Probability Class 12 Important Questions

10 questions · 27 marks · no calculator · step-marked answers

Name _____ Date _____ Score / 27

- Original questions in the board paper's question types, from 1-mark MCQs to a case study. Try every question before you look at the answers.
- No calculator: as in the CBSE board exam, everything works by hand.
- Worked answers with step marks for 5 questions start after the questions. The other 5 open free on the chapter page with a free account (no card): the link is next to each one.
- Online, with more practice: cbsemathrevision.com/class-12/probability

Section A · Multiple choice and assertion–reason (1 mark each)

1. **1 mark · Independent events and multiplication theorem**

Independent events A and B have $P(A) = \frac{1}{4}$ and $P(B) = \frac{2}{5}$. What is $P(A \cup B)$?

(a) $\frac{13}{20}$ (b) $\frac{11}{20}$

(c) $\frac{1}{10}$ (d) $\frac{3}{5}$

2. **1 mark · Conditional probability**

$P(B) = \frac{2}{5}$ and $P(A \cap B) = \frac{1}{5}$. Then $P(A \mid B)$ is

(a) $\frac{1}{2}$ (b) $\frac{2}{5}$

(c) $\frac{1}{5}$ (d) $\frac{2}{3}$

3. 1 mark · Independent events and multiplication theorem

In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.

Assertion (A): If A and B are independent events with $P(A) = P(B) = \frac{1}{2}$, then A and B are mutually exclusive.

Reason (R): For independent events, $P(A \cap B) = P(A)\,P(B)$.

(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 but 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.

Section B · Short answer (2 marks each)

4. 2 marks · Conditional probability

A fair die is thrown once. E is the event 'the number is even' and F is 'the number is greater than 3'. Find $P(E \mid F)$.

5. 2 marks · Independent events and multiplication theorem

A bag holds 3 red and 5 black balls. Two balls are drawn one after the other without replacement. Find the probability that both are red.

Section C · Short answer (3 marks each)

6. **3 marks · Random variables and their mean**

A fair coin is tossed twice and X is the number of tails. Find the probability distribution of X and its mean.

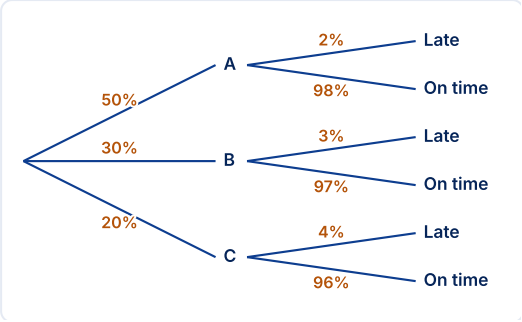
7. **3 marks · Independent events and multiplication theorem**

The probability that Arjun hits a target is $\frac{1}{3}$ and that Bela hits it is $\frac{1}{4}$. They shoot independently. Find the probability that (a) the target is hit, (b) exactly one of them hits it.

Section D · Long answer (5 marks each)

8. **5 marks · Total probability and Bayes' theorem**

Three couriers A, B and C deliver 50%, 30% and 20% of a shop's parcels. Of their parcels, 2%, 3% and 4% respectively arrive late. A parcel is found to be late. Find the probability that it was delivered by A, and the probability that it was delivered by C.



Couriers A, B, C and late parcels

9. **5 marks · Random variables and their mean**

A bag holds 4 red and 2 white balls. Two balls are drawn at random without replacement, and X is the number of white balls drawn. Find the probability distribution of X and the mean of X.

Section E · Case study (4 marks)

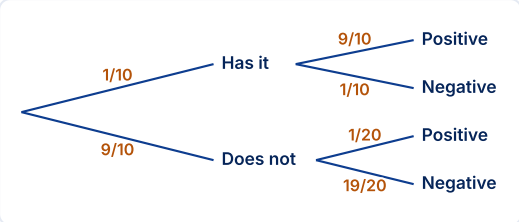
10. **4 marks · Total probability and Bayes' theorem**

Screening test. A screening test finds a condition in 9 out of every 10 people who have it, but also wrongly flags 1 in every 20 people who do not. One person in 10 in a town has the condition. A person is tested at random.

i. Find the probability that the person has the condition and tests positive. *[1 mark]*

ii. Find the probability that the person tests positive. *[1 mark]*

iii. A person tests positive. Find the probability that they have the condition. *[2 marks]*



Screening test: condition, then test result

Answers and worked solutions

Question 1 — 1 mark

$P(A \cap B) = \frac{1}{4} \times \frac{2}{5} = \frac{1}{10}$, so

$P(A \cup B) = \frac{5}{20} + \frac{8}{20} - \frac{2}{20} = \frac{11}{20}$ **A1**

Correct option: (b) $\frac{11}{20}$

Question 2 — 1 mark

Worked answer: free with a free account (no card) on the chapter page: cbsemathrevision.com/class-12/probability#iq-2

Question 3 — 1 mark

Worked answer: free with a free account (no card) on the chapter page: cbsemathrevision.com/class-12/probability#iq-3

Question 4 — 2 marks

Answer: $\frac{2}{3}$

$F = \{4, 5, 6\}$ and $E \cap F = \{4, 6\}$ **M1**

$P(E \mid F) = \frac{2/6}{3/6} = \frac{2}{3}$ **A1**

Question 5 — 2 marks

Worked answer: free with a free account (no card) on the chapter page: cbsemathrevision.com/class-12/probability#iq-5

Question 6 — 3 marks

Answer: $\frac{1}{4}, \frac{1}{2}, \frac{1}{4}$; mean 1

X takes the values $0, 1, 2$ **M1**

$P(X = 0) = \frac{1}{4}$, $P(X = 1) = \frac{1}{2}$,

$P(X = 2) = \frac{1}{4}$ **A1**

Mean $= 0 \times \frac{1}{4} + 1 \times \frac{1}{2} + 2 \times \frac{1}{4} = 1$ **A1**

Question 7 — 3 marks

Worked answer: free with a free account (no card) on the chapter page: cbsemathrevision.com/class-12/probability#iq-7

Question 8 — 5 marks

Answer: $\frac{10}{27}$ and $\frac{8}{27}$

$P(A) = \frac{1}{2}$, $P(B) = \frac{3}{10}$, $P(C) = \frac{1}{5}$;

$P(L \mid A) = \frac{2}{100}$, $P(L \mid B) = \frac{3}{100}$,

$P(L \mid C) = \frac{4}{100}$ **M1**

Total probability:

$P(L) = \frac{1}{100} + \frac{9}{1000} + \frac{8}{1000}$ **M1**

$= \frac{27}{1000}$ **A1**

Bayes' theorem: $P(A \mid L) = \frac{10/1000}{27/1000} = \frac{10}{27}$

A1

$P(C \mid L) = \frac{8/1000}{27/1000} = \frac{8}{27}$ **A1**

Question 9 — 5 marks

Worked answer: free with a free account (no card) on the chapter page: cbsemathrevision.com/class-12/probability#iq-9

Question 10 — 4 marks

i. $\frac{1}{10} \times \frac{9}{10} = \frac{9}{100}$ **A1**

ii. $\frac{9}{100} + \frac{9}{10} \times \frac{1}{20} = \frac{9}{100} + \frac{9}{200} = \frac{27}{200}$ **A1**

iii. Bayes' theorem: $\frac{9/100}{27/200}$ **M1**

$= \frac{18}{27} = \frac{2}{3}$ **A1**

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