# Probability

## EXERCISE 22 (A)

**Question 1.**
**A coin is tossed once. Find the probability of**
**(i) getting a head**
**(ii) not getting a head**
**Solution:**
Total number of possible outcomes are Head (H) and Tail (T) i.e. 2
**(i)** P (Getting a head) $=\frac{1}{2}$
**(ii)** P (Not getting a head) = $\frac{1}{2}$

**Question 2.**
**A coin is tossed 80 times and the head is obtained 38 times. Now, if a coin tossed once, what will the probability of getting:**
**(i) a tail**
**(ii) ahead**
**Solution:**

(*i*) $\because$ Total number of possible outcomes = 80

and, the number of favourable outcomes of getting a tail = 80 – 38 = 42

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

$$= \frac{42}{80} = \frac{21}{40}$$

(*ii*) $\because$ Total number of possible outcomes = 80

and, the number of favourable outcomes of getting head = 38

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

$$= \frac{38}{80} = \frac{19}{40}$$

**Question 3.**

**A dice is thrown 20 times and the outcomes are noted as shown below :**

| Outcomes | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| No. of times | 2 | 3 | 4 | 4 | 3 | 4 |

**Now a dice is thrown at random, find the probability of getting :**

**Solution:**

$\because$ Total number of outcomes = 20

(*i*) P (getting 3) = $\frac{4}{20} = \frac{1}{5}$

(*ii*) A number less than 3 (1, 2) will appear = 2 + 3 = 5 times

$\therefore$ Probability = $\frac{5}{20} = \frac{1}{4}$

(*iii*) A number greater than 3 (4, 5, 6) will appear = 4 + 3 + 4 = 11 times

$\therefore$ Probability = $\frac{11}{20}$

**Question 4.**

**A survey of 50 boys showed that 21 like tea while 29 dislike it. Out of these boys, one boy is chosen at random. What is the probability that the chosen boy**

**(i) likes tea**

**(ii) dislikes tea**

**Solution:**

Total number of boys = 50

Number of boys like tea = 21

Number of boys dislike tea = 29

(*i*) Probability of boys like tea = $\frac{21}{50}$

(*ii*) Probability of boys dislike tea = $\frac{29}{50}$

**Question 5.**
**In a cricket match, a batsman hits a boundary 12 times out of 80 balls he plays, further, if he plays one ball more, what will be the probability that:**
**(i) he hits a boundary**
**(ii) he does not hit a boundary**
**Solution:**

(*i*) Total number of balls = 80

Hits boundaries = 12 times

$$\therefore \text{ P (Hitting a boundary)} = \frac{12}{80} = \frac{3}{20}$$

$$(ii) \text{ P (of not hitting a boundary)} = \frac{68}{80} = \frac{17}{20}$$

**Question 6.**
**There are 8 marbles in a bag with numbers from 1 to 8 marked on each of them. What is the probability of drawing a marble with number**
**(i) 3**
**(ii) 7**
**Solution:**
Total number of marbles = 8
**(i)** Probability (of getting a marble with number 3) = $\frac{1}{8}$
**(ii)** Probability (of getting a marble with number 7) = $\frac{1}{8}$

**Question 7.**
**Two coins are tossed simultaneously 100 times and the outcomes are as given below:**

| Outcomes | Two heads (H, H) | Exactly one head (H T or T H) | No head (T T) |
|---|---|---|---|
| No. of times | 21 | 55 | 24 |

**If the same pair of coins is tossed again at random, find the probability of getting :**
**(i) two heads**
**(ii) exactly one head**
**(iii) no head.**

**Solution:**

(*i*) Here, total number of trials = 100 times

Number of heads got (H, H) = 21

$$\therefore \text{ P (E)} = \frac{\text{Number of trials in which two heads occurs}}{\text{Total number of trials}} = \frac{21}{100}$$

(*ii*) Total number of trials = 100 times

Number of exactly one head = 55

$$\therefore \text{ P (E)} = \frac{55}{100} = \frac{11}{20}$$

(*iii*) Total number of trials = 100 times

Number of head = 24

$$\therefore \text{ Probability} = \frac{24}{100} = \frac{16}{25}$$

**Question 8.**

**A bag contains 4 white and 6 black balls,- all of the same shape and same size. A ball is drawn from the bag without looking into the bag. Find the probability that the ball drawn is :**

**(i) a black ball**

**(ii) a white ball**

**(iii) not a black ball**

**Solution:**

Number of white balls = 4

Number of black balls = 6

Number of total balls or possible events = 6 + 4 = 10 balls

(*i*) Probability (a black ball)

Number of black balls = 6

Number of total balls = 10

$$\therefore \text{ Probability} = \frac{6}{10} = \frac{3}{5}$$

(*ii*) P (a white ball)

Number of white balls = 4

Number of total balls = 10

$\therefore$ Probability $= \frac{4}{10} = \frac{2}{5}$

(*iii*) P (not a black ball)

$= \frac{\text{Number of white balls}}{\text{Number of total balls}} = \frac{4}{10} = \frac{2}{5}$

(*ii*) P (a white ball)

Number of white balls = 4

Number of total balls = 10

$\therefore$ Probability $= \frac{4}{10} = \frac{2}{5}$

(*iii*) P (not a black ball)

$= \frac{\text{Number of white balls}}{\text{Number of total balls}} = \frac{4}{10} = \frac{2}{5}$

**Question 9.**

**In a single throw of a dice, find the probability of getting a number:**

**(i) 4**

**(ii) 6**

**(iii) greater than 4**

**Solution:**

$\because$ Total number of outcomes = 6

(*i*) Event of getting number 4 = 1

Total number of outcomes = 6

$\therefore$ Probability $= \frac{1}{6}$

(*ii*) Event of getting number 6 = 1

Total number of outcomes = 6

$\therefore$ P $= \frac{1}{6}$

(*iii*) Greater than 4 (*i.e.* 5, 6) will appear 2 times

$\therefore$ Probability (of getting greater than 4) $= \frac{2}{6}$

$= \frac{1}{3}$

**Question 10.**
**Hundred identical cards are numbered from 1 to 100. The cards are well shuffled and then a card is drawn. Find the probability that the number on the card drawn is :**
**(i) 50**
**(ii) 80**
**(iii) 40**
**Solution:**

Here, total number of cards = 100

(*i*) Card drawn with number = 50

Favourable outcomes = 1

Total number of outcomes = 100

$\therefore P = \frac{1}{100}$

(*ii*) Card drawn with number = 80

Favourable outcomes = 1

Total number of outcomes = 100

$\therefore P = \frac{1}{100}$

(*iii*) Card drawn with number = 40

Favourable outcomes = 1

Total number of outcomes = 100

$\therefore P = \frac{1}{100}$

## EXERCISE 22 (B)

**Question 1.**
**Suppose S is the event that will happen tommorow and P(S) = 0.03.**
**(i) State in words, the complementary event S'.**
**(ii) Find P(S')**
**Solution:**
Given, P(S) = 0.03
**(i)** The event will not happen tommorow.
**(ii)** P(S') = 1 – P(S)
P(S') = 1 – 0.03 [∵ P(S) + P(S') = 1]
P(S') = 0.97

**Question 2.**

**Five Students A, B, C, D and E are competing in a long distance race. Each student's probability of winning the race is given below:**

**A → 20 %, B → 22 %, C → 7 %, D → 15% and E → 36 %**

**(i) Who is most likely to win the race ?**

**(ii) Who is least likely to win the race ?**

**(iii) Find the sum of probabilities given.**

**(iv) Find the probability that either A or D will win the race.**

**(v) Let S be the event that B will win the race.**

**(a) Find P(S)**

**(b) State, in words, the complementary event S'.**

**(c) Find P(S')**

**Solution:**

Given Probabilities of five students A, B, C, D and E such as

P(A) = 20%, P(B) = 22%, P(C) = 7%

P(D) = 15% and P(E) = 36%

(*i*) The mostly chance of winning the race is of Student E.

[∵ P(E) = 36% maximum]

(*ii*) The least chances of winning the race is of Student C.

[∵ P(C) = 7% minimum]

(*iii*) The sum of the probabilities

= P(A) + P(B) + P(C) + P(D) + P(E)

= 20% + 22% + 7% + 15% + 36%

= 100%

(*iv*) Favourable outcomes that either A or D will win = 20% + 15% = 35%

$$P(\text{either A or D will win}) = \frac{35}{100} = \frac{7}{20}$$

(*v*) (a) Favourable outcomes that B will win = 22%

$$P(S) = \frac{22}{100} = \frac{11}{50}$$

(b) S' = B will not win the race.

(c) P(S') = 1 – P(S)

$$= 1 - \frac{11}{50} = \frac{50-11}{50} = \frac{39}{50}$$

**Question 3.**
**A Ticket is randomly selected from a basket containing3 green, 4 yellow and 5 blue tickets. Determine the probability of getting:**
**(i) a green ticket**
**(ii) a green or yellow ticket.**
**(iii) an orange ticket.**
**Solution:**

Number of green tickets = 3

Number of yellow tickets = 4

Number of blue tickets = 5

Total Number of tickets = 3 + 4 + 5 = 12

(*i*) P (getting a green ticket) = $\frac{3}{12} = \frac{1}{4}$

(*ii*) Total Number of green and yellow tickets
= 3 + 4 = 7 tickets

P ( getiing a green or yellow ticket) = $\frac{7}{12}$

(*iii*) Since, Basket contains green, yellow and blue tickets only.

∴ Number or orange tickets = 0

∴ P (gettting an orange ticket) = $\frac{0}{12} = 0$

**Question 4.**
**Ten cards with numbers 1 to 10 written on them are placed in a bag. A card is chosen from the bag at random. Determine the probability of choosing:**
**(i) 7**
**(ii) 9 or 10**
**(iii) a number greater than 4**
**(iv) a number less than 6**

**Solution:**

Total Number of outcomes = 10 *i.e.* 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

(*i*) P (of getting a number 7) = $\frac{1}{10}$

(*ii*) P (of getting 9 or 10) = $\frac{2}{10} = \frac{1}{5}$

(*iii*) Numbers greater than 4 are 5, 6, 7, 8, 9 and 10 = 6

P (of getting number greater than 4)

$$= \frac{6}{10} = \frac{3}{5}$$

(*iv*) Numbers less than 6 are 1, 2, 3, 4, 5 = 5

P(of getting a number less than 6)

$$= \frac{5}{10} = \frac{1}{2}$$

**Question 5.**

**A carton contains eight brown and four white eggs. Find the probability that an egg selected at random is :**

**(i) brown**

**(ii) white**

**Solution:**

Number of brown eggs = 8

Number of white eggs = 4

Total Number of eggs = 8 + 4 = 12

(*i*) P (of getting a brown egg) = $\frac{8}{12} = \frac{2}{3}$

(*ii*) P (of getting a white egg) = $\frac{4}{12} = \frac{1}{3}$

**Question 6.**

**A box contains 3 yellow, 4 green and 8 blue tickets. A ticket is chosen at random. Find the probability that the ticket is :**

**(i) yellow**

**(ii) green**

**(iii) blue**

**(iv) red**

**(v) not yellow**

**Solution:**

Number of yellow tickets = 3

Number of green tickets = 4

Number of blue tickets = 8

Total Number of tickets = 3 + 4 + 8 = 15

(*i*) P (getting a yellow ticket) = $\frac{3}{15} = \frac{1}{5}$

(*ii*) P (getting a green ticket) = $\frac{4}{15}$

(*iii*) P (getting a blue ticket) = $\frac{8}{15}$

(*iv*) Since, Basket contains yellow, green and blue tickets only.

∴ Number or red tickets = 0

∴ P (gettting an red ticket) = $\frac{0}{15} = 0$

(*v*) Total number of green and blue tickets = 4 + 8 = 12 tickets

P (not getting yellow ticket ) = P(getting either green or blue ticket) = $\frac{12}{15} = \frac{4}{5}$

**OR**

P (not getting a yellow ticket) = $1 - \frac{1}{5} = \frac{5-1}{5} = \frac{4}{5}$

**Question 7.**

**The following table shows number of males and number of females of a small locality in different age groups.**

**If one of the persons, from this locality, is picked at random, what is the probability that**

**(a) the person picked is a male ?**

**(b) the person picked is a female ?**

**(c) the person picked is a female aged 21-50 ?**

**(d) the person is a male with age upto 50 years?**

**Solution:**

$\because$ Total number of persons = Number of males + Number of females

$= 26 + 20 = 46$

(a) An event when the person picked is male $= 8 + 12 + 6 = 26$

$\therefore$ Required Probability $= \frac{26}{46} = \frac{13}{23}$

(b) An event when the person picked is female $= 6 + 10 + 4$

$\therefore$ Required Probability $= \frac{20}{46} = \frac{10}{23}$

(c) An event when the person picked is a female aged 21-50 = 10

$\therefore$ Required Probability $= \frac{10}{46} = \frac{5}{23}$

(d) An event when the person picked is a male aged upto 50 years = 20

$\therefore$ Required Probability $= \frac{20}{46} = \frac{10}{23}$