



Trial Examination 2022

**Question and Response Booklet**

# **QCE General Mathematics Units 1&2**

Paper 2

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.
- Write using black or blue pen.
- QCAA-approved scientific calculator permitted.
- Formula sheet provided.
- Planning paper will not be marked.

### **Section 1 (40 marks)**

- 7 short response questions

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## **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 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.
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**DO NOT WRITE ON THIS PAGE**

**THIS PAGE WILL NOT BE MARKED**

**QUESTION 1 (6 marks)**

A family receives two quotes to hire play equipment for their child’s party. Hiring play equipment from company ABC costs \$20 per hour with a set-up fee of \$50. Company XYZ offers the same service for \$40 per hour with no set-up fee.

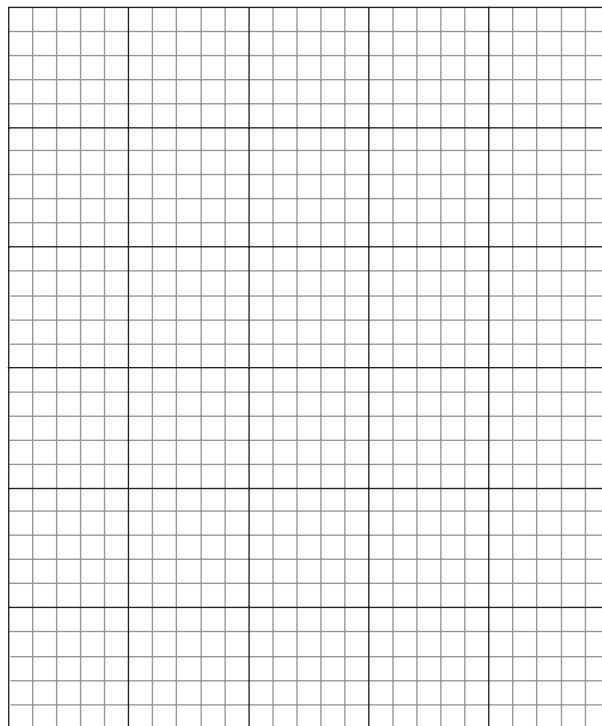
- a) Identify the equation for the total cost ( $C$ ), in dollars, of hiring company ABC’s play equipment for  $n$  hours. *[1 mark]*

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- b) Identify the equation for the total cost, ( $C$ ), in dollars, of hiring company XYZ’s play equipment for  $n$  hours. *[1 mark]*

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- c) Sketch the relationship between  $C$  and  $n$  for both companies using the grid. *[3 marks]*



- d) Use the graph from part c) to determine when it is cheaper to hire company XYZ’s play equipment. *[1 mark]*

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**QUESTION 2 (5 marks)**

During a school athletics carnival, the number of students who received an award (first, second or third place) for the four school houses were recorded in the table.

School house	Award		
	First place	Second place	Third place
Red	39	39	47
Blue	33	61	48
Green	51	25	40
Orange	45	43	33

Students who are awarded first place receive 7 points, students who are awarded second place receive 5 points and students who are awarded third place receive 3 points.

- a) Construct a column matrix that represents the points given to each award (first, second or third place). *[1 mark]*

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- b) Use matrix multiplication to determine which school house earns the most points. *[4 marks]*

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Trial Examination 2022

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**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	$D = 111.2 \times \text{angular distance}$	$D = 111.2 \cos \theta \times \text{angular distance}$	

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)	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	$v + f - e = 2$

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