

Prediction Using Probability- Challenge

Task - 1

In a society of 12 members, you must select a committee of 5 members. Ava, the owner of the society, is already a member of the committee. In how many ways the committee can be formed?

Solution

As owner of company is already selected, 4 members need to select out of 11 members. Thus number of ways committee can form is ${}^{11}C_4$

$${}_nC_r = \frac{n!}{r!(n-r)!}$$

$$\begin{aligned}\text{Number of ways committee can be form} &= {}^{11}C_4 \\ &= 330\end{aligned}$$

Task- 2

At a car parking, there are 150 vehicles. Of these, 80 are cars, 50 are vans, and the remaining are lorries. If each vehicle is equally likely to leave, find the probability of:

- a) a van leaving first
- b) a lorry leaving first
- c) a car leaving second if either a lorry or a van had left first

Solution

Sample Space is total number of vehicles=150

Thus

- a) The probability of a van leaving first is $50/150$
- b) The probability of lorry leaving first is $20/150$
- c) The probability of car leaving second if either a lorry or a van had left first is $80/149$

Task- 3

A survey was taken on 30 classes at a school to find the total number of left-handed students in each class. The table below shows the results:

No. of left-Handed students	0	1	2	3	4	5
Frequency (no. of classes)	1	2	8	5	12	2

a) Find the probability that the class has 2 left-handed students. b) What is the probability that the class has at least 3 left-handed students?

Solution

Sample Space = Number of classes = 30

a) The probability that the class has 2 left-handed students is $\frac{8}{30}$

b) The probability that the class has at least 3 left-handed students = $P(3) + P(4) + P(5)$
 $= \frac{(5+12+2)}{30}$
 $= \frac{19}{30}$

Task -4

PQRS is a square in which A is the midpoint of the edge QR and B is the midpoint of the edge SR. A point is selected at random in the square. Calculate the probability of the point lying inside the triangle ABR [Hint: Consider the length of the square as $2x$]

Select the correct answer from the following options:

1. $\frac{1}{2}$
2. $\frac{1}{4}$
3. $\frac{1}{6}$
4. $\frac{1}{8}$

Solution

Probability of the point lying inside the triangle ABR is $\frac{\text{Area of Triangle}}{\text{Area of Square}}$
 $= \frac{(0.5 * x * x)}{(2x * 2x)}$
 $= \frac{1}{8}$

Task -5

Two dice are rolled. Find the probability that the sum of the two numbers that appear is:

1. equal to 1
2. equal to 4
3. less than 13

Solution

Sample space = 36

1. Probability that the sum of the two numbers that appear is 1 is 0
2. Here favourable outcomes are (1,3),(3,1),(2,2)

Thus probability that the sum of the two numbers that appear is 4 is $\frac{3}{36}$

3. Probability that the sum of the two numbers that appear is less than 13 is 1

Task -6

There are 20 tickets marked with numbers 1 to 20. What is the probability of selecting a ticket having the following properties?

a) even number

b) number divisible by 3

c) prime number

c) number divisible by 5

Solution

Here sample space is 20

a) No of even numbers in 1 to 20 is 10

Thus probability of selecting a ticket having even number is $10/20 = 1/2$

b) Total numbers divisible by 3 is 6 (3,6,9,12,15,18)

Thus probability of selecting ticket having number divisible by 3 is $6/20 = 3/10$

c) Number of prime numbers = 8 (2,3,5,7,11,13,17,19)

Thus probability of selecting a ticket having number prime number is $8/20 = 2/5$

d) Numbers divisible by 5 are (5,10,15,20)

Thus probability of selecting a ticket having number divisible by 5 = $4/20 = 1/5$

Task -7

Henry is playing with 3 dice. He wants to know whether to bet on the sum 11 or 12. Which of the sums will occur more probably?

Solution

Total outcomes will be $6 \times 6 \times 6 = 216$

The probability of getting sum 11 is $27/216$ & probability of getting sum 12 is $25/216$

Thus 11 will occur most probably.