CHAPTER TEST: PROBABILITY (HOTS)

Mathematics | Class IX | (2026/PROB-HOTS/09/001)

Time: 1.5 Hours **Max. Marks: 35**

GENERAL INSTRUCTIONS

– This paper contains 70% NCERT Exemplar and 30% High-Level HOTS Questions.

– Section A: 6 MCQs (1 mark each).

– Section B: 5 Short Answer Questions (2 marks each).

– Section C: 3 Long Answer Questions (3 marks each).

– Section D: 2 Case Study / Multi-concept Questions (5 marks each).

Section A: Multiple Choice Questions (1 Mark Each)

1. If the probability of an event is $P(E)$, then the probability of its complementary event $P(\bar{E})$ satisfies which of the following?
   (a) $P(E) + P(\bar{E}) = 0$ (b) $P(E) + P(\bar{E}) = 1$ (c) $P(E) = P(\bar{E})$ (d) $P(E) < P(\bar{E})$

2. A die is thrown 250 times and the outcomes are noted. The frequency of prime numbers (2, 3, 5) is 125. The probability of getting a composite number is:
   (a) 0.50 (b) 0.40 (c) 0.45 (d) Cannot be determined exactly without frequency of '1'

3. In a non-leap year, the probability of having 53 Tuesdays is:
   (a) $\frac{1}{7}$ (b) $\frac{2}{7}$ (c) $\frac{3}{7}$ (d) $\frac{53}{365}$

4. Three coins are tossed simultaneously 200 times. The frequency of 'at least 2 heads' is 72. The probability of getting 'less than 2 heads' is:
   (a) 0.36 (b) 0.64 (c) 0.72 (d) 0.28

5. The probability of an impossible event is x, and the probability of a certain event is y. The value of $x^2 + y^2$ is:
   (a) 0 (b) 1 (c) 2 (d) 0.5

6. If $P(E) = \frac{x}{3}$ and $P(\text{not } E) = \frac{2x}{5}$, the value of x is:
   (a) $\frac{15}{11}$ (b) $\frac{11}{15}$ (c) $\frac{5}{11}$ (d) 1

Section B: Short Answer Questions (2 Marks Each)

7. Two dice are thrown 400 times. The frequency of getting a sum of 10 is 45. Find the probability of getting a sum that is not 10.

8. 800 packages of a certain machine part were inspected. 56 were found defective. If a package is chosen at random, find the probability that it is:
   (i) a good package.
   (ii) a defective package.

9. A bag contains cards numbered 1 to 50. One card is drawn at random. Find the probability that the number on the card is a perfect square.

10. In a class of 45 students, 25 are boys and the rest are girls. If a student is selected at random for a project, what is the probability that the student is a girl?

11. A letter is chosen at random from the word "PROBABILITY". What is the probability that it is a vowel?

Section C: Long Answer Questions (3 Marks Each)

12. A survey of 500 families with 3 children was conducted. The data is as follows:

No. of Girls	3	2	1	0
No. of Families	60	190	200	50

Find the probability that a family chosen at random has:
(i) At least 1 girl. (ii) At most 1 girl.

13. A box contains 100 bulbs out of which 10 are defective. If one bulb is drawn at random, find:
(i) P(Defective bulb)
(ii) P(Non-defective bulb)
(iii) If the first bulb drawn is defective and not replaced, find the probability that the second bulb drawn is also defective.

14. The following data shows the weights of 30 students:

Weight (kg)	30–35	35–40	40–45	45–50
No. of Students	8	12	6	4

Find the probability that a student chosen at random:
(i) Weighs at least 40 kg.
(ii) Weighs less than 40 kg.

Section D: Case Study / HOTS Questions (5 Marks Each)

15. **Case Study: Weather Forecasting**
The record of a weather station shows that out of the past 300 consecutive days, its weather forecasts were correct 210 times.
(i) On a given day, what is the probability that the forecast was correct? (1M)
(ii) What is the probability that it was not correct? (1M)
(iii) If for the next 10 days, the station guarantees an accuracy of 90%, how many days is the forecast expected to be correct? (1M)
(iv) Prove that the sum of the probabilities in part (i) and (ii) is 1. (2M)

16. **Experimental Probability Analysis**
A coin is tossed 1000 times with the following frequencies: Head: 455, Tail: 545.
(i) Compute the probability for each event. (2M)
(ii) If the coin is tossed 2000 times, is it guaranteed that we will get exactly 910 heads? Explain the difference between theoretical and experimental probability. (3M)