NCERT Solutions Class 10 Maths
Chapter 14: Statistics
Exercise 14.1

Complete Solutions

Question 1

QUESTION

Complete the following statements:

(i) Probability of an event E + Probability of the event 'not E' = _____.

(ii) The probability of an event that cannot happen is _____. Such an event is called _____.

(iii) The probability of an event that is certain to happen is _____. Such an event is called _____.

(iv) The sum of the probabilities of all the elementary events of an experiment is _____.

(v) The probability of an event is greater than or equal to _____ and less than or equal to _____.

SOLUTION

The probability of the complement of an event is 1 minus the probability of the event itself, so their sum is 1. An event that cannot occur has probability 0 and is called an impossible event, while an event that is sure to occur has probability 1 and is called a certain (sure) event. The probabilities of all elementary outcomes in a sample space add up to 1, and probabilities of any event always lie between 0 and 1 inclusive.

ANSWER

(i) 1

(ii) 0; impossible event

(iii) 1; sure or certain event

(iv) 1

(v) 0, 1

Question 2

Which of the following experiments have equally likely outcomes? Explain.

(i) A driver attempts to start a car. The car starts or does not start.

(ii) A player attempts to shoot a basketball. She/he shoots or misses the shot.

(iii) A trial is made to answer a true–false question. The answer is right or wrong.

(iv) A baby is born. It is a boy or a girl.

SOLUTION

For a true–false question, there are two outcomes (right or wrong) that are assumed to be equally likely. For the birth of a baby, it is usually assumed that boy and girl are equally likely. In the other two cases, the chances of success and failure depend on many factors (condition of the car, skill of the player), so the outcomes are not equally likely.

ANSWER

The experiments (iii) and (iv) have equally likely outcomes.

Question 3

QUESTION

Why is tossing a coin considered to be a fair way of deciding which team should get the ball at the beginning of a football game?

SOLUTION

A fair coin has two faces and, under normal conditions, each face has the same chance of appearing on any toss. So no team has an advantage, making the decision fair.

ANSWER

Because the two possible outcomes, head and tail, are equally likely.

Question 4

QUESTION

Which of the following cannot be the probability of an event?

(A) $\frac{2}{3}$ (B) −1.5   (C) 15%   (D) 0.7

SOLUTION

Probabilities must lie between 0 and 1 (inclusive). The number −1.5 is negative, so it cannot be a probability. The others ($\frac{2}{3}$, 15% = 0.15, and 0.7) all lie between 0 and 1.

ANSWER

(B) −1.5

Question 5

QUESTION

If P(E) = 0.05, what is the probability of 'not E'?

SOLUTION

The probability of the complement of an event is 1 minus the probability of the event itself: P(not E) = 1 − P(E).

ANSWER

P(not E) = 1 − 0.05 = 0.95

Question 6

A bag contains lemon flavoured candies only. Malini takes out one candy without looking into the bag. What is the probability that she takes out:

(i) an orange flavoured candy?

(ii) a lemon flavoured candy?

SOLUTION

Since all candies in the bag are lemon flavoured, it is impossible to get an orange flavoured candy (probability 0) and certain to get a lemon flavoured candy (probability 1).

ANSWER

(i) 0

(ii) 1

Question 7

QUESTION

It is given that in a group of 3 students, the probability of 2 students not having the same birthday is 0.992. What is the probability that the 2 students have the same birthday?

SOLUTION

The two events "having the same birthday" and "not having the same birthday" are complementary, so their probabilities add to 1. Hence P(same birthday) = 1 − 0.992 = 0.008.

ANSWER

The probability that the 2 students have the same birthday is 0.008.

Question 8

QUESTION

A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is:

(i) red?

(ii) not red?

SOLUTION

Total number of balls = 3 + 5 = 8. Probability of drawing a red ball = 3/8. The event "not red" means drawing a black ball, so its probability is $(5)/(8)$, or equivalently $1 - 3/8$.

ANSWER

(i) 3/8

(ii) (5)/(8)

Question 9

A box contains 5 red marbles, 8 white marbles and 4 green marbles. One marble is taken out of the box at random. What is the probability that the marble taken out will be:

(i) red?

(ii) white?

(iii) not green?

SOLUTION

Total number of marbles = 5 + 8 + 4 = 17. So P(red) = (5)/(17) and P(white) = (8)/(17). The event "not green" means the marble is either red or white, so the favourable marbles are 5 + 8 = 13 and P(not green) = 13/17.

ANSWER

(i) (5)/(17)

(ii) (8)/(17)

(iii) 13/17

Question 10

QUESTION

A piggy bank contains hundred 50p coins, fifty ₹ 1 coins, twenty ₹ 2 coins and ten ₹ 5 coins. If it is equally likely that one of the coins will fall out when the bank is turned upside down, what is the probability that the coin

(i) will be a 50 p coin?

(ii) will not be a ₹ 5 coin?

ANSWER

(i) (5)/(9)

(ii) (17)/(18)

Question 11

QUESTION

Gopi buys a fish from a shop for his aquarium. The shopkeeper takes out one fish at random from a tank containing 5 male fish and 8 female fish. What is the probability that the fish taken out is a male fish?

ANSWER

(5)/(13)

Question 12

QUESTION

A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8, and these are equally likely outcomes. What is the probability that it will point at

(i) 8?

(ii) an odd number?

(iii) a number greater than 2?

(iv) a number less than 9?

ANSWER

(i) (1)/(8)

(ii) (1)/(2)

(iii) (3)/(4)

(iv) 1

Question 13

A die is thrown once. Find the probability of getting

(i) a prime number

(ii) a number lying between 2 and 6

(iii) an odd number.

ANSWER

(i) $(1)/(2)$

(ii) $(1)/(2)$

(iii) $(1)/(2)$

Question 14

One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting

(i) a king of red colour

(ii) a face card

(iii) a red face card

(iv) the jack of hearts

(v) a spade

(vi) the queen of diamonds.

ANSWER

(i) (1)/(26)

(ii) (3)/(13)

(iii) (3)/(26)

(iv) (1)/(52)

(v) (1)/(4)

(vi) (1)/(52)

Question 15

QUESTION

Five cards — the ten, jack, queen, king and ace of diamonds, are well-shuffled with their face downwards. One card is then picked up at random.

(i) What is the probability that the card is the queen?

(ii) If the queen is drawn and put aside, what is the probability that the second card picked up is (a) an ace? (b) a queen?

ANSWER

(i) $(1)/(5)$

(ii) (a) $(1)/(4)$ (b) 0

Question 16

QUESTION

12 defective pens are accidentally mixed with 132 good ones. It is not possible to just look at a pen and tell whether or not it is defective. One pen is taken out at random from this lot. Determine the probability that the pen taken out is a good one.

ANSWER

$(11)/(12)$

Question 17

(i) A lot of 20 bulbs contain 4 defective ones. One bulb is drawn at random from the lot. What is the probability that this bulb is defective?

(ii) Suppose the bulb drawn in (i) is not defective and is not replaced. Now one bulb is drawn at random from the rest. What is the probability that this bulb is not defective?

ANSWER

(i) $(1)/(5)$

(ii) $(15)/(19)$

Question 18

A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears

(i) a two-digit number

(ii) a perfect square number

(iii) a number divisible by 5.

ANSWER

(i) $(9)/(10)$

(ii) $(1)/(10)$

(iii) $(1)/(5)$

Question 19

A child has a die whose six faces show the letters A, B, C, D, E and A. The die is thrown once. What is the probability of getting:

(i) A?

(ii) D?

ANSWER

(i) (1)/(3)

(ii) 1/6

Question 20

Suppose you drop a die at random on the rectangular region shown in Fig. 14.6. The rectangle is 3 m long and 2 m wide, and it contains a circle of diameter 1 m. What is the probability that the die will land inside the circle?

ANSWER

π/24

Question 21

A lot consists of 144 ball pens of which 20 are defective and the others are good. Nuri will buy a pen if it is good, but will not buy it if it is defective. The shopkeeper draws one pen at random and gives it to her. What is the probability that:

(i) she will buy it?

(ii) she will not buy it?

ANSWER

(i) (31)/(36)

(ii) (5)/(36)

Question 22

Refer to Example 13.

(i) Complete the following table:

Event: 'Sum on 2 dice'	2	3	4	5	6	7	8	9	10	11	12
Probability	(1)/(36)						(5)/(36)				(1)/(36)

(ii) A student argues that there are 11 possible outcomes 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12. Therefore, each of them has a probability 1/11. Do you agree with this argument? Justify your answer.

ANSWER

(i) Probabilities of sums 2 to 12 respectively are: (1)/(36), (2)/(36), (3)/(36), (4)/(36), (5)/(36), (6)/(36), (5)/(36), (4)/(36), (3)/(36), (2)/(36), (1)/(36).

(ii) No. The sums are not equally likely; for example, 7 can occur in 6 different ways, while 2 or 12 can occur in only 1 way each, so their probabilities are not all 1/11.

Question 23

QUESTION

A game consists of tossing a one-rupee coin three times and noting its outcome each time. Hanif wins if all the tosses give the same result, i.e., three heads or three tails, and loses otherwise. Calculate the probability that Hanif will lose the game.

ANSWER

3/4

Question 24

QUESTION

A die is thrown twice. What is the probability that:

(i) 5 will not come up either time?

(ii) 5 will come up at least once?

ANSWER

(i) 25/36

(ii) (11)/(36)

Question 25

QUESTION

Which of the following arguments are correct and which are not correct? Give reasons for your answers.

(i) If two coins are tossed simultaneously there are three possible outcomes—two heads, two tails or one of each. Therefore, for each of these outcomes, the probability is (1)/(3).

(ii) If a die is thrown, there are two possible outcomes—an odd number or an even number. Therefore, the probability of getting an odd number is (1)/(2).

ANSWER

(i) Not correct. The equally likely outcomes are HH, HT, TH and TT, so P(two heads) = 1/4, P(two tails) = 1/4 and P(one of each) = (1)/(2), not (1)/(3) each.

(ii) Correct. There are three odd (1, 3, 5) and three even (2, 4, 6) outcomes, so P(odd) = (3)/(6) = (1)/(2).

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