SHIKSHA CLASSES

Sub. : Maths **Answer Paper** **Marks : 30**

Std. : X th - CBSE **14 : Probability**

Section : A (Each 1 Mark)

Multiple choice Questions (MCQs).

Q.1 : If an event occurs surely, then its probability is

Ans : b) 1

Q.2 : If the probability of an event is 0.65, then the probability of not happening of that event is.....

Ans : a) 0.35

Q.3 : Two friends were born in the year 2000. The probability that they have the same birth date is .....

Ans : d) $\frac{1}{366}$

Q.4 : If an event cannot occur,then its probability is.....

Ans : d) 0

Q.5 : A die is thrown once. The probability of getting an even number is.....

Ans : d) $\frac{1}{2}$

Q.6 : Which of the following can be the probability of an event?

Ans : c) $\frac{18}{25}$

Q.7 : A bag contains lemon flavoured candies only. Shalini takes out one candy without looking into the bag. The probability she takes out an orange flavoured candy is

Ans : b) 0

Q.8 : A single letter is selected at random from the word 'PROBABILITY'. The probability that it is a vowel is

Ans : b) $\frac{4}{11}$

Q.9 : The probability of getting 53 friday's in a leap year is

Ans : b) $\frac{2}{7}$

For question number 10 to 11 two statements are given one labeled Assertion and other labeled Reason select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below

Q.10 : Assertion (A): The probability of a sure event is 1.

Reason (R): Let E be an event. Then $0 \leq P(E) \leq 1$.

Ans : b) Both Assertion (A) & Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

Q.11 : Assertion: If a box contains 5 white, 2 red and 4 black marbles, then the probability of not drawing a white marble from the box is 5/11.

Reason: $P(\bar{E}) = 1 - P(E)$, **where E is any event.**

Ans : d) Assertion (A) is false but Reason (R) is true.

Section : B (Each 2 Marks)

Q.12 : If a number x is chosen at random from the numbers –2, –1, 0, 1, 2. What is the probability that $x^2 < 2$?

Ans : Clearly, number x can take any one of the five given value.

So, total number of elementary events = 5

We observe that $x^2 < 2$ when x takes any one of the following three values –1, 0, 1

So, favourable number of elementary events = 3

Hence, $P(x^2 < 2) = \frac{3}{5}$

Q.13 : The number x is selected from the numbers 1, 2, 3 and then a second number y is randomly selected from the numbers 1, 4, 9. What is the probability that the product xy of the two numbers will be less than 9?

Ans : Number x can be select in three ways and corresponding to each such way there are three ways of selecting number y. Therefore two numbers can be selected in 9 ways as listed below :

(1, 1) (1, 4) (1, 9) (2, 1) (2, 4) (2, 9) (3, 4) (3, 1) (3, 9)

So, total number of elementary events = 9

The product xy will be less than 9, if x and y are chosen in one of the following ways,

(1, 1) (1, 4) (2, 1) (2, 4) (3, 1)

∴ Favourable number of elementary events = 5

Hence, required probability = $\frac{5}{9}$.

OR

Find the probability that a leap year selected at random will contain 53 sundays.

Ans : In a leap year there are 366 days

$$7\overline{)366}\,(52$$
$$35$$
$$16$$
$$14$$
$$2 \text{ days}$$

We have 366 days = 52 weeks and 2 days

Thus, a leap year has always 52 sundays.

The remaining 2 days can be

(i) Sunday and Monday

(ii) Monday and Tuesday

(iii) Tuesday and Wednesday

(iv) Wednesday and Thursday

(v) Thursday and Friday

(vi) Friday and Saturday

(vii) Saturday and Sunday

Clearly, there are seven elementary events associated with this random experiment

Let A be event that a leap year has 53 Sundays.

Clearly, the event A will happen if the last two days of leap year are either Sunday and Monday or Saturday and Sunday

∴ Favourable number of elementary events = 2

i.e. $P(A) = \frac{2}{7}$.

Section : C (Each 3 Marks)

Q.14 : A bag contains 5 red balls, 8 white balls, 4 green balls and 7 black balls. If one ball is drawn at random. Find the probability that it is (i) black (ii) red (iii) not green.

Ans : Total no. of balls in the bag

= 5 + 8 + 4 + 7 = 24

∴ Total number of elementary events = 24

(i) There are 7 black balls in the bag

$\therefore$ Favourable number of elementary events = 7

Hence P(Getting a black ball) = $\frac{7}{24}$

(ii) There are 5 red balls in the bag

$\therefore$ Favourable number of elementary events = 5

Hence, P(Getting a red balls) = $\frac{5}{24}$

(iii) There are 5 + 8 + 7 = 20 balls which are not green

$\therefore$ Favourable number of elementary events = 20

Hence, P(Not getting a green ball) = $\frac{20}{24} = \frac{5}{6}$

Q.15 : A carton consists of 100 shirts of which 88 are good, 8 have minor defects and 4 have major defects. Jimmy, a trader will only accept the shirts which are good, but Sujatha another trader will only reject the shirts which have major defect. One shirt is drawn at random from the cartoon, what is the probability, that it is acceptable to (i) Jimmy (ii) Sujatha?

Ans : One shirt is drawn at random from the carton of 100 shirts. This can be done in 100 ways.

$\therefore$ Total number of elementary events = 100

(i) Since, Jimmy accepts only good shirts and the number of good shirt is 88

$\therefore$ No. of elementary events favourable to Jimmy = 88

So, probability that a shirt is acceptable to Jimmy = $\frac{88}{100} = 0.88$

(ii) Sujatha accepts good as well as shirts having minor defects, The number of such shirts = 88 + 8 = 96

$\therefore$ Favourable number of elementry events = 96

Hence, probability that a shirt is acceptable to Sujatha = $\frac{96}{100} = 0.96$

OR

A piggy bank contains hundred 50 paisa coins, fifty Rs. 1 coins, twenty Rs.l 2 coins and ten Rs. 5 coins. If it is equally likely that one of the coins will fall out when the bank is turned up side down, what is the probability that the coin (i) Will be a 50 paisa coin? (ii) Will not be Rs. 5 coin?

Ans : We have

Total number of coins

= 100 + 50 + 20 + 10 = 180

So, one coin can be chosen out of 180 coins in 180 ways.

$\therefore$ Total no. of elementary events = 180

(i) There are 100 fifty paisa coin out of which one coin can be chosen in 100 ways

$\therefore$ Probability that a 50 paisa coin will fall

$= \frac{100}{180} = \frac{5}{9}$

(ii) Other than Rs. 5 coin there are 170 coins

$\therefore$ Probability that coin fallen out is not a Rs. 5 coin = $\frac{170}{180} = \frac{17}{18}$

Section - D(Each 5 Marks)

16. : Two dice are thrown simultaneously. Find the probability of getting.

(i) an even number as the sum.

(ii) the sum as a prime number

(iii) a multiple of 2 on one dice and a multiple of 3 on the other.

(iv) Same number on both dice i.e. a doublet.

(v) 11 (deven) as the sum.

Ans : Elementary events associated to the random experiment of throwing two dice are :

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

$\therefore$ Total number of elementary events

$= 6 \times 6 = 36$

(i) Let A be the event of getting an even number as the sum i.e. 2, 4, 6, 8, 10, 12

Elementary events favourable to event A are

(1, 1) (1, 3) (3, 1) (2, 2) (1, 5) (5, 1)
(2, 4) (4, 2) (3, 3) (2, 6) (6, 2) (4, 4)
(5, 3) (3, 5) (5, 5) (6, 4) (4, 6) and
(6, 6)

Clearly, favourable number of elementary events = 18

Hence, required probability $= \frac{18}{36} = \frac{1}{2}$

(ii) Let A be the event of getting the sum as a prime number i.e. 2, 3, 5, 7, 11

Elementary events favourable to event A are

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

$\therefore$ Favourable number of elementary events = 15

Hence, required probability $= \frac{15}{36} = \frac{5}{12}$

(iii) Let A be the event of getting a d multiple of 2 on one die and a multiple of 3 on the other, then the elementary events favourable to A are

(2, 3) (2, 6) (4, 3) (4, 6) (6, 3) (6, 6)
(3, 2) (3, 4) (3, 6) (6, 2) (6, 4)

$\therefore$ Favourable number of elementary events = 11

Hence, required probability $= \frac{11}{36}$

(iv) Let A be the event of getting the same number on both dice. Then, elementary events favourable to A are

(1, 1) (2, 2) (3, 3) (4, 4) (5, 5) and (6, 6)

$\therefore$ Favourable number of elementary events = 6

Hence, required probability $= \frac{6}{36} = \frac{1}{6}$

(v) Let A be the event of getting 11 (eleven) as the sum, then elementary events favourable to A are (5, 6) (6, 5)

$\therefore$ favourable number of elementary events = 2

Hence, required probability

$= \frac{2}{36} = \frac{1}{18}$.

OR

One card is drawn from a pack of 52 cards each of the 52 cards being equally likely to be drawn. Find the probability that the card drawn is :

(i) An ace (ii) Either red or king
(iii) Red and a king (iv) a face card
(v) Five (5) of spade.

Ans : Total number of elementary events = 52

(i) There are four ace cards in a pack of 52 cards, so one ace can be chosen in 4 ways.

$\therefore$ Favourable number of elementary events = 4

Hence, required probability $= \frac{4}{52} = \frac{1}{13}$

(ii) There are 26 red cards including two red king in a pack of 52 cards. Also there are 4 king, two red and two black. Therefore card drawn will be a red card or a king if it is any one of 28 cards

(26 red cards and 2 black kings)

$\therefore$ Favourable number of elementary events = 28

Hence, required probability $= \frac{28}{52} = \frac{7}{13}$

(iii) A card drawn will be red as well as king, if it a king. There are 2 red kings in a pack of 52 playing cards.

$\therefore$ Favourable number of elementary events = 2

Hence, required probability $= \frac{2}{52} = \frac{1}{26}$

(iv) In a deck of 52 cards, kings, queens and jacks are called face cards, Thus there are 12 face cards. So one face card can be chosen in 12 ways.

$\therefore$ Favourable number of elementary events = 12

Hence, required probability $= \frac{12}{52} = \frac{3}{13}$

(v) In a deck of 52 cards five of spade is only the one card

$\therefore$ favourable number of elementary events = 1

Hence, required probability $= \frac{1}{52}$.

Section : E

Q.17 : Case Study :

One day Rahul ------ likely outcomes.

i) Find the probability that the arrow will point at 2.

Ans : Total numbers = 8

The probability that the arrow will point at $2 = \frac{1}{8}$

ii) Find the probability that the arrow will point at a prime number.

Ans : Prime numbers are 2, 3, 5, 7

So total prime = 4

Therefore, The probability that arrow will point at a prime number $= \frac{4}{8} = \frac{1}{2}$.

iii) Find the probabilitiy that the arrow will point at a number divisible by 3.

Ans : Nos divisible by 3 are 3, 6

So, The probability that the arrow will point at a number divisible by $3 = \frac{2}{8} = \frac{1}{4}$

OR

Find the probability that the arrow will point at a number greater than 2.

Ans : The number which are greater than 2

3, 4, 5, 6, 7, 8

$\therefore$ Total no. = 6

Therefore, The probability that the arrow will point at a number greater than 2

$= \frac{6}{8} = \frac{3}{4}$.

* * *