \cup B) = 520, n(A) - n(A \cap B) = 360$$

$$n(B) - n(A \cap B) = 130, n(A \cap B) = ?$$

By the formula,

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

or

$$520 = n(A) + 130$$

\therefore

$$n(A) = 520 - 130 = 390$$

\therefore By the question,

$$n(A) - n(A \cap B) = 360$$

or

$$390 - n(A \cap B) = 360$$

or

$$n(A \cap B) = 390 - 360$$

\therefore

$$n(A \cap B) = 30$$

So number of persons can speak both Hindi and English

$$= 30$$

Find the H.C.F. of 18, 24 and 30 by using set.

(JAC, 2016)

Solution :

Let factors of A = 18 {1, 2, 3, 6, 9, 18}
factors of B = 24 {1, 2, 3, 4, 6, 8, 12, 24}
factors of C = 30 {1, 2, 3, 5, 6, 10, 15, 30}

$$\therefore A \cap B \cap C = \{1, 2, 3, 6\}$$

$$\therefore \text{The greatest digit in } A \cap B \cap C = 6$$

$$\text{So the required H.C.F.} = 6$$

Ans.

Example 10.

Calculate the L.C.M. of 4, 6, 8 by set method.

(JAC, 2015)

Solution :

A = the set of multiple of 4

B = the set of multiple of 6

C = the set of multiple of 8

then A = {4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48,}

B = {6, 12, 18, 24, 30, 36, 42, 48,}

C = {8, 16, 24, 32, 40, 48,}

$$\therefore A \cap B \cap C = \{24, 48, \dots\}$$

$$\text{So least integer of } A \cap B \cap C = 24$$

$$\text{So the required L.C.M.} = 24$$

Ans.