

EXERCISE 22B

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1. Suppose S is the event that will snow tomorrow and $P(S) = 0.03$.**(i) State in words, the complementary event S' .****(ii) Find $P(S')$** **Solution:**

It is given that

$$P(S) = 0.03$$

(i) The complementary event $S' =$ It will not snow tomorrow

(ii) $P(S') = 1 - P(S)$

Substituting the values

$$P(S') = 1 - 0.03 = 0.97$$

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 \rightarrow 20 %, B \rightarrow 22 %, C \rightarrow 7 %, D \rightarrow 15% and E \rightarrow 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:**

It is given that

Probabilities of five students A, B, C, D and E is

$$P(A) = 20\%, P(B) = 22\%, P(C) = 7\%, P(D) = 15\%, P(E) = 36\%$$

(i) Student E is most likely to win the race as $P(E) = 36\%$ (ii) Student C is least likely to win the race as $P(C) = 7\%$ (iii) Sum of probabilities = $P(A) + P(B) + P(C) + P(D) + P(E)$

Substituting the values

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

$$= 100\%$$

(iv) Here the favorable outcomes that either A or D will win = $20\% + 15\% = 35\%$ So the $P(\text{either A or D will win}) = 35/100 = 7/20$

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

So $P(S) = 22/100 = 11/50$

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

$$\begin{aligned} \text{(c) } P(S') &= 1 - P(S) \\ \text{Substituting the values} \\ &= 1 - 11/50 \\ &= (50 - 11)/50 \\ &= 39/50 \end{aligned}$$

3. A Ticket is randomly selected from a basket containing 3 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:

It is given that

No. of green tickets = 3

No. of yellow tickets = 4

No. of blue tickets = 5

So the total number of tickets = $3 + 4 + 5 = 12$

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

$$\begin{aligned} \text{(ii) No. of green and yellow tickets} &= 3 + 4 = 7 \\ P(\text{getting a green or yellow ticket}) &= 7/12 \end{aligned}$$

$$\begin{aligned} \text{(iii) We know that the basket has green, yellow and blue tickets only} \\ \text{No. of orange tickets} &= 0 \\ \text{Here } P(\text{getting an orange ticket}) &= 0/12 = 0 \end{aligned}$$

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:

It is given that

Total number of outcomes = 10 (1, 2, 3, 4, 5, 6, 7, 8, 9, 10)

$$\text{(i) } P(\text{choosing } 7) = 1/10$$

$$\text{(ii) } P(\text{choosing } 9 \text{ or } 10) = 2/10 = 1/5$$

$$\begin{aligned} \text{(iii) We know that the numbers greater than 4 are } 5, 6, 7, 8, 9 \text{ and } 10 = 6 \\ \text{So the } P(\text{choosing a number greater than } 4) = 6/10 = 3/5 \end{aligned}$$

$$\begin{aligned} \text{(iv) We know that the numbers less than 6 are } 1, 2, 3, 4, 5 = 5 \\ \text{So } P(\text{choosing a number less than } 6) = 5/10 = 1/2 \end{aligned}$$

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:

We know that

No. of brown eggs = 8

No. of white eggs = 4

So the total number of eggs = $8 + 4 = 12$

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

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

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:

We know that

No. of yellow tickets = 3

No. of green tickets = 4

No. of blue tickets = 8

So the total number of tickets = $3 + 4 + 8 = 15$

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

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

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

(iv) Here the basket has yellow, green and blue tickets only

No. of red tickets = 0

So $P(\text{getting a red ticket}) = \frac{0}{15} = 0$

(v) We know that

Total number of green and blue tickets = $4 + 8 = 12$ tickets

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

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

Age in years	10-20	21-50	Above 50
Male	8	12	6

Female	6	10	4
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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:

We know that

Total number of persons = No. of males + No. of females

Substituting the values

$$= 26 + 20$$

$$= 46$$

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

So the required probability = $26/46 = 13/23$

(b) Event when the person picked is a female = $6 + 10 + 4 = 20$

So the required probability = $20/46 = 10/23$

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

So the required probability = $10/46 = 5/23$

(d) Event when the person is a male with age upto 50 years = 20

So the required probability = $20/46 = 10/23$