

Q: In a college, 30% students fail in physics, 25% fail in mathematics and 10% fail in both. One student is chosen at random. The probability that she fails in physics if she has failed in mathematics is

- 1) $\frac{1}{10}$
- 2) $\frac{2}{5}$
- 3) $\frac{5}{20}$
- 4) $\frac{1}{3}$

Solution: :

Random Variable	Value	Description
X	0	Subject being mathematics
	1	Subject being physics
Y	0	Fail
	1	Pass

TABLE 4

TABLE 1

$$\Pr(X = 1, Y = 0) = 0.3 \quad (1)$$

$$\Pr(X = 0, Y = 0) = 0.25 \quad (2)$$

$$\Pr(Y = 0) = 0.1 \quad (3)$$

$$\Pr(X = 1, Y = 0 | X = 0, Y = 0) = \frac{\Pr(Y = 0)}{\Pr(X = 0, Y = 0)} \quad (4)$$

$$= \frac{0.1}{0.3} \quad (5)$$

$$= \frac{1}{3} \quad (6)$$

Hence, option (d) $\frac{1}{3}$ is the correct option.