

2.5 Collect, classify and display data without overstating evidence

Name: _____ Class: _____ Date: _____

Total: 24 marks

KEY WORDS population 总体 • sample 样本 • bias 偏差

Objective

Collect, classify and display data without overstating evidence. Original GAC004-aligned practice, not an official assessment. Show the method as well as the result. All applied scenarios are invented classroom problems.

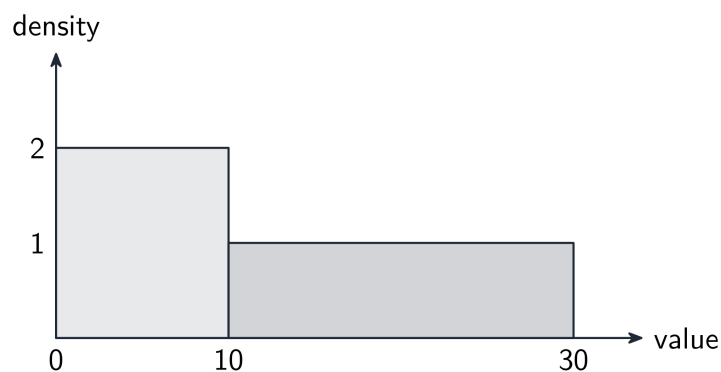
1 Key knowledge and worked examples

■ Key knowledge: a sample and a graph both need a defined scope

The **population** 总体 is the group a question concerns; a **sample** 样本 is the observed subset. A **bias** 偏差 can systematically favour some members or responses. A large convenience sample does not automatically represent the population. Record units, collection method, nonresponse and the question asked.

Categorical data use labels; quantitative data use numbers with a meaningful measurement scale. Discrete data are counts and continuous data are measured over an interval. Use separated bars for categories. For unequal-width continuous histogram classes, frequency density is frequency divided by class width; area, not height alone, represents frequency. Association in observational data does not establish causation.

■ Worked example: equal bar heights can conceal unequal frequencies



Known: class 0 to 10 has frequency 20; class 10 to 30 has frequency 20. Widths differ, so calculate frequency density.

$$D = \frac{f}{w}$$

$$D_1 = \frac{20}{10} = 2$$

$$D_2 = \frac{20}{20} = 1$$

The second bar is half as high but twice as wide. Both areas represent 20 observations.

2 Practice

2.1 A school studies all 600 students but surveys 60 randomly selected students. Identify its population and sample. [2]

2.2 Classify each variable as categorical or quantitative: (a) preferred bus route label, (b) travel time in minutes. [2]

2.3 A school asks only members of its sports club whether more money should go to sports facilities. Identify a sampling limitation, explain its effect, and suggest a better selection method. [3]

2.4 A histogram class from 20 to 30 minutes has frequency 15. Find its width and frequency density, and state what the area of its bar represents. [3]

3 Exam-style questions

3.1 A supplied travel-time table uses classes 0 to less than 10 minutes: 12 students; 10 to less than 20: 18; 20 to less than 40: 20. (a) Find the total count. (b) Find each frequency density for a histogram. (c) Find the proportion taking less than 20 minutes. (d) Explain why using frequencies directly as bar heights would distort the unequal-width histogram. [6]
