Time allowed

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

Examination materials provided

- Paper One – Question book
- Paper One – Resource book
- Multiple-choice response sheet
- 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
- graphics/graphing calculator

Calculators with computer algebra system (CAS) functionality are not allowed.

Directions

You may write in this book during perusal time.

Paper One has two parts:

- Part A: Questions 1–10 (multiple choice)
- Part B: Questions 1–5 (extended response)

Attempt all questions.

Suggested time allocation

- Part A: 30 minutes
- Part B: 2 hours 30 minutes

Assessment

Assessment standards are at the end of this book.

After the examination

Take this book when you leave the examination room.
Planning space
Part A

Multiple-choice

Suggested time allocation: **30 minutes**.

Part A has **10** questions of equal value. The questions assess Knowledge and Procedures (KP) and Modelling and Problem solving (MP).

Attempt all questions.

Each question contains four options, one of which is correct or is the best option. Respond to each question by selecting one of the four possible options and blackening the appropriate circle on the multiple-choice response sheet. Use a 2B pencil to blacken the circles.

No credit for your response will be given if more than one circle is blackened.

**Question 1**

John and Patricia want to buy a block of land and are considering two options:

<table>
<thead>
<tr>
<th>Rainbow Estate</th>
<th>Swanbank Village</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blocks of land 16 metres x 45 metres</td>
<td>Blocks of land 18 metres x 45 metres</td>
</tr>
<tr>
<td>$70000 each</td>
<td>$76950 each</td>
</tr>
</tbody>
</table>

What is the *difference* between the two options in cost per square metre of land?

A  $2.22  
B  $69.50  
C  $77.22  
D  $100

**Question 2**

Charles is about to attend a conference in New Zealand. The costs for the conference are:

- Registration NZ$330
- Accommodation NZ$120 per night for 5 nights
- Return airfare NZ$465

What is the total cost in Australian dollars, to the nearest dollar, if the exchange rate is AUD$1=NZ$1.1825?

A  $774  
B  $1082  
C  $1180  
D  $1650
**Question 3**

Jenna’s house is sold by All-Go Auctioneers for $380000. The auctioneers charge a fee for their service as follows:

<table>
<thead>
<tr>
<th>Value of sale</th>
<th>Auctioneer’s fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than $100000</td>
<td>5%</td>
</tr>
<tr>
<td>From $100001 to $300000</td>
<td>$6000 plus 3% of each dollar over $100000</td>
</tr>
<tr>
<td>More than $300000</td>
<td>$9000 plus 4% of each dollar over $300000</td>
</tr>
</tbody>
</table>

The auctioneer’s fee for selling Jenna’s house is

A $12200.

B $14400.

C $19000.

D $24200.

**Question 4**

Consider the following boxplots.

Before

After

Which measure must be the same for both datasets?

A mean

B range

C median

D interquartile range
Question 5

The stem-and-leaf plot below represents the daily sales of confectionery from a school canteen.

```
1 | P 6 6
2 | 0 2 3 4
3 | 3 4 4 8
4 | 1 3 3
5 | 0 2
6 | 3 4 7
```

If the range of sales is 53, then what is the value of P?

A 0  
B 4  
C 6  
D 14

Question 6

The angle of depression of the base of the tree from the top of the building is 47°. The height of the building is 50 metres.

What is the distance from the base of the building to the base of the tree, correct to the nearest metre?

A 34  
B 37  
C 47  
D 54
Question 7

A concrete slab will be laid as the foundation for a steel kit-form garage. The slab has the dimensions of 6125 millimetres by 9050 millimetres. To check that the corners of the slab are right angles, the builder will measure the diagonal. What should the diagonal measure, correct to the nearest millimetre?

A 2925 millimetres
B 6662 millimetres
C 10928 millimetres
D 15175 millimetres

Question 8

The location of Town X is 25°N 45°E. The location of Town Y is 25°N 105°E.

Which of the following is true?

A Town X is four hours ahead of Town Y
B Town X is four hours behind Town Y
C Town X is one hour ahead of Town Y
D Town X is one hour behind Town Y

Question 9

The height of each student in a class was measured and it was found that the mean height was 165 centimetres. Two students were absent. When their heights were included in the data for the class, the mean height did not change.

Which of the following pairs of heights are possible for the two absent students?

A 155 cm and 170 cm
B 157 cm and 167 cm
C 159 cm and 169 cm
D 162 cm and 168 cm
Question 10

A house has a skillion roof with a pitch of 20° as shown in the diagram.

The overhangs AG and CB are both 600 mm. If C is 1500 mm above the ceiling GD, the length of AB (correct to the nearest millimetre) is

A 4121 mm.
B 4386 mm.
C 5321 mm.
D 5586 mm.

End of Part A
Part B

Extended response

Suggested time allocation: 2 hours 30 minutes.

Part B has five questions. Each question assesses Knowledge and Procedures (KP), Modelling and Problem solving (MP) or a combination of both. Communication and Justification (CJ) will be assessed by an overall judgment of your responses to Part B.

Attempt all questions.

Write your responses in the response book provided.

Question 1

a. A jewellery item has a mark-down of $50. If the original price of the jewellery item was $225, calculate
   i. the marked-down price
   ii. the mark-down as a percentage of the original price.

b. Helen is a casual employee at the local fuel depot and is paid at the following rates:

   | Weekday rate | $18 per hour |
   | Saturday rate | Time-and-a-half |
   | Sunday rate | Double time |

   Displayed is Helen’s timesheet for last week.

<table>
<thead>
<tr>
<th>Start</th>
<th>Finish</th>
<th>Unpaid break</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friday 7:00 am</td>
<td>2:30 pm</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Saturday 9:00 am</td>
<td>5:00 pm</td>
<td>1 hour</td>
</tr>
<tr>
<td>Sunday 10:00 am</td>
<td>4:00 pm</td>
<td>30 minutes</td>
</tr>
</tbody>
</table>

d. Su Yin is the senior sales representative for a large office furniture warehouse. Her fortnightly retainer is $2100 and she earns 4% of her total sales as a commission. Last fortnight, Su Yin’s gross pay was $2700. What were her total sales for the fortnight?

   Show full working to justify your response.
Question 2

a. Convert
   i. 2550 cm to m
   ii. 7.024 m² to mm²

b. A yacht leaves the Pacific island of Nauru (1°S, 167°E) and sails due south to Vanuatu (16°S, 167°E). The yacht leaves Nauru at 7:00 am on Sunday 8 November 2009.
   i. To the nearest kilometre, find the distance the yacht sails between Nauru and Vanuatu.
   ii. The yacht sails at an average speed of 10 knots. How long will it take to sail from Nauru to Vanuatu? Give your response correct to the nearest hour.
   iii. The yacht must arrive in Vanuatu by midday on Thursday 12 November 2009. Can the yacht arrive on time? Provide supporting justification. (Assume time zones are the same.)

(c. The diagram below shows part of a wall BF held in an upright position by two timber supports, CD and AE.

AB = 1.8 metres, BE = 1.2 metres, DC = 2.96 metres, angle BCD = 48°

i. Calculate the length of the timber support AE.

ii. Calculate θ correct to the nearest degree.

iii. Find BF, the height of the wall, if the point D is 40 centimetres below F.

   Show full working to justify your response.
Question 3

Below is the plan of the ground floor of the Jones family house drawn to a scale of 1:150.

![House Plan](image)

a. Find the cost of carpeting the dining and living rooms if carpet costs $60 per metre installed. Include GST of 10% in your calculations.

(KP)

b. To conserve water, the Jones family has installed a custom-built cylindrical water tank with a base radius of 4 metres and standing 3.5 metres tall.

Calculate the volume of the tank correct to the nearest cubic metre.

(KP)

c. Use the graph paper on page 20 of the response book to respond to Question 3c.

The Jones family house is built on a square block of land of side length 32 metres. The house foyer faces due east and the house is positioned six metres from the eastern end of the block and four metres from the fence on the northern side of the property.

The Jones family is planning to build a flat on their property at the back of the house for an elderly relative. If the flat will have dimensions 8 metres by 5 metres, draw a plan of the block with the house, the flat and water tank suitably positioned on it using a scale of 1:200.

Note: It is sufficient to represent the house as a suitably sized rectangle on the block; detail is not required.

Show full working to justify your response.

(MP)
Question 4

a. Miguel is a utilities worker for a large north Queensland tourism operator. Miguel is paid $24 per hour for a 32-hour week with overtime paid at time-and-a-half.

i. Each year (52 weeks) Miguel is entitled to take four weeks leave. His pay during this time is calculated at $24 per hour for a 32-hour working week for four weeks. For the rest of the year, Miguel regularly works 35 hours each week. Calculate Miguel’s gross annual income.

ii. Every pay week, including the holidays, Miguel’s employer withholds $240 PAYG tax. Calculate the total amount of PAYG tax Miguel has paid for the year.

iii. Calculate Miguel’s taxable income if he has $4500 in allowable deductions.

iv. Miguel must pay 1.5% of his taxable income as a Medicare levy. Use the following table to determine Miguel’s tax liability including the Medicare levy.

<table>
<thead>
<tr>
<th>Taxable Income</th>
<th>Tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1 – $6000</td>
<td>Nil</td>
</tr>
<tr>
<td>$6001 – $21600</td>
<td>17 cents for each $1 over $6000</td>
</tr>
<tr>
<td>$21601 – $58000</td>
<td>$2652 + 30 cents for each $1 over $21600</td>
</tr>
<tr>
<td>$58001 – $70000</td>
<td>$13572 + 42 cents for each $1 over $58000</td>
</tr>
<tr>
<td>$70001 and over</td>
<td>$18612 + 47 cents for each $1 over $70000</td>
</tr>
</tbody>
</table>

(KP)

b. When Anna and Terry were planning to buy a home, their mortgage broker provided them with a monthly mortgage repayment table so they could consider repayment options.

<table>
<thead>
<tr>
<th>Monthly mortgage repayment table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal and interest per $1000 borrowed</td>
</tr>
<tr>
<td>Interest rate per annum</td>
</tr>
<tr>
<td>--------------------------</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6.5%</td>
</tr>
<tr>
<td>7.0%</td>
</tr>
<tr>
<td>7.5%</td>
</tr>
<tr>
<td>8.0%</td>
</tr>
</tbody>
</table>

Anna and Terry intended to buy a house that was for sale at $390000. Together, they had combined savings of $9000 and were entitled to receive the First Home Owner’s Grant of $14000. Half of this grant money would be allocated to fees and charges associated with arranging the mortgage.

Anna and Terry had also received $25000 from the estate of Terry’s recently deceased grandfather. They had a combined after-tax income of $85000 per annum and were paying off their car at $350 per month. The financial institution providing the loan for the purchase of the house will allow 40% of their combined after-tax income to be used for repayments.

Using the mortgage repayment table above, can Anna and Terry afford to buy the house over 25 years at 7% p.a? Discuss the strengths and weaknesses of their financial position should the interest rate increase from 7% to 8% p.a. in the coming year.

Show full working to justify your response. (MP)
Question 5

a. Use the graph paper on page 21 of your response book to respond to Question 5a.

Following a severe bushfire, a scientist measured the heights of some tree seedlings that have grown since the fire. The table below shows the height $H$ (cm) of a eucalypt tree seedling as it grows following the bushfire.

<table>
<thead>
<tr>
<th>Time $T$ (weeks)</th>
<th>Height of seedling $H$ (centimetres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>2</td>
<td>8.8</td>
</tr>
<tr>
<td>3</td>
<td>9.1</td>
</tr>
<tr>
<td>4</td>
<td>10.5</td>
</tr>
<tr>
<td>5</td>
<td>12.3</td>
</tr>
<tr>
<td>6</td>
<td>13.8</td>
</tr>
<tr>
<td>7</td>
<td>15.3</td>
</tr>
<tr>
<td>8</td>
<td>15.5</td>
</tr>
<tr>
<td>9</td>
<td>15.7</td>
</tr>
<tr>
<td>10</td>
<td>15.9</td>
</tr>
</tbody>
</table>

Prepare a scatterplot of the data given in the table and draw a straight line of best fit through it.  

(KP)

b. A student examining the scatterplot and the straight line of best fit makes the following proposal:

$$
Seedling \ height = 1.5 \times Time \ in \ weeks + 4.6
$$

“This formula can be applied at any stage to predict the height of the seedling for the first twelve weeks.”

Discuss the limitations of the model proposed by the student. Is the student’s proposal reasonable?

Fully justify your response.

(MP)

End of Part B

End of Paper One
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge and procedures</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>Modelling and problem solving</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 generally demonstrates 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 demonstrates 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> mathematical thinking which includes following basic procedures and/or using strategies.</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Communication and justification | 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. | 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. | 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. | The overall quality of a candidate’s achievement demonstrates evidence of the use of the basic conventions of language and mathematics. | The overall quality of a candidate’s achievement rarely demonstrates use of the basic conventions of language or mathematics. |