Exercise 7.5

For the following experiments, find the probability in each case:

i.   Experiment

From a box containing Orange flavored sweets, Bilal takes out one sweet without looking.
Events Happening:

i)   The sweet is orange flavoured   ii)   the sweet is lemon
        flavoured

Solution:

Total orange flavoured sweets = 1

i. The sweet is orange flavoured

Total possible outcomes   = 1

Flavoured outcomes   = 1

P(sweet is orange flavoured) $= \frac{1}{1} = 1$

Hence, probability of outcomes = 1

ii. The sweet is lemon-flavoured

Total possible outcomes   = 1

Flavoured outcomes   = 1

P(sweet is lemon- flavoured) $= \frac{0}{1} = 0$

Hence, probability of outcomes = 0

ii)   Experiment

Pakistan and India play a cricket match. The result is:

    i)   **Pakistan wins**   **ii)**   **India does not lose.**

Solution:

    i. **Pakistan wins**

$$\text{favorable outcomes} = 1$$

$$\text{P(Pakistan wins)} = \frac{1}{3}$$

Hence, probability of Pakistan wins $= {}^1/_3$

    ii. **India does not lose.**

$$\text{favorable outcomes} = 2$$

$$\text{P (Pakistan wins)} = {}^2/_3$$

Hence, probability of India does not lose $= {}^2/_3$

    ii)   **Experiment**

There are 5 green and 3 red balls in a box, one ball is taken out.

Event happening:

    i)   **the ball is green**   **ii)**   **the ball is red.**

Solution:

$$\text{Total ball} = 5 + 3 = balls$$

    i. **Total possible outcomes $= {}^8C_1 = 8$**

$$\text{favorable outcomes (ball is green)} = {}^5C_1 = 5$$

$$\text{P (ball is green)} = \frac{5}{8}$$

Hence, probability the ball is green $= \frac{5}{8}$

ii. Total possible outcomes $= {}^8C_1 = 8$

favorable outcomes (ball is red) $= {}^3C_1 = 3$

P (ball is red) $= \frac{3}{8}$

Hence, probability the ball is red $= \frac{3}{8}$

iii)   Experiment

A fair coin is tossed three times. It shows

Events Happening:

i)   One tail   ii)   at least one head.

Solution:

Total possible outcomes $= 8$

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

i. One tail

Favorable outcomes $= 3$

P (one tail) $= \frac{3}{8}$

Hence, probability of one tail $= \frac{3}{8}$

ii. atleast one head

Favorable outcomes $= 7$

P (at least one head) $= \frac{7}{8}$

Hence, probability of at least one head $= \frac{7}{8}$

iv)   Experiment

A die is rolled. The top shows

Events Happening:

i)   **3 or 4 dots**   ii)   **dots less than 5.**

Solution:

Total possible outcomes $= 6$ $\{1, 2, 3, 4, 5, 6\}$

i. **3 or 4 dots**

P (3 or 4 dots) $= P(3) + P(2) + P(3) + P(4)$

$$= \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6}$$

$$= \frac{1+1+1+1}{6} = \frac{4}{6} = \frac{2}{3}$$

Hence, probability of dots less than 5 $= \frac{2}{3}$

v)   Experiment

**A box containing slips number 1, 2,3, ..., 5 one slip is picked up
Events Happening:**

i)   **the number on the slip is prime number**

ii)   **the number on the slip is a multiple of 3.**

Solution:

Total number $= 5$ $\{1, 2, 3, 4, 5\}$

i. **the number on the slip is prime number.**

Favorable outcome $= 3 \; \{2, 3, 5\}$

P (the number on the slip is prime number) $= \dfrac{3}{5}$

Hence, the probability of the numbers is prime $= {}^3/_5$

ii. the number on the slip is a multiple of 3.

P (the number on the slip is multiple of 3) $= \dfrac{1}{5}$

Hence, the probability of the numbers is multiple of 3 $= {}^1/_5$

vi)   Experiment

Two dice, one red and the other blue are rolled simultaneously. The numbers of dots on the top are added the total of the two score is:

Events Happening:

   i. 5   *ii.* 7   *iii.* 11

Solution:

Two dice are rolls $= 5 \quad \{1, 2, 3, 4, 5\}$

Possible outcomes $= {}^6C_1 \times {}^6C_1$

$$= \dfrac{6!}{1!5!} \times \dfrac{6!}{1!5!}$$

$$= \dfrac{6 \times 5!}{5!} \times \dfrac{6 \times 5!}{5!}$$

$$= 6 \times 6 = 36$$

i.   the score of two dice is 5

Favorable outcomes $= 4 \quad \{(4, 1), (2, 3), (3, 2), (1, 4)\}$

$$P \text{ (score of two dice is 5)} = \frac{4}{36} = {}^{1}/_{9}$$

Hence the probability of score of two dice is $5 = {}^{1}/_{9}$

ii.   the score of two dice is 7

Favorable outcomes $= 7$ $\{(1,6),(2,5),(3,4),(4,3),(5,2),(6,1)\}$

$$P \text{ (score of two dice is 7)} = \frac{6}{36} = \frac{1}{6}$$

Hence the probability of score of two dice is $7 = \frac{1}{6}$

iii.   the score of two dice is 11

Favorable outcomes $= 2$ $\{(5,6),(6,5)\}$

$$P \text{ (score of two dice is 11)} = \frac{2}{36} = \frac{1}{18}$$

Hence the probability of score of two dice is $11 = \frac{1}{18}$

vii)   Experiment

A bag contains 40 balls out of which 5 are green 15 or black and the remaining are yellow. A ball is taken out of the bag.

i)   The ball is black   ii)   The ball is green

iii)   The ball is not green.

Solution:

Total balls $= 15$

i.   The ball is black

Favourable outcomes $= 15$

$$P \text{ (The ball is black)} = \frac{15}{40} = \frac{3}{8}$$

Hence the probability of score of the ball is black = $\frac{3}{8}$

ii.   the ball is green

Favourable outcomes = 5

$$P \text{ (The ball is green)} \qquad = {}^{15}/_{40} = {}^{1}/_{8}$$

Hence the probability of score of the ball is green = $^{1}/_{8}$

iii.   The ball is not green.

Favourable outcomes = 40 − 5 = 35

$$P \text{ (The ball is not green)} \quad = \frac{35}{40} = {}^{7}/_{8}$$

Hence the probability of score of the ball is not green = $^{7}/_{8}$

viii)   Experiment

One chit out of 30 containing the names of 30 students of a class of 18 boys and 12 girls is taken out at random, for nomination as the monitor of the class.

Event Happening

i)   The monitor is a boy   ii)   the monitor is a girl

Solution:

Total number of students = 30

(18 *boys and* 12 *girls*)

i. **The monitor is a boy**

Favourable outcomes = 18

$$P \text{ (the monitor is a boy)} = \frac{18}{30} = \frac{3}{5}$$

Hence the probability, the monitor is a boy $= {}^3/_5$

ii. The monitor is a girl

Favourable outcomes = 18

$$P \text{ (the monitor is a girl)} = \frac{12}{30} = {}^2/_5$$

Hence the probability, the monitor is a girl $= {}^2/_5$

ix)   Experiment

A coin is tossed four times. The top shows

Events Happening:

i)   **All heads**   ii)   **2 heads and 2 tails.**

Solution:

Total possible outcomes = 2^4 = 16

{HHHH, HHHT, HHTH, HTHH, THHH, HHTT, HTHT, THHT, THTH, HTTH, TTHH, TTTH, TTHT, THTT, HTTT, TTTT}

i. all heads

Favourable outcomes $= 1$ $\{HHHH\}$

$$P \text{ (all heads)} = \frac{1}{16}$$

Hence, the probability if all heads $= \frac{1}{16}$

ii)   **2 heads and 2 tails.**

Favourable outcomes $= 6$

{HHTT, HTHT, THHT, THTH, HTTH, TTHH}

P (2 heads and 2 tails.) $= \dfrac{6}{36} = \dfrac{1}{16}$

Hence, the probability if all heads $= \dfrac{1}{16}$