Probability

Exercise 13.1

Q. 1 A. Complete the following statements:

Probability of an event E + Probability of the event 'not E'=_____

Answer : 1

As we know that,

Probability of Event 'E'=P(E)

Probability of an event 'not E' = $P(\bar{E})$

⇒ P(not E) = 1 – P(E)

⇒ P(not E) + P(E) = 1

Q. 1 B. Complete the following statements:

The probability of an event that cannot happen is _____ Such an event is called _____

Answer : 0, Impossible event

⇒ Probability of an event which can not be happen is 0. And this type of event is called as impossible event.

Q. 1 C. Complete the following statements:

The probability of an event that is certain to happen is _____ Such an event is called_____

Answer :

1, Sure event

⇒ If an event is certain to happen then probability is always 1. And this type of event is called Sure event.

Q. 1 D. Complete the following statements:

The sum of the probabilities of all the elementary events of an experiment is _____

Answer : 1

⇒ The sum of probabilities of all the elementary events of an experiment is always 1.

Q. 1 E. Complete the following statements:

The probability of an event is greater than or equal to _____ and less than or equal to _____

Answer : 0, 1

⇒ Probability of an event lies between 0 and 1 i.e. Probability can't be less than 1 or more than unity.

⇒ $0 \leq P(E) \geq 1$

∴ The probability of an event is greater than or equal to 0 and less than or equal 1.

Q. 2 A. Which of the following experiments have equally likely outcomes? Explain.

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

Answer : No

⇒ If a driver is trying to start a car, The Car may start or may not be start it depends on fuel in car engine. Starting also depends on how old car is and there is no accident happen with car. Now we can conclude that the factors on which car will start or not start is not same. Thus, we can say that it is not an equally likely event.

Q. 2 B. Which of the following experiments have equally likely outcomes? Explain.

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

Answer : No

⇒ When a player shoot basketball the number of shots player shoots can go in or misses it depends on players ability. Players ability is not defined here. Therefore, it is not equally likely event.

Q. 2 C. Which of the following experiments have equally likely outcomes? Explain.

A trail is made to answer a true –false question. The answer is right or wrong.

Answer : Yes

⇒ In the trial there is only two cases – first answer may be right or it may be wrong because it is true false question.

⇒ 50% probability answer is right or 50% probability question is wrong. Therefore, it is equally likely event.

Q. 2 D. Which of the following experiments have equally likely outcomes? Explain.

A baby is born. It is a boy or a girl.

Answer :

Yes

⇒ When a baby child is born. Born baby may be boy or girl. Probability for baby is boy is 50% while baby is girl also 50%. Therefore, it is also an equally likely event.

Q. 3. If P (E)=0.05. What is the probability of 'notE'?

Answer : If a probability of an event to be happen is P. Then event not to happen will (1 – P).

Here, probability of event 'E' is given as –

⇒ P(E)=0.05

⇒ P(not E)= $P(\bar{E})$ = 1 – P(E)

⇒ $P(\bar{E})$= 1 – 0.05

⇒ $P(\bar{E})$=0.95

∴ probability of 'notE' = 0.95

Q. 4 A. A bag contains lemon flavored candies only. Malini takes out one candy without looking into the bag. What is the probability that she takes out?

an orange flavored candy?

Answer : let total number of candies be ‘x’

All candies are lemon flavored.

∴ Total number of orange flavored candy is = 0.

⇒ Probability of Malini takes out an orange flavored candy (P)

$$= \frac{\text{Number of orange flavoured candies}}{\text{Total number of candies}}$$

⇒ P(Taken out orange flavor) = $\frac{0}{x}$

⇒ P(Taken out orange flavor) = 0

∴ Probability that Malini takes out an orange flavored candy = 0

Q. 4 B. A bag contains lemon flavored candies only. Malini takes out one candy without looking into the bag. What is the probability that she takes out?

a lemon-flavored candy?

Answer : Let Total number of candies be ‘x’ in bag

all candies in the bag are lemon flavored only.

∴ lemon flavored candies will also ‘x’.

∵ there is no other candies in the bag.

⇒ If Malini takes out lemon flavored candy from bag.

∴ P(lemon flavored candies) = $\frac{\text{Number of lemon flavoured candies}}{\text{Total number of candies}}$

⇒ P(lemon flavored candies) = $\frac{x}{x}$

⇒ P(lemon flavored candies) = 1.

∴ Probability that Malini takes out a lemon-flavored candy = 1

Q. 5 A. Rahim removes all the hearts from the cards. What is the probability of

Getting an ace from the remaining pack.

Answer : There are 52 cards in a pack of cards.

A pack of 52 cards have 4 aces.

Total number of hearts in pack of cards = 13

⇒ Rahim removes all the hearts. 1 ace will also removed.

∴ Remaining cards = 52 – 13 = 39

⇒ remaining ace cards = 4 – 1 = 3

⇒ Number of favourable cases = 3

$$\Rightarrow P(\text{getting an ace}) = \frac{\text{Number of remaining aces in a pack of cards}}{\text{number of remaining cards}}$$

$$\Rightarrow P(\text{getting an ace}) = \frac{3}{39}$$

$$\Rightarrow P(\text{getting an ace}) = \frac{1}{13}$$

$$\therefore \text{Probability of getting an ace} = \frac{1}{13}$$

$$\therefore \text{Probability of getting ace from remaining cards} = \frac{1}{13}$$

Q. 5 B. Rahim removes all the hearts from the cards. What is the probability of Getting a diamond.

Answer : As we know there are always 52 cards in a pack of card.

⇒ out of 26 red cards there are 13 diamonds cards.

⇒ Rahim removes all the hearts. 1 ace will also removed.

∴ Remaining cards = 52 – 13 = 39

$$\Rightarrow P(\text{Getting diamond}) = \frac{\text{Total number of Diamond Cards}}{\text{Total number of cards}}$$

$$\Rightarrow P(\text{Getting diamond}) = \frac{13}{39}$$

$$\Rightarrow P(\text{Getting diamond}) = \frac{1}{3}$$

$$\therefore \text{Probability of getting diamond is } \frac{1}{3}$$

Q. 5 C. Rahim removes all the hearts from the cards. What is the probability of Getting a card that is not a heart.

Answer : Rahim removes all the heart cards.

∴ remaining cards = 52 – 13 = 39

⇒ There is no heart cards in this 39 cards.

$$\Rightarrow P(\text{Getting a card that is not heart}) = \frac{\text{Number of cards that is not hearts}}{\text{Total number of cards}}$$

$$\Rightarrow P(\text{Getting a card that is not heart}) = \frac{39}{39}$$

⇒ P(Getting a card that is not heart) = 1.

∴ Probability of getting card that is not heart is 1.

Q. 5 D. Rahim removes all the hearts from the cards. What is the probability of

Getting the Ace of hearts.

Answer : ⇒ Rahim removes all the hearts.

⇒ remaining heart cards = 0.

$$\Rightarrow P(\text{Getting the ace of hearts}) = \frac{\text{Number of hearts cards}}{\text{Total number of cards}}$$

$$\Rightarrow P(\text{Getting the ace of hearts}) = \frac{0}{39}$$

⇒ P(Getting the ace of hearts) = 0.

∴ Probability of getting the ace of heart is zero.

Q. 6. 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?

Answer : Given,

⇒ Probability of 2 students not having same birthday = 0.992

∴ Probability of 2 students having same birthday = 1 – Probability of 2 students not having same birthday.

⇒ P(2 students having same birthday) = 1 – P(2 students having same birthday)

⇒ P(2 students having same birthday) = 1 – 0.992

⇒ P(2 students having same birthday) = 0.008

⇒ Probability that the 2 students have the same birthday is 0.008

Q. 7 A. A die is rolled once. Find the probability of getting a prime number:

Answer :

When a dice is thrown total outcomes can be (1,2,3,4,5,6).

⇒ Possible outcomes = 6

⇒ Prime numbers = (2,3,5)

⇒ number of prime numbers = 3

⇒ Probability of getting prime number –

$$\Rightarrow P(\text{a prime number}) = \frac{\text{number of outcomes of prime numbers}}{\text{total possible numbers}}$$

$$\Rightarrow P(\text{a prime number}) = \frac{3}{6}$$

$$\Rightarrow P(\text{a prime number}) = \frac{1}{2}$$

$$\therefore \text{Probability of getting prime number is } \frac{1}{2}.$$

Q. 7 B. A die is rolled once. Find the probability of getting

a number lying between 2 and 6

Answer : When a dice is thrown total outcomes can be (1,2,3,4,5,6).

⇒ Possible outcomes = 6

⇒ numbers lying between 2 and 6 = (3,4,5)

⇒ Possible outcomes = 3

$$\Rightarrow P(\text{number lying between 2 and 6}) = \frac{\text{number of possible outcomes of numbers lying between 2 and 6}}{\text{total possible numbers}}$$

$$\Rightarrow P(\text{number lying between 2 and 6}) = \frac{3}{6}$$

$$\Rightarrow P(\text{number lying between 2 and 6}) = \frac{1}{2}$$

$$\therefore \text{Probability for number lying between 2 and 6 is } \frac{1}{2}.$$

Q. 7 C. A die is rolled once. Find the probability of getting an odd number.

Answer : When a dice is thrown total outcomes can be (1,2,3,4,5,6).

⇒ Possible outcomes = 6

⇒ Odd numbers = (1,3,5)

⇒ Possible outcomes = 3

$$\Rightarrow \text{P(an odd number)} = \frac{\text{possible outcomes of odd numbers}}{\text{total possible outcomes}}$$

⇒ P(an odd number) = $\frac{3}{6}$

⇒ P(an odd number) = $\frac{1}{2}$

∴ Probability of getting odd number is $\frac{1}{2}$.

Q. 8. What is the probability of selection out a red king from a deck of cards?

Answer : There are total 52 cards in a pack of cards.

⇒ There are 4 kings in which 2 kings are red color.

⇒ Total outcomes = 52

⇒ Favorable outcomes = 2 (∵ only 2 kings are of red color)

⇒ Probability of selection out a red king from a deck of cards –

$$\Rightarrow \text{P(a red king)} = \frac{\text{number of favourable outcomes}}{\text{number of total outcomes}}$$

$$\Rightarrow \text{P(a red king)} = \frac{2}{52}$$

$$\Rightarrow \text{P(a red king)} = \frac{1}{26}$$

∴ Probability of getting red king from deck of cards is $\frac{1}{26}$.

Exercise 13.2

Q. 1 A. A bag contains 3 red balls and 5 black balls. A ball is selected at random from the bag. What is the probability that the ball selected is red ?

Answer : From given data,

⇒ Total number of balls in bag = 5 + 3

⇒ Total number of balls in bag = 8

⇒ Total number of Red balls in bag = 3

Q. 1 B. A bag contains 3 red balls and 5 black balls. A ball is selected at random from the bag. What is the probability that the ball selected is not red ?

Answer : As we know,

⇒ P(Not Red) = 1 – P(Red)

$$\Rightarrow P(\text{Not Red}) = 1 - \frac{3}{8}$$

$$\Rightarrow P(\text{Not Red}) = \frac{5}{8}$$

$$\therefore \text{Probability that the ball selected is not red} = \frac{5}{8}.$$

Q. 2 A. 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 red?

Answer : Total number of marbles = 5 + 8 + 4 = 17

⇒ Number of red marbles = 5

$$\Rightarrow P(\text{Marbles taken out is red}) = \frac{\text{Number of red marbles}}{\text{Total number of marbles}}$$

$$\Rightarrow P(\text{Marbles taken out is red}) = \frac{5}{17}$$

$\therefore$ Probability that marble taken out is Red $= \frac{5}{17}$.

Q. 2 B. 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 white?

Answer :

$\Rightarrow$ Total number of marbles = 5 + 8 + 4 = 17

$\Rightarrow$ Number of White marbles = 8

$$\Rightarrow \text{P(Marbles taken out is White)} = \frac{\text{Number of white marbles}}{\text{Total number of marbles}}$$

$$\Rightarrow \text{P(Marbles taken out is White)} = \frac{8}{17}$$

$\therefore$ Probability that marble taken out is white is $\frac{8}{17}$.

Q. 2 C. 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 not green?

Answer : Total number of marbles = 5 + 8 + 4 = 17

$\Rightarrow$ Number of green marbles = 4

$$\Rightarrow \text{P(Marbles taken out is green)} = \frac{\text{Number of green marbles}}{\text{Total number of marbles}}$$

$$\Rightarrow \text{P(Marbles taken out is green)} = \frac{4}{17}$$

$\Rightarrow$ P(Marbles taken out is not green) = 1 – P(marbles taken out is green)

$$\Rightarrow \text{P(Marbles taken out is not green)} = 1 - \frac{4}{17}$$

$$\Rightarrow \text{P(Marbles taken out is not green)} = \frac{(17-4)}{17}$$

⇒ P(Marbles taken out is not green) = $\frac{13}{17}$

∴ Probability that marble taken out is not green is $\frac{13}{17}$.

Q. 3 A. A kiddy bank contains hundred 50p coins. Fifty DI coins, twenty D2 coins and ten D5 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.

will be a 50p coin?

Answer : There are hundred 50p coins, 50 DI coins, 20 D2 coins and 10 D5 coins.

⇒ Total number of coins in kiddy bank = 100 + 50 + 20 + 10

⇒ Total number of coins in kiddy bank = 180

⇒ Probability that the coin will be 50p coins –

⇒ P(coin will be 50p coin) = $\frac{\text{Number of 50p coins}}{\text{Total number of coins in kiddy bank}}$

⇒ P(coin will be 50p coin) = $\frac{100}{180}$

⇒ P(coin will be 50p coin) = $\frac{5}{9}$

∴ Probability that the coin will be 50p coin is $\frac{5}{9}$.

Q. 3 B. A kiddy bank contains hundred 50p coins. Fifty DI coins, twenty D2 coins and ten D5 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.

will not be a D5 coin?

Answer : Probability the coin will be a D5 coin –

⇒ P(Coin will be a D5 coin) = $\frac{\text{Number of D5 coins}}{\text{Total number of coins}}$

⇒ P(Coin will be a D5 coin) = $\frac{10}{180}$

⇒ P(Coin will be a D5 coin) = $\frac{1}{18}$

∴ P(coin will not be a D5 coin) = 1 – P(coin will be a D5 coin)

⇒ P(coin will not be a D5 coin) = $1 - \frac{1}{18}$

⇒ P(Coin will not be a D5 coin) = $\frac{18-1}{18}$

⇒ P(Coin will not be a D5 coin) = $\frac{17}{18}$

∴ Probability that the coin will not be D5 coin is $\frac{17}{18}$.

Q. 4. 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 (See figure). What is the probability that the fish taken out is a male fish?

Answer : Total number of fish in tank = 5 male + 8 female

⇒ Total number of fish in tank = 13

⇒ number of male fish = 5

⇒ Probability the shopkeeper takes out a male fish –

⇒ P(Male fish) = $\frac{\text{Number of male fish}}{\text{Total number of fish}}$

⇒ P(male fish) = $\frac{5}{13}$

∴ Probability that the fish taken out is a male fish = $\frac{5}{13}$

Q. 5 A. 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 (Sec figure), and these are equally likely outcomes. What is the probability that it will point at 8?

Answer :

There are total 8 numbers.

⇒ We can get 8, one times only.

∴ number of favourable cases = 1

⇒ Probability that arrow will point 8 –

$$\Rightarrow \text{P(arrow will point 8)} = \frac{\text{number of favourable cases}}{\text{total numbers}}$$

$$\Rightarrow \text{P(arrow will point 8)} = \frac{1}{8}$$

$$\therefore \text{Probability that arrow will point 8 will be } \frac{1}{8}.$$

Q. 5 B. 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 (Sec figure), and these are equally likely outcomes. What is the probability that it will point at

an odd number?

Answer : Total numbers = 8

⇒ Total odd numbers = (1,3,5,7)

⇒ Number of favourable cases = 4

$$\Rightarrow P(\text{ an odd number}) = \frac{\text{Number of favourable cases}}{\text{total numbers}}$$

$$\Rightarrow P(\text{ an odd number}) = \frac{4}{8}$$

$$\Rightarrow P(\text{ an odd number}) = \frac{1}{2}$$

$$\therefore \text{Probability arrow will point an odd number will be } \frac{1}{2}.$$

Q. 5 C. 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 (Sec figure), and these are equally likely outcomes. What is the probability that it will point at

a number greater than 2?

Answer : ⇒ Probability of numbers greater than 2 –

⇒ Total numbers = 8

⇒ Numbers greater than 2 = (3,4,5,6,7,8)

⇒ Total numbers greater than 2 = 6

$$\Rightarrow P(>2) = \frac{\text{numbers greater than2}}{\text{total numbers}}$$

$$\Rightarrow P(>2) = \frac{6}{8}$$

$\Rightarrow P(>2) = \frac{3}{4}$

$\therefore$ Probability of numbers greater than 2 is $\frac{3}{4}$.

Q. 5 D. 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 (Sec figure), and these are equally likely outcomes. What is the probability that it will point at

a number less than 9?

Answer : $\Rightarrow$ total numbers = 8

$\Rightarrow$ total numbers which are less than 9 = (1,2,3,4,5,6,7,8)

i.e. all 8 numbers are less than 9.

$\therefore$ P(Numbers less than 9) = $\frac{\text{Total numbers which are less than 9}}{\text{Total numbers}}$

$\Rightarrow$ P(Numbers less than 9) = $\frac{8}{8}$

$\Rightarrow$ P(Numbers less than 9) = 1.

$\therefore$ Probability of arrow will point number less than 9 is 1

Q. 6 A. One card is selected from a well-shuffled deck of 52 cards. Find the probability of getting a king of red colour

Answer :

There are total 52 cards in a pack of cards.

$\Rightarrow$ There are 4 kings in which 2 kings are red color.

$\Rightarrow$ Total outcomes = 52

⇒ Favourable outcomes = 2 (∵ only 2 kings are of red color)

⇒ Probability of selection out a red king from a deck of cards –

$$\Rightarrow \text{P(a red king)} = \frac{\text{number of favourable outcomes}}{\text{number of total outcomes}}$$

$$\Rightarrow \text{P(a red king)} = \frac{2}{52}$$

$$\Rightarrow \text{P(a red king)} = \frac{1}{26}$$

∴ Probability of getting a red king is $\frac{1}{26}$.

Q. 6 B. One card is selected from a well-shuffled deck of 52 cards. Find the probability of getting a face cards

Answer : There are total 52 cards in a pack of cards.

In which face cards are (King, Queen and Jack).

⇒ Each type has four cards.

⇒ Total face cards = 3× 4

⇒ Face cards = 12

⇒ Probability of getting a face card –

$$\Rightarrow \text{P(face card)} = \frac{\text{total number of face cards}}{\text{total number of cards in a deck}}$$

$$\Rightarrow \text{P(face cards)} = \frac{12}{52}$$

$$\Rightarrow \text{P(face cards)} = \frac{3}{13}$$

∴ Probability of getting face card = $\frac{3}{13}$.

Q. 6 C. One card is selected from a well-shuffled deck of 52 cards. Find the probability of getting

a red face card

Answer : There are total 52 cards in a pack of cards.

⇒ Red face card = 2× 3 =6

⇒ P(a red face card) = $\frac{\text{total red face card}}{\text{total card}}$

⇒ P(a red face card) = $\frac{6}{52}$

⇒ P(a red face card) = $\frac{3}{26}$

∴ Probability of getting a red face card = $\frac{3}{26}$.

Q. 6 D. One card is selected from a well-shuffled deck of 52 cards. Find the probability of getting

the jack of hearts

Answer : There are total 52 cards in a pack of cards. There is only one jack of hearts.

⇒ Number of favourable outcome = 1

$$\Rightarrow \text{P(Jack of hearts)} = \frac{\text{(number of favourable outcome)}}{\text{total outcomes}}$$

$$\Rightarrow \text{P(Jack of hearts)} = \frac{1}{52}$$

$$\therefore \text{Probability of getting Jack of hearts} = \frac{1}{52}.$$

Q. 6 E. One card is selected from a well-shuffled deck of 52 cards. Find the probability of getting

a spade

Answer : There are total 52 cards in a deck of cards.

⇒ Number of spade cards = 13

⇒ Favourable cases = 13

⇒ Probability of getting a spade card –

$$\Rightarrow P(\text{a spade}) = \frac{\text{favourable casese}}{\text{total cases}}$$

$$\Rightarrow P(\text{a spade}) = \frac{13}{52}$$

$$\Rightarrow P(\text{a spade}) = \frac{1}{4}$$

$$\therefore \text{Probability of getting a spade} = \frac{1}{4}.$$

Q. 6 F. One card is selected from a well-shuffled deck of 52 cards. Find the probability of getting

the queen of diamonds

Answer : There are total 52 cards in a pack of cards. In which only one queen of diamonds.

⇒ Number of favourable cases = 1

⇒ Probability of getting a queen of diamonds –

$$\Rightarrow P(\text{queen of diamonds}) = \frac{\text{number of favourable cases}}{\text{number of total cases}}$$

$$\Rightarrow P(\text{queen of diamonds}) = \frac{1}{52}$$

$$\therefore \text{Probability of getting a queen of diamonds} = \frac{1}{52}.$$

Q. 7 A. Five cards- the ten jack. Queen. King and ace of diamonds. Are well-shuffled with their face downwards. One card is selected at random.

What is the probability that the card is the queen?

Answer : total cards = 5

⇒ Total cases while drawing a card at random = 5

⇒ There is one queen.

⇒ So favourable case for getting a queen = 1

⇒ probability that the card is the queen –

$$\Rightarrow P(\text{ card is queen }) = \frac{\text{(favourable cases)}}{\text{total possible cases}}$$

$$\Rightarrow P(\text{ card is queen }) = \frac{1}{5}$$

$$\therefore \text{Probability the card is queen} = \frac{1}{5}.$$

Q. 7 B. Five cards- the ten jack. Queen. King and ace of diamonds. Are well-shuffled with their face downwards. One card is selected at random.

If the queen is selected and put aside (without replacement). What is the probability that the second card selected is (a) an ace ? (b) a queen ?

Answer :

(a) $\frac{1}{4}$

queen is selected and put aside.

Remaining cards = 5 – 1

⇒ Remaining cards = 4

⇒ Total cases drawing a card at random = 4

⇒ One ace card.

∴ favourable cases to select ace = 1

⇒ probability that the second card selected is an ace –

$$\Rightarrow \text{P(card selected is an ace)} = \frac{\text{number of favourable cases}}{\text{total cases}}$$

$$\Rightarrow \text{P(card selected is an ace)} = \frac{1}{4}$$

$$\therefore \text{Probability selected card is an ace} = \frac{1}{4}.$$

(b) 0

queen is selected and put aside.

∴ number of favourable cases to select queen = 0

∴ probability that the second card selected is a queen will bw zero.

Q. 8. 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 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 : Given,

⇒ Total defective pens = 12

⇒ Total good pens = 132

∴ number of favourable cases = 132

⇒ Total number of pens = 12 + 132

⇒ Total number of pens = 144

⇒ Number of total outcomes will 144.

$$\Rightarrow \text{Probability that the pen taken out is a good one} = \frac{\text{number of favourable cases}}{\text{number of total outcomes}}$$

$$\Rightarrow \text{P(pen taken out is good one)} = \frac{132}{144}$$

$$\Rightarrow \text{P(pen taken out is good one)} = \frac{11}{12}$$

$$\therefore \text{Probability of pen taken out is good one is } \frac{11}{12}.$$

Q. 9. A lot of 20 bulbs contain 4 defective ones. One bulb is selected at random from the lot. What is the probability that this bulb is defective? Suppose the bulb selected in previous case is not defective and is not replaced. Now one bulb is selected at random from the rest. What is the probability that this bulb is not defective?

Answer : Given,

Total number of bulbs = 20

Defective bulbs = 4

Probability selected this bulb is defective –

$$\text{P(selected bulb is defective)} = \frac{\text{Number of defective bulbs}}{\text{total number of bulbs}}$$

$$\text{P(selected bulb is defective)} = \frac{4}{20}$$

$$\text{P(selected bulb is defective)} = \frac{1}{5}$$

$$\therefore \text{Probability the selected bulb is defective is } \frac{1}{5}.$$

Q. 10 A. A box contains 90 discs which are numbered from 1 to 90. If one disc is selected at random from the box, find the probability that it bears.

a two- digit number

Answer : Given,

⇒ There are 90 discs in a box.

⇒ Number of outcomes in which discs is selected = 90.

⇒ Discs are numbered from 1 to 90.

∴ total 2 digits numbers = 90 – 9 (∵ 1 to 9 will be one digit numbers)

⇒ Total 2 digits numbers = 81

⇒ favourable outcomes = 81

⇒ Probability that discs bears a two- digit number –

$$\Rightarrow P(\text{two digit numbers}) = \frac{\text{favourable outcomes}}{\text{total outcomes}}$$

$$\Rightarrow P(\text{two digit numbers}) = \frac{81}{90}$$

$$\Rightarrow P(\text{two digit numbers}) = \frac{9}{10}$$

$$\therefore \text{Probability that disc bears two digit number is } \frac{9}{10}.$$

Q. 10 B. A box contains 90 discs which are numbered from 1 to 90. If one disc is selected at random from the box, find the probability that it bears.

a perfect square number

Answer : There are 90 discs in a box.

⇒ Number of outcomes in which discs is selected = 90.

⇒ Total perfect square in the box –

⇒ $1^2 = 1$

⇒ $2^2 = 4$

⇒ $3^2 = 9$

⇒ $4^2 = 16$

$\Rightarrow 5^2 = 25$

$\Rightarrow 6^2 = 36$

$\Rightarrow 7^2 = 49$

$\Rightarrow 8^2 = 64$

$\Rightarrow 9^2 = 81$

⇒ Number of favourable cases = 9

⇒ Probability that discs bears a perfect square number –

$$\Rightarrow P(\text{Perfect square numbers}) = \frac{\text{favourable outcomes}}{\text{total outcomes}}$$

$$\Rightarrow P(\text{Perfect square numbers}) = \frac{9}{90}$$

$$\Rightarrow P(\text{Perfect square numbers}) = \frac{1}{10}$$

$$\therefore \text{Probability that discs bears a perfect square number is } \frac{1}{10}.$$

Q. 10 C. A box contains 90 discs which are numbered from 1 to 90. If one disc is selected at random from the box, find the probability that it bears.

a number divisible by 5.

Answer : There are 90 discs in a box.

⇒ Number of outcomes in which discs is selected = 90.

⇒ Number of multiples of 5 from 1 to 90.

⇒ (5,10,15,20,25,30,35,40,45,50,55,60,65,70,75,80,85,90)

⇒ Number of favourable cases = 18

⇒ Probability that disc bears number divisible by 5 –

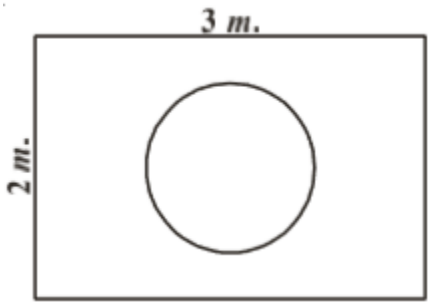
⇒ P(number divisible by 5) = $\frac{\text{favourable cases}}{\text{total cases}}$

⇒ P(number divisible by 5) = $\frac{18}{90}$

⇒ P(number divisible by 5) = $\frac{1}{5}$

∴ Probability that disc bears a number divisible by 5 is $\frac{1}{5}$.

Q. 11. Suppose you drop a die at random on the rectangular region shown in figure. What is the probability that it will land inside the circle with diameter 1m?



Answer : Given,

⇒ Length of rectangular region = 3m

⇒ Breadth of rectangular region = 2m

⇒ Area of rectangular region = length× breadth

⇒ Area of rectangular region = 3× 2

⇒ Area of rectangular region = $6m^2$

$$\Rightarrow \text{Radius of circle} = \frac{\text{Diameter}}{2}$$

$$\Rightarrow \text{Radius of circle} = \frac{1}{2}m$$

⇒ Area of circle = πr^2

$\Rightarrow$ Area of circle $= \pi\left(\frac{1}{2}\right)^2$

$\Rightarrow$ Area of circle $= \frac{\pi}{4}m^2$

$\Rightarrow$ Probability die will lie inside circle –

$\Rightarrow$ P(die will lie inside circle) $= \frac{\text{area of circle}}{\text{area of rectangular region}}$

$\Rightarrow$ P(die will lie inside circle) $= \frac{\frac{\pi}{4}}{6}$

$\Rightarrow$ P(die will lie inside circle) $= \frac{\pi}{24}$

$\Rightarrow$ P(die will lie inside circle) $= \frac{\left(\frac{22}{7}\right)}{24}$ $\left(\because \pi = \frac{22}{7}\right)$

$\Rightarrow$ P(die will lie inside circle) $= \frac{22}{7\times24}$

$\Rightarrow$ P(die will lie inside circle) $= \frac{11}{84}$

$\therefore$ Probability die will lie inside circle is $\frac{11}{84}$.

Q. 12 A. A lot consists of 144 ball pens of which 20 are defective and the others are good. The shopkeeper draws one pen at random and gives it to Sudha.

What is the probability that She will buy it?

Answer : Given, $\Rightarrow$ Lot consists of total 144 ball pens.

⇒ Defective pens = 20

⇒ Non – defective pens = 144 – 20

⇒ Non – defective pens = 124

⇒ Sudha will buy pens if pen is good.

⇒ Probability that Sudha will buy pens –

$$\Rightarrow P(\text{Sudha will buy pen}) = \frac{\text{number of non–defective pens}}{\text{total pens}}$$

$$\Rightarrow P(\text{Sudha will buy pen}) = \frac{124}{144}$$

$$\Rightarrow P(\text{Sudha will buy pen}) = \frac{31}{36}$$

$$\therefore \text{Probability of Sudha will buy a pen will } \frac{31}{36}.$$

Q. 12 B. A lot consists of 144 ball pens of which 20 are defective and the others are good. The shopkeeper draws one pen at random and gives it to Sudha.

What is the probability that She will not buy it?

Answer : Given,

⇒ Lot consists of total 144 ball pens.

⇒ Defective pens = 20

⇒ Sudha will not buy pens if pen is defective.

$$\Rightarrow P(\text{Sudha will not buy pen}) = \frac{\text{number of defective pens}}{\text{total pens}}$$

$$\Rightarrow P(\text{Sudha will not buy pen}) = \frac{20}{144}$$

$\Rightarrow$ P(Sudha will not buy pen) = $\frac{5}{36}$

$\therefore$ Probability Sudha will not buy a pen is $\frac{5}{36}$.

Q. 13 A. Two dice are rolled simultaneously and counts are added.

completes the table given below:

Event: 'Sum on 2 dice'	2	3	4	5	6	7	8	9	10	11	12
Probability	$\frac{1}{36}$						$\frac{5}{36}$				$\frac{12}{36}$

Answer : when two dices are rolled.

$\Rightarrow$ Number of total outcomes = 6× 6.

$\Rightarrow$ Number of total outcomes = 36.

$\Rightarrow$ Probability = $\frac{\text{number of favourable outcome}}{\text{total outcome}}$

Sum on 2 Dice	Favorable outcome	Number of favorable outcome	Probability
2	(1,1)	1	$\frac{1}{36}$
3	(1,2)(2,1)	2	$\frac{2}{36}$
4	(2,2)(1,3)(3,1)	3	$\frac{3}{36}$
5	(2,3)(3,2) (4,1)(1,4)	4	$\frac{4}{36}$
6	(2,4) (4,2)(5,1)(1,5)(3,3)	5	$\frac{5}{36}$
7	(1,6) (6,1) (2,5) (5,2) (3,4)(4,3)	6	$\frac{6}{36}$
8	(2,6) (6,2) (3,5)(5,3)(4,4)	5	$\frac{5}{36}$
9	(3,6) (6,3) (4,5)(5,4)	4	$\frac{4}{36}$
10	(4,6) (6,4) (5,5)	3	$\frac{3}{36}$
11	(5,6) (6,5)	2	$\frac{2}{36}$
12	(6,6)	1	$\frac{1}{36}$

⇒ Complete table will be –

Event: 'Sum on 2 dice'	2	3	4	5	6	7	8	9	10	11	12
Probability	$\frac{1}{36}$	$\frac{2}{36}$	$\frac{3}{36}$	$\frac{4}{36}$	$\frac{5}{36}$	$\frac{6}{36}$	$\frac{5}{36}$	$\frac{4}{36}$	$\frac{3}{36}$	$\frac{2}{36}$	$\frac{1}{36}$

Q. 13 B. Two dice are rolled simultaneously and counts are added.

A student argues that 'there are 11 possible outcomes 2.3.4.5.6.7.8.9.10.11 and12. Therefore, each of them has a probability $\frac{1}{11}$. Do you agree with this argument? Justify your answer.

Answer : Sum 2,3,4,5,6,7,8,9,10,11,12 have different number of favourable outcomes. As we know total number of outcomes when two dice are thrown is 36. Therefore students argument is wrong.

Q. 14. A game consists of tossing a one-rupee coin 3 times and noting its outcome each time. Deskhitha wins if all the tosses give the same result i.e. three heads or three tails. And loses otherwise. Calculate the probability that she will lose the game.

Answer :

We know that when a coin is tossed 'n' times.

⇒ Total number of outcome = 2^n

∴ when a coin is tossed 3 times.

⇒ Total number of outcomes = 2^3

⇒ Total number of outcomes = 8

⇒ Deskhitha wins if all the tosses give same result i.e. three heads and three tails.

⇒ When 3 coins tossed following cases will appear –

T T T

T T H

T H T

H T T

H H T

H T H

T H H

H H H

⇒ From the above analysis we conclude that there are 1 case where 3 heads and 1 case where three tails are appears.

⇒ And other 6 outcomes are of different results.

⇒ Probability of Deskhitha loose the game –

$$\Rightarrow P(\text{Deskhitha loose the game}) = \frac{\text{number of favourable cases}}{\text{total outcomes}}$$

$$\Rightarrow P(\text{Deskhitha loose the game}) = \frac{6}{8}$$

$$\Rightarrow P(\text{Deskhitha loose the game}) = \frac{3}{4}$$

$$\therefore \text{Probability of Deskhitha loose the game is } \frac{3}{4}.$$

Q. 15 A. A die is thrown twice. What is the probability that 5 will not come up either time?

[Hint : Throwing a die twice and throwing two dice simultaneously are treated as the same experiment].

Answer : If a dice thrown 'n' times then total number of outcome = 6^n

⇒ Dice is thrown 2 times then total outcomes = 6^2

⇒ Dice is thrown 2 times then total outcomes = 36

⇒ Favourable outcomes where 5 will not come up either time = (1,1)(1,2)(1,3)(1,4)(1,6)(2,1)(2,2)(2,3)(2,4)(2,6)(3,1)(3,2)(3,3)(3,4)(3,6)(4,1)(4,2)(4,3)(4,4)(4,6)(6,1)(6,2)(6,3)(6,4)(6,6).

⇒ Number of favourable events = 25

⇒ Probability 5 will not come up either time –

$$\Rightarrow P(\text{5 will not come up either time}) = \frac{\text{favourable events}}{\text{total events}}$$

$$\Rightarrow P(\text{5 will not come up either time}) = \frac{25}{36}$$

$$\therefore \text{Probability 5 will not come up either time is } \frac{25}{36}.$$

Q. 15 B. A die is thrown twice. What is the probability that 5 will come up at least once?

[Hint : Throwing a die twice and throwing two dice simultaneously are treated as the same experiment].

Answer : If a dice thrown 'n' times then total number of outcome = 6^n

⇒ Dice is thrown 2 times then total outcomes = 6^2

⇒ Dice is thrown 2 times then total outcomes = 36

⇒ Favourable outcomes where 5 will come up at least once.

⇒ (1,5)(2,5)(3,5)(4,5)(5,5)(5,1)(5,2)(5,3)(5,4)(5,6)(6,5).

⇒ Favourable events = 11

⇒ Total events = 36

$$\Rightarrow P(5 \text{ will come at least once}) = \frac{\text{favourable event}}{\text{total event}}$$

$$\Rightarrow P(5 \text{ will come at least once}) = \frac{11}{36}$$

$$\therefore \text{Probability that 5 will come up at least once will } \frac{11}{36}.$$