CHAPTER

15 PROBABILITY

Syllabus

- Classical definition of probability. Simple problems on single events (not using set notation).

Trend Analysis

List of Concepts	2018		2019		2020	
	Delhi	Outside Delhi	Delhi	Outside Delhi	Delhi	Outside Delhi
Problems based on tossing a coin			1 Q (2 M)		1 Q (1 M)	
Problems Based on Throwing a Die	1 Q (2 M)			1 Q (2 M)	2 Q (1 M)	1 Q (1 M) 2 Q (2 M)
Problems Based on Playing cards	1 Q (2 M)					
Problems Based on selection of an object from a Bag etc.	1 Q (2 M)			1 Q (2 M)	1 Q (1 M) 1 Q (2 M)	2 Q (1 M)

Revision Notes

- Probability is a branch of mathematics that deals with calculating the likelihood of a given event's occurrence.
- A random experiment is an experiment or a process for which the outcome cannot be predicted with certainty. *e.g.*,

  (i) tossing a coin, **(ii)** throwing a dice, **(iii)** selecting a card and **(iv)** selecting an object etc.
- Outcome associated with an experiment is called an event. *e.g.*, **(i)** Getting a head on tossing a coin, **(ii)** getting a face card when a card is drawn from a pack of 52 cards.
- The events whose probability is one are called sure/certain events.
- The events whose probability is zero are called impossible events.
- An event with only one possible outcome is called an elementary event.
- In a given experiment, if two or more events are equally likely to occur or have equal probabilities, then they are called equally likely events.
- Probability of an event always lies between 0 and 1.
- Probability can never be negative and more than one.

- A pack of playing cards consists of 52 cards which are divided into 4 suits of 13 cards each. Each suit consists of an ace, one king, one queen, one jack and 9 other cards numbered from 2 to 10. Four suits are spades, hearts, diamonds and clubs.
- King, queen and jack are face cards.
- The sum of the probabilities of all elementary events of an experiment is 1.
- Two events A and B are said to be complementary to of each other if the sum of their probabilities is 1.
- Probability of an event E, denoted as P(E), is given by:

$$P(E) = \frac{\text{Number of outcomes favourable to } E}{\text{Total possible number of outcomes}}$$

- For an event E, $P(\bar{E}) = 1 - P(E)$, where the event $\bar{E}$ representing 'not E' is the complement of the event E.
- For A and B two possible outcomes of an event,
  (i) If $P(A) > P(B)$, then event A is more likely to occur than event B.
  (ii) If $P(A) = P(B)$, then events A and B are equally likely to occur.

Know the Facts

- The experimental or empirical probability of an event is based on what has actually happened while the theoretical probability of the event attempts to predict what will happen on the basis of certain assumptions.
- As the number of trials in an experiment go on increasing, we may expect the experimental and theoretical probabilities to be nearly the same.
- When we speak of a coin, we assume it to be '**fair** ' *i.e.*, it is symmetrical so that there is no reason for it to come down more often on one side than the other. We call this property of the coin as being '**unbiased**'.
- By the phrase '**random toss**', we mean that the coin is allowed to fall freely without any **bias** or **interference**.
- In the case of experiment we assume that the experiments have equally likely outcomes.
- A deck of playing cards consists of 4 suits : spades (♠), hearts (♥), diamonds (♦) and clubs (♣). Clubs and spades are of black colour, while hearts and diamonds are of red colour.
- The first book on probability '**The Book on Games of Chance**' was written by Italian mathematician **J. Cardan**.
- The classical definition of probability was given by Pierre Simon Laplace.

How is it done on the GREENBOARD?

Q.1. One dice and one coin are tossed simultaneously. Write the sample space. Find the probability of getting :
(i) Prime number on dice
(ii) head
(iii) head and even number

Solution:

Step I: Writing the sample space:
{(H,1),(H,2),(H,3),(H,4),(H,5),(H,6)(T,1), (T, 2), (T, 3), (T, 4), (T, 5), (T, 6)}

Step II: Finding prime number on dice : prime numbers are 2, 3 and 5
∴ favourable cases are :

$A = \{(H, 2), (H, 3), (H, 5), (T, 2), (T, 3), (T, 5)\}$

$n(A) = 6$

∴ Required probability

$$= \frac{n(A)}{n(S)} = \frac{6}{12} = \frac{1}{2}$$

Step III: Finding cases having head:

$B = \{(H, 1), (H, 2), (H, 3), (H, 4), (H, 5), (H, 6)\}$

$n(B) = 6$

∴ Required probability $= \frac{n(B)}{n(S)}$

$$= \frac{6}{12} = \frac{1}{2}$$

Step IV: Finding head and even number:

$C = \{(H, 2), (H, 4), (H, 6)\}$

$n(C) = 3$

∴ Required probability $= \frac{n(C)}{n(S)}$

$$= \frac{3}{12} = \frac{1}{4}$$

Very Short Answer Type Questions — 1 mark each

AI Q. 1. Find the probability of getting a doublet in a throw of a pair of dice. U [CBSE SQP, 2020-21] [CBSE Delhi Set-II, 2020]

Sol. Probability of getting a doublet $= \frac{1}{6}$ **1**

Doublet means same number on both dice.

[CBSE Marking Scheme, 2020]

Detailed Solution:

The outcomes when two dice are thrown together are:

(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6)
(2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 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) ½

Total number of outcomes $= n(S) = 36$

Favourable outcomes are: (1, 1), (2, 2), (3, 3), (4, 4), (5, 5) and (6, 6) *i.e.*, $n(E) = 6$

Required Probability $= \frac{n(E)}{n(S)} = \frac{6}{36} = \frac{1}{6}$ ½

AI Q. 2. Find the probability of getting a black queen when a card is drawn at random from a well-shuffled pack of 52 cards. U [CBSE SQP, 2020-21]

Sol. Probability of getting a black queen $= \frac{2}{52} = \frac{1}{26}$ **1**

Detailed Solution:

Total no. of cards = 52

No. of black queens = 2

So, Probability of black queen $= \frac{2}{52} = \frac{1}{26}$ **1**

AI Q. 3. A letter of english alphabet is chosen at random. What is the probability that the chosen letter is a consonant. U [CBSE Delhi Set-I, 2020]

Sol. In English language, there are 26 alphabets. Consonants are 21.

So, total no. of outcomes,

$n(S) = 26$

and favourable outcomes,

$n(E) = 21$ ½

$\therefore$ The probability of choosing a consonant

$= \frac{n(E)}{n(S)} = \frac{21}{26}$ ½

AI Q. 4. A die is thrown once. What is the probability of getting a number less than 3 ? A [CBSE Delhi Set-I, 2020]

Sol. Total possible outcomes $= n(S) = 6$

Favourable outcomes = 1, 2

i.e., $n(E) = 2$

$\therefore$ P(number less than 3) $= \frac{n(E)}{n(S)}$

$= \frac{2}{6} = \frac{1}{3}$. **1**

Q. 5. If the probability of winning a game is 0.07, what is the probability of losing it ?

Sol. P(winning the game) $= 0.07$

P(losing the game) $= 1 - 0.07$

$= 0.93$ **1**

Q. 6. A die thrown once. What is the probability of getting an even prime number ? U [CBSE Delhi Set-II, 2020]

Sol. Total possible outcome $n(S) = 6$

Favourable outcome $= \{2\}$

i.e., $n(E) = 1$

P(getting an even prime number) $= \frac{n(E)}{n(S)} = \frac{1}{6}$. **1**

AI Q. 7. If a number x is chosen at random from the numbers $-3, -2, -1, 0, 1, 2, 3$, then find the probability of $x^2 < 4$. U [CBSE OD Set-I, 2020]

Sol.

x	–3	–2	–1	0	1	2	3
x^2	9	4	1	0	1	4	9

Total possible outcomes $= n(S) = 7$

Favourable outcomes $= x^2 < 4$ *i.e.*, $x = -1, 0, 1$

$n(E) = 3$

$P(x^2 < 4) = \frac{n(E)}{n(S)} = \frac{3}{7}$. **1**

AI Q. 8. What is the probability that a randomly taken leap year has not 53 Sundays ? A [CBSE OD Set-I, 2020]

Sol. Number of days in a leap year = 366

Number of weeks $= \frac{366}{7} = 52.28$

So, there will be 52 weeks and 2 days

So, every leap year has 52 Sundays

Now, the probability depends on remaining 2 days

The possible pairing of days are

Sunday and Monday, Monday and Tuesday, Tuesday and Wednesday, Wednesday and Thursday, Thursday and Friday, Friday and Saturday, Saturday and Sunday. ½

There are total 7 pairs and out of 7 pairs, only 2 pairs have Sunday. The remaining 5 pairs does not include Sunday.

Therefore, the probability of has not 53 Sundays in a Leap year is $\frac{5}{7}$ ½

Q. 9. A die is thrown once. What is the probability of getting a prime number ? U [CBSE OD Set-I, 2020]

Sol. Total possible outcomes $= n(S) = 6$

Favourable outcomes $= \{2, 3, 5\}$

i.e., $n(E) = 3$ ½

$$\text{Probability} = \frac{n(E)}{n(S)}$$

$$= \frac{3}{6} = \frac{1}{2}.$$ ½

AI **Q. 10. A number is chosen at random from the numbers – 5, – 4, – 3, – 2, – 1, 0, 1, 2, 3, 4, 5. Then find the probability that square of this number is less than or equal to 1.** U **[CBSE SQP, 2020-21]**

[Delhi Set-I, II, III, 2017]

Sol. $\frac{3}{11}$ **[CBSE SQP Marking Scheme, 2020] 1**

Detailed Solution:

Given numbers, – 5, – 4, – 3, – 2, – 1, 0, 1, 2, 3, 4, 5

Total outcomes = 11 ½

Squaring all the numbers we get

25, 16, 9, 4, 1, 0, 1, 4, 9, 16, 25

$$\text{Probability, } P(E) = \frac{\text{Favourable outcomes}}{\text{Total number of outcomes}}$$

$$P(E) = \frac{3}{11}$$

Hence, Probability $= \frac{3}{11}$. ½

Q. 11. The probability of selecting a rotten apple randomly from a heap of 900 apples is 0.18. What is the number of rotten apples in the heap ? R **[CBSE OD 2017]**

Topper Answer, 2017

Sol.

A = getting a rotten apple.

n(S) = 900 – total apples

P(A) = 0.18.

1.

A = getting a rotten apple.

n(S) = 900 – total apples

P(A) = 0.18.

let n(A) be number of rotten apples.

Then, $P(A) = \frac{n(A)}{n(S)} = \frac{n(A)}{900}$

$0.18 \times 900 = n(A)$

$\therefore n(A) = 162$

So, there are 162 rotten apples in the heap.

1

Q. 12. A die is thrown once. Find the probability of getting "at most 2." U **[CBSE S.A.-2 2016]**

Sol. $S = \{1, 2, 3, 4, 5, 6\}$

$n(S) = 6$

$A = \{1, 2\}$

$n(A) = 2$

$\therefore P(A) = \frac{n(A)}{n(S)} = \frac{2}{6} = \frac{1}{3}$ **1**

Q. 13. Out of 200 bulbs in a box, 12 bulbs are defective. One bulb is taken out at random from the box. What is the probability that the drawn bulb is not defective ? U **[CBSE SQP, 2016]**

Sol. Total no. of cases = 200

Favourable cases = 200 – 12 = 188

$\therefore$ Required probability $= \frac{188}{200}$

$= \frac{47}{50}$ **1**

Q. 14. What is the probability that a non-leap year has 53 Mondays ? U **[CBSE Term-2, 2015]**

Sol. There are 365 days in a non-leap year.

$\because$ 365 days = 52 weeks + 1 day

$\therefore$ One day can be M, T, W, Th, F, S, S = 7 ½

$\therefore P(53 \text{ Mondays in non-leap year}) = \frac{1}{7}$ ½

[CBSE Marking Scheme, 2015]

Q. 15. Two different dice are tossed together. Find the probability that the product of the number on the top of the dice is 6. A **[CBSE OD Set-I, II, III, 2015]**

Sol. Product of 6 are (1, 6); (2, 3); (6, 1); (3, 2)

No. of possible outcomes = 4

Total number of chances = $6 \times 6 = 36$

$$P(\text{Product} = 6) = \frac{4}{36} = \frac{1}{9}$$

[CBSE Marking Scheme, 2015] 1

Q. 16. 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. Find the probability that the arrow will point at any factor of 8 ?

U [Foreign Set I, II, III, 2015]

Sol. Total number of points = 8

Since, the factors of 8 are, 1, 2, 4 and 8.

$= (1 \times 8), (2 \times 4), (8 \times 1), (4 \times 2)$

No. of favourable outcomes = 4

$\therefore P(\text{Factors of 8}) = \dfrac{\text{No. of favourable outcomes}}{\text{Total no. of possible outcomes}}$ ½

$= \dfrac{4}{8} = \dfrac{1}{2}$ ½

[CBSE Marking Scheme, 2015]

Short Answer Type Questions-I — 2 marks each

Q. 1. If a number x is chosen at random from the number $-3, -2, -1, 0, 1, 2, 3$. What is probability that $x^2 \le 4$?

U [CBSE Delhi Set-I, 2020]

Sol. Try yourself, similar to Q. 7, of very short answer type questions.

AI **Q. 2. 'A child has a die whose six faces show the letters as shown below :**

A	B	C	D	E	A

The die is thrown once. What is the probability of getting (i) A, (ii) D ?

C + A [CBSE OD Set-I, 2020]

Sol. Total possible outcomes, $n(S) = 6$

(i) Let E_1 = getting event letter A, then

$n(E_1) = 2$

$\therefore$ Probability $= \dfrac{n(E_1)}{n(S)} = \dfrac{2}{6} = \dfrac{1}{3}$ **1**

(ii) Let E_2 = getting event letter D, then

$n(E_2) = 1$

$\therefore$ Probability $= \dfrac{n(E_2)}{n(S)} = \dfrac{1}{6}$. **1**

Q. 3. A child has a die whose six faces show the letters as shown below :

A	A	B	C	C	C

The die is thrown once. What is the probability of getting (i) A, (ii) C ?

C + A [CBSE OD Set-II, 2020]

Sol. Total possible outcomes $n(S) = 6$

(i) Let E_1 = getting event letter A, then $n(E_1) = 2$

$\therefore$ Probability $= \dfrac{n(E_1)}{n(S)} = \dfrac{2}{6} = \dfrac{1}{3}$ **1**

(ii) Let E_2 = Getting event letter C, then $n(E_2) = 3$

$\therefore$ Probability $= \dfrac{n(E_2)}{n(S)} = \dfrac{3}{6} = \dfrac{1}{2}$. **1**

AI **Q. 4. A game consists of tossing a coin 3 times and noting the outcome each time, if getting the same result in all the tosses is a success, find the probability of losing the game.**

U [CBSE Delhi Set-I, 2019]

Sol. Total number of outcomes = 8 ½

Favourable number of outcomes (HHH, TTT) = 2 ½

Prob. (getting success) $= \dfrac{2}{8}$ or $\dfrac{1}{4}$ ½

$\therefore$ Prob. (losing the game) $= 1 - \dfrac{1}{4} = \dfrac{3}{4}$ ½

[CBSE Marking Scheme, 2019]

COMMONLY MADE ERROR

- Most of the students commit errors in writing correct total outcomes. Sometimes, favourable outcomes are also incorrectly written by students.

ANSWERING TIP

- Remember to list the favourable outcomes of tossing a coin 3 times.

AI **Q. 5. A die is thrown twice. Find the probability that**
(i) 5 will come up at least once.
(ii) 5 will not come up either time.

U [CBSE OD Set-III, 2019]

Sol. E_1 {(1, 5),(2, 5), (3, 5), (4, 5), (5, 5), (6, 5), (5, 1), (5, 2), (5, 3), (5, 4), (5, 6)}

$\therefore P(\text{5 will come at least once}) = P(E_1) = \dfrac{11}{36}$ **1**

$P(\text{5 will not come either time}) = 1 - \dfrac{11}{36} = \dfrac{25}{36}$ **1**

[CBSE Marking Scheme, 2019]

COMMONLY MADE ERROR

- In die based problems, students often get confused in favorable outcomes.

ANSWERING TIP

- List all the events of throwing a die and not assume in mind.

AI **Q. 6. The probability of selecting a blue marble at random from a jar that contains only blue, black and green marbles is $\frac{1}{5}$. The probability of selecting a black marble at random from the same jar is $\frac{1}{4}$. If the jar contains 11 green marbles, find the total number of marbles in the jar.**

U [CBSE OD, Set-I, 2019]

[CBSE OD, Set-I, II, 2015]

Sol. $P(\text{blue marble}) = \frac{1}{5}$, $P(\text{black marble}) = \frac{1}{4}$

$\therefore \quad P(\text{green marble}) = 1 - \left(\frac{1}{5} + \frac{1}{4}\right) = \frac{11}{20}$ **1**

Let total number of marbles be x

then $\frac{11}{20} \times x = 11 \Rightarrow x = 20$ **1**

[CBSE Marking Scheme, 2019]

Detailed Solution:

Let x and y be the number of Blue and Black marbles.

No. of green marbles = 11

Total number of marbles = $x + y + 11$ ½

According to the problem,

$$P(\text{black marbles}) = \frac{1}{4}$$

$$\frac{y}{x+y+11} = \frac{1}{4}$$

or, $\quad x = 3y - 11$ ...(i) ½

Again, $\quad P(\text{blue marble}) = \frac{1}{5}$

$$\frac{x}{x+y+11} = \frac{1}{5}$$

or, $\quad x = \frac{y+11}{4}$ ...(ii) ½

Now, from equation (i) and (ii), we have

$$3y - 11 = \frac{y+11}{4}$$

or, $\quad 12y - 44 = y + 11$

or, $\quad y = 5$

From equation (i), $\quad x = 3 \times 5 - 11$

$x = 4$

Hence, total number of marbles in the jar

$= x + y + 11$

$= 4 + 5 + 11$

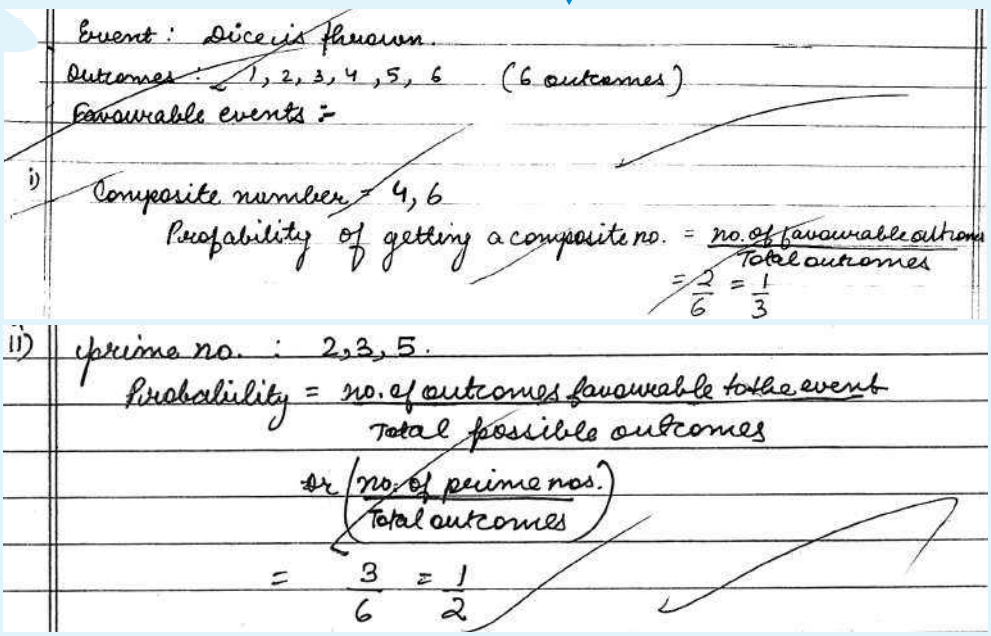
$= 20.$ ½

Q. 7. A die is thrown once. Find the probability of getting (i) a composite number, (ii) a prime number.

U [CBSE Delhi Region, 2019]

Topper Answer, 2019

Sol.



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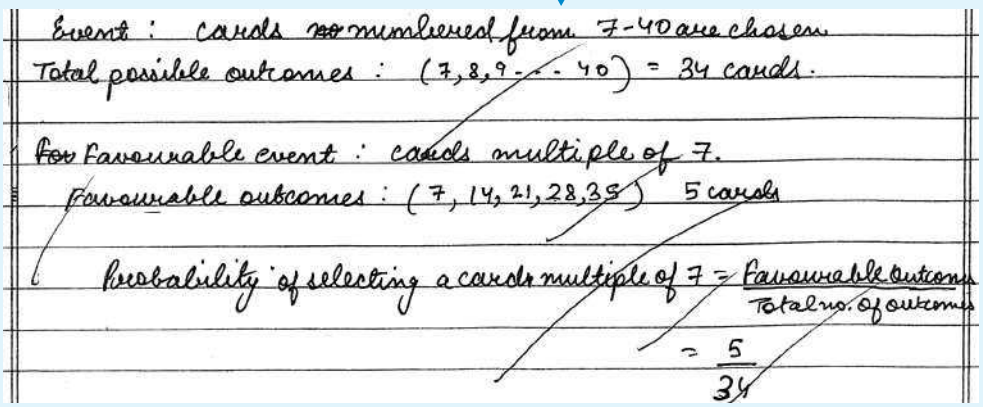
Q. 8. Cards numbered 7 to 40 were put in a box. Poonam selects a card at random. What is the probability that Poonam selects a card which is a multiple of 7 ? [CBSE Delhi, 2019]

Topper Answer, 2019

Sol.



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Q. 9. An integer is chosen at random between 1 and 100. Find the probability that it is :
(i) divisible by 8.
(ii) not divisible by 8.

U [CBSE Delhi/OD, 2018]

Sol. Total number of outcomes = 98

(i) Favourable outcomes are 8, 16, 24, ..., 96, *i.e.*, 12 ½

Probability (integer is divisible by 8) = $\frac{12}{98}$ or $\frac{6}{49}$ **1**

(ii) Probability (integer is not divisible by 8) = $1-\frac{6}{49}$

$= \frac{43}{49}$

[CBSE Marking Scheme, 2018] ½

Q. 10. A card is drawn at random from a well shuffled deck of 52 cards. Find the probability of getting neither a red card nor a queen.

U [CBSE SQP, 2018]
[CBSE O.D., Set-I, II, III, 2016]

Sol. Probability of either a red card or a queen

$= \frac{26+2}{52} = \frac{28}{52}$ **1**

P(neither red card nor a queen) = $1-\frac{28}{52}$

$= \frac{52-28}{52} = \frac{24}{52} = \frac{6}{13}$ **1**

[CBSE Marking Scheme, 2018]

Q. 11. Two dice are thrown at the same time and the product of numbers appearing on them is noted. Find the probability that the product is a prime number. U [CBSE SQP, 2018]

Sol. Total number of outcomes = 36 **1**

Favourable outcomes are (1, 2), (2, 1), (1, 3), (3, 1), (1, 5), (5, 1) *i.e.*, 6

Required probability = $\frac{6}{36}$ or $\frac{1}{6}$ **1**

[CBSE Marking Scheme, 2018]

Q. 12. Two different dice are thrown together. Find the probability that the product of the number appeared is less than 18.

U [Foreign Set-I, II, III, 2017]

Sol. No. of all possible outcomes = $6^2 = 36$

No. of favourable outcomes = 26 ½

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

$\therefore$ P(Product appears is less than 18) = $\frac{26}{36} = \frac{13}{18}$ **1½**

[CBSE Marking Scheme, 2017]

Q. 13. A letter of English alphabet is chosen at random, find the probability that the letter so chosen is :
(i) a vowel,
(ii) a consonant.

A [CBSE Delhi Term-2, Set-I, II, III, 2015]

Sol. Since, total number in english alphabet is 26. in which 5 vowels and 21 consonants.

(i) P(a vowel) = $\frac{5}{26}$ **1**

(ii) P(a consonant) = $\frac{21}{26}$

[CBSE Marking Scheme, 2015] **1**

Q. 14. A bag contains cards with numbers written on it from 1 - 80. A card is pulled out at random. Find the probability that the card shows a perfect square.

U [CBSE S.A.-2, 2016]
[CBSE Delhi Set-I, II, III, 2016]

Sol. $S = \{1, 2 \ldots\ldots\ldots\ldots 80\}$

$n(S) = 80$ ½

$A = \{1, 4, 9, 16, 25, 36, 49, 64\}$

$n(A) = 8$ ½

$P(A) = \frac{n(A)}{n(S)} = \frac{8}{80}$

$= \frac{1}{10}$ **1**

Short Answer Type Questions-II — 3 marks each

AI **Q. 1. An integer is chosen between 70 and 100. Find the probability that it is.**
(i) a prime number
(ii) divisible by 7. U [CBSE SQP, 2020-21]

Sol. Total number of integers = 29

(i) Prob. (prime number) $= \frac{6}{29}$

(ii) Prob. (number divisible by 7) $= \frac{4}{29}$

[CBSE SQP Marking Scheme, 2020] **3**

Detailed Solution:

Total number of outcomes = $n(S) = 29$

(i) Total prime numbers between 70 and 100
= 71, 73, 79, 83, 89, 97

i.e., favourable outcomes = $n(E) = 6$ ½

$\therefore$ P(prime number) $= \frac{n(E)}{n(S)}$

$= \frac{6}{29}$ **1**

(ii) Numbers, which are divisible by 7
= 77, 84, 91, 98

i.e., favourable outcomes = $n(E_1) = 4$ ½

$\therefore P$(number divisible by 7) $= \frac{n(E_1)}{n(S)}$

$= \frac{4}{29}$. **1**

Q. 2. From all the two digit numbers a number is chosen at random. Find the probability that the chosen number is a multiple of 7.
U [CBSE OD Comptt. Set-III, 2017]

Sol. All possible outcomes are 10, 11, 12 ..... 98, 99.
No. of all possible outcomes = 90. **1**
All favourable outcomes are 14, 21, 28 98
No. of favourable outcomes = 13 **1**

$\therefore$ P(getting a number multiple of 7) $= \frac{13}{90}$ **1**

[CBSE Marking Scheme, 2017]

Q. 3. A box contains cards, number 1 to 90. A card is drawn at random from the box. Find the probability that the selected card bears a :
(i) Two digit number.
(ii) Perfect square number
U [Delhi Comptt. Set-I, 2017]

Sol. No. of all possible outcomes = 90

(i) No. of cards having 2 digit number = 90 – 9 = 81
$\therefore$ No. of favourable outcomes = 81
P(selected card bears two digit number)
$= \frac{\text{No. of favourable outcomes}}{\text{No. of all possible outcomes}} = \frac{81}{90} = \frac{9}{10}$ **1**

(ii) Perfect square numbers between 1 to 90 are
1, 4, 9, 16, 25, 36, 49, 64, 81 **1**
$\therefore$ No. of favourable outcomes = 9
P(Selected card bears perfect square numbers)
$= \frac{9}{90} = \frac{1}{10}$ **1**

[CBSE Marking Scheme, 2017]

Q. 4. Two different dice are thrown together. Find the probability that the number obtained.
(i) have a sum less than 7.
(ii) have a product less than 16.
(iii) is a doublet of odd numbers.
U [CBSE Delhi Set-I, II, III, 2017]

Sol. Total number of all possible outcomes = $6^2 = 36$

(i) The sum less than 7 = (1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (2, 1), (2, 2), (2, 3), (2, 4), (3, 1), (3, 2), (3, 3), (4, 1), (4, 2), (5, 1)
No. of favourable outcomes = 15
P(have sum less than 7) $= \frac{15}{36} = \frac{5}{12}$ **1**

(ii) Product less than 16 = (1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (4, 1), (4, 2), (4, 3), (5, 1), (5, 2), (5, 3), (6, 1), (6, 2)
No. of favourable out outcomes = 25
$\therefore$ P(have a product less than 16)
$= \frac{25}{36}$ **1**

(iii) Doublet of odd numbers = (1, 1), (3, 3), (5, 5)
No. of favourable outcomes = 3
$\therefore$ P(a doublet of odd number)
$= \frac{3}{36} = \frac{1}{12}$ **1**

[CBSE Marking Scheme, 2017]

Q. 5. Peter throws two different dice together and finds the product of the two numbers obtained. Rina throws a die and squares the number obtained. Who has the better chance to get the number 25.
[CBSE Delhi Set-I, II, III, 2017]

Sol. Peter throws two dice together
$\therefore$ Total number of possible outcomes = $6^2 = 36$ ½
He get 25 only when he gets (5, 5)
$\therefore$ No. of favourable outcomes = 1 ½

P(getting the numbers of product 25) $= \frac{1}{36}$ **1**

Rina throws one dice
$\therefore$ Total number of all possible outcomes = 6
The number where square is 25 is 5
$\therefore$ No. of favourable outcomes = 1 ½

P(getting a number whose square is 25) $= \frac{1}{6}$

$\because$ $\frac{1}{6} > \frac{1}{36}$ ½

Hence, Rina has better chances to get the number 25.

[CBSE Marking Scheme, 2017]

Q. 6. A bag contains 15 white and some black balls. If the probability of drawing a black ball from the bag is thrice that of drawing a white ball, find the number of black balls in the bag. C [CBSE OD Set-III, 2017]

Topper Answer, 2017

Sol.

Let there be x black balls and 15 white balls.

Total balls $= n(S) = 15 + x$

P(drawing black ball) $= 3 \times P$(drawing white ball).

$\Rightarrow \frac{x}{(15+x)} = 3 \times \frac{15}{(15+x)}$

$\frac{x}{} = \frac{3 \times 15}{(15+x)} \times (15+x)$

$x = 45$

$\therefore$ There are 45 black balls in the bag.

3

Q. 7. In a single throw of a pair of different dice, what is the probability of getting (i) a prime number on each dice ? (ii) a total of 9 or 11 ?

U [CBSE Delhi Set I, 2016]

Sol. (i) Favourable outcomes are (2, 2) (2, 3) (2, 5) (3, 2) (3, 3) (3, 5) (5, 2) (5, 3) (5, 5) *i.e.*, 9 outcomes. **1**

P(a prime number on each die) $= \frac{9}{36}$ or $\frac{1}{4}$ ½

(ii) Favourable outcomes are (3, 6) (4, 5) (5, 4) (6, 3) (5, 6) (6, 5) *i.e.*, 6 outcomes **1**

P(a total of 9 or 11) $= \frac{6}{36}$ or $\frac{1}{6}$ ½

[CBSE Marking Scheme, 2016]

Q. 8. Two different dice are thrown together. Find the probability of :

(i) getting a number greater than 3 on each dice.

(ii) getting a total of 6 or 7 of the numbers on two dice.

C + A [CBSE Delhi Set II, 2016]

Sol. (i) Favourable outcomes are (4, 4) (4, 5) (4, 6) (5, 4) (5, 5) (5, 6) (6, 4) (6, 5) (6, 6) **1**

$\therefore$ No. of favourable outcomes = 9

P(*a* number > 3 on each dice) $= \frac{9}{36}$ or $\frac{1}{4}$ ½

(ii) Favourable outcomes are (1, 5) (2, 4) (3, 3) (4, 2) (5, 1) (1, 6) (2, 5) (3, 4) (4, 3) (5, 2) (6, 1) **1**

$\therefore$ No. of favourable outcomes = 11

P(a total of 6 or 7) $= \frac{11}{36}$. ½

[CBSE Marking Scheme, 2016]

Q. 9. A box consists of 100 shirts of which 88 are good, 8 have minor defects and 4 have major defects. Ramesh, a shopkeeper will buy only those shirts which are good but 'Kewal' another shopkeeper will not buy shirts with major defects. A shirt is taken out of the box at random. What is the probability that :

(i) Ramesh will buy the selected shirt ?

(ii) 'Kewal' will buy the selected shirt ?

C + A [CBSE Delhi Set III, 2016]

Sol. (i) Number of good shirts = 88 **1**

P(Ramesh buys the shirt) $= \frac{88}{100}$ or $\frac{22}{25}$ ½

(ii) Number of shirts without major defect = 96 **1**

P(Kewal buys a shirt) $= \frac{96}{100}$ or $\frac{24}{25}$ ½

[CBSE Marking Scheme, 2016]

Q. 10. Three different coins are tossed together. Find the probability of getting

(i) exactly two heads.

(ii) at least two heads

(iii) at least two tails. U [CBSE OD Set I, 2016]

Sol. Possible outcomes are

$\{HHH, HHT, HTH, THH, HTT, THT, TTH, TTT\}$

$\Rightarrow n(S) = 8$

(i) Exactly two heads $= \{HHT, HTH, THH\}$

$n(P_1) = 3$

$\therefore P_1 = \frac{n(P_1)}{n(S)} = \frac{3}{8}$ **1**

(ii) At least two heads $\{HHT, HTH, THH, HHH\}$

$n(P_2) = 4$

$P_2 = \frac{n(P_2)}{n(S)} = \frac{4}{8} = \frac{1}{2}$ **1**

(iii) At least two tails $\{TTH, THT, HTT, TTT\}$

$n(P_3) = 4$

$P_3 = \frac{n(P_3)}{n(S)} = \frac{4}{8} = \frac{1}{2}$ **1**

[CBSE Marking Scheme, 2016]

Q. 11. A game consists of tossing a one-rupee coin 3 times and noting the outcome each time. Ramesh will win the game if all the tosses show the same result, (*i.e.* either all three heads or all three tails) and loses the game otherwise. Find the probability that Ramesh will lose the game.

C + A [Foreign Set-I, 2016]

Sol. Total outcomes are

$\{HHH, HHT, HTH, THH, HTT, THT, TTH, TTT\}$

No. of total outcomes = 8

Same result on all the tosses (A) = HHH, TTT, **1**

No. of favourable outcomes = 2 **1**

$\therefore$ P (Ramesh will lose the game) $= \frac{8-2}{8} = \frac{6}{8} = \frac{3}{4}$ **1**

[CBSE Marking Scheme, 2016]

Q. 12. One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting (a) Non face card, (b) Black king or a Red queen, (c) Spade card. C + A [CBSE SQP, 2016]

Sol. (a) Total number of cards = 52

Number of non-face cards = 52 – 12

= 40

P(non-face cards) $= \frac{40}{52} = \frac{10}{13}$ **1**

(b) Number of black kings = 2

Number of red queens = 2

P(a black King or a red queen) $= \frac{4}{52} = \frac{1}{13}$ **1**

(c) Number of spade cards = 13

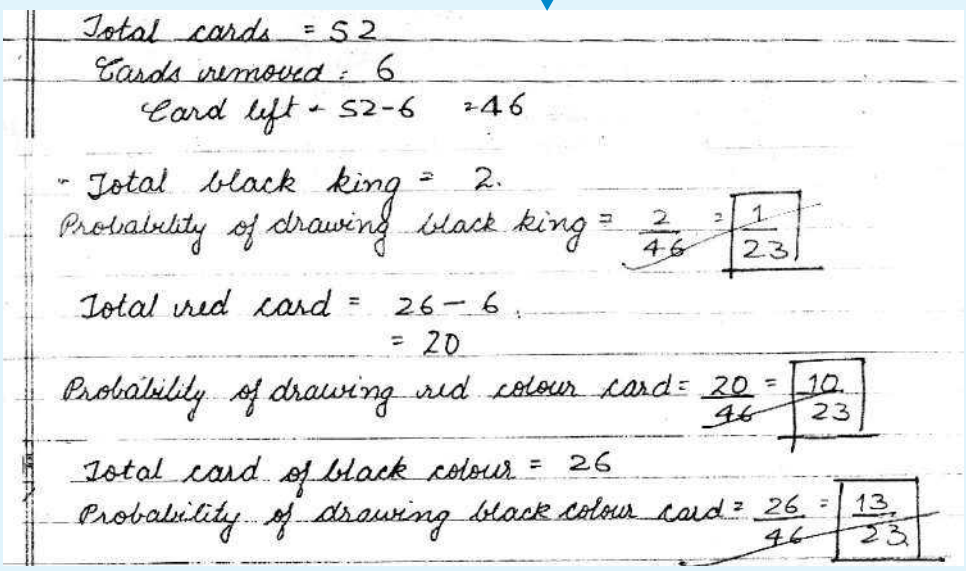
P(Spade cards) $= \frac{13}{52} = \frac{1}{4}$ **1**

[CBSE Marking Scheme, 2016]

Q. 13. From a pack of 52 playing cards, Jacks, Queens and Kings of red colour are removed. From the remaining, a card is drawn at random. Find the probability that drawn card is :
(i) a black king, (ii) a card of red colour, (iii) a card of black colour. C [CBSE Term-II, 2015, 2016]

Topper Answer, 2016

Sol.



3

Q. 14. A bag contains 18 balls out of which x balls are red.

(i) If one ball is drawn at random from the bag, what is the probability that it is not red ?

(ii) If 2 more red balls are put in the bag, the probability of drawing a red ball will be $\frac{9}{8}$ times the probability of drawing a red ball in the first case. Find the value of x. C + A [Foreign Set I, 2015]

Sol. P(red ball) $= \frac{x}{18}$

(i) P(no red ball) $= 1 - \frac{x}{18} = \frac{18-x}{18}$ **1**

(ii) Total number of balls = 18 + 2 = 20

red balls are = x + 2

P(red balls) $= \frac{x+2}{20}$ ½

Now, According to the question,

$$\frac{x+2}{20} = \frac{9}{8} \times \frac{x}{18}$$

$\Rightarrow$ $180x = 144x + 288$

$\Rightarrow$ $36x = 288$

$\Rightarrow$ $x = \frac{288}{36} = 8$ **1½**

[CBSE Marking Scheme, 2015]

Long Answer Type Questions — 5 marks each

Q. 1. The King, Queen and Jack of clubs are removed from a pack of 52 cards and then the remaining cards are well shuffled. A card is selected from the remaining cards. Find the probability of getting a card.

(i) of spade **(ii) of black king**

(iii) of club **(iv) of jacks**

U [CBSE Comptt. Set I, II, III, 2018]

Sol. Total number of cards = 52 – 3 = 49 **1**

(i) $P(\text{spade}) = \frac{13}{49}$ **1**

(ii) $P(\text{black king}) = \frac{1}{49}$ **1**

(iii) $P(\text{club}) = \frac{10}{49}$ **1**

(iv) $P(\text{Jack}) = \frac{3}{49}$ **1**

[CBSE Marking Scheme, 2018]

Detailed Solution :

Total number of cards = 52 – 3 = 49 **1**

(i) Number of spade cards = 13

$\therefore$ $P(\text{getting a spade}) = \frac{13}{49}$ **1**

(ii) Number of black king = 2 – 1 = 1

$\therefore$ $P(\text{getting a black king}) = \frac{1}{49}$ **1**

(iii) Number of club card = 13 – 3 = 10

$\therefore$ $P(\text{getting a club card}) = \frac{10}{49}$ **1**

(iv) Number of jacks = 4 – 1 = 3

$\therefore$ $P(\text{getting a jack}) = \frac{3}{49}$ **1**

Q. 2. A box contains cards numbered from 1 to 20. A card is drawn at random from the box.
Find the probability that number on the drawn card is

(i) a prime number

(ii) a composite number

(iii) a number divisible by 3

A [CBSE Comptt. I, II, III,2018]
[CBSE Term-2, Set I, II, 2015]

Sol. (i) Prime numbers from 1 to 20 are 2, 3, 5, 7, 11, 13, 17, 19 *i.e.* 8.

$P(\text{prime number}) = \frac{8}{20}$ or $\frac{2}{5}$ **1½**

(ii) Composite numbers from 1 to 20 are 4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20, *i.e.*, 11

$P(\text{Composite number}) = \frac{11}{20}$ **1½**

(iii) Numbers divisible by 3 from 1 to 20 are 3, 6, 9, 12, 15, 18 *i.e.*, 6

$P(\text{number divisible by 3}) = \frac{6}{20}$ or $\frac{3}{10}$ **2**

[CBSE Marking Scheme, 2018]

COMMONLY MADE ERROR

- Many candidates commit the following errors.
  (i) Total outcomes of event are incorrect.
  (ii) Favourable outcomes are incorrect.
  (iii) The results are not given in the simplest form. *e.g.*

$$\frac{8}{20} = \frac{2}{5}$$

ANSWERING TIP

- All necessary outcomes must be listed before finding probability and all answers must be in the simplest from.

Q. 3. Two different dice are rolled together once. Find the probability of numbers coming on the tops whose product is a perfect square.

A [CBSE OD Comptt. Set-I, 2017]

Sol. No. of all possible outcomes = $6^2 = 36$ **1**

All favourable outcomes are

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

$\therefore$ No. of favourable outcomes = 8 **1½**

$\therefore$ P(getting the numbers, whose product is a perfect square) = $\frac{8}{36} = \frac{2}{9}$. **1½**

[CBSE Marking Scheme, 2017]

Q. 4. A box contains 125 shirts of which 110 are good 12 have minor defects and 3 have major defects Ram Lal will buy only those shirts which are good while Naveen will reject only those which have major defects. A shirt is taken out at random from the box. Find the probability that :

(i) Ram Lal will buy it.

(ii) Naveen will buy it. A [CBSE OD Set-III, 2017]

Sol. No. of all possible outcomes = 125 ½

(i) Ramlal will buy a good shirt

$\therefore$ No. of favourable outcomes = 110 ½

$\therefore$ P(Ramlal will buy a shirt)

$$= \frac{\text{No. of favourable outcomes}}{\text{No. of all possible outcomes}}$$

$\therefore$ P(Ramlal will buy a shirt)

$$= \frac{\text{No. of favourable outcomes}}{\text{No. of all possible outcomes}}$$

$$= \frac{110}{125} = \frac{22}{25} \qquad 1\frac{1}{2}$$

(ii) Naveen will reject the shirt which have major defects.

$\therefore$ No. of favourable outcomes $= 125 - 3 = 122$

$\therefore$ P(Naveen will buy the shirt)

$$= \frac{\text{No. of favourable outcomes}}{\text{No. of all possible outcomes}}$$

$$= \frac{122}{125} \qquad 1\frac{1}{2}$$

[CBSE Marking Scheme, 2017]

Q. 5. The king, queen and jack of clubs are removed from a deck of 52 cards. The remaining cards are mixed together and then a card is drawn at random from it. Find the probability of getting (i) a face card, (ii) a card of heart, (iii) a card of clubs (iv) a queen of diamond.

A **[CBSE Delhi Comptt. Set-II, 2017]**

Sol. No. of all possible outcomes $= 52 - 3 = 49$

(i) No. of face cards $= 12 - 3 = 9$ **1**

Required probability $= \frac{9}{49}$

(ii) No. of card of heart in the deck $= 13$

$\therefore$ Required probability $= \frac{13}{49}$ **1**

(iii) No. of cards of clubs $= 13 - 3 = 10$

$\therefore$ Required probability $= \frac{10}{49}$ **1**

(iv) There is only one queen of diamond

$\therefore$ Required probability $= \frac{1}{49}$ **1**

[CBSE Marking Scheme, 2017]

Q. 6. A box contains 90 discs which are numbered 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) number divisible by 5.

A **[Foreign Set-I, II, III, 2017]**

Sol. Total number of discs in the box $= 90$

$\therefore$ No. of all possible outcomes $= 90$ $\frac{1}{2}$

(i) Discs with two digit number are 10, 11, ... 90

No. of discs with two digits numbers $= 90 - 9 = 81$ $\frac{1}{2}$

$\therefore$ No. of favourable outcomes $= 81$

P(a disc with two digit number)

$$= \frac{\text{No. of favourable outcomes}}{\text{No. of all possible outcomes}} \qquad \frac{1}{2}$$

$$= \frac{81}{90} = \frac{9}{10} \qquad \frac{1}{2}$$

(ii) The numbers divisible by 5 from 1 to 90 are

5, 10, 15 .... 85, 90 $\frac{1}{2}$

$\therefore$ No. of favourable outcomes $= 18$

$\therefore$ P(a disc with a number divisible by 5)

$$= \frac{18}{90} = \frac{1}{5} \qquad 1\frac{1}{2}$$

[CBSE Marking Scheme, 2017]

Q. 7. From a deck of 52 playing cards, Jacks and kings of red colour and Queen and Aces of black colour are removed. The remaining cards are mixed and a card is drawn at random. Find the probability that the drawn card is :

(i) A black Queen.

(ii) A card of red colour.

(iii) A Jack of black colour.

(iv) A face card. A **[CBSE OD Comptt. Set-I, 2017]**

Sol. No. of all possible outcomes $= 52 - (2 + 2 + 2 + 2)$

$= 44$ **1**

(i) No. of black Queens in the deck $= 0$

$\therefore$ P(getting a black Queen) $= \frac{0}{44} = 0$

Hence it is an impossible event **1**

(ii) No. of red cards $= 26 - 4 = 22$

$\therefore$ P(getting a red card) $= \frac{22}{44} = \frac{1}{2}$ **1**

(iii) No. of Jacks (black) $= 2$

$\therefore$ P(getting a black coloured Jack)

$= \frac{2}{44} = \frac{1}{22}$ **1**

(iv) No. of face cards in the deck $= 12 - 6 = 6$

$\therefore$ P(getting a face card) $= \frac{6}{44} = \frac{3}{22}$ **1**

[CBSE Marking Scheme, 2017]

Q. 8. Two different dice are thrown together. Find the probability that the numbers obtained have

(i) even sum, and

(ii) even product.

A **[CBSE OD Set-III, 2017]**

Topper Answer, 2017

Sol.

i) A = sum of digits is even.

n(S) = 6^2 = 36. – total possible outcomes.

n(A) = {(1,3), (1,5), (1,1), (2,2), (2,4), (2,6), (3,1), (3,3), (3,5), (4,2), (4,4), (4,6), (5,1), (5,3), (5,5), (6,2), (6,4), (6,6)}

= 18.

$P(A) = \frac{n(A)}{n(S)} = \frac{18}{36}$

$\frac{1}{2}$ or 0.5

∴ probability of getting an even sum is $\frac{1}{2}$ or 0.5.

ii) A = product of digits is even

n(S) = 36.

n(A) = {(1,2), (1,4), (1,6), (2,1), (2,2), (2,3), (2,4), (2,5), (2,6), (3,2), (3,4), (3,6), (4,1), (4,2), (4,3), (4,4), (4,5), (4,6), (5,2), (5,4), (5,6), (6,1), (6,2), (6,3), (6,4), (6,5), (6,6)}.

= 27

$P(A) = \frac{n(A)}{n(S)} = \frac{27}{36}$

$= \frac{3}{4} = 0.75$

probability of getting even product is $\frac{3}{4}$ or 0.75.

5

Q. 9. Cards on which numbers 1, 2, 3 ..... 100 are written (one number on one card and no number is repeated) and put in a bag and are mixed thoroughly. A card is drawn at random from the bag. Find the probability that card taken out has.

(i) An even number

(ii) A number which is a multiple of 13.

(iii) A perfect square number

(iv) A prime number less than 20.

A [CBSE Delhi Comptt. Set-I, 2017] [CBSE SQP, 2016]

Sol. Total number of possible outcomes = 100

(i) Number of even numbers from 1 to 100 = 50

∴ *P*(card taken out has an even number)

$= \frac{50}{100} = \frac{1}{2}$ 1½

(ii) Multiple of 13 from 1 to 100 are 13, 26, 39, 52, 65, 78 and 91.

No. of favourable outcomes = 7

∴P(card taken out has multiple of 13) = $\frac{7}{100}$ 1½

(iii) Perfect square numbers from 1 to 100 are 1, 4, 9, 16, 25, 36, 49, 64, 81 and 100.

No. of all favourable outcomes = 10

∴ P(card taken out has a perfect square number)

$= \frac{10}{100} = \frac{1}{10}$

(iv) Prime numbers less than 20 are 2, 3, 5, 7, 11, 13, 17 and 19.

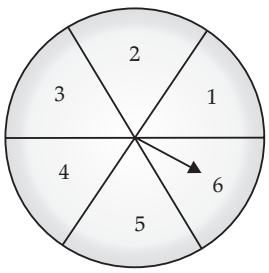
No. of all favourable outcomes = 8

∴P(card taken out has a prime number less than 20)

$= \frac{8}{100} = \frac{2}{25}$ 1

[CBSE Marking Scheme, 2017]

Q. 10. In fig. a disc on which a player spins an arrow twice. The fraction $\frac{a}{b}$ is formed, where '*a*' is the number of sector on which arrow stops on the first spin and '*b*' is the number of the sector in which the arrow stops on second spin, On each spin, each sector has equal chance of selection by the arrow. Find the probability that the fraction $\frac{a}{b} > 1$.



A [Foreign Set I, II, III, 2016]

Sol. For $\frac{a}{b} > 1$, when $a = 1$, b can not take any value,

$a = 2$, b can take 1 value, $a = 3$, b can take 2 values,

$a = 4$, b can take 3 values **2½**

When $a = 5$, b can take 4 values,

$a = 6$, b can take 5 values.

Total possible outcomes = 36 **½**

$\therefore P\left(\frac{a}{b} > 1\right) = \frac{1+2+3+4+5}{36}$ **1**

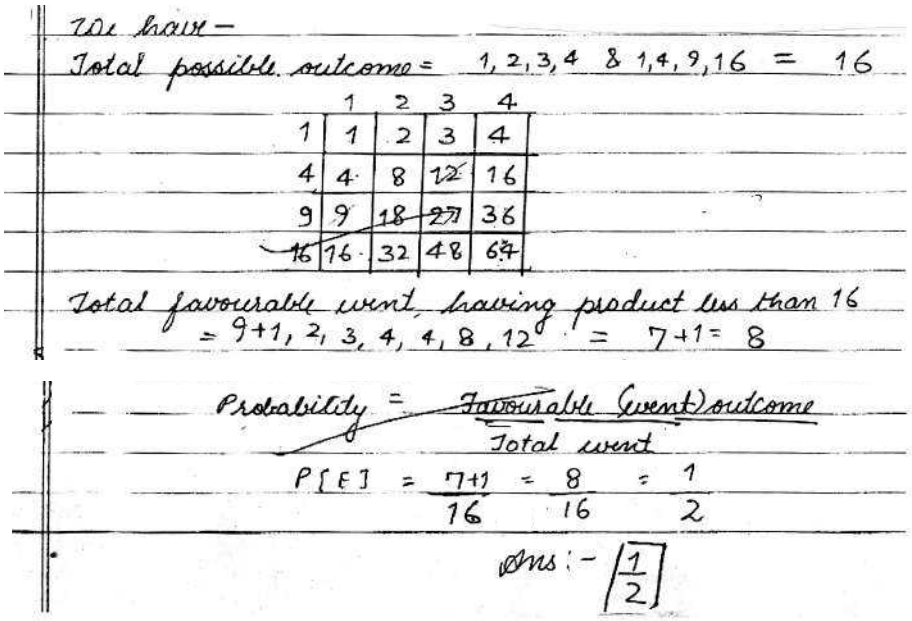
$= \frac{15}{36}$ or $\frac{5}{12}$ **1**

[CBSE Marking Scheme, 2016]

Q. 11. A number x is selected at random from the numbers 1, 2, 3 and 4. Another number y is selected at random from the numbers 1, 4, 9 and 16. Find the probability that product of x and y is less than 16.

A **[CBSE OD Set-II, 2016]**

Sol.



	1	2	3	4
1	1	2	3	4
4	4	8	12	16
9	9	18	27	36
16	16	32	48	64

[Topper's Answer, 2016] 5

Q. 12. A card is drawn at random from a well-shuffled deck of playing cards. Find the probability that the card drawn is :

(i) a card of spade or an ace.

(ii) a black king.

(iii) neither a jack nor a king.

(iv) either a king or a queen.

A **[CBSE OD Set-I, II, III, 2015]**

Sol. (i) Cards of spade or an ace = 13 + 3 = 16

Total no. of cards = 52

P(spade or an ace) $= \frac{16}{52} = \frac{4}{13}$ **1½**

(ii) Black kings = 2

P(a black king) $= \frac{2}{52} = \frac{1}{26}$ **1**

(iii) Jack or king = 4 + 4 = 8

P(neither jack nor a king) $= \frac{52-8}{52} = \frac{44}{52} = \frac{11}{13}$ **1**

(iv) King or queen = 4 + 4 = 8

P(either a king or a queen) $= \frac{8}{52} = \frac{2}{13}$ **1½**

[CBSE Marking Scheme, 2015]

Q. 13. A bag contains 15 balls of which x are blue and the remaining are red. If the number of red balls are increased by 5, the probability of drawing the red balls doubles. Find :

(i) P(red ball)

(ii) P(blue ball)

(iii) P(blue ball if of 5 extra red balls are actually added)

A **[CBSE Term-2, 2015]**

Sol. According to the question,

$\frac{20-x}{20} = 2\left(\frac{15-x}{15}\right)$ **1**

$\Rightarrow 1 - \frac{x}{20} = 2 - \frac{2x}{15}$

$\Rightarrow \frac{2x}{15} - \frac{x}{20} = 2 - 1$

$\Rightarrow \frac{8x-3x}{60} = 1$

$\Rightarrow 5x = 60$

$\therefore x = 12$ **1**

$\therefore$ Blue balls = 12 and red balls = 3

(i) $P(\text{red ball}) = \frac{3}{15} = \frac{1}{5}$ **1**

(ii) $P(\text{blue ball}) = \frac{12}{15} = \frac{4}{5}$ **1**

(iii) P(blue ball if 5 red balls are added)

$= \frac{12}{20} = \frac{3}{5}$ **1**

[CBSE Marking Scheme, 2015]

Visual Case Based Questions — 4 marks each

Note: Attempt any four sub parts from each question. Each sub part carries 1 mark

Q. 1. On a weekend Rani was playing cards with her family. The deck has 52 cards.If her brother drew one card.

(i) Find the probability of getting a king of red colour.

(a) $\frac{1}{26}$ **(b)** $\frac{1}{13}$

(c) $\frac{1}{52}$ **(d)** $\frac{1}{4}$

Sol. Correct option: **(a)**.

Explanation:

No. of cards of a king of red colour = 2

Total no. of cards = 52

Probability of getting a king of red colour

$= \frac{\text{No. of king of red colour}}{\text{Total number of cards}}$

$= \frac{2}{52} = \frac{1}{26}$

(ii) Find the probability of getting a face card.

(a) $\frac{1}{26}$ **(b)** $\frac{1}{13}$

(c) $\frac{2}{13}$ **(d)** $\frac{3}{13}$

Sol. Correct option: **(d)**.

(iii) Find the probability of getting a jack of hearts.

(a) $\frac{1}{26}$ **(b)** $\frac{1}{52}$

(c) $\frac{3}{52}$ **(d)** $\frac{3}{26}$

Sol. Correct option: **(b)**.

(iv) Find the probability of getting a red face card.

(a) $\frac{3}{13}$ **(b)** $\frac{1}{13}$

(c) $\frac{1}{52}$ **(d)** $\frac{1}{4}$

Sol. Correct option: **(a)**.

Explanation:

No. of face card = 13

Total no of cards = 52

Probability of getting a face card

$= \frac{\text{No. of face cards}}{\text{Total no. of cards}}$

$= \frac{12}{52} = \frac{3}{13}$

(v) Find the probability of getting a spade.

(a) $\frac{1}{26}$ **(b)** $\frac{1}{13}$

(c) $\frac{1}{52}$ **(d)** $\frac{1}{4}$

Sol. Correct option: **(d)**.

No. of face card = 13

Total no of cards = 52

Probability of getting a face card

$= \frac{\text{No. of face cards}}{\text{Total no. of cards}}$

$= \frac{13}{52} = \frac{1}{4}$

Q. 2. Rahul and Ravi planned to play Business (board game) in which they were supposed to use two dice.

(i) Ravi got first chance to roll the dice. What is the probability that he got the sum of the two numbers appearing on the top face of the dice is 8?

(a) $\frac{1}{26}$ **(b)** $\frac{5}{36}$

(c) $\frac{1}{18}$ **(d)** 0

Sol. Correct option: **(b)**.

Explanation:

The outcomes when two dice are thrown together are:

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

Total outcomes = 36

No. of outcomes when the sum is 8 = 5

Probability = $\frac{5}{36}$

(ii) Rahul got next chance. What is the probability that he got the sum of the two numbers appearing on the top face of the dice is 13?

(a) 1 **(b)** $\frac{5}{36}$

(c) $\frac{1}{18}$ **(d)** 0

Sol. Correct option: **(d)**.

Explanation:

No. of outcomes when the sum is 13 = 0

Total outcomes = 36

Probability = $\frac{0}{35} = 0$

(iii) Now it was Ravi's turn. He rolled the dice. What is the probability that he got the sum of the two numbers appearing on the top face of the dice is less than or equal to 12 ?

(a) 1 **(b)** $\frac{5}{36}$

(c) $\frac{1}{18}$ **(d)** 0

Sol. Correct option: **(a)**.

Explanation:

No. of outcomes when the sum is less than or equal to 12 = 36

Total outcomes = 36

probability = $\frac{36}{36} = 1$

(iv) Rahul got next chance. What is the probability that he got the sum of the two numbers appearing on the top face of the dice is equal to 7 ?

(a) $\frac{5}{9}$ **(b)** $\frac{5}{36}$

(c) $\frac{1}{6}$ **(d)** 0

Sol. Correct option: **(c)**.

(v) Now it was Ravi's turn. He rolled the dice. What is the probability that he got the sum of the two numbers appearing on the top face of the dice is greater than 8 ?

(a) 1 **(b)** $\frac{5}{36}$

(c) $\frac{1}{18}$ **(d)** $\frac{5}{18}$

Sol. Correct option: **(d)**.

SELF ASSESSMENT TEST - 7

Maximum Time: 1 hour **MM: 25**

Q. 1. For the following distribution:

Class	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25
Frequency	10	15	12	20	9

Find the sum of lower limits of median class and modal class. A

Q. 2. Consider the following distribution :

Marks Obtained	0 or more	10 or more	20 or more	30 or more	40 or more	50 or more
Number of students	63	58	55	51	48	42

(i) Calculate the frequency of the class 30 – 40.

(ii) Calculate the class mark of the class 10 – 20.

A [Board Term- I, 2014]

AI **Q. 3. From the number 3, 5, 5, 7, 7, 7, 9, 9, 9, 9, one number is selected at random, what is the probability that the selected number is mean ?**

U [CBSE Term-2, 2012]

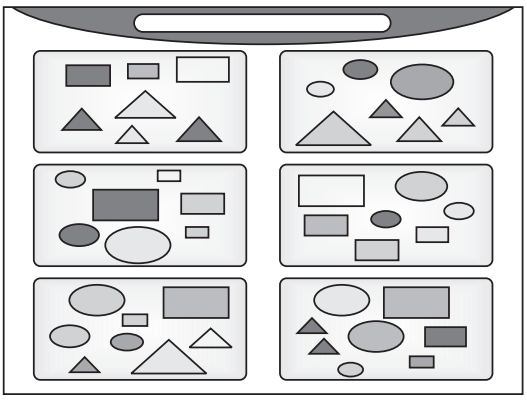
AI **Q. 4. A girl calculates the probability of her winning the game in a match and find it 0.08. What is the probability of her losing the game ?**

R [CBSE Term-2, 2012]

Q. 5. A bag contains cards numbered from 1 to 25. A card is drawn at random from the bag. Find the probability that number is divisible by both 2 and 3. U [Foreign Set I, II, III, 2014]

Q. 6. Visually Case Based Questions (1 mark each)

A child's game has 8 triangles of which 3 are blue and rest are red, and 10 squares of which 6 are blue and rest are red. One piece is lost at random.



C + AE

(i) How many triangles are of red colour and how many squares are of red colour?

(a) 5, 4 (b) 4, 5

(c) 5, 5 (d) 8, 6

(ii) Find the probability that lost piece is triangle.

(a) $\frac{4}{9}$ (b) $\frac{5}{9}$

(c) $\frac{1}{3}$ (d) $\frac{5}{18}$

(iii) Find the probability that lost piece is square.

(a) $\frac{4}{9}$ (b) $\frac{5}{9}$

(c) $\frac{1}{3}$ (d) $\frac{5}{18}$

(iv) Find the probability that lost piece is square of blue colour.

(a) $\frac{4}{9}$ (b) $\frac{5}{9}$

(c) $\frac{1}{3}$ (d) $\frac{5}{18}$

(v) Find the probability that lost piece is triangle of red colour.

(a) $\frac{4}{9}$ (b) $\frac{5}{9}$

(c) $\frac{1}{3}$ (d) $\frac{5}{18}$

AI **Q. 7. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball from the bag is thrice that of the red ball, find the number of blue balls in the bag.** C + A [Board Term-2, 2012]
[Board Term-2, 2012]

Q. 8. Two different dice are tossed together. Find the probability.

(i) that the number on each dice is even.

(ii) that the sum of numbers appearing on the two dice is 5. C + A [CBSE OD Set-I, 2014]
[CBSE Term-2, 2012]

Q. 9. If the median for the following frequency distribution is 28.5, find the value of x and y :

Class	Frequencies
0 – 10	5
10 – 20	x
20 – 30	20
30 – 40	15
40 – 50	y
50 – 60	5
Total	60

U [CBSE Term-1, 2013]

Q. 10. Find the mode of the following data :

Marks	Below 10	Below 20	Below 30	Below 40	Below 50
Number of students	8	20	45	58	70

Q. 11. The following table gives the weight of 120 articles :

Weight (in kg)	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
Number of students	14	17	22	26	23	18

Change the distribution to a 'more than type' distribution and draw its ogive. A [CBSE Term-1, Set-48, 2012]