Time allowed

- Perusal time: 10 minutes
- Working time: 3 hours

Examination materials provided

- Paper One — Question book
- Paper One — Resource book
- Paper One — Response book

Equipment allowed

- QSA-approved equipment
- ruler (metric, parallel or rolling)
- protractor
- drawing compass
- set squares
- templates (without formulas)
- non-programmable calculator
- graphing calculator

Not allowed: calculators with computer algebra system (CAS) functionality.

Directions

You may write in this book during perusal time.
Paper One has five extended-response questions. Attempt all questions.

Assessment

Paper One assesses the following assessment criteria:
- Knowledge and procedures (KP)
- Modelling and problem solving (MP)
- Communication and justification (CJ)

Assessment standards are at the end of this book.

After the examination session

Take this book when you leave.
Planning space
Paper One has five questions. Attempt all questions.
Write your responses in the response book. Show full working in all responses. Partial credit can only be awarded if working is shown.

Question 1

a. Steven’s gross pay is $1500 per week.
   Weekly deductions from Steven’s gross pay are:
   • $184.90 for tax
   • $12.50 for union fees
   • $33 for private health insurance.

   i. Calculate his weekly net pay.
   ii. Steven is paid an annual leave loading of 17.5% of four weeks gross pay. Calculate his annual leave loading.

(KP)

b. A real estate agent sells a house for $400 000. From the selling price he earns $10 000 commission.

   i. Calculate the percentage commission the agent is paid for his services.
   A salesperson in a shoe shop earns $200 per week plus $40 commission for each pair of shoes she sells.

   ii. How many items does she need to sell to earn a total of $2640 in two weeks?

(KP)

c. Peta purchased a camera for $896.50 while on holiday in Australia. This price included 10% GST. When she left Australia she received a refund of the GST. How much was Peta’s refund?

(KP)

d. Andrew worked for 24 hours as shown on his pay slip.

   i. What was his hourly rate of pay?

   ii. Andrew decides not to work any overtime in the future, but he wants to keep his weekly gross pay the same. How many hours must he work at the normal rate to keep the same gross pay?

(KP)
**Question 2**

a. A 130 cm long garden rake leans against a fence. The end of the rake is 0.75 m from the base of the fence.

![Diagram](image)

If the fence is vertical, find the value of $\theta$ to the nearest degree.

(KP)

b. The diagram shows the shape of Sally’s garden bed. All measurements are in metres.

![Diagram](image)

i. Find the area of the garden bed.

ii. Sally decides to add a 5 cm layer of mulch to the garden bed. She can only buy the mulch in bags of 0.25 cubic metres.

How many bags of mulch does Sally need to buy to cover the garden bed?

iii. To hold the mulch in place, a straight fence is to be constructed joining Point A to Point B.

Find the length of this fence to the nearest metre.

(KP)

c. Determine the distance between Uluru (25°S, 131°E) and Darwin (12°S, 131°E), correct to the nearest kilometre.

(KP)

d. Barry lives in Adelaide (35°S, 140°E) and his cousin Juan lives in Buenos Aires (35°S, 60°W). Barry wants to telephone Juan at 7 pm on a Friday night, Buenos Aires time.

At what time and on what day in Adelaide should Barry make the call?

(KP)
e. The sheets of paper used in a photocopier are 21 cm by 30 cm. The paper is 80 gsm, which means that one square metre of this paper has a mass of 80 grams. A pile of this paper weighs 25.2 kg. How many sheets of paper are in the pile? 

(KP)

f. Tony’s pizzas are made in three different sizes.

Tony puts olives on all of his pizzas. The number of olives depends on the size of the pizza as shown in the table below.

<table>
<thead>
<tr>
<th>Size</th>
<th>Diameter</th>
<th>Number of olives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini</td>
<td>20 cm</td>
<td>8</td>
</tr>
<tr>
<td>Standard</td>
<td>30 cm</td>
<td>18</td>
</tr>
<tr>
<td>Large</td>
<td>40 cm</td>
<td>32</td>
</tr>
</tbody>
</table>

Tony decides to make a square pizza with sides of 25 cm. He will use the same number of olives as he would need for a round pizza with the same area. Determine how many olives will be needed on the square pizza.

(MP)
**Question 3**

**a.** The site plan of Lot 8, General Drive is drawn to scale.

**i.** A fence is to be erected along all boundaries of Lot 8 except for the boundary on General Drive. How many metres of fencing will be required?

*(KP)*

**ii.** The family who will live at Lot 8 want to build a rectangular swimming pool parallel to their proposed house. The swimming pool must be located six metres from the northern fence, four metres from the house and at least two metres from the other boundaries.

By comparing at least two possible pools and showing all calculations, determine the area of the largest pool that will fit in the space. Draw this pool in the correct position on the site plan in the response book.

*(MP)*

**b.** A builder takes the following measurements from the string lines on a building site.

Determine if the corner is square, using calculations to justify your decision.

*(KP)*
Question 4

a. List two ways in which the graph below is misleading.

![Sales of boxes of Brand X and Brand Y washing powder](image)

b. The radar chart below was used to display the average daily temperatures each month.

![Average daily temperature (°C)](image)

i. What is the average daily temperature of Town B for March?

ii. In which month do the average daily temperatures of the two towns have the greatest difference?

iii. In which months is the average daily temperature in Town B higher than in Town A?

(KP)

c. A class of 14 students is going on a three-day excursion. The students each pack only one bag for the trip. The bags are weighed and the weights (kg) are listed in order as follows:

8, 9, 10, 11, 15, 18, 20, 22, 25, 29, 35, 38, 41, 45

i. Calculate the five-number summary of the weights of the bags.

ii. Calculate the interquartile range of the weights.

iii. Construct an accurate box-and-whisker plot to display the distribution of the weights of the bags.

(KP)
d. The graph shows the quiz results of 150 students.

i. Find the mode, mean and median scores of the students for this quiz.

ii. Calculate the standard deviation of the scores, correct to two decimal places.

iii. If the same quiz was given to another group of 30 students, how many students in this group would you expect to score five marks on the quiz?

(KP)

e. A class of students completed an algebra test and a geometry test. The results were displayed in a scatterplot as shown below.

One student looked at the scatterplot and commented, “In this class, if you do well in algebra you will do well in geometry.”

Explain if this student’s comment is correct, giving specific reasons to support your decision.

(MP)
Question 5

a. On 25 May, purchases of $125 are charged to a credit card that has no interest-free period and a zero balance. Simple interest is calculated and charged to the credit account on the statement date. Interest is charged at the annual percentage rate of 19.39% on amounts from (and including) the date of purchase up to (and including) the statement date. The statement date of this credit card is 20 June.

Calculate the amount of interest charged to this account on the statement date of 20 June. (KP)

b. Use the income tax table below to:

i. Calculate the tax payable on a taxable income of $50000. (Do not include the Medicare levy.)

ii. Calculate the percentage increase in tax paid if the taxable income increases from $50000 to $90000. (Do not include the Medicare levy.)

<table>
<thead>
<tr>
<th>Taxable income</th>
<th>Tax payable</th>
</tr>
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<tbody>
<tr>
<td>$0 – $18200</td>
<td>Nil</td>
</tr>
<tr>
<td>$18201 – $37000</td>
<td>Nil plus 19 cents for each $1 over $18200</td>
</tr>
<tr>
<td>$37001 – $80000</td>
<td>$3572 plus 32.5 cents for each $1 over $37000</td>
</tr>
<tr>
<td>$80001 – $180000</td>
<td>$17 547 plus 37 cents for each $1 over $80000</td>
</tr>
<tr>
<td>$180001 and over</td>
<td>$54 547 plus 45 cents for each $1 over $180000</td>
</tr>
</tbody>
</table>

(KP)

c. Paul invested money in a bank for four years. The stated interest rate was 6.1% p.a. compounded annually.

Mary invested money in a different bank for four years. The stated interest rate on her investment was 6% p.a. compounded monthly.

Mary thinks that she has a better deal than Paul.

i. Do you agree? Justify your response by comparing the effective interest rates for both accounts.

ii. List some possible strengths and limitations of the two investment deals.

Note: The formula used to calculate the effective simple interest rate is:

\[ E = \frac{(1 + r)^n - 1}{n} \]

where \( r \) is the stated interest rate per period (expressed as a decimal),
\( E \) is the effective simple interest rate per period (expressed as a decimal) and
\( n \) is the number of periods. (MP)

End of Paper One
<table>
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<tr>
<td><strong>Knowledge and procedures (KP)</strong></td>
<td>The overall quality of a candidate’s achievement across the full range within the contexts of application, technology and complexity, and across topics, <strong>consistently demonstrates</strong>: • accurate recall, selection and use of definitions and rules • use of technology • recall and selection of procedures, and their accurate and proficient use.</td>
<td>The overall quality of a candidate’s achievement across a range within the contexts of application, technology and complexity, and across topics, <strong>generally demonstrates</strong>: • accurate recall, selection and use of definitions and rules • use of technology • recall and selection of procedures, and their accurate use.</td>
<td>The overall quality of a candidate’s achievement in the contexts of application, technology and complexity, <strong>generally demonstrates</strong>: • accurate recall and use of basic definitions and rules • use of some technology • accurate use of basic procedures.</td>
<td>The overall quality of a candidate’s achievement in the contexts of application, technology and complexity, <strong>sometimes demonstrates</strong>: • accurate recall and use of some definitions and rules • use of some technology.</td>
<td>The overall quality of a candidate’s achievement <strong>rarely demonstrates</strong> knowledge and use of procedures.</td>
</tr>
<tr>
<td><strong>Modelling and problem solving (MP)</strong></td>
<td>The overall quality of a candidate’s achievement across the full range within each context, and across topics <strong>generally demonstrates</strong> mathematical thinking which includes: • interpreting, clarifying and analysing a range of situations, and identifying variables • selecting and using effective strategies • informed decision making … and sometimes <strong>demonstrates</strong> mathematical thinking which includes: • selecting and using procedures to solve a wide range of problems • initiative in exploring the problem • recognising strengths and limitations of models.</td>
<td>The overall quality of a candidate’s achievement across a range within each context, and across topics, <strong>generally demonstrates</strong> mathematical thinking which includes: • interpreting, clarifying and analysing a range of situations, and identifying variables • selecting and using strategies … and sometimes <strong>demonstrates</strong> mathematical thinking which includes: • selecting and using procedures required to solve a range of problems • informed decision making.</td>
<td>The overall quality of a candidate’s achievement <strong>demonstrates</strong> mathematical thinking which includes: • interpreting and clarifying a range of situations • selecting strategies and/or procedures.</td>
<td>The overall quality of a candidate’s achievement <strong>demonstrates</strong> mathematical thinking which includes following basic procedures and/or using strategies.</td>
<td>The overall quality of a candidate’s achievement <strong>rarely demonstrates</strong> following basic procedures and/or using strategies.</td>
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<tr>
<td>Communication and justification (CJ)</td>
<td>The overall quality of a candidate’s achievement across the full range within each context consistently demonstrates: • accurate use of mathematical terms and symbols • accurate use of language • organisation of information into various forms suitable for a given use • use of mathematical reasoning to develop logical arguments in support of conclusions, results and/or decisions • justification of procedures.</td>
<td>The overall quality of a candidate’s achievement across a range within each context generally demonstrates: • accurate use of mathematical terms and symbols • accurate use of language • organisation of information into various forms suitable for a given use • use of mathematical reasoning to develop simple logical arguments in support of conclusions, results and/or decisions.</td>
<td>The overall quality of a candidate’s achievement in some contexts generally demonstrates: • accurate use of basic mathematical terms and symbols • accurate use of basic language • organisation of information into various forms • use of some mathematical reasoning to develop simple logical arguments.</td>
<td>The overall quality of a candidate’s achievement sometimes demonstrates evidence of the use of the basic conventions of language and mathematics.</td>
<td>The overall quality of a candidate’s achievement rarely demonstrates use of the basic conventions of language or mathematics.</td>
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