



GEO.SK5 Numerical Skills: Percentages, Averages and Measures of Spread

AQA 8035 · Calculators not allowed · about 30 minutes

Total Marks

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Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** State what is meant by the term 'median' when describing a numerical data set in geography.

(Total for Question 1 is 1 mark)

- 2** State the modal value for the following set of river widths (metres) measured at ten sites on a small river channel: 3, 4, 4, 5, 6, 4, 7, 5, 6, 6.

(Total for Question 2 is 2 marks)

- 3** Calculate the mean of these household water use values (litres per day) recorded in a small village: 80, 70, 90, 60, 100. Show your method and final answer.

(Total for Question 3 is 2 marks)

- 4** A coastal town had 12 000 visitors in 2019 and 15 000 visitors in 2024. Calculate the percentage change in visitor numbers from 2019 to 2024. Show your working. No calculator is allowed.

(Total for Question 4 is 2 marks)

- 5 Calculate the range for the following sample of UK coastal erosion rates in metres per year: 0.2, 0.5, 0.3, 0.8, 0.1. Show method and answer in metres per year.

(Total for Question 5 is 2 marks)

- 6 A field survey records tree counts on a hill: 2, 2, 3, 4, 2, 5, 3. State the median tree count and show how you found it.

(Total for Question 6 is 2 marks)

- 7 Using the quartile values $Q1 = 12$, median = 18 and $Q3 = 26$ for annual rainfall (mm) at a weather station, calculate the interquartile range and state what it shows about the rainfall distribution.

(Total for Question 7 is 2 marks)

- 8 A sample of household incomes in a small town in pounds per week is: 120, 130, 150, 140, 110, 125. Calculate the median income and the mean income, then state which average is higher.

(Total for Question 8 is 2 marks)

- 9 A coastal survey reports cliff heights at six locations in metres: 8, 12, 12, 15, 9, 20. Which average, mean or median, best represents a typical cliff height here? State your choice and give one reason based on the data.

(Total for Question 9 is 2 marks)

- 10** State the mode for the following sample of household waste weights (kg) collected in a street:
3, 4, 2, 3, 5, 3, 4.

(Total for Question 10 is 1 mark)

- 11** A village population increased from 4 000 to 4 600 over five years. Calculate the percentage change and show your working. No calculator allowed.

(Total for Question 11 is 2 marks)

- 12** A sample of river discharge measurements in cubic metres per second is: 30, 25, 35, 28, 32. Calculate the mean discharge and give your answer to the nearest whole number.

(Total for Question 12 is 1 mark)

- 13** Two small towns report the following median incomes in pounds per week: Town A median = 420, Town B median = 380. Town A has an IQR of 60 and Town B has an IQR of 120. Which town has greater income inequality in the central 50 percent and give a reason using the IQR values?

(Total for Question 13 is 2 marks)

- 14** A sample of travel times to a city centre in minutes is: 20, 25, 30, 45, 90. Calculate the median and explain briefly why the median is a better measure of typical travel time than the mean for this data set.

(Total for Question 14 is 2 marks)

- 15** A sample of parcel weights in kg is: 1, 1, 2, 2, 2, 3, 10. Calculate the mean and the median, then state which is more appropriate to describe a typical parcel weight and why.

(Total for Question 15 is 3 marks)

- 16** A conservation survey records bird counts on six transects: 4, 6, 5, 7, 6, 5. Calculate the mode and state whether the data are symmetric by comparing mean and median briefly.

(Total for Question 16 is 2 marks)

Mark scheme · GEO.SK5 Numerical Skills: Percentages, Averages and Measures of Spread

Question 1

- **B1** the middle value when the data are arranged in order, oe
- **Answer: The middle value when the data are arranged in order.**

Question 2

- **B1** state the correct modal value, 4 or 6, with justification that it appears most often, oe
- **B1** if one modal value given, accept either 4 or 6 with count shown, ecf
- **Answer: Mode = 4 (also 6 occurs three times, so the set is bimodal: modes 4 and 6).**

Question 3

- **M1** method: $(80 + 70 + 90 + 60 + 100) / 5$ seen, oe
- **A1** 80 litres per day cao
- **Answer: 80 litres per day.**

Question 4

- **M1** method: $(15\,000 - 12\,000) / 12\,000 \times 100$ or equivalent seen, oe
- **A1** 25% cao
- **Answer: 25% increase.**

Question 5

- **M1** method: highest minus lowest seen, e.g. $0.8 - 0.1$, oe
- **A1** 0.7 metres per year cao
- **Answer: 0.7 metres per year.**

Question 6

- **M1** data ordered and middle position identified, e.g. ordered 2,2,2,3,3,4,5 and middle is 3rd or 4th, oe
- **A1** median = 3 cao
- **Answer: Median = 3 (ordered data 2,2,2,3,3,4,5, middle value is 3).**

Question 7

- **M1** method: $Q3 - Q1$ seen, e.g. $26 - 12$, oe
- **A1** IQR = 14 mm and statement that central 50% of values lie within 14 mm implying moderate spread, oe
- **Answer: IQR = 14 mm. This shows the middle 50% of annual rainfall measurements fall within a 14 mm range, indicating a moderate spread around the median.**

Question 8

- **M1** median method: order data and find middle two: ordered 110,120,125,130,140,150 so median = $(125+130)/2$ seen, oe
- **A1** median = 127.5 pounds and mean = 125.83... pounds, accept mean 126 pounds if shown correctly, and state median higher, oe
- **Answer: Median = $(125 + 130)/2 = 127.5$ pounds. Mean = $(110+120+125+130+140+150)/6 = 775/6 = 129.166...$ pounds, rounded 129.17. Mean is higher than median.**

Question 9

- **B1** state which average is better, e.g. median is better, oe
- **B1** reason linked to data, e.g. mean is affected by the 20 m outlier so median (12) better represents typical height, oe
- **Answer: Median is best. The mean would be pulled up by the 20 m value, whereas the median (ordered 8,9,12,12,15,20 so median = $(12+12)/2 = 12$) better represents a typical cliff height.**

Question 10

- **B1** mode = 3, oe
- **Answer: Mode = 3 kg.**

Question 11

- **M1** method: $(4\,600 - 4\,000) / 4\,000 \times 100$ seen, oe
- **A1** 15% cao
- **Answer: 15% increase.**

Question 12

- **B1** mean = $(30+25+35+28+32)/5 = 150/5 = 30$ m3/s cao
- **Answer: 30 m3/s.**

Question 13

- **B1** state which town has greater inequality in central 50 percent, Town B, oe
- **B1** reason: Town B has larger IQR (120 vs 60) so central 50% incomes are more spread out, oe
- **Answer: Town B shows greater income inequality in the central 50 percent because its IQR is 120 compared with Town A's IQR of 60, so the middle 50% of incomes are more widely spread in Town B.**

Question 14

- **M1** median method: ordered data 20,25,30,45,90 and middle value 30 seen, oe
- **A1** median = 30 and explanation that mean would be inflated by the 90 minute outlier so median better represents a typical journey time, oe
- **Answer: Median = 30 minutes. The median is better because the 90 minute outlier would raise the mean and not reflect the typical travel time experienced by most people.**

Question 15

- **M1** method for mean: sum $1+1+2+2+2+3+10 = 21$ seen and division by 7, oe
- **A1** mean = 3 kg cao
- **B1** median = 2 kg and justification that median is more appropriate because 10 kg is an outlier which inflates the mean, oe
- **Answer: Mean = $21/7 = 3$ kg. Median = 2 kg. Median is more appropriate because the 10 kg outlier inflates the mean, so the median better represents a typical parcel weight.**

Question 16

- **M1** mode identified, 5 or 6 both appear twice so state both or state bimodal, oe
- **A1** mean = $(4+6+5+7+6+5)/6 = 33/6 = 5.5$, median = $(5+6)/2 = 5.5$ so mean = median so distribution roughly symmetric, oe
- **Answer: Mode = 5 and 6 (bimodal). Mean = $33/6 = 5.5$; median = $(5 + 6)/2 = 5.5$, so mean equals median and the distribution is roughly symmetric.**