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

$$\text{Required probability}=\frac{\text{Number of families having 2 girls}}{\text{Total number of families}}$$

$$=\frac{392}{1000}=\frac{49}{125}$$

(ii) Number of families having 2 girls = 275

$$\text{Required probability}=\frac{\text{Number of families having 1 girls}}{\text{Total number of families}}$$

$$=\frac{275}{1000}=\frac{11}{40}$$

(iii) Number of families having no girl = 333

$$\text{Required probability}=\frac{\text{Number of families having no girl}}{\text{Total number of families}}$$

$$=\frac{333}{1000}$$

Answer 3.

Number of times 2 tails come up = 83

Total number of times the coins were tossed = 300

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

Number of times 1 tail come up = 140

Total number of times the coins were tossed = 300

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

Number of times no tail come up = 77

Total number of times the coins were tossed = 300

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

Answer 4.

Total number of times die is thrown =450

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

$$P(\text{4 will come up on die}) = \frac{\text{Number of times4 come up}}{\text{Total number of times the die is thrown}} = \frac{75}{450} = \frac{1}{6}$$

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

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

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

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

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

P(More than 70% marks in a unit test)

$$=\frac{\text{Number of times student gets more than 70\% marks in a unit test}}{\text{Total number of tests taken by a student}}$$

$$=\frac{4}{6}=\frac{2}{3}$$

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

P(less than 72% marks in a unit test)

$$=\frac{\text{Number of times student gets less than 72\% marks in a unit test}}{\text{Total number of tests taken by a student}}$$

$$=\frac{3}{6}=\frac{1}{2}$$

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

P(less than 65% marks in a unit test)

$$=\frac{\text{Number of times student gets less than 65\% marks in a unit test}}{\text{Total number of tests taken by a student}}$$

$$=\frac{0}{6}=0$$

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

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

(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

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

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

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

(ii) Number of favourable outcomes = 3

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

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

Favorable out comes for getting at least 2 heads are:

HHH, HHT, HTH, THH

So number of favorable outcomes = 4

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

Answer 13.

f 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

Thus, P(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(Two different digits) = 1– P(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

Thus, P(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(Winning) + P(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

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

(ii) Favorable outcomes are: HH

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

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

P(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

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

(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

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

(iii) A sum of at least 11

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

Number of favorable outcomes = 3

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

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