Statistics, Probability and Case Studies: Practice Questions with Answers

Class 10 Maths · Unit VII and Section E · Important board-style questions

Name: _____ Class / Section: _____ Date: _____

HOW TO USE THIS SHEET

Try each question on your own first, then check the answer. Marks shown follow the CBSE paper pattern. **Topics covered:** Mean, Median and Mode of Grouped Data, Probability, and Case Study-Based Questions.

Q1 Find the mean of the following frequency distribution. [3 marks]

Class interval	0–10	10–20	20–30	30–40	40–50
Frequency (f)	6	10	14	8	2

ANSWER

Class marks are the midpoints: 5, 15, 25, 35, 45.

Class	Class mark (x)	f	fx
0–10	5	6	30
10–20	15	10	150
20–30	25	14	350
30–40	35	8	280
40–50	45	2	90
Total		**40**	**900**

Mean = $\Sigma fx/\Sigma f = 900/40 = 22.5$

Final Answer: Mean = 22.5.

Q2 Find the median of the following frequency distribution. [3 marks]

Class interval	0–20	20–40	40–60	60–80	80–100
Frequency (f)	5	10	20	10	5

ANSWER

Class	Frequency (f)	Cumulative frequency (cf)
0–20	5	5
20–40	10	15
40–60	20	35
60–80	10	45
80–100	5	50

N = 50, so N/2 = 25. The cumulative frequency just greater than 25 is 35, so the median class is 40–60.

l = 40, cf = 15, f = 20, h = 20

Median = $l + [(N/2 - cf)/f] \times h = 40 + [(25 - 15)/20] \times 20 = 40 + 10 = 50$

Final Answer: Median = 50.

Q3 **Find the mode of the following frequency distribution.** **[3 marks]**

Class interval	0–10	10–20	20–30	30–40	40–50
Frequency (f)	5	8	15	10	2

ANSWER

The highest frequency is 15, so the modal class is 20–30.

$l = 20, f_1 = 15, f_0 = 8, f_2 = 10, h = 10$

$\text{Mode} = l + [(f_1 - f_0)/(2f_1 - f_0 - f_2)] \times h$

$= 20 + [(15 - 8)/(30 - 8 - 10)] \times 10 = 20 + (7/12) \times 10 = 20 + 5.83 = 25.83$ (approx.)

Final Answer: Mode ≈ 25.83.

Q4 **Two coins are tossed simultaneously. Find the probability of getting at least one head.** **[2 marks]**

ANSWER

All possible outcomes: HH, HT, TH, TT. Total = 4.

Outcomes with at least one head: HH, HT, TH = 3.

P(at least one head) = 3/4

Final Answer: The probability is 3/4.

Q5 **Two dice are thrown together. Find the probability that the sum of the numbers on the two dice is 8.** **[3 marks]**

ANSWER

Total number of outcomes = 6 × 6 = 36.

Favourable outcomes (sum 8): (2, 6), (3, 5), (4, 4), (5, 3), (6, 2) = 5.

P(sum is 8) = 5/36

Final Answer: The probability is 5/36.

Q6 **A bag contains 5 red, 3 blue and 2 green balls. One ball is drawn at random. Find the probability that it is (i) red, (ii) green, (iii) neither red nor green.** **[3 marks]**

ANSWER

Total number of balls = 5 + 3 + 2 = 10.

(i) P(red) = 5/10 = 1/2

(ii) P(green) = 2/10 = 1/5

(iii) Neither red nor green means blue: P(blue) = 3/10

Final Answer: (i) 1/2 (ii) 1/5 (iii) 3/10

Q7 **One card is drawn at random from a well-shuffled deck of 52 cards. Find the probability of getting (i) a king of red colour, (ii) a face card, (iii) a red face card.** **[3 marks]**

ANSWER

Total outcomes = 52.

(i) There are 2 red kings (hearts and diamonds): P = 2/52 = 1/26

(ii) Face cards are kings, queens and jacks: 3 × 4 = 12. P = 12/52 = 3/13

(iii) Red face cards: 3 × 2 = 6. P = 6/52 = 3/26

Final Answer: (i) 1/26 (ii) 3/13 (iii) 3/26

CS1 Case Study 1 (Arithmetic Progression): Riya's Savings [4 marks]

Riya starts a savings plan. She saves ₹100 in the first month and increases her saving by ₹20 every month.

(a) How much does she save in the 6th month?

(b) How much does she save in the 12th month?

(c) What is her total saving in 12 months?

ANSWER

Here a = 100 and d = 20.

(a) $a_6 = a + 5d = 100 + 5 \times 20 = ₹200$

(b) $a_{12} = a + 11d = 100 + 11 \times 20 = ₹320$

(c) $S_{12} = 12/2\ [2 \times 100 + 11 \times 20] = 6 \times 420 = ₹2520$

Final Answer: (a) ₹200 (b) ₹320 (c) ₹2520

CS2 Case Study 2 (Heights and Distances): The School Building [4 marks]

A school building is 30 m high. A student stands on level ground in front of it and looks at the top of the building. (Use √3 = 1.732)

(a) Which trigonometric ratio connects the height, the distance and the angle of elevation?

(b) How far is the student from the building when the angle of elevation is 45°?

(c) How far is the student when the angle of elevation is 30°?

ANSWER

(a) tan θ = Height/Distance, because height is the perpendicular and distance is the base.

(b) tan 45° = 30/d, so 1 = 30/d and d = 30 m.

(c) tan 30° = 30/d, so 1/√3 = 30/d and d = 30√3 = 30 × 1.732 = 51.96 m.

Final Answer: (a) tan θ (b) 30 m (c) about 51.96 m

BEFORE YOU CLOSE THIS SHEET

For case study questions, read the passage twice, list what is given, and answer each part separately. Each sub-question carries its own marks.