

Q: Without repetition of the numbers, four digit numbers are formed with the numbers 0,2,3,5. The probability of such a number divisible by 5 is

(A) $\frac{1}{5}$ (B) $\frac{4}{5}$ (C) $\frac{1}{30}$ (D) $\frac{5}{9}$

Solution: Number of four digit numbers possible are $3 \times 3 \times 2 \times 1 = 18$ because zero cannot be in the first place.

Random Variable	Values	Description
X	1	first digit
	2	second digit
	3	third digit
	4	fourth digit
Y	0	0 as digit
	1	5 as digit

TABLE 0

TABLE 1

As number of four digit numbers with fourth digit being 0 is $3 \times 2 \times 1 \times 1 = 6$

$$p(Y = 0, X = 4) = \frac{3 \times 2 \times 1 \times 1}{3 \times 3 \times 2 \times 1 \times 1} \quad (1)$$

$$= \frac{1}{3} \quad (2)$$

(3)

As number of four digit numbers with fourth digit being 5 and second digit being 0 is $2 \times 1 \times 1 \times 1 = 2$

$$p(Y = 1, X = 4 | Y = 0, X = 2) = \frac{2 \times 1 \times 1 \times 1}{3 \times 3 \times 2 \times 1} \quad (4)$$

$$= \frac{1}{9} \quad (5)$$

(6)

As number of four digit numbers with fourth digit being 5 and third digit being 0 is $2 \times 1 \times 1 \times 1 = 2$

$$p(Y = 1, X = 4 | Y = 0, X = 3) = \frac{2 \times 1 \times 1 \times 1}{3 \times 3 \times 2 \times 1} \quad (7)$$

$$= \frac{1}{9} \quad (8)$$

(9)

Probability of forming four digit number divisible by 5, without repetition,

$$p = p(Y = 0, X = 4) + p(Y = 1, X = 4 | Y = 0, X = 2) + p(Y = 1, X = 4 | Y = 0, X = 3) \quad (10)$$

$$= \frac{5}{9} \quad (11)$$

Hence, option (D) $\frac{5}{9}$ is the correct option.