

C9.2 Interpreting statistical data

Name: _____ Class: _____ Date: _____

Total: 20 marks

KEY WORDS data 数据 • statistical 统计 • mean 平均数 • range 极差

Objective

Use interpreting statistical data to solve Core IGCSE Mathematics problems.

You must be able to:

- Compare distributions with an average and a spread
- Relate statistical comparisons to the data context
- Qualify claims using the size and nature of a sample

1 Key knowledge and worked examples

■ Key knowledge: Interpreting statistical data

Read titles, axis scales, keys and units before drawing conclusions. Compare averages for typical values and ranges for spread. Give a conclusion in context, supported by figures. A small or unrepresentative sample may not describe the population. A graph showing two quantities moving together does not prove that one causes the other.

■ Worked example: Interpreting statistical data

A: 4, 6, 8

B: 5, 6, 7

same mean, different spread

Two groups have scores A: 4, 6, 8 and B: 5, 6, 7.

- Means: $\bar{x}_A = (4 + 6 + 8)/3 = 6$ and $\bar{x}_B = (5 + 6 + 7)/3 = 6$; equal typical score.
- Ranges: $R_A = 8 - 4 = 4$, $R_B = 7 - 5 = 2$; B is more consistent in this sample.
- Three people per group is a small sample: do not claim every member of B will score better.

■ Method check

An average describes a typical value, not every observation. Use the range to describe spread and limit conclusions to the evidence available.

2 Practice

2.1 A chart shows 18 walkers and 12 cyclists. Find the total and the more common method. [2]

2.2 Class A has mean 64 and class B mean 71 in the same test. Compare typical performance. [2]

2.3 Two routes have travel-time ranges 8 min and 3 min. Which is more consistent in the recorded data? [2]

2.4 A survey asks only football-club members about their favourite sport. Explain a limitation. [2]

3 Exam-style questions

3.1 Apply the interpreting statistical data methods below. Show working and include units where appropriate.

- (a) Shop A has daily customers 20, 30, 40; shop B has 28, 30, 32. Find both means. [2]

- (b) Find both ranges and compare consistency. [2]

- (c) Explain why these three days do not prove that one shop is always more popular. [2]

3.2 Five delivery times, in minutes, are A: 8, 10, 10, 10, 12 and B: 6, 8, 10, 12, 14.

- (a) Find each mean and range, and compare consistency. [3]

- (b) A manager says that A is always faster because its range is smaller. Use the observations to evaluate this claim and state one sampling limitation. [3]

Solutions

Award method and answer marks as indicated; accept equivalent correct methods.

2.1

- $N = 18 + 12 = \mathbf{30}$; **walking** is more common.

2.2

- **B has the higher mean by 7 marks**, so its average performance was higher.

2.3

- **The route with range 3 min**, since its times have less spread.

2.4

- **The sample favours people interested in football**, so may not represent the whole school.

3.1

(a)

- $\bar{x}_A = 90/3 = \mathbf{30}$; $\bar{x}_B = 90/3 = \mathbf{30}$.

(b)

- $R_A = 40 - 20 = \mathbf{20}$; $R_B = 32 - 28 = \mathbf{4}$. **B is more consistent** over these days.

(c)

- **Only three days were observed and other days may differ**; equal sample means do not establish an always-more-popular shop.

3.2

(a)

- Means $\bar{t}_A = 50/5 = \mathbf{10}$ and $\bar{t}_B = 50/5 = \mathbf{10}$ min.
- Ranges are **4 and 8 min**.
- A is more consistent in this sample, with the smaller range.

(b)

- B has a delivery at **6 min**, faster than A's fastest 8 min.
- Equal means and a smaller spread do not imply A is always faster.
- Five deliveries may be too few or unrepresentative of other routes/days.