

Student name

2024 Mock Exam (Units 3&4)

Question and response book

General Mathematics

Paper 2

Time allowed

Perusal time — 5 minutes

Working time — 90 minutes

General instructions

- Answer all questions in this question and response book.
- Write using black or blue pen.
- QCAA-approved scientific calculator permitted.
- QCAA formula sheet provided.
- Planning paper will not be marked.

Section 1 (33 marks)

- 7 short response questions.

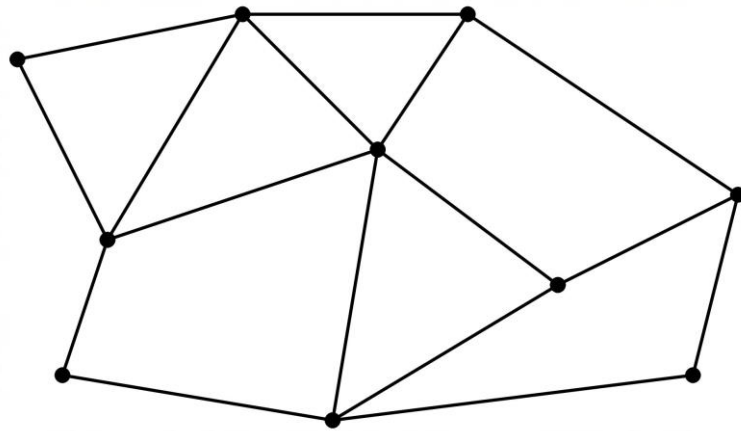
Section 1**Instructions**

- Questions worth more than one mark require mathematical reasoning and/or working to be shown to support answers.
 - If you need more space for a response, use the additional pages at the back of this book.
 - On the additional pages, write the question number you are responding to.
 - Cancel any incorrect response by ruling a single diagonal line through your work.
 - Write the page number of your alternative/additional response, i.e. See page ...
 - If you do not do this, your original response will be marked.
 - This section has seven questions and is worth 33 marks.
-

DO NOT WRITE ON THIS PAGE
THIS PAGE WILL NOT BE MARKED

QUESTION 1 - Eulerian Trail (4 marks)

Consider the following network when completing the question:

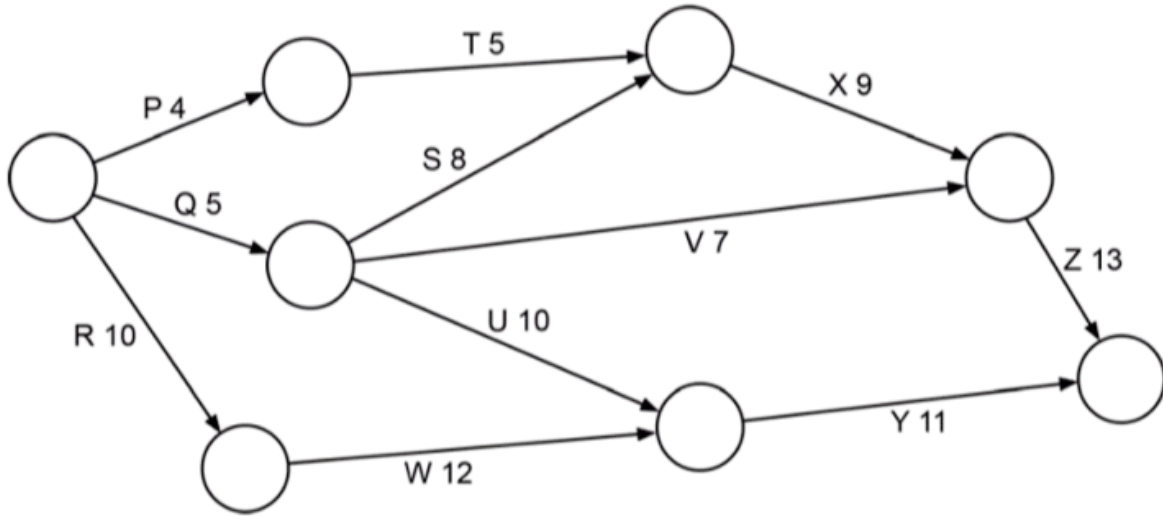


Explain why a Semi-Eulerian trail doesn't exist. Hence, add the minimum number of edges to the graph above so that it does contain a Semi-Eulerian trail. Justify the reasonableness of your solution.

Do not write outside this box

QUESTION 2 - Critical Path (4 marks)

Consider the following network when completing the question.



The network is measured in days of completion. Determine the critical path of the network. Hence, explain how, if at all, a 5-day delay to activity Q will impact the minimum completion time of the project.

Do not write outside this box

QUESTION 3 - Earth Geometry (5 marks)

Two cargo planes are scheduled to fly from Melbourne ($37.81^\circ S, 144.96^\circ E$) to Singapore ($1^\circ N, 103^\circ E$). Plane 1 will depart from Melbourne and fly directly north then travel west to arrive at its destination. Plane 2 will depart at the same time but will fly directly west before turning north to arrive in Singapore.

Assuming both planes fly at an equivalent speed, use mathematical procedures to determine which cargo plane will arrive in Singapore first. Evaluate the reasonableness of your solution.

Do not write outside this box

QUESTION 5 - Two Way Tables (4 marks)

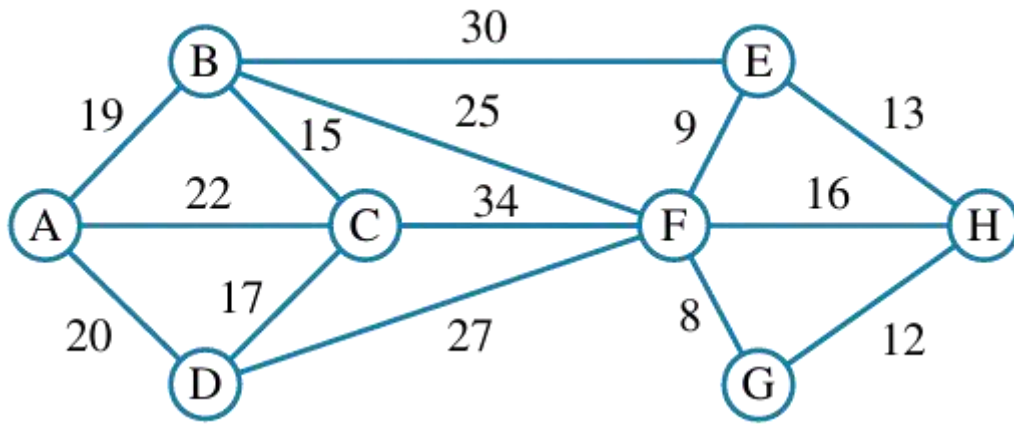
100 young adults took part in a survey on home ownership. Of the 45 females, 11 said they lived with their parents, and 20 of the males were renting a home. 9 people owned their own home, with 8 of those being females.

Using appropriate percentages, determine if there is an association between gender and home ownership.

Do not write outside this box

QUESTION 6 - Max Flow Hard (5 marks)

The following graph illustrates the rate that cars can pass through between each street, per minute. Assume the roads between town are two-way roads.



It is claimed that the road from C to F is being used inefficiently for cars travelling from A to H. Mathematically justify the reasonableness of this claim, and provide recommendations for future infrastructural improvements on this route to maximise the efficiency of the road C to F.

Do not write outside this box

QUESTION 7 - Hungarian Algorithm (6 marks)

Three marketing teams are to be allocated three separate jobs from an employer. Each team can only accept one job. The following information is provided:

Team A can finish job 1 two hours faster than Team B, and three hours faster than Team C.

Job 2 can be performed by Team A in just two hours, where it takes both Team B and Team C twice as long.

Team B will take seven hours to complete Job 3, and nine hours to complete Job 1.

Team A and Team C can complete Job 3 in three hours less time than Team B.

Determine the minimum time to complete all jobs.

Do not write outside this box

ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

Do not write outside this box

