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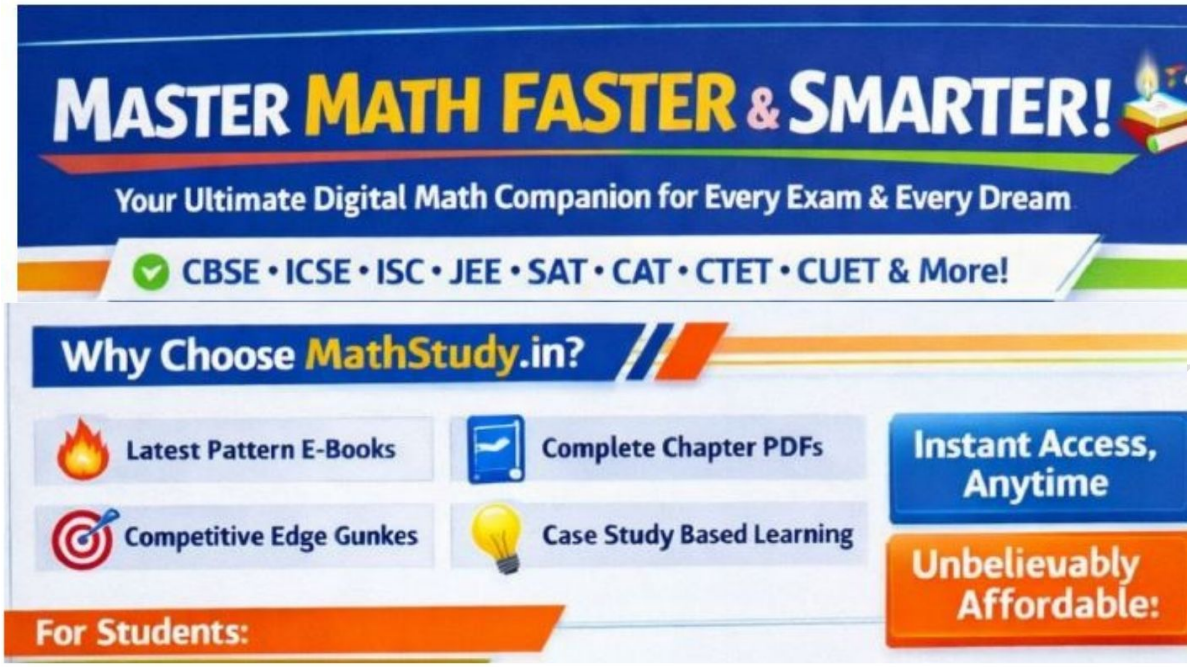

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DETAILED SOLUTIONS: PROBABILITY

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

Section A: Multiple Choice Questions

1. **Correct Option: (b)** $1 - p$
   Reasoning: The sum of the probability of an event happening $P(E)$ and not happening $P(\bar{E})$ is always 1.
   $$P(E) + P(\bar{E}) = 1 \implies p + P(\bar{E}) = 1 \implies P(\bar{E}) = 1 - p$$

2. **Correct Option: (b)** 0.54
   Reasoning: Total tosses = 100. Heads = 46. Tails = $100 - 46 = 54$. Probability of Tail = $\frac{54}{100} = 0.54$.

3. **Correct Option: (b)** -1.5
   Reasoning: Probability of any event E is always $0 \leq P(E) \leq 1$. It can never be negative.

4. **Correct Option: (c)** 0.75
   Reasoning: Total children = 364. Like chips = 91. Do not like chips = $364 - 91 = 273$. $P(\text{not liking}) = \frac{273}{364} = \frac{3}{4} = 0.75$.

5. **Correct Option: (b)** $\frac{27}{40}$
   Reasoning: Total throws = 200. $P(> 4) = 65$. Numbers ≤ 4 is the complement of numbers > 4. Frequency of numbers $\leq 4 = 200 - 65 = 135$. $P(\leq 4) = \frac{135}{200} = \frac{27}{40}$.

Section B: Short Answer Questions

6. Total balls played = 30. Balls hitting boundary = 6. Balls not hitting boundary = $30 - 6 = 24$. $P(\text{not hitting boundary}) = \frac{24}{30} = \frac{4}{5} = 0.8$.

7. Total trials = 500. Frequency of "No head" = 120. $P(\text{No head}) = \frac{120}{500} = \frac{12}{50} = \frac{6}{25} = 0.24$.

8. Total balls = $5(\text{red}) + 8(\text{white}) + 4(\text{green}) = 17$. Number of balls not green = Red + White $= 5 + 8 = 13$. $P(\text{not green}) = \frac{13}{17}$.

9. Total people surveyed = 642. People with certificate = 514. $P(\text{having certificate}) = \frac{514}{642} = \frac{257}{321} \approx 0.8$.

Section C: Long Answer Questions

10. Total families = 1500. (i) $P(2 \text{ girls}) = \frac{475}{1500} = \frac{19}{60}$.
    (ii) $P(1 \text{ girl}) = \frac{814}{1500} = \frac{407}{750}$.
    (iii) $P(0 \text{ girls}) = \frac{211}{1500}$.
    (iv) Sum = $\frac{475+814+211}{1500} = \frac{1500}{1500} = 1$.

11. Total students = 30. (i) Less than 20: Students in (0–10) + (10–20) = $2 + 5 = 7$. $P = \frac{7}{30}$.
    (ii) 30 or more: Students in (30–40) + (40–50) = $10 + 5 = 15$. $P = \frac{15}{30} = 0.5$.
    (iii) Range 10–40: Students in (10–20) + (20–30) + (30–40) = $5 + 8 + 10 = 23$. $P = \frac{23}{30}$.

12. Total days = 200. (i) $P(\text{No defective}) = \frac{50}{200} = 0.25$.
(ii) $P(\text{At least 1 defective}) = 1 - P(0 \text{ defective}) = 1 - 0.25 = 0.75$.
(iii) Not more than 5: Sum of frequencies for 0, 1, 2, 3, 4, 5 defectives. Sum $= 50 + 32 + 22 + 18 + 12 + 32 = 166$. $P = \frac{166}{200} = 0.83$.

13. Total rolls = 300. (i) Even numbers (2, 4, 6): $60 + 53 + 30 = 143$. $P = \frac{143}{300}$.
(ii) Prime numbers (2, 3, 5): $60 + 55 + 60 = 175$. $P = \frac{175}{300} = \frac{7}{12}$.
(iii) Less than 3 (1, 2): $42 + 60 = 102$. $P = \frac{102}{300} = \frac{17}{50} = 0.34$.

Section D: NCERT/Exemplar Highlights

1. **1 (one)**
2. **0 (zero)**
3. **0.63** (Since $1 - 0.37 = 0.63$)
4. **0** and **1**