

Probability — CBSE Pattern Test 1

Class 12 Maths · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

Test 1 — CBSE Pattern (90 minutes, 40 marks)

Class 12 Maths · Probability · Narayan Gurukul Academy (ClassApna)

General Instructions: (1) This paper has four sections — Section A (1×10), Section B (2×4), Section C (3×4) and Section D (5×2) — total 40 marks. Time allowed: 90 minutes.
 (2) All questions are compulsory. No overall choice is given; internal choice, where allowed, is clearly marked.
 (3) For MCQ questions choose the single correct option; for VSA answers write a single line.
 (4) Take $g = 10 \text{ m/s}^2$. All symbols carry their usual meaning. Use of a calculator is not permitted.

Section A — MCQ & VSA ($10 \times 1 = 10$ marks)

1. The conditional probability $P(A|B)$ equals
 - (A) $P(A \cap B)/P(B)$
 - (B) $P(A)P(B)$
 - (C) $P(A * B)$
 - (D) $P(A)/P(B)$
2. If A and B are independent, then $P(A \cap B) =$
 - (A) $P(A)P(B)$
 - (B) $P(A) + P(B)$
 - (C) 0
 - (D) $P(A|B)$
3. The multiplication theorem states $P(A \cap B) =$
 - (A) $P(A)P(B|A)$
 - (B) $P(A) + P(B)$
 - (C) $P(A) - P(B)$
 - (D) $P(A)/P(B)$
4. The theorem of total probability computes
 - (A) $P(A)$
 - (B) $P(A \cap B)$
 - (C) $P(A|B)$
 - (D) $P(A * B)$
5. Bayes' theorem gives
 - (A) $P(E_i|A)$
 - (B) $P(A|E_i)$ only
 - (C) $P(A \cap E_i)$
 - (D) $P(A)$
6. The probability distribution of a random variable X satisfies
 - (A) $\sum P(X = x) = 1$
 - (B) $\sum P(X = x) = 0$
 - (C) $P(X = x) < 0$
 - (D) $\sum P(X = x) > 1$
7. A Bernoulli trial has
 - (A) two outcomes, success and failure

- (B) three outcomes
 (C) infinitely many outcomes
 (D) one outcome
8. The binomial distribution gives $P(X = r) =$
 (A) ${}^nC_r p^r q^{n-r}$
 (B) $p^r q^{n-r}$
 (C) ${}^nC_r p^n q^r$
 (D) $p + q$
9. Write the formula for $P(A|B)$.
10. Define a Bernoulli trial.

Section B — Short Answer I ($4 \times 2 = 8$ marks)

11. State the condition for two events to be independent.
12. State the theorem of total probability.
13. Write the condition for a valid probability distribution.
14. What is the relation between p and q ?

Section C — Short Answer II ($4 \times 3 = 12$ marks)

15. If $P(A) = 0.5$, $P(B) = 0.4$ and A , B are independent, find $P(A \cap B)$.
16. Given $P(E_1) = 0.4$, $P(E_2) = 0.6$, $P(A|E_1) = 0.5$, $P(A|E_2) = 0.3$, find $P(A)$.
17. Find the mean of X with $P(X = 0) = 0.3$, $P(X = 1) = 0.5$, $P(X = 2) = 0.2$.
18. A coin is tossed 5 times. Find the probability of exactly 3 heads.

Section D — Long Answers ($2 \times 5 = 10$ marks)

19. Bag I has 3 red 4 black, Bag II has 5 red 6 black. A bag is chosen and a ball drawn is red. Find $P(\text{Bag I chosen})$.
20. Two machines produce 60% and 40% of items; defect rates 2% and 5%. An item is defective, find $P(\text{it came from machine 1})$. In 10 tosses of a fair coin, find the probability of at least 8 heads.

Answer Key (Marking Scheme)

- Q1 — (A) $P(A \cap B)/P(B)$. Q2 — (A) $P(A)P(B)$. Q3 — (A) $P(A)P(B|A)$. Q4 — (A) $P(A)$.
- Q5 — (A) $P(E_i|A)$. Q6 — (A) $\sum P(X = x) = 1$. Q7 — (A) two outcomes, success and failure. Q8 — (A) ${}^nC_r p^r q^{n-r}$.
- Q9 — $P(A|B) = P(A \cap B)/P(B)$.
- Q10 — A trial with exactly two outcomes.
- Q11 — When $P(A \cap B) = P(A)P(B)$.
- Q12 — $P(A) = \sum P(E_i)P(A|E_i)$.
- Q13 — $\sum P(X = x) = 1$ with each probability between 0 and 1.
- Q14 — $p + q = 1$.
- Q15 — 0.2.
- Q16 — 0.38.
- Q17 — 0.9.
- Q18 — 5/16.

Q19 — $33/68$.

Q20 — 0.375 ; $56/1024 = 7/128$.