



EXAMINATIONS COUNCIL OF ESWATINI  
Eswatini General Certificate of Secondary Education

CANDIDATE  
NAME

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CENTRE  
NUMBER

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CANDIDATE  
NUMBER

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**MATHEMATICS**

**6880/03**

Paper 3 Calculator Structured Questions (Extended)

**October/November 2019**

**2 hours 30 minutes**

Candidates answer on the Question Paper.

Additional Materials:      Electronic calculator  
                                    Geometric instruments  
                                    Mathematical tables (optional)  
                                    Tracing paper (optional)

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on the spaces provided.  
Write in dark blue or black pen.  
You may use a soft pencil for any diagrams or graphs.  
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

All working should be clearly shown below that question.  
Marks will be given for working which shows that you know how to solve the problem even if you get the answer wrong.

The number of marks is given in brackets [ ] at the end of each question or part question.

Electronic calculators should be used.  
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures.  
Give answers in degrees to one decimal place.  
For  $\pi$ , use either your calculator value or 3.142.  
The total of the marks for this paper is 100.

For Examiner's Use	
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<b>Total</b>	

This document consists of **16** printed pages and **4** blank pages.

- 1 The table shows some terms of two sequences R and T.

Term	1	2	3	4	5	6	...	$n$
Sequence R	3	5	7	9			...	
Sequence T	6	9	14	21			...	

- (a) Find the next 2 terms of:

- (i) sequence R,

*Answer (a)(i)* ....., ..... [1]

- (ii) sequence T.

*Answer (a)(ii)* ....., ..... [2]

- (b) Write the  $n$ th term expression for:

- (i) sequence R

*Answer (b)(i)* ..... [2]

- (ii) sequence T.

*Answer (b)(ii)* ..... [2]

- 2 In a sale, a customer paid E8992 for a brush cutter.  
The brush cutter had been discounted by 20%.

Calculate the original price of the brush cutter.

*Answer E* ..... [2]

3 (a) Solve the equation

$$\frac{2}{1-p} = \frac{p+5}{4}.$$

*Answer (a)* ..... [4]

(b) Solve the simultaneous inequalities.

$$2x - 2 \leq 1 \text{ and } x + 5 \geq 3$$

*Answer (b)* ..... [3]

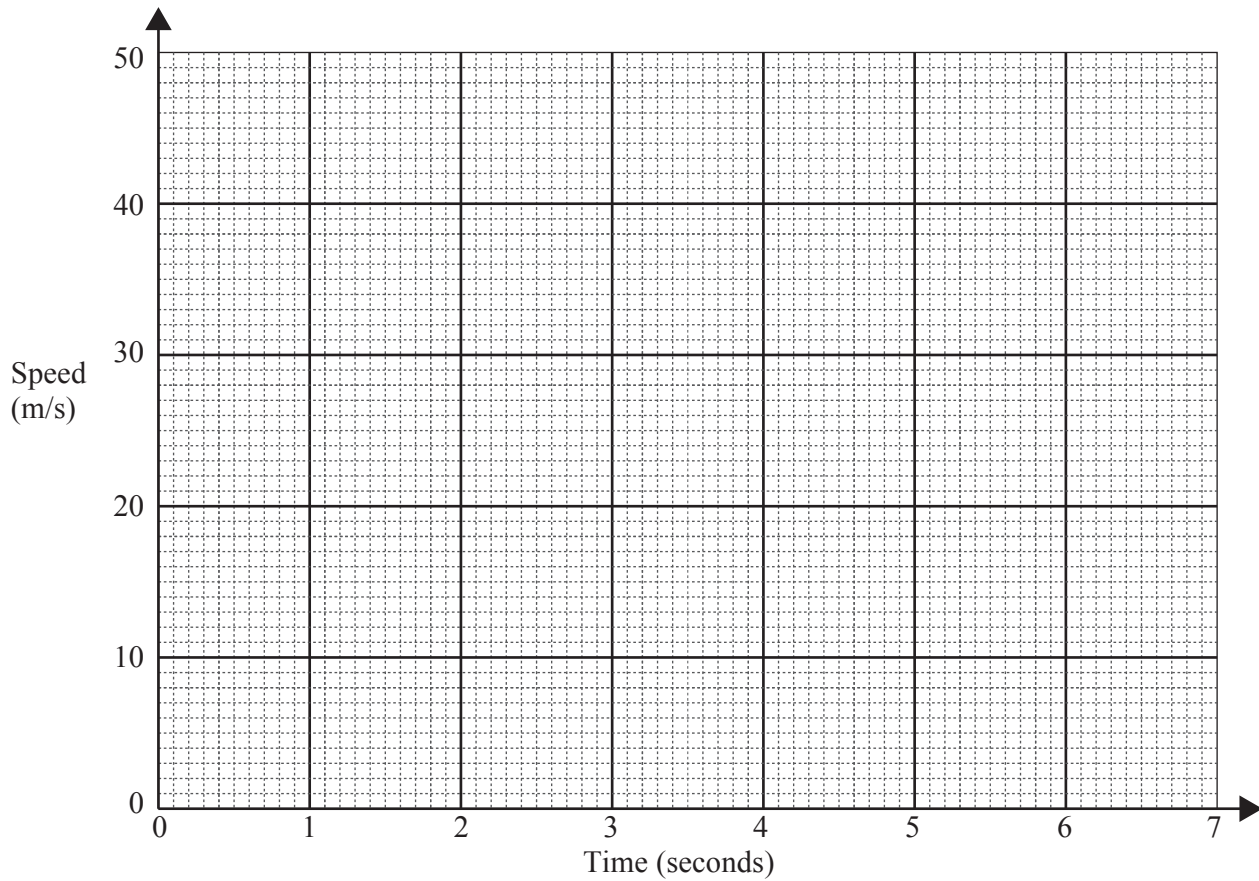
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- 4 A body accelerates from rest at a constant acceleration until it reaches a speed of 10 m/s after 2 seconds.

In the next  $1\frac{1}{2}$  seconds, the body is moving at a constant speed of 10 m/s.

The body then accelerates uniformly to reach the speed of 40 m/s after another  $1\frac{1}{2}$  seconds.

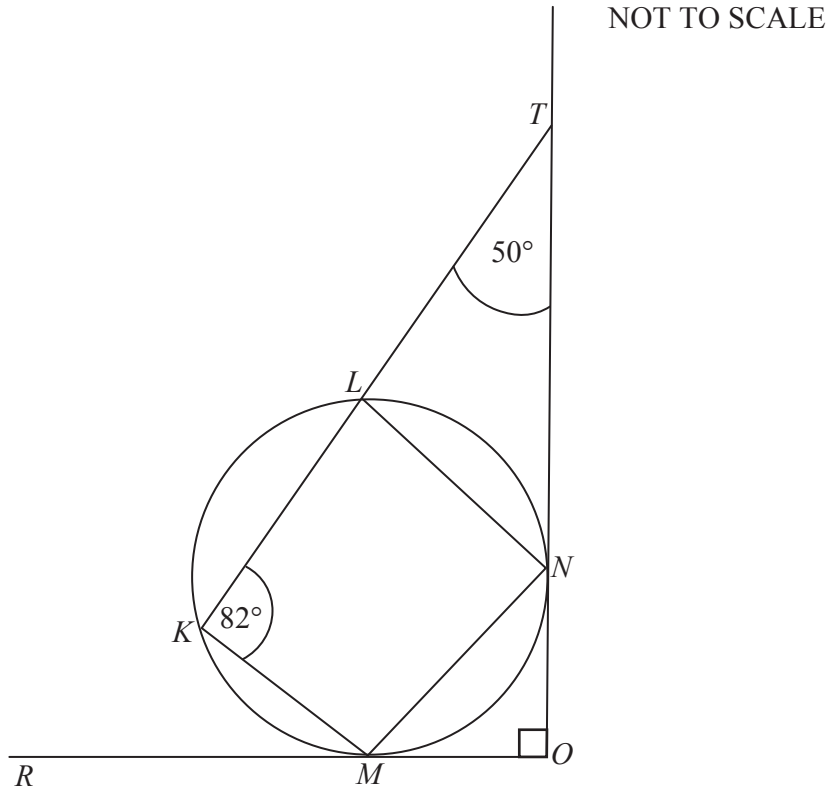
In the last 2 seconds, the body moves with a constant acceleration of  $-5 \text{ m/s}^2$ .



Draw the speed-time graph for the body.

[6]

- 5  $K, L, M$  and  $N$  are points on the circumference of a circle.  
 $ONR$  and  $OMT$  are tangents to the circle.  
 Angle  $KTM = 50^\circ$ .  
 Angle  $TKM = 82^\circ$ .  
 Angle  $ROT = 90^\circ$ .  
 $KLT$  is a straight line.



Find the size of

- (a) angle  $MNO$ ,

Answer (a) .....  $^\circ$  [1]

- (b) angle  $LNT$ ,

Answer (b) .....  $^\circ$  [3]

- (c) angle  $KMN$ .

Answer (c) .....  $^\circ$  [2]

6 Simplify the fractions

(a)  $\frac{m+2}{m+3} - \frac{m-2}{m-3}$ ,

Answer (a) ..... [4]

(b)  $\frac{p^2 - pq}{p^2 - q^2}$ .

Answer (b) ..... [3]

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7 Given that  $f(x) = 3x - 4$  and  $g(x) = 3x^2$ ,

(a) Find and simplify,

(i)  $ff(x)$ ,

*Answer (a)* ..... [2]

(ii)  $(ff)^{-1}(x)$ ,

*Answer (b)* ..... [2]

(b) Find  $gf(x)$ .

Write your answer in the form  $ax^2 + bx + c$ .

*Answer (c)* ..... [3]

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8 The table shows masses of 110 patients attended at a health centre on a particular day.

Mass (kg)	$0 < x \leq 20$	$20 < x \leq 40$	$40 < x \leq 60$	$60 < x \leq 80$	$80 < x \leq 100$	$100 < x \leq 130$
Number of patients ( $f$ )	12	18	30	$w$	15	12

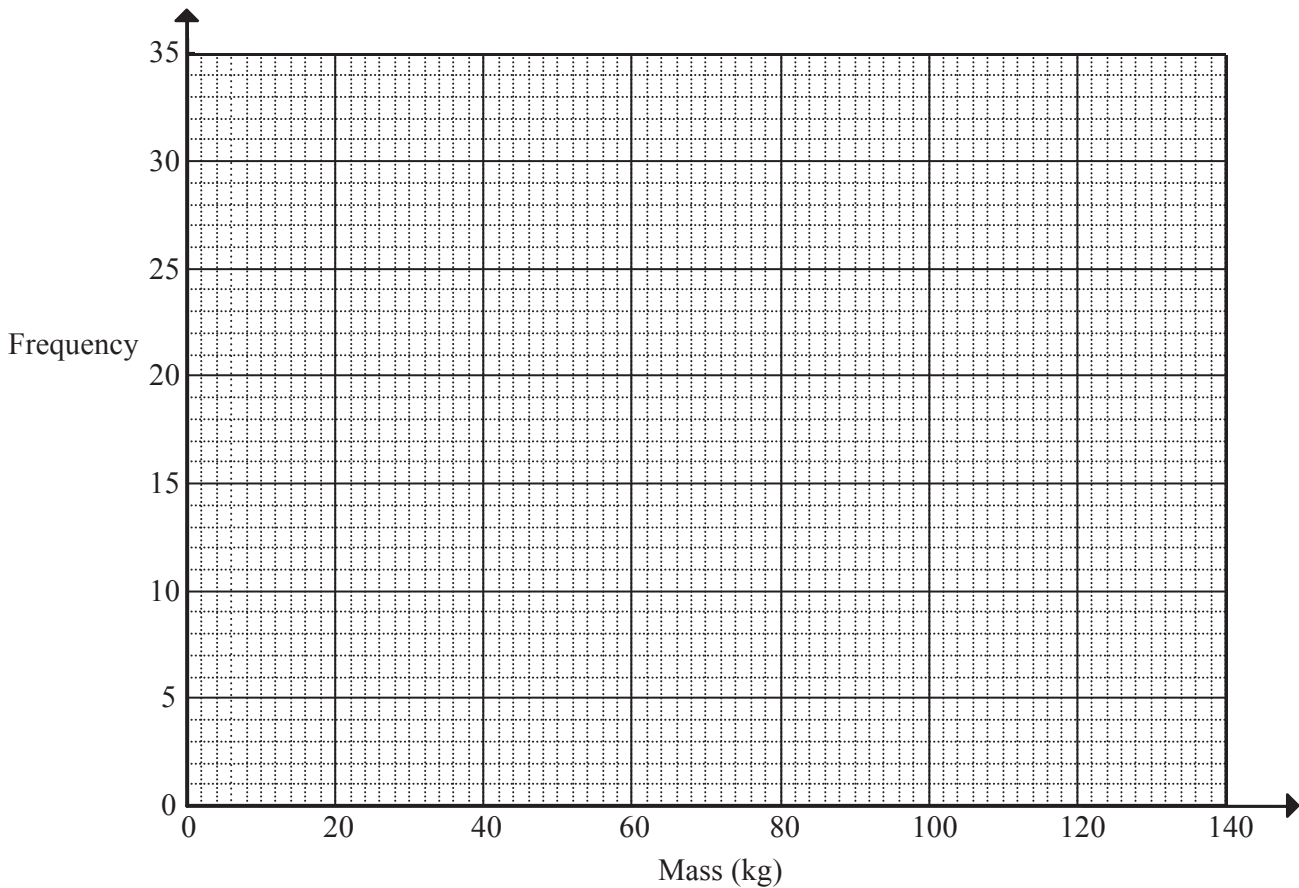
(a) Find the value of  $w$ .

Answer (a) ..... [1]

(b) How many patients had masses above 80 kg?

Answer (b) ..... [1]

(c) Use the grid below to draw a frequency polygon to represent this information.



[3]

(d) Write down the modal class mass of the patients' masses.

Answer (d) ..... kg [1]



(e) Calculate an estimate of the mean mass.

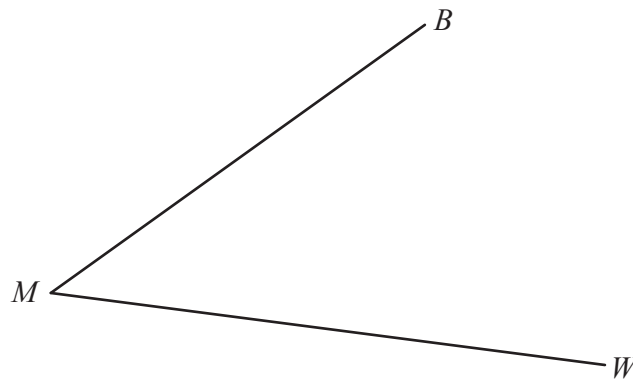
Answer (e) .....kg [4]

9 (a) *C* is a fixed point in a three dimensional space.  
Point *D* is always 3 cm from *C*.

Describe the locus of point *D* from point *C*, in three dimensions.

Answer (a) .....  
..... [3]

(b)

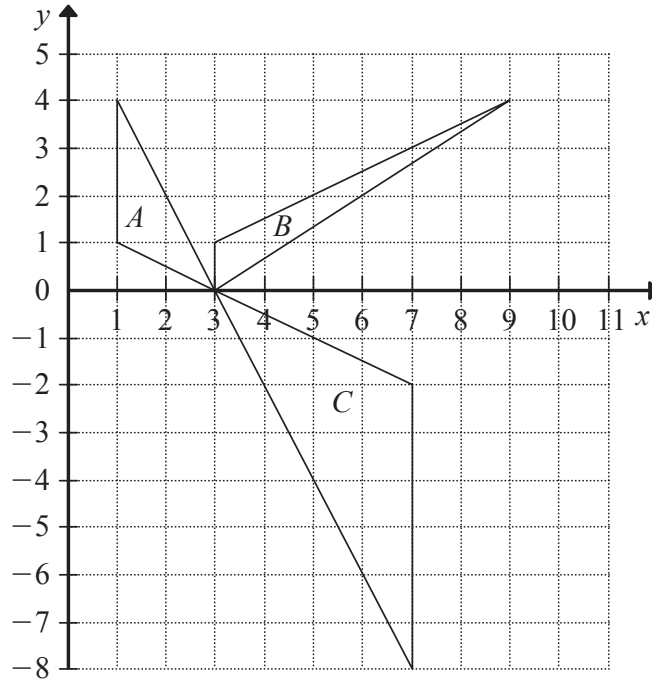


In the diagram above, the two lines *MB* and *MW* meet at *M*.

Describe the locus, in three dimensional space, of points that are equidistant between lines *MB* and *MW*.

Answer (b) .....  
..... [2]

10 (a) The diagram shows three shapes, *A*, *B* and *C*.



Describe the **single** transformation that will map:

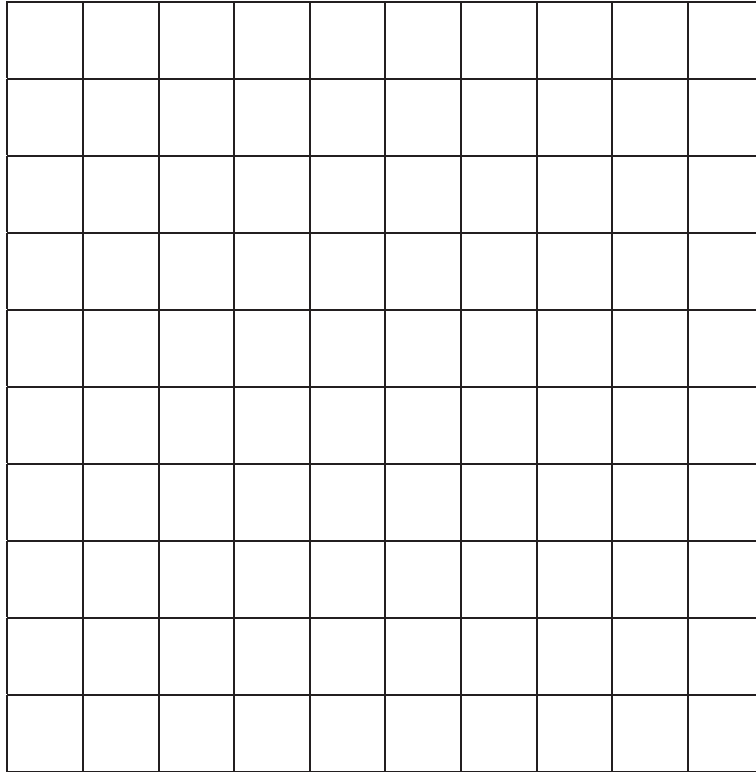
(i) Shape *A* onto shape *B*.

Answer (a)(i) .....  
 ..... [3]

(ii) Shape *A* onto shape *C*.

Answer (a)(ii) .....  
 ..... [3]

(b) You may use the grid below to help you answer (b)(i) and (b)(ii).



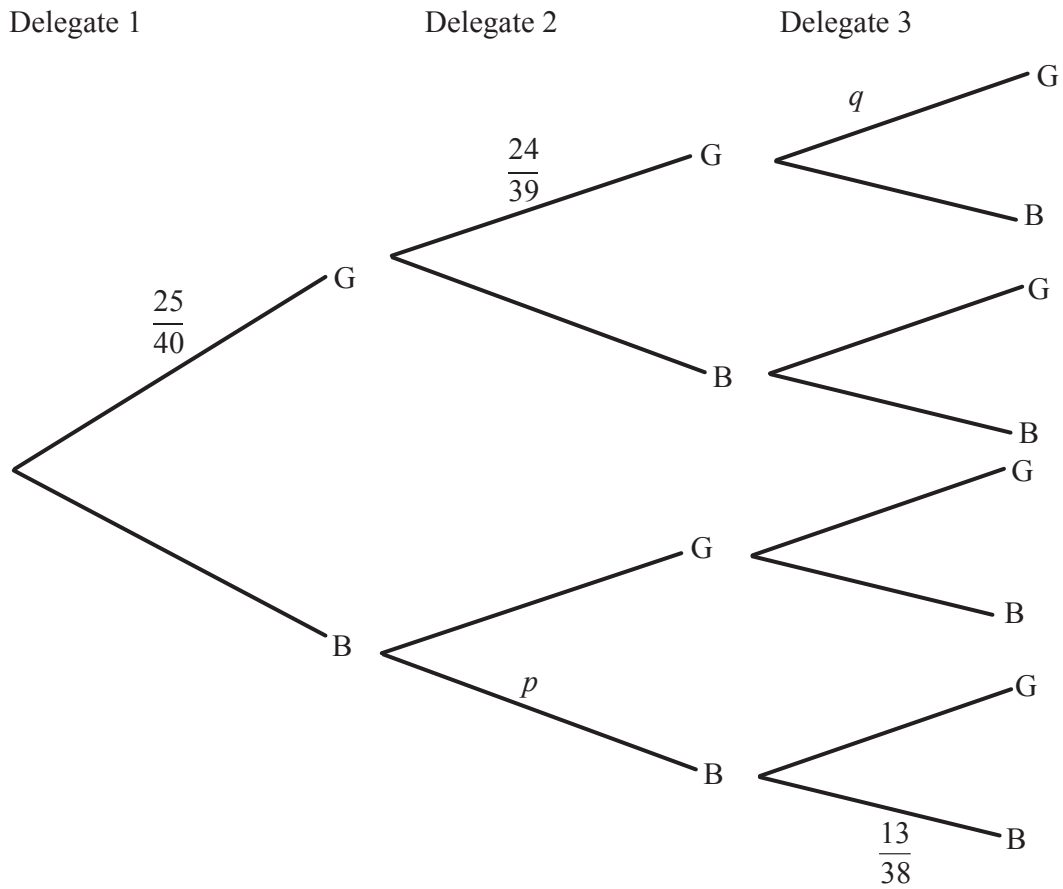
- (i) Find the matrix for a transformation that maps the points  $M(2, 1)$ ,  $N(3, -4)$  and  $K(1, -2)$  onto  $M_1(1, 2)$ ,  $N_1(-4, 3)$  and  $K_1(-2, 1)$ .

*Answer (b)(i)*  $\left( \begin{array}{cc} & \\ & \end{array} \right)$  [3]

- (ii) Find the matrix for a stretch with  $y$  – axis invariant and stretch factor 3.

*Answer (b)(ii)*  $\left( \begin{array}{cc} & \\ & \end{array} \right)$  [2]

- 11 Three delegates from a class are to be sent to a youth meeting.  
There are 15 boys and 25 girls in the class.  
A fair draw is made to select the delegates.  
The tree diagram shows possible genders of the delegates, boys (B) or girls (G).



- (a) Find the value of  $p$  and the value of  $q$ .

Give your answers as fractions.

Answer (a)  $p = \dots\dots\dots$

$q = \dots\dots\dots$  [2]

- (b) There are three possible sponsors for the delegation.  
Sponsor A wants the delegation to have at least one girl.  
Sponsor B wants the delegation to have both gender.  
Sponsor C wants the delegation to be of the same gender for accommodation purposes.

Use the tree diagram to find the probability that the delegation meets the requirement of

- (i) Sponsor A,

*Answer (b)(i)* ..... [3]

- (ii) Sponsor B,

*Answer (b)(ii)* ..... [3]

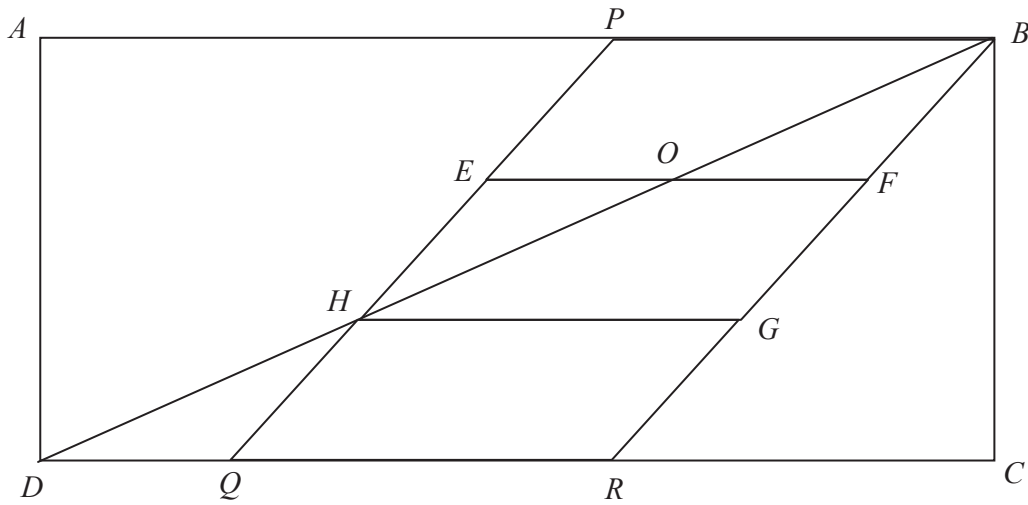
- (iii) Sponsor C.

*Answer (b)(iii)* ..... [2]

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- 12 In the diagram,  $ABCD$  is a rectangle.  
Parallelograms  $PBFE$  and  $HGRQ$  are congruent.  
 $PEHQ$  and  $BFGR$  are straight lines.

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- (a) Name **two** congruent triangles.

Answer (a) ..... and ..... [2]

- (b) Name **three** triangles which are similar but not congruent to triangle  $EOH$ .

Answer (b) ....., ..... and ..... [3]

- (c) Given that parallelograms  $EFGH$  and  $PBFE$  are similar, explain why they are also congruent.

Answer (c) .....  
..... [2]

- 13** Two sisters left their house at the same time and drove to the same town in different cars. The town was 100 km away. One car was travelling at an average speed 10 km/h faster than the other car.

Let  $x$  km/h to be the speed of the slower car.

- (a)** Express the time taken by the faster car in terms of  $x$ .

*Answer (a)* ..... [1]

- (b)** The faster car arrived one hour earlier than the slower car.

- (i)** Form an equation in  $x$  and show that it simplifies to

$$x^2 + 10x - 1000 = 0$$

[3]

- (ii)** Hence, solve the equation  $x^2 + 10x - 1000 = 0$

*Answer (b)(ii)*  $x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [4]

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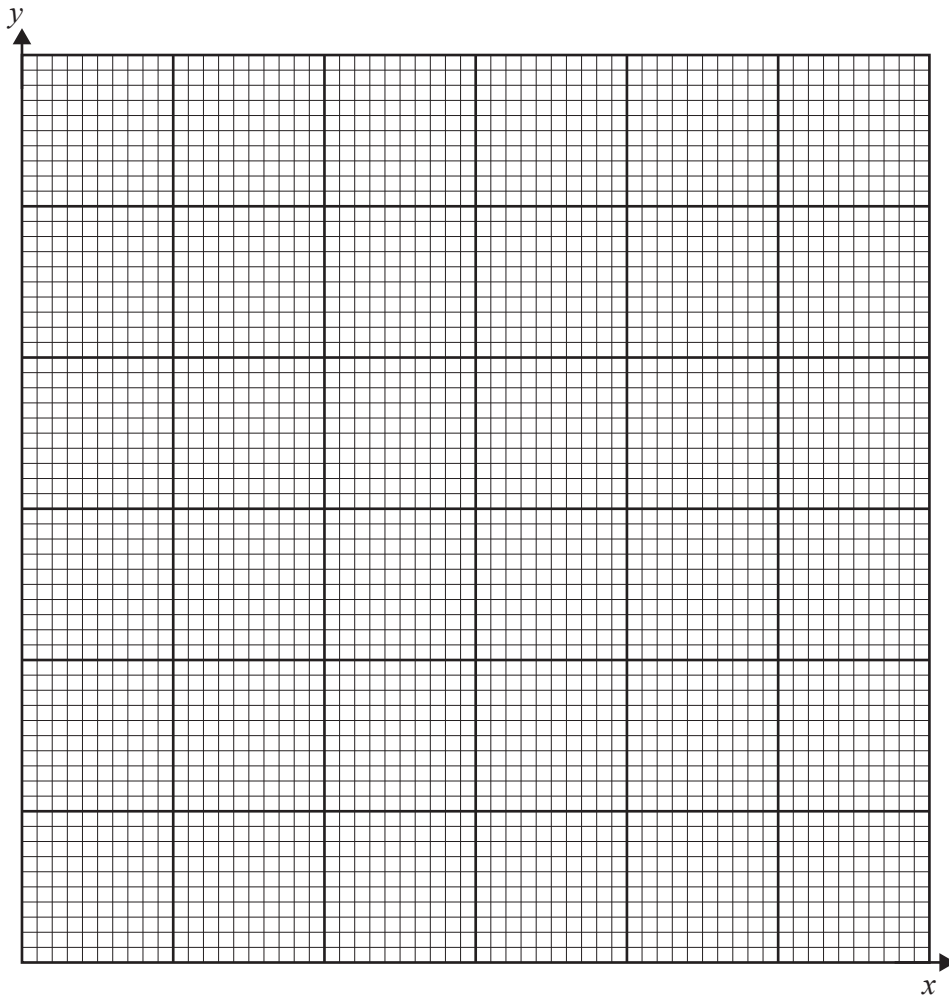
14 A certain species of worm grows according to the formula  $y = 2^x$  where  $x$  is the time in minutes and  $y$  is the length of the worm in centimetres.

(a) Complete the table.

$x$	0	0.5	1.0	1.5	2.0	2.5
$y$	1		2			5.66

[2]

(b) Draw the graph of  $y = 2^x$  using the values in the table above. Use a scale of 2 cm to represent 1 unit on the horizontal axis and 2 cm to represent 1 unit on the vertical axis.



[3]

(c) Using your graph, estimate the time it takes for the worm to reach a length of 5 cm.

Answer (c) ..... minutes [1]

(d) Explain why the graph does not pass through (0, 0).

Answer (d) .....  
 ..... [1]



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