ASSIGNMENT-3 - CBSE-11 EX:16.3

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PROBLEM-18:
In Class XI of a school 40% of the students study Mathematics and 30% study Biology. 10% of the class study both Mathematics and Biology. If a student is selected at random from the class, find the probability that he will be studying Mathematics or Biology.

SOLUTION:

Let X = $\{0, 1\}$ be a random variable representing students studying mathematics and biology respectively.

Event	Description
X = 0	Students studying mathematics
X = 1	Students studying biology

Let's assume 'A' be the event that the student is studying mathematics and 'B' be the event that the student is studying biology. so,

$$\Pr(X = 0) = \frac{40}{100} = \frac{2}{5} \tag{1}$$

$$\Pr(X = 1) = \frac{30}{100} = \frac{3}{10} \tag{2}$$

$$then, \Pr((X = 0)(X = 1)) = \frac{10}{100} \tag{3}$$

$\implies$ $\frac{1}{10}$, probability of studying both mathematics and biology.
Here, probability of studying mathematics or biology will be given by $\Pr((X = 0) + (X = 1))$

$$\Pr((X = 0) + (X = 1)) = \Pr((X = 0)) + \Pr((X = 1)) - \Pr((X = 0)(X = 1)) \tag{4}$$

$$= (2/5) + (3/10) - (1/10) \tag{5}$$

$$= (6/10) \tag{6}$$

$$\boxed{= (3/5)} \tag{7}$$

Hence, (3/5) is the probability that student will be studying mathematics or biology.