CLASS IX – MATHEMATICS

Chapter Test: The Mathematics of Maybe – Introduction to Probability

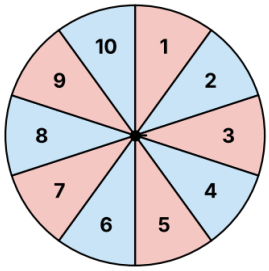
(Ganita Manjari, Grade 9, Part I – Chapter 7)

Time: 1½ Hours **M. M.: 40**

General Instructions:

1. This paper contains 21 questions. All questions are compulsory.
2. This paper is divided into 5 sections: **A, B, C, D** and **E**.
3. In **Section A**, Questions no. **1** to **10** are MCQs and questions no. **11** and **12** are Assertion-Reason based questions of 1 mark each.
4. In **Section B**, Questions no. **13** to **16** are Very Short Answer type questions carrying 2 marks each.
5. In **Section C**, Questions no. **17** and **18** are Short Answer type questions carrying 3 marks each.
6. In **Section D**, Questions no. **19** and **20** are Long Answer type questions carrying 5 marks each.
7. In **Section E**, Question no. **21** is a case based question carrying 4 marks. Internal choice is provided in the 2 marks part of the case study.
8. There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 1 part of Section E.
9. Write probabilities as fractions in simplest form unless stated otherwise. Draw neat diagrams wherever required.
10. Use of calculator is **not** allowed.

Q. No.	Section – A	Marks
1.	Which of the following **cannot** be the probability of an event? (A) 0.35 (B) 7/10 (C) 1.2 (D) 1	**[1]**
2.	A fair die is rolled once. The probability of getting a prime number is (A) 1/3 (B) 1/2 (C) 2/3 (D) 1/6	**[1]**
3.	Two dice are rolled together. The number of elements in the sample space is (A) 12 (B) 18 (C) 24 (D) 36	**[1]**
4.	A letter is chosen at random from the word ‘STATISTICS’. The probability that the letter is S is (A) 3/10 (B) 1/10 (C) 3/7 (D) 1/3	**[1]**
5.	A die is rolled 40 times and a six appears 10 times. The relative frequency of getting a six is (A) 1/6 (B) 1/10 (C) 1/4 (D) 1/40	**[1]**
6.	A bag contains 4 red, 5 blue and 3 green balls. One ball is drawn at random. The probability that it is **not** blue is (A) 7/12 (B) 5/12 (C) 1/3 (D) 3/4	**[1]**
7.	The sample space of an experiment is S = {1, 2, 3, 4, 5, 6, 7, 8}, with all outcomes equally likely. The probability of the event ‘a multiple of 3’ is (A) 1/8 (B) 1/4 (C) 3/8 (D) 1/2	**[1]**

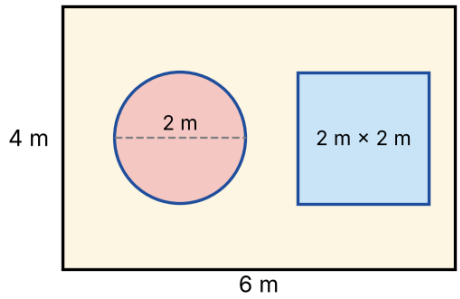
Q. No.	Section – A	Marks
8.	The spinner shown has 10 equal sectors numbered 1 to 10. The arrow stops at random on one sector. The probability that it stops on a number less than 4 is  (A) 1/10 (B) 3/10 (C) 2/5 (D) 1/3	**[1]**
9.	When a standard die is rolled once, which of the following events is **certain**? (A) a number greater than 6 (B) an even number (C) a prime number (D) a number less than 7	**[1]**
10.	Two fair coins are tossed together. The probability of getting exactly one head is (A) 1/4 (B) 1/3 (C) 1/2 (D) 3/4	**[1]**
	Questions number 11 and 12 are Assertion and Reason based questions. Two statements are given, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the options (A), (B), (C) and (D) as given below. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). (B) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of Assertion (A). (C) Assertion (A) is true but Reason (R) is false. (D) Assertion (A) is false but Reason (R) is true.	
11.	**Assertion (A):** A fair coin shows heads five times in a row. Then tails is more likely on the next toss. **Reason (R):** Each toss of a fair coin is independent of the earlier tosses.	**[1]**
12.	**Assertion (A):** If a letter is chosen at random from the word 'BANANA', the probability that it is A is 1/2. **Reason (R):** The word 'BANANA' has 3 different letters, so the probability of choosing each letter is 1/3.	**[1]**

Q. No.	Section – B	Marks
13.	A coin is tossed and a die is rolled together. Write the sample space S of this experiment and state the sample size $n(S)$.	**[2]**
14.	(A) In a survey of 60 students, 24 chose cricket, 18 chose football, 12 chose badminton and 6 chose other games as their favourite. A student is chosen at random. Find the probability that the student's favourite is (i) cricket, (ii) badminton or other games. **OR** (B) A die is rolled 60 times and an even number comes up 36 times. Find the experimental probability of getting an even number and compare it with the theoretical probability.	**[2]**
15.	A letter is chosen at random from the word 'MATHEMATICS'. Find the probability that it is (i) a vowel, (ii) the letter T.	**[2]**

Q. No.	Section – B	Marks
16.	(A) A box contains 20 cards numbered 1 to 20. One card is drawn at random. Find the probability that the number on it is (i) a prime number, (ii) a perfect square. **OR** (B) Label each event as impossible, less likely, equally likely (even chance), more likely or certain: (i) Picking a red marble from a bag that has only red marbles. (ii) Getting tails when a fair coin is tossed. (iii) Rolling an 8 on a standard die. (iv) Getting a number from 1 to 5 when a standard die is rolled.	**[2]**

Q. No.	Section – C	Marks
17.	(A) A random sample of 50 students of a school was asked about their favourite subject. 18 chose Mathematics, 14 chose Science, 10 chose English and 8 chose Social Science. (i) Find the probability that a randomly chosen student from the sample prefers Science. (ii) The school has 1200 students. Estimate, using the sample, how many students prefer Mathematics. **OR** (B) A bag contains 6 red, 4 blue and 5 yellow balls. One ball is drawn at random. Find the probability that it is (i) yellow, (ii) not blue, (iii) red or blue.	**[3]**
18.	(A) Three coins are tossed together. Write the sample space. Find the probability of getting (i) exactly two heads, (ii) at least one tail. **OR** (B) A company tested 500 bulbs and recorded how long each lasted: **Life (hours)** | Less than 500 | 500 to 1500 | 1500 to 2000 | More than 2000 **No. of bulbs** | 25 | 130 | 215 | 130 A bulb is chosen at random. Find the probability that it lasts (i) less than 500 hours, (ii) from 500 to 2000 hours, (iii) more than 2000 hours.	**[3]**

Q. No.	Section – D	Marks
19.	(A) A bag contains 3 red balls and 2 blue balls. A ball is drawn at random, its colour is noted and it is **put back** in the bag. Then a second ball is drawn. (i) Draw a tree diagram showing all possible outcomes with the probability on each branch. [2] (ii) Write the sample space. [1] (iii) Find the probability that both balls are of the same colour. [1] (iv) Find the probability that exactly one ball is red. [1] **OR** (B) A basket has 3 apples and 2 oranges. A fruit is picked at random and **not replaced**. Then a second fruit is picked. (i) Draw a tree diagram showing all possible outcomes with the probability on each branch. [2] (ii) Write the sample space. [1] (iii) Find the probability that both fruits are of the same kind. [1] (iv) Find the probability that exactly one fruit is an apple. [1]	**[5]**

Q. No.	Section – D	Marks
20.	(A) Two dice are rolled together. (i) Write the sample space (a table may be used) and find $n(S)$. [1] Find the probability that (ii) the sum of the numbers is 9, [1] (iii) both dice show the same number, [1] (iv) the product of the numbers is 12, [1] (v) the sum of the numbers is less than 4. [1] **OR** (B) A rectangular canvas measures 6 m × 4 m. A circular patch of diameter 2 m and a square patch of side 2 m are painted on it as shown. A drop of dye falls at random on the canvas. (Take π = 22/7.)  Find the probability that the drop lands (i) inside the circular patch, (ii) inside the square patch, (iii) outside both patches.	**[5]**

Q. No.	Section – E	Marks
21.	**Case Study:** The school's transport committee wants to plan parking and bus services. It randomly selected 200 students from classes 6 to 12 and asked how each one travels to school. The responses are shown below. **Mode of travel** | Walk | Cycle | Bus | Car **Number of students** | 50 | 30 | 80 | 40 (i) A student from this sample is chosen at random. Find the probability that the student travels by bus. **[1]** (ii) Find the probability that the chosen student walks or cycles to school. **[1]** (iii) (A) The school has 1500 students. Using the sample, estimate how many students come by car. **[2]** **OR** (iii) (B) The committee had instead surveyed only 200 students of Class 9. Explain whether this sample would be good for estimating the travel pattern of the whole school. Suggest one way to make the estimate more reliable. **[2]**	**[4]**