

Previous Year Question with Solution :

A person throws two fair dice. He wins ₹ 15 for throwing a doublet (same numbers on the two dice), wins ₹ 12 when the throw results in the sum of 9, and loses ₹ 6 for any other outcome on the throw. Then, the expected gain/loss (in ₹) of the person is

(2019 Main, 12 April II)

- (a) $\frac{1}{2}$ gain (b) $\frac{1}{4}$ loss (c) $\frac{1}{2}$ loss (d) 2 gain

It is given that a person wins ₹15 for throwing a doublet (1, 1) (2, 2), (3, 3), (4, 4), (5, 5), (6, 6) and win ₹12 when the throw results in sum of 9, i.e., when (3, 6), (4, 5), (5, 4), (6, 3) occurs.

Also, losses ₹6 for throwing any other outcome, i.e., when any of the rest $36 - 6 - 4 = 26$ outcomes occurs.

Now, the expected gain/loss

$= 15 \times P$ (getting a doublet) $+ 12 \times P$ (getting sum 9) $- 6 \times P$ (getting any of rest 26 outcome)

$$\begin{aligned} &= \left(15 \times \frac{6}{36}\right) + \left(12 \times \frac{4}{36}\right) - \left(6 \times \frac{26}{36}\right) \\ &= \frac{5}{2} + \frac{4}{3} - \frac{26}{6} = \frac{15 + 8 - 26}{6} \\ &= \frac{23 - 26}{6} = -\frac{3}{6} = -\frac{1}{2}, \text{ means loss of } \text{₹} \frac{1}{2} \end{aligned}$$