Neap

Trial Examination 2022

Question and Response Booklet

QCE General Mathematics Units 1&2

Paper 1

Student's Name: _____

Teacher's Name: _____

Time allowed

- Perusal time – 5 minutes
- Working time – 90 minutes

General instructions

- Answer all questions in this question and response booklet.
- QCAA-approved scientific calculator permitted.
- Formula sheet provided.
- Planning paper will not be marked.

Section 1 (20 marks)

- 20 multiple choice questions

Section 2 (40 marks)

- 10 short response questions

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SECTION 1

Instructions

- Choose the best answer for Questions 1–20.
- This section has 20 questions and is worth 20 marks.
- Use a 2B pencil to fill in the A, B, C or D answer bubble completely.
- If you change your mind or make a mistake, use an eraser to remove your response and fill in the new answer bubble completely.

	A	B	C	D
Example:	●	○	○	○

	A	B	C	D
1.	○	○	○	○
2.	○	○	○	○
3.	○	○	○	○
4.	○	○	○	○
5.	○	○	○	○
6.	○	○	○	○
7.	○	○	○	○
8.	○	○	○	○
9.	○	○	○	○
10.	○	○	○	○
11.	○	○	○	○
12.	○	○	○	○
13.	○	○	○	○
14.	○	○	○	○
15.	○	○	○	○
16.	○	○	○	○
17.	○	○	○	○
18.	○	○	○	○
19.	○	○	○	○
20.	○	○	○	○

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SECTION 2

Instructions

- Write using black or blue pen.
- 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 booklet.
  - 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 10 questions and is worth 40 marks.

DO NOTE WRITE ON THIS PAGE

THIS PAGE WILL NOT BE MARKED

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QUESTION 21 (3 marks)

Erman has a part-time job at a local supermarket where he earns $15.60 per hour for a standard 25-hour week. He gets time-and-a-half for any additional hours he works over the 25 hours.

a) Determine Erman's standard weekly wage. *[1 mark]*

b) Calculate his wage for a week where he works 32 hours. *[2 marks]*

QUESTION 22 (3 marks)

Let $A = \begin{bmatrix} 4 & -6 \\ 3 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & 1 \\ -2 & 0 \end{bmatrix}$.

Express $3A - 2B$ as a single matrix.

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QUESTION 23 (4 marks)

A factory produces two types of 45 g chocolate bars and has two machines, one for each type of chocolate bar. The masses, in grams, of a sample of 10 chocolate bars produced by machine 1 are shown.

45.5 44.2 45.8 45.0 46.2 45.1 44.7 44.3 45.5 43.9

a) Determine the mean and standard deviation of the sample of chocolate bars from machine 1. Give your answer correct to three decimal places. *[2 marks]*

b) A sample of 10 chocolate bars from machine 2 has a mean of 45.4 g and a standard deviation of 1.5 g.

Discuss whether machine 1 is more accurate than machine 2, using mathematical reasoning to justify your response. *[2 marks]*

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QUESTION 24 (3 marks)

Solve for m in the equation $\frac{4-7m}{2} = -3$.

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QUESTION 25 (4 marks)

The formula $C = \frac{5}{9}(F - 32)$ is used to convert a temperature from degrees Fahrenheit (°F) to degrees Celsius (°C).

a) Transpose the formula to make F the subject. *[2 marks]*

b) In 2021, Brisbane recorded an average low temperature of 10°C in the month of July. Determine what this temperature is in degrees Fahrenheit. *[2 marks]*

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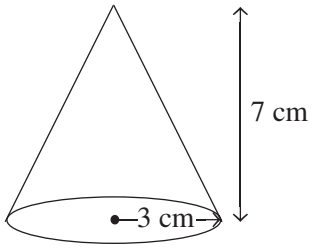
QUESTION 26 (6 marks)

A business sells cone-shaped paper weights. The smallest paper weight sold has the dimensions shown in the diagram.



a) Calculate the volume of the paper weight, correct to the nearest cm^3. *[3 marks]*

b) The largest paper weight has a volume of 528 cm^3 and similar proportions to the smallest paper weight.

Calculate the scale factor for length. *[3 marks]*

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QUESTION 27 (3 marks)

a) A shareholder owns 650 shares in a company that has 6 580 300 shares and distributes its annual profits of $1 879 561 to its shareholders.

Determine the dividend payable to the shareholder. *[2 marks]*

b) Calculate the price-to-earnings ratio for a company if each share has a market price of $15.16 and the company has annual earnings of $1.40 per share. *[1 mark]*

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QUESTION 28 (4 marks)

Solve the simultaneous equations $p = 6 - 8q$ and $3p = 5 + 2q$.

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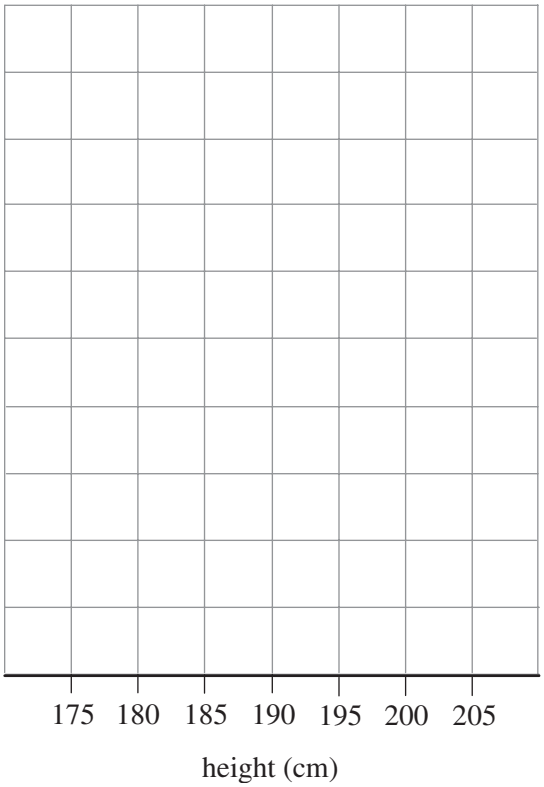
QUESTION 29 (6 marks)

The heights, in centimetres, of 20 volleyball players at a local volleyball tournament are given.

175	177	180	185	190	191	193	195	196	197
197	197	198	198	198	200	200	201	203	204

a) Construct a histogram of the data. *[4 marks]*



b) State the modal class. *[1 mark]*

_____

_____

c) Describe the shape of the distribution. *[1 mark]*

_____

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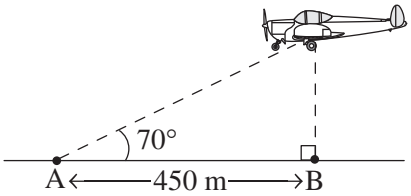
QUESTION 30 (4 marks)

a) The angle of elevation from point A to a plane in the sky is 70°. The plane is directly above point B. There is a horizontal distance of 450 m from point A to point B, as shown in the diagram.



Determine the height of the plane above the ground. Give your answer correct to the nearest metre. *[2 marks]*

b) A ship travels due north for 4 km then due west for 6 km.

Calculate the true bearing of the ship from its starting point, correct to the nearest degree. Use a diagram in your response. *[2 marks]*

END OF PAPER

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ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

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Neap

Trial Examination 2022

Formula Booklet

QCE General Mathematics Units 1&2

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Mensuration			
circumference of a circle	$C = 2\pi r$	**area of a circle**	$A = \pi r^2$
area of a parallelogram	$A = bh$	**area of a trapezium**	$A = \frac{1}{2}(a+b)h$
area of a triangle	$A = \frac{1}{2}bh$	**total surface area of a cone**	$S = \pi rs + \pi r^2$
total surface area of a cylinder	$S = 2\pi rh + 2\pi r^2$	**surface area of a sphere**	$S = 4\pi r^2$
volume of a cone	$V = \frac{1}{3}\pi r^2 h$	**volume of a cylinder**	$V = \pi r^2 h$
volume of a prism	$V = Ah$	**volume of a pyramid**	$V = \frac{1}{3}Ah$
volume of a sphere	$V = \frac{4}{3}\pi r^3$		
Heron's rule	$A = \sqrt{s(s-a)(s-b)(s-c)}$, where $s = \frac{a+b+c}{2}$		
Earth geometry	$D = 111.2 \times$ angular distance	$D = 111.2\cos\theta \times$ angular distance	

Finance			
simple interest	$I = Pin$	**compound interest**	$A = P(1+i)^n$
effective annual rate of interest	$i_{\text{effective}} = \left(1 + \frac{i}{n}\right)^n - 1$	**dividend yield**	$\frac{\text{dividend}}{\text{share price}} \times 100$
price to earnings ratio (of a share)	$\text{P/E ratio} = \frac{\text{market price per share}}{\text{annual earnings per share}}$		
recurrence relation for reducing balance loans	$A_{n+1} = rA_n - R$	**recurrence relation for compound interest**	$A_{n+1} = rA_n$
recurrence relation for annuities	$A_{n+1} = rA_n + d$		
annuities	$A = M\left(\frac{(1+i)^n - 1}{i}\right)$	$A = M\left(\frac{1-(1+i)^{-n}}{i}\right)$	

Sequences	
arithmetic sequence	$t_n = t_1 + (n-1)d$
geometric sequence	$t_n = t_1 r^{(n-1)}$

Networks and matrices	
Euler's formula	$v + f - e = 2$

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Trigonometry			
Pythagoras' theorem	$c^2 = a^2 + b^2$		
trigonometric ratios	$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$	$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$	$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$
cosine rule	$c^2 = a^2 + b^2 - 2ab\cos C$		
sine rule	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$		
area of a triangle	$\text{area} = \frac{1}{2}bc\sin A$		

Statistics	
mean	$\bar{x} = \frac{\Sigma x_i}{n}$
median	$\left(\frac{n+1}{2}\right)^{\text{th}}$ data value
least-squares line (slope)	$b = \frac{\Sigma(x_i - \bar{x})(y_i - \bar{y})}{\Sigma(x_i - \bar{x})^2} = r\frac{s_y}{s_x}$
least-squares line (intercept)	$a = \bar{y} - b\bar{x}$
correlation coefficient (*r*)	$r = \frac{1}{n-1}\sum\left(\frac{x_i - \bar{x}}{s_x}\right)\left(\frac{y_i - \bar{y}}{s_y}\right)$
standard deviation	$s = \sqrt{\frac{\Sigma(x_i - \bar{x})^2}{n-1}}$
outliers (identifying)	$Q_1 - 1.5 \times \text{IQR} \leq x \leq Q_3 + 1.5 \times \text{IQR}$

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