

Chapter 25. Probability

Ex 25.1

Answer 1.

As the coin is tossed 800 times, the total number of trials is 800. Let E_1 and E_2 be the events of the coin coming up with a head and a tail respectively.

The number of times E_1 occurs = 415 and the number of times E_2 occurs = 385

$$\therefore P(E_1) = \frac{415}{800} = \frac{83}{160}, \text{ and}$$

$$P(E_2) = \frac{385}{800} = \frac{77}{160}$$

Answer 2.

Total number of families = $333 + 392 + 275 = 1000$

(i) Number of families having 1 girl = 392

$$\begin{aligned} \text{Required probability} &= \frac{\text{Number of families having 2 girls}}{\text{Total number of families}} \\ &= \frac{392}{1000} = \frac{49}{125} \end{aligned}$$

(ii) Number of families having 2 girls = 275

$$\begin{aligned} \text{Required probability} &= \frac{\text{Number of families having 1 girls}}{\text{Total number of families}} \\ &= \frac{275}{1000} = \frac{11}{40} \end{aligned}$$

(iii) Number of families having no girl = 333

$$\begin{aligned} \text{Required probability} &= \frac{\text{Number of families having no girl}}{\text{Total number of families}} \\ &= \frac{333}{1000} \end{aligned}$$

Answer 3.

Number of times 2 tails come up = 83

Total number of times the coins were tossed = 300

$$\begin{aligned}P(2 \text{ tails will come up}) &= \frac{\text{Number of times 2 tails come up}}{\text{Total number of times the coins were tossed}} \\ &= \frac{83}{300}\end{aligned}$$

Number of times 1 tail come up = 140

Total number of times the coins were tossed = 300

$$\begin{aligned}P(1 \text{ tail will come up}) &= \frac{\text{Number of times 1 tail come up}}{\text{Total number of times the coins were tossed}} \\ &= \frac{140}{300} = \frac{7}{15}\end{aligned}$$

Number of times no tail come up = 77

Total number of times the coins were tossed = 300

$$\begin{aligned}P(\text{no tails will come up}) &= \frac{\text{Number of times no tail come up}}{\text{Total number of times the coins were tossed}} \\ &= \frac{77}{300}\end{aligned}$$

Answer 4.

Total number of times die is thrown = 450

(i) Number of times 4 come up on the die = 75

$$\begin{aligned}P(4 \text{ will come up on die}) &= \frac{\text{Number of times 4 come up}}{\text{Total number of times the die is thrown}} \\ &= \frac{75}{450} = \frac{1}{6}\end{aligned}$$

(ii) Number of times less than 4 come up = 73 + 70 + 74 = 217

$$\begin{aligned}P(<4 \text{ will come up on die}) &= \frac{\text{Number of times } (<4) \text{ come up}}{\text{Total number of times the die is thrown}} \\ &= \frac{217}{450}\end{aligned}$$

(iii) Number of times greater than 4 come up = 80 + 78 = 158

$$\begin{aligned}P(>4 \text{ will come up on die}) &= \frac{\text{Number of times } (>4) \text{ come up}}{\text{Total number of times the die is thrown}} \\ &= \frac{158}{450} = \frac{79}{225}\end{aligned}$$

Answer 5.

The total number of tests taken by a student =6

(i)The number of times a student gets more than 70% marks in a unit test =4

$$\begin{aligned} &P(\text{More than 70\% marks in a unit test}) \\ &= \frac{\text{Number of times student gets more than 70\% marks in a unit test}}{\text{Total number of tests taken by a student}} \\ &= \frac{4}{6} = \frac{2}{3} \end{aligned}$$

(ii) The number of times a student gets less than 72% marks in a unit test =3

$$\begin{aligned} &P(\text{less than 72\% marks in a unit test}) \\ &= \frac{\text{Number of times student gets less than 72\% marks in a unit test}}{\text{Total number of tests taken by a student}} \\ &= \frac{3}{6} = \frac{1}{2} \end{aligned}$$

(iii)The number of times a student gets less than 65% marks in a unit test =0

$$\begin{aligned} &P(\text{less than 65\% marks in a unit test}) \\ &= \frac{\text{Number of times student gets less than 65\% marks in a unit test}}{\text{Total number of tests taken by a student}} \\ &= \frac{0}{6} = 0 \end{aligned}$$

Answer 7.

When a die is tossed once , the possible outcomes are the numbers 1,2,3,4,5,6

So, total number of possible outcomes =6

(i)The event is getting an even number and the even numbers are 2,4,6.

So , the number of favourable outcomes to the event getting an even number =3

$$\text{Therefore , } P(\text{getting an even number}) = \frac{\text{Favourable outcomes}}{\text{Total number of outcomes}} = \frac{3}{6} = \frac{1}{2}$$

(ii)The event is getting a perfect square and the perfect squares are 1 and 4 .

So ,the number of favourable outcomes to the event getting a perfect square =2

$$\text{Therefore , } P(\text{getting a perfect square}) = \frac{\text{Favourable outcomes}}{\text{Total number of outcomes}} = \frac{2}{6} = \frac{1}{3}$$

Answer 10.

The sample space for the experiment of tossing two coins is {HH,HT,TH,TT}.

Number of outcomes = 4

Number of favourable outcomes = 2

P(getting different faces on the coins) =

$$\frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{2}{4} = \frac{1}{2}$$

Answer 11.

When a coin is tossed twice, the outcomes are {HH,HT,TH,TT}.

Number of outcomes = 4

(i) Number of favourable outcomes = 1

$$P(\text{getting no head}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{1}{4}$$

(ii) Number of favourable outcomes = 3

$$P(\text{getting at most one tail}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{3}{4}$$

Answer 12.

If three coins are tossed then possible outcomes are:

HHH, HHT, HTH, THH, HTT, THT, TTH, TTT

So total number of outcomes = 8

Favourable outcomes for getting at least 2 heads are:

HHH, HHT, HTH, THH

So number of favourable outcomes = 4

$$\text{Thus, } P(\text{Getting at least 2 heads}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{4}{8} = \frac{1}{2}$$

Answer 13.

If two dice are rolled then the possible outcomes are:

(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6)

(2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6)

(3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6)

(4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6)

(5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6)

(6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)

So the total number of outcomes = 36

(i) a sum of 6

Favorable outcomes for getting a sum 6 are:

(1, 5), (2, 4), (3, 3), (4, 2), (5, 1)

So number of favorable outcomes = 5

$$\text{Thus, } P(\text{a sum of 6}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{5}{36}$$

(ii) two different digits

Here we use the following formula:

$$P(\text{Two different digits}) = 1 - P(\text{both digits are same})$$

Now favorable outcomes for both digits same are: (1, 1), (2, 2), (3, 3), (4, 4),

(5, 5), (6, 6)

So the number of possible outcomes for both digits same = 6

$$\text{Thus, } P(\text{Two different digits}) = 1 - \frac{6}{36} = \frac{5}{6}$$

(iii) a difference of 1

Favorable outcomes for getting a difference 1 are:

(1, 2), (2, 1), (2, 3), (3, 2), (3, 4), (4, 3), (4, 5), (5, 4), (5, 6), (6, 5)

So the number of possible outcomes = 10

Answer 14.

Total number of outcomes = 3

$$(i) P(\text{Yellow ball}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{1}{3}$$

$$(ii) P(\text{Red ball}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{1}{3}$$

$$(iii) P(\text{Blue ball}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{1}{3}$$

Answer 15

Since $P(\text{Winning}) + P(\text{Losing}) = 1$

$$\text{Therefore, } P(\text{Losing}) = 1 - P(\text{winning}) = 1 - \frac{5}{11} = \frac{6}{11}$$

Answer 16.

Total number of marbles = $5 + 8 + 4 = 17$

(i) Number of red marbles = 5

$$\text{Probability of getting a red marble} = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} =$$

(ii) Number of white marbles = 8

$$\text{Probability of getting a white marble} = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{8}{17}$$

(iii) Number of green marbles = 4

$$\text{Probability of getting a green marble} = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{4}{17}$$

$$\text{Probability of not getting a green marble} = 1 - \frac{4}{17} = \frac{13}{17}$$

Answer 17.

Possible outcomes for tossing two coins are: HH, HT, TH, TT

So the number of outcomes = 4

(i) Favorable outcomes are: TT

$$\text{So, } P(\text{Two tails}) = \frac{1}{4}$$

(ii) Favorable outcomes are: HH

$$\text{So, } P(\text{No tail}) = \frac{1}{4}$$

(iii) Favorable outcomes are: TT, TH, HT

$$P(\text{At least one tail}) = \frac{3}{4}$$

Answer 18.

Total number of outcomes when two dice are rolled = 36

(i) A doublet

Favorable outcomes are: (1,1), (2,2), (3,3), (4,4), (5,5), (6,6)

Number of favorable outcomes = 6

$$P(\text{A doublet}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{6}{36} = \frac{1}{6}$$

(ii) Sum divisible by 5

Favorable outcomes are: (1,4), (2,3), (3,2), (4,1), (4,6), (5,5), (6,4)

Number of favorable outcomes = 7

$$P(\text{Sum divisible by 5}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{7}{36}$$

(iii) A sum of at least 11

Favorable outcomes are: (5,6), (6,5), (6,6)

Number of favorable outcomes = 3

$$P(\text{sum is at least 11}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{3}{36} = \frac{1}{12}$$

Answer 19.

When two dice are rolled the outcomes are:

(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6)

(2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6)

(3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6)

(4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6)

(5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6)

(6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)

So, the total number of outcomes = 36