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TUTGATHER PRACTICE PAPER

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2027

Candidate Number

MATHEMATICS Compulsory Part
PAPER 1

Question-Answer Book

TUTGATHER
PRACTICE PAPER · NOT AN OFFICIAL HKEAA PAPER

1 hour 5 minutes

This paper must be answered in English

Topic practice: Uses and Abuses of Statistics

INSTRUCTIONS

(1) This paper consists of THREE sections, A(1), A(2) and B.

(2) Attempt ALL questions in this paper. Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins.

(3) Unless otherwise specified, all working must be clearly shown.

(4) Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.

(5) The diagrams in this paper are not necessarily drawn to scale.

(6) Calculators and mathematical drawing instruments may be used.

(7) The marks for each question are shown in brackets.

(8) No extra time will be given after the 'Time is up' announcement.

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SECTION A(1) (16 marks)

1. A school has 600 students, of whom 330 are boys and 270 are girls. A researcher wants to select a sample of 40 students using stratified sampling by gender. Find the number of boys and the number of girls that should be included in the sample. **(3 marks)**

2. A magazine asks its readers to complete an online survey about their favourite sport. State one source of bias in this survey and explain briefly how it may affect the result. **(3 marks)**

3. The bar chart below shows the number of books read by four students in a month. The vertical axis starts at 10 instead of 0. The bars for Amy, Ben, Chris and Dana have heights 12, 14, 16 and 20 units respectively on this truncated scale. (a) Explain how the truncated axis can mislead a reader. (b) If the true numbers of books are 12, 14, 16 and 20, find the ratio of the apparent height of Dana's bar to that of Amy's bar on the truncated chart, and compare it with the ratio of the true numbers. **(4 marks)**

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4. A news report states: “A survey of 500 teenagers found that 60% of them own a smartphone. Therefore, about 60% of all people in Hong Kong own a smartphone.” (a) Identify the population and the sample in the survey. (2 marks) (b) Explain why the conclusion drawn in the report is not valid. (2 marks) (c) Suggest one improvement to the survey so that the conclusion can be more reasonably generalised. (2 marks) **(6 marks)**

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SECTION A(2) (24 marks)

5. A factory employs 240 workers in three departments: Production (120 workers), Packaging (72 workers) and Administration (48 workers). A committee of 20 workers is to be formed by stratified sampling according to department. (a) Find the number of workers from each department that should be selected. (3 marks) (b) Describe how the required number of workers from the Production department could be selected using a random number table. (2 marks) (c) Give one advantage and one disadvantage of using stratified sampling in this situation. (2 marks) **(7 marks)**

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6. A researcher wants to estimate the average monthly expenditure on public transport of all 1,200 employees of a company. She decides to stand outside the company canteen on a Monday morning and ask the first 50 employees who enter. (a) Identify the sampling method used. (1 mark) (b) Give two reasons why this sample may be biased. (4 marks) (c) Suggest a better sampling method and explain how it would reduce bias. (3 marks) **(8 marks)**

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7. The table below shows the number of visitors (in thousands) to a museum in two consecutive years. **(9 marks)**

Year	Visitors (thousands)
2024	80
2025	100

A magazine presents this data as a 3-D pictogram using two museum icons. The 2024 icon has height 2 cm and the 2025 icon has height 2.5 cm. (a) Find the percentage increase in the actual number of visitors from 2024 to 2025. (2 marks) (b) The magazine claims that the number of visitors “increased by 25%” based on the heights of the icons. Show that this claim is misleading by comparing the areas of the icons. (4 marks) (c) Explain how the pictogram could be redrawn to give a fair comparison. (3 marks)

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SECTION B (10 marks)

8. A health organisation surveys 800 randomly selected adults in a city and finds that 480 of them exercise regularly. (a) Calculate the sample proportion of adults who exercise regularly. (1 mark) (b) A newspaper reports: “Almost 60% of adults in the city exercise regularly.” Explain why this statement may be an overgeneralisation, referring to sampling error and the sample size. (3 marks) (c) Suppose the survey was actually conducted by asking people at a gym. Explain how this would affect the sample proportion and the validity of the conclusion. (3 marks) (d) The organisation wants to reduce the margin of error of the estimate. Suggest one practical way to do this and state one limitation of your suggestion. (3 marks) **(10 marks)**

END OF PAPER

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