

CHAPTER TEST: PROBABILITY

Mathematics | Class IX | (2026/PROBAB/09/002)

Time: 1.5 Hours

Max. Marks: 40

General Instructions:

- All questions are compulsory.
- Section A contains 8 MCQs of 1 mark each.
- Section B contains 4 questions of 2 marks each.
- Section C contains 3 questions of 3 marks each.
- Section D contains 2 questions of 5 marks each.
- Use of calculators is strictly prohibited.

Section A (Multiple Choice Questions - 8 Marks)

1. The sum of the probabilities of all the elementary events of an experiment is:
 - (a) 0
 - (b) 0.5
 - (c) 1
 - (d) 2
2. A coin is tossed 1000 times with the following frequencies: Head: 455, Tail: 545. The experimental probability of getting a Head is:
 - (a) 0.455
 - (b) 0.545
 - (c) 0.5
 - (d) 1
3. Which of the following cannot be the probability of an event?
 - (a) $\frac{2}{3}$
 - (b) -1.5
 - (c) 15%
 - (d) 0.7
4. If $P(E) = 0.37$, then the probability of 'not E' is:
 - (a) 0.37
 - (b) 0.73
 - (c) 0.63

- (d) 0.53
5. A die is thrown once. The probability of getting a prime number is:
- (a) $\frac{1}{2}$
 - (b) $\frac{1}{3}$
 - (c) $\frac{1}{6}$
 - (d) $\frac{2}{3}$
6. In a survey of 200 ladies, it was found that 142 like coffee while 58 dislike it. The probability that a lady chosen at random dislikes coffee is:
- (a) 0.71
 - (b) 0.29
 - (c) 0.58
 - (d) 0.42
7. The probability of an impossible event is:
- (a) 1
 - (b) 0.5
 - (c) 0
 - (d) Any negative number
8. A bag contains 3 red, 5 black and 4 white balls. A ball is drawn from the bag at random. The probability that the ball drawn is not black is:
- (a) $\frac{5}{12}$
 - (b) $\frac{7}{12}$
 - (c) $\frac{3}{12}$
 - (d) $\frac{4}{12}$

Section B (Very Short Answer - 8 Marks)

1. Define 'Sample Space' with the help of an example involving a die.
2. Over the past 200 working days, the weather forecasts were correct 150 times. What is the probability that on a given day the forecast was not correct?
3. Write all the possible outcomes (Sample Space) when two coins are tossed simultaneously.
4. A box contains 50 tokens numbered from 1 to 50. A token is drawn at random. Find the probability that the number on the token is a multiple of 10.

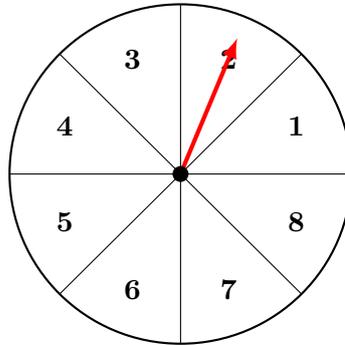
Section C (Short Answer - 9 Marks)

1. A teacher wants to analyze the performance of two sections of students in a mathematics test of 100 marks. The data is given below:

Marks	0-20	20-30	30-40	40-50	50-60	60-Above
No. of Students	7	10	10	20	20	15

Find the probability that a student obtained:

- (a) Less than 40 marks.
 - (b) 60 or more marks.
2. Consider the following spinner used in a board game.



The spinner is spun once. Find the probability that the pointer stops at:

- (a) An even number.
 - (b) A number greater than 5.
3. 1500 families with 2 children were selected randomly, and the following data were recorded:

Number of girls in a family	2	1	0
Number of families	475	814	211

Compute the probability of a family, chosen at random, having:

- (a) 2 girls.
- (b) No girl.

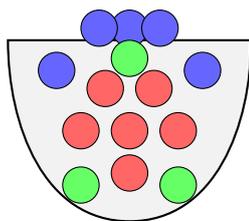
Section D (Long Answer - 10 Marks)

1. Three coins are tossed simultaneously 200 times with the following frequencies of different outcomes:

Outcome	3 heads	2 heads	1 head	No head
Frequency	23	72	77	28

Compute the probability of getting:

- (a) Exactly 2 heads.
 - (b) At least 2 heads.
 - (c) More tails than heads.
2. A bag contains a certain number of identical balls of different colors. The distribution is shown in the diagram below:



Bag of 14 Balls: 6 Red, 5 Blue, 3 Green

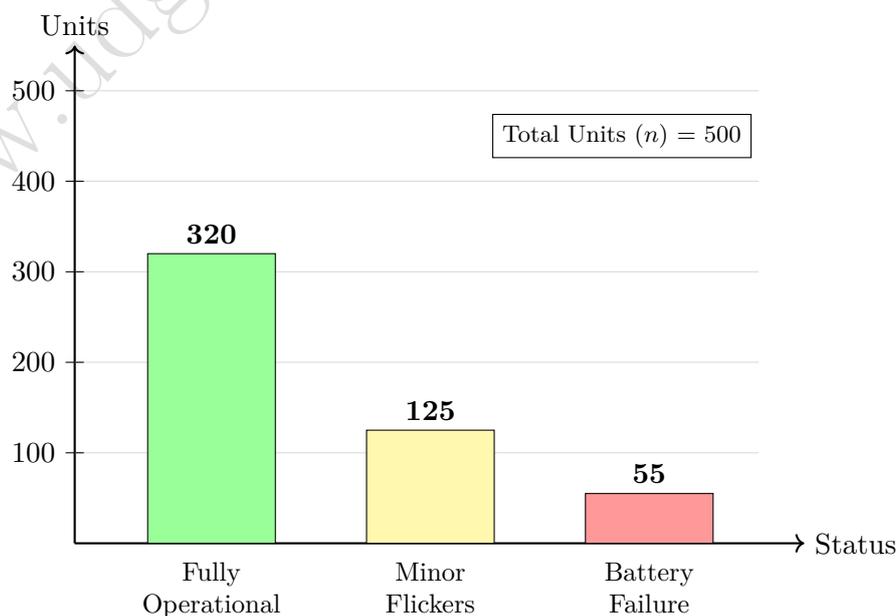
A ball is drawn at random from the bag. Calculate the following:

- Probability of getting a red ball.
- Probability of getting either a blue or a green ball.
- Probability of getting a ball that is not red.
- If 2 more green balls are added to the bag, what will be the new probability of drawing a green ball?

Section E

Case Study:

In a sustainable city project, engineers installed smart sensors on five hundred solar streetlights to monitor their performance during the monsoon season. Probability theory, historically used to predict weather patterns, now helps these engineers assess hardware reliability under stress. Over a period of one hundred days, the maintenance team conducted frequent inspections. Their records indicate that three hundred twenty streetlights operated without any interruptions. One hundred twenty-five streetlights experienced minor flickers due to cloud cover, while the remaining units suffered from battery storage failures. This experimental data provides a clear frequency distribution for calculating the empirical probability of a unit requiring maintenance. By analyzing these specific outcomes against the total number of trials, students can predict the operational efficiency of larger solar grids, demonstrating how mathematics drives modern environmental solutions and infrastructure planning.



Multiple Choice Questions

1. Based on the empirical data provided, what is the total number of trials (n) in this probability experiment?
 - (a) 100
 - (b) 320
 - (c) 500
 - (d) 445
2. What is the experimental probability that a randomly chosen solar streetlight will suffer from a "Battery Failure"?
 - (a) $11/100$
 - (b) $55/100$
 - (c) $320/500$
 - (d) $1/55$
3. If $P(A)$ is the probability of a streetlight being "Fully Operational" and $P(B)$ is the probability of it having "Minor Flickers", find the value of $P(A) + P(B)$.
 - (a) 0.64
 - (b) 0.89
 - (c) 0.25
 - (d) 1.00
4. An engineer claims that the probability of a unit performing without "Battery Failure" is 0.89. Is this claim mathematically consistent with the data?
 - (a) No, the probability is 0.11
 - (b) Yes, because $1 - P(\text{Battery Failure}) = 0.89$
 - (c) No, because the probability is 0.64
 - (d) Yes, because the total number of units is 500
5. Suppose the city decides to install 10,000 such streetlights. Using the results of this experiment, how many units are expected to experience "Minor Flickers"?
 - (a) 2,500
 - (b) 1,250
 - (c) 500
 - (d) 3,200