ExamPath

CLASS 9 MATHEMATICS · FBISE · UNIT 11 · SECTIONS B AND C PRACTICE

Unit 11: Basic Statistics: short and long questions

Write your working in the boxes. Model answers are on the last pages. These are practice questions written by ExamPath, not official FBISE questions or marking schemes.

Section B style: short questions (3 marks each)

B1 · 3 marks · Mean of grouped data

Find the mean of this grouped data using class marks.
Class: 0–10, 10–20, 20–30, 30–40; Frequency: 5, 8, 12, 5.

B2 · 3 marks · Median

Find the median of 12, 7, 3, 15, 9, 10, 4, 18.

B3 · 3 marks · Relative and expected frequency

A coin was tossed 200 times and showed heads 112 times.
(a) Find the relative frequency of heads. (b) For a fair coin, how many heads would you expect in 500 tosses?

B4 · 3 marks · Probability

A bag contains 5 red, 7 blue and 8 green beads. One bead is taken at random. Find (a) P(red) (b) P(green) (c) P(not blue).

B5 · 3 marks · Weighted mean

Asma scored 70 in class tests (weight 2), 85 in the mid-term (weight 3) and 60 in homework (weight 1). Find her weighted mean score.

B6 · 3 marks · Mode of grouped data

Find the mode of this grouped data.

Class: 10–20, 20–30, 30–40, 40–50, 50–60; Frequency: 4, 9, 14, 8, 5.

Section C style: long questions (6 marks each)

C1 · 6 marks · Grouped data

The heights (cm) of 40 students are shown.

Height: 140–145, 145–150, 150–155, 155–160, 160–165; Frequency: 4, 10, 16, 7, 3.

(a) Find the mean height. (2 marks)

(b) Find the median height. (2 marks)

(c) Find the modal height. (2 marks)

C2 · 6 marks · Using the mean in real life

A school has Rs 120 000 to share among three classes in proportion to their enrolment: Class 6 has 40 students, Class 7 has 50 and Class 8 has 30.

(a) Find the mean number of students per class. (2 marks)

(b) Find the amount for each class. (3 marks)

(c) Find the amount per student. (1 mark)

C3 · 6 marks · Probability and relative frequency

A die was rolled 120 times with these results: 1 → 18, 2 → 22, 3 → 20, 4 → 17, 5 → 24, 6 → 19.

(a) Find the relative frequency of a 5. (1 mark)

(b) Compare it with the theoretical probability of a 5. (2 marks)

(c) Find the relative frequency of an even number. (1 mark)

(d) If the die is fair, how many 5s would you expect in 300 rolls? (2 marks)

Model answers

B1.

1. Class marks x: 5, 15, 25, 35.
2. fx: 25, 120, 300, 175, so Σfx = 620. Σf = 30.
3. Mean = 620 ÷ 30 ≈ 20.67.

Answer: About 20.67

Watch out: Multiply each frequency by its class mark, not by the lower limit of the class.

B2.

1. Arrange in order: 3, 4, 7, 9, 10, 12, 15, 18.
2. There are 8 values, so the median is the mean of the 4th and 5th values.
3. Median = (9 + 10)/2 = 9.5.

Answer: 9.5

Watch out: Always put the data in order first.

B3.

1. (a) Relative frequency = 112 ÷ 200 = 0.56.
2. (b) For a fair coin P(heads) = 1/2, so expected frequency = 500 × 1/2 = 250.

Answer: (a) 0.56 (b) 250

Watch out: Relative frequency comes from the experiment; expected frequency uses the theoretical probability.

B4.

1. Total = 5 + 7 + 8 = 20 beads.
2. (a) P(red) = 5/20 = 1/4.
3. (b) P(green) = 8/20 = 2/5.
4. (c) P(not blue) = 1 − 7/20 = 13/20.

Answer: (a) 1/4 (b) 2/5 (c) 13/20

Watch out: P(not A) = 1 − P(A).

B5.

1. Σwx = 70 × 2 + 85 × 3 + 60 × 1 = 140 + 255 + 60 = 455.
2. Σw = 2 + 3 + 1 = 6.
3. Weighted mean = 455 ÷ 6 ≈ 75.83.

Answer: About 75.83

Watch out: Divide by the total of the weights (6), not by the number of scores (3).

B6.

1. The modal class is 30–40 (highest frequency 14). So l = 30, h = 10, f_m = 14, f_1 = 9, f_2 = 8.
2. Mode = $l + (f_m - f_1)/(2f_m - f_1 - f_2) \times h$
3. $= 30 + (14 - 9)/(28 - 9 - 8) \times 10 = 30 + 5/11 \times 10 \approx 34.55$.

Answer: About 34.55

Watch out: f_1 is the frequency of the class before the modal class and f_2 the class after it.

C1.

1. (a) Class marks: 142.5, 147.5, 152.5, 157.5, 162.5. $\Sigma fx = 570 + 1475 + 2440 + 1102.5 + 487.5 = 6075$. Mean = $6075 \div 40 \approx 151.9$ cm.
2. (b) $n/2 = 20$. Cumulative frequencies: 4, 14, 30, … so the median class is 150–155 ($l = 150$, $f = 16$, $C = 14$, $h = 5$).
3. Median = $150 + (20 - 14)/16 \times 5 = 150 + 1.875 \approx 151.9$ cm.
4. (c) Modal class 150–155: $f_m = 16$, $f_1 = 10$, $f_2 = 7$. Mode = $150 + (16 - 10)/(32 - 10 - 7) \times 5 = 150 + 2 = 152$ cm.

Answer: (a) about 151.9 cm (b) about 151.9 cm (c) 152 cm

Watch out: For the median, find the class that contains the (n/2)th value using cumulative frequency.

C2.

1. (a) Total = 40 + 50 + 30 = 120 students. Mean = $120 \div 3 = 40$ students per class.
2. (b) Class 6: $40/120 \times 120\,000 = $ Rs 40 000. Class 7: $50/120 \times 120\,000 = $ Rs 50 000. Class 8: $30/120 \times 120\,000 = $ Rs 30 000.
3. (c) $120\,000 \div 120 = $ Rs 1000 per student.

Answer: (a) 40 (b) Rs 40 000, Rs 50 000, Rs 30 000 (c) Rs 1000

Watch out: Check that the three shares add up to the total: 40 000 + 50 000 + 30 000 = 120 000.

C3.

1. (a) $24 \div 120 = 0.2$.
2. (b) Theoretical $P(5) = 1/6 \approx 0.167$. The relative frequency 0.2 is a little higher; with more rolls it is expected to get closer to 0.167.
3. (c) Even numbers: 22 + 17 + 19 = 58, so $58 \div 120 \approx 0.483$.
4. (d) Expected number = $300 \times 1/6 = 50$.

Answer: (a) 0.2 (b) 0.2 vs about 0.167 (c) about 0.483 (d) 50

Watch out: A difference between relative frequency and probability does not by itself show the die is unfair.

Free practice from ExamPath (exampath.org). You may print and share for study.