

A die is loaded in such a way that each odd number is twice as likely to occur as each even number. Find $P(G)$, where G is the event that a number greater than 3 occurs on a single roll of the die.

Solution:

Given that probability of odd numbers

$$= 2 \times (\text{Probability of even number})$$

$$\Rightarrow P(\text{Odd}) = 2 \times P(\text{Even})$$

$$\text{Now, } P(\text{Odd}) + P(\text{Even}) = 1$$

$$\Rightarrow 2 P(\text{Even}) + P(\text{Even}) = 1$$

$$\Rightarrow 3 P(\text{Even}) = 1$$

$$P(\text{Even}) = 1/3$$

$$P(\text{Odd}) = 1 - 1/3 = 2/3$$

Now, Total number occurs on a single roll of die = 6

And the number greater than 3 = 4, 5 or 6

$$\text{So, } P(G) = P(\text{number greater than 3})$$

$$= P(\text{number is 4, 5 or 6})$$

Here, 4 and 6 are even numbers and 5 is odd

$$\therefore P(G) = 2 \times P(\text{Even}) \times P(\text{Odd})$$

$$= 2 \times 1/3 \times 2/3$$

$$= 4/9$$

Hence, the required probability is $4/9$