

Write your name here

Surname

Other names

Pearson
Edexcel GCSE

Centre Number

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Candidate Number

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Mathematics B

Unit 3: Number, Algebra, Geometry 2 (Calculator)

Higher Tier

Tuesday 17 June 2014 – Morning

Time: 1 hour 45 minutes

Paper Reference

5MB3H/01

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.



Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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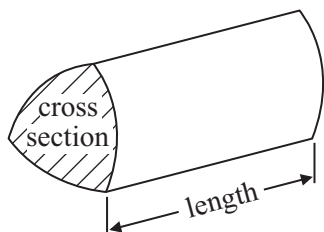

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GCSE Mathematics 2MB01

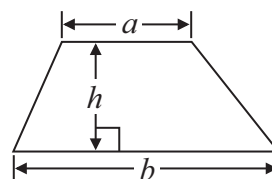
Formulae: Higher Tier

**You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.**

Volume of prism = area of cross section \times length

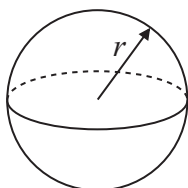


Area of trapezium = $\frac{1}{2} (a + b)h$



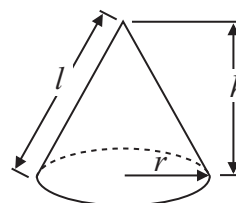
Volume of sphere = $\frac{4}{3} \pi r^3$

Surface area of sphere = $4\pi r^2$

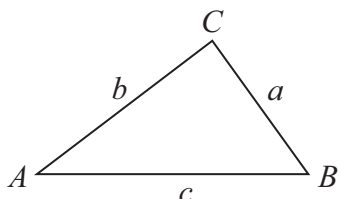


Volume of cone = $\frac{1}{3} \pi r^2 h$

Curved surface area of cone = $\pi r l$



In any triangle ABC



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2} ab \sin C$



Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

- 1** Glen buys four tickets for a concert.
Each ticket costs £54

Glen also has to pay a booking fee.
The booking fee is 5% of the total price of the tickets.

Work out the total amount Glen has to pay.

£.....

(Total for Question 1 is 3 marks)

- 2** Tony has a hosepipe.
The length of the hosepipe is 20 m.

Tony stores the hosepipe on a reel.
The weight of the reel is 1.4 kg.

$\frac{1}{2}$ metre of the hosepipe has a weight of 150 grams.

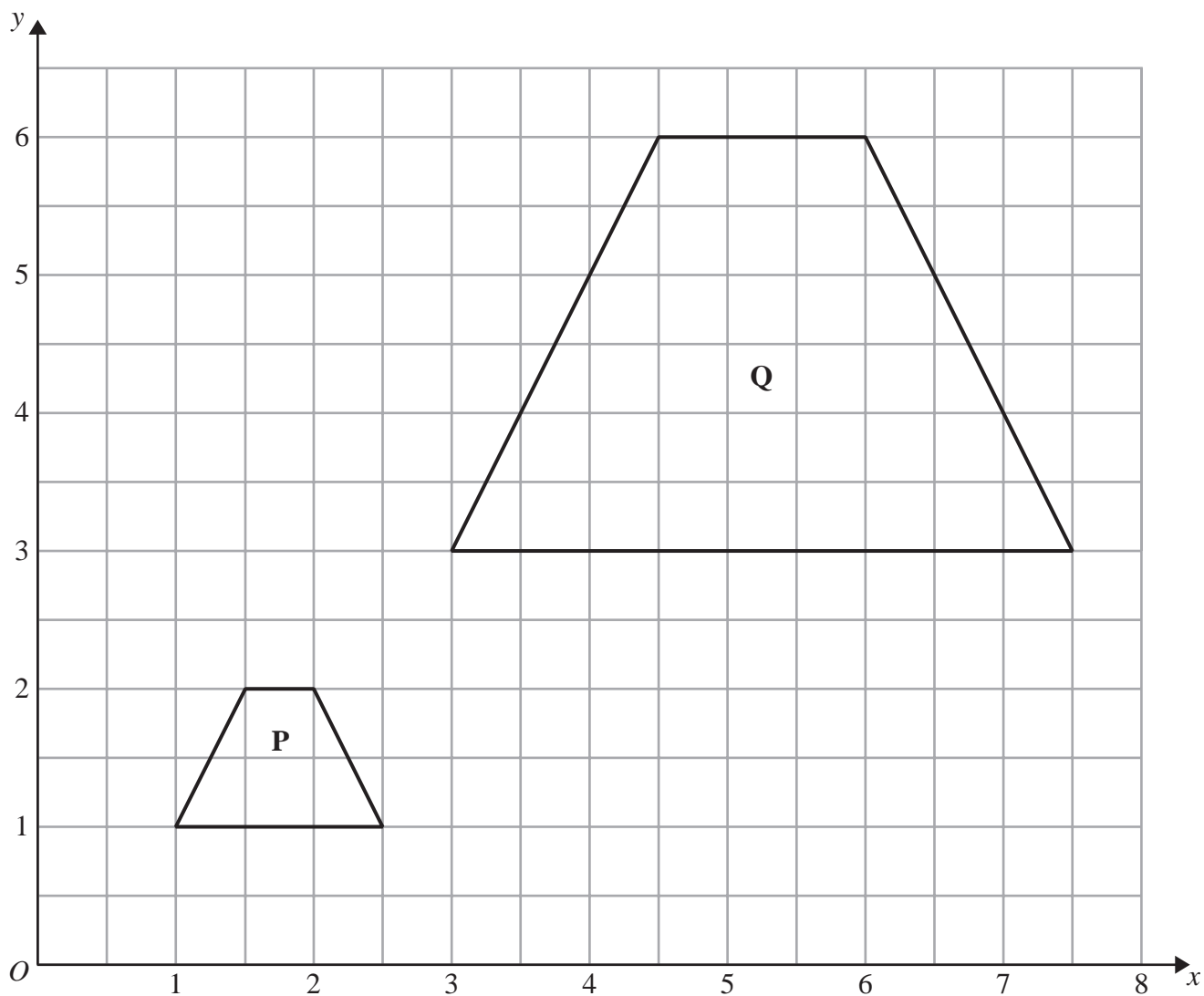
Work out the total weight of the hosepipe and the reel.

..... kg

(Total for Question 2 is 3 marks)



3



Describe fully the single transformation that maps shape **P** onto shape **Q**.

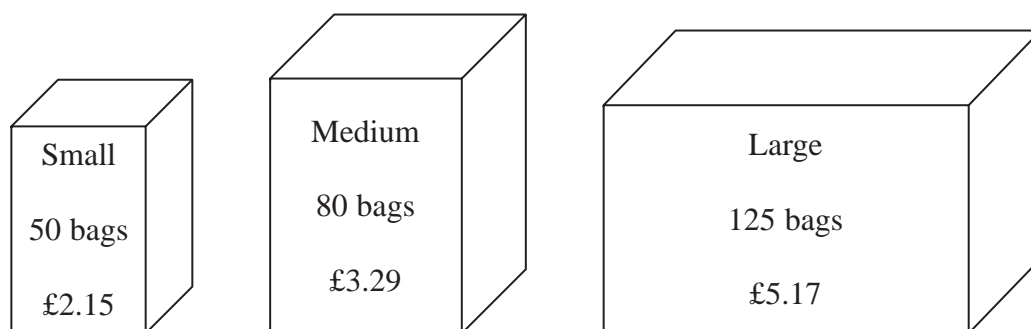
(Total for Question 3 is 3 marks)

4



P 4 3 4 1 1 R A 0 4 2 4

*4 Tea bags are sold in three sizes of box.



A small box of 50 tea bags costs £2.15

A medium box of 80 tea bags costs £3.29

A large box of 125 tea bags costs £5.17

Which size of box is the best value for money?

(Total for Question 4 is 4 marks)



5 The diagram shows a tile.

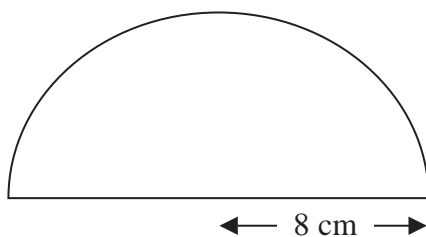


Diagram **NOT**
accurately drawn

The tile is in the shape of a semicircle of radius 8 cm.

Work out the perimeter of the tile.

Give your answer correct to one decimal place.

..... cm

(Total for Question 5 is 3 marks)



- 6 Stephanie is x years old.
Tobi is twice as old as Stephanie.
Ulrika is 3 years younger than Tobi.

The sum of all their ages is 52 years.

(a) Show that $5x - 3 = 52$

(3)

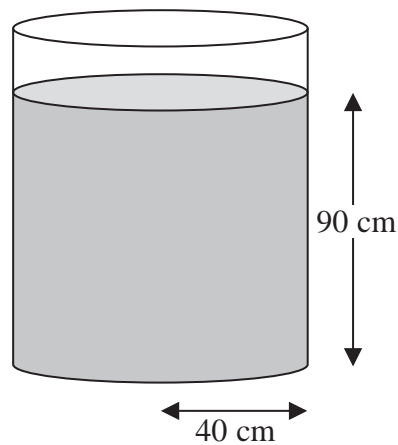
(b) Work out the value of x .

$x = \dots\dots\dots$
(2)

(Total for Question 6 is 5 marks)



7 The diagram shows a container used to store oil.



The container is in the shape of a cylinder of radius 40 cm.

The height of the oil in the container is 90 cm.

65 litres of oil are taken from the container.

1 litre = 1000 cm^3 .

Work out the new height of the oil in the container.

Give your answer correct to one decimal place.

..... cm

(Total for Question 7 is 4 marks)



8 The equation

$$x^3 + 6x = 27$$

has a solution between 2 and 3

Use a trial and improvement method to find the solution.

Give your answer correct to one decimal place.

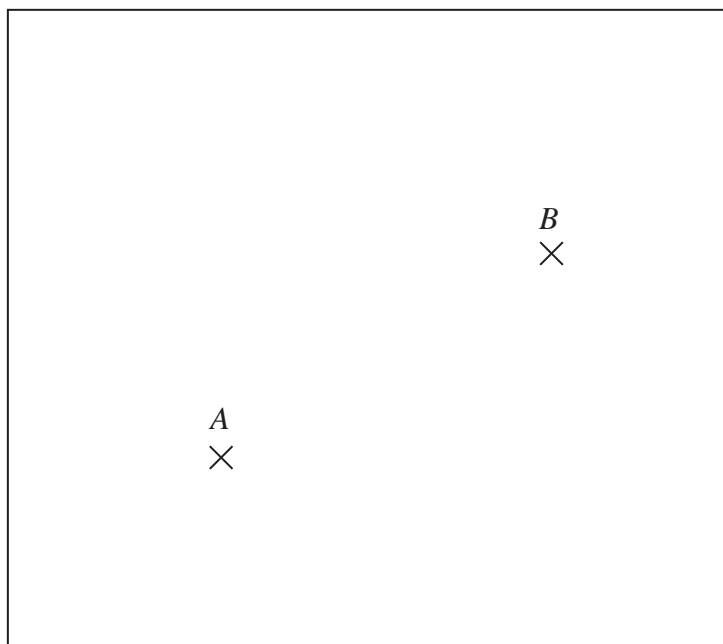
You **must** show all your working.

$x = \dots\dots\dots$

(Total for Question 8 is 4 marks)



- 9 The diagram shows the positions of two shops, *A* and *B*, on a map.



The scale of the map is 1 cm represents 5 km.

Yannis wants to build a warehouse.

The warehouse needs to be

less than 10 km from *A*,
less than 20 km from *B*.

Show by shading where Yannis can build the warehouse.

(Total for Question 9 is 3 marks)

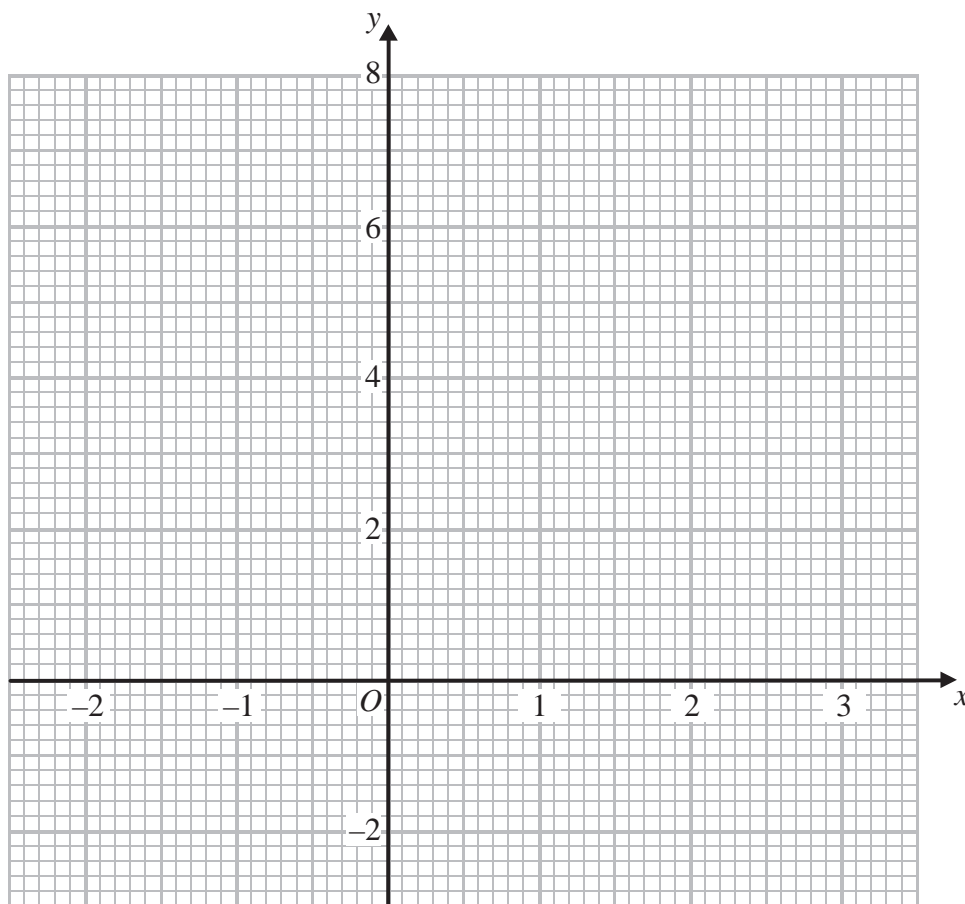


10 (a) Complete the table of values for $y = x^2 - 2x - 1$

x	-2	-1	0	1	2	3
y	7			-2	-1	

(2)

(b) On the grid, draw the graph of $y = x^2 - 2x - 1$ for values of x from $x = -2$ to $x = 3$



(2)

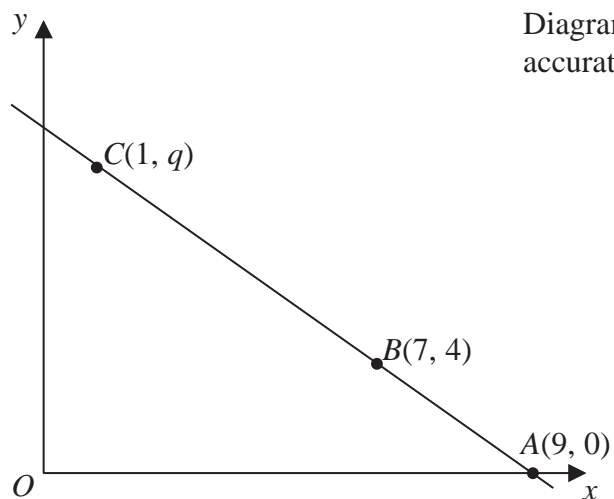
(c) Find estimates for the solutions of the equation $x^2 - 2x - 1 = 0$

.....
(2)

(Total for Question 10 is 6 marks)



11



The points A , B and C lie on a straight line.

The coordinates of A are $(9, 0)$.

The coordinates of B are $(7, 4)$.

The coordinates of C are $(1, q)$.

Work out the value of q .

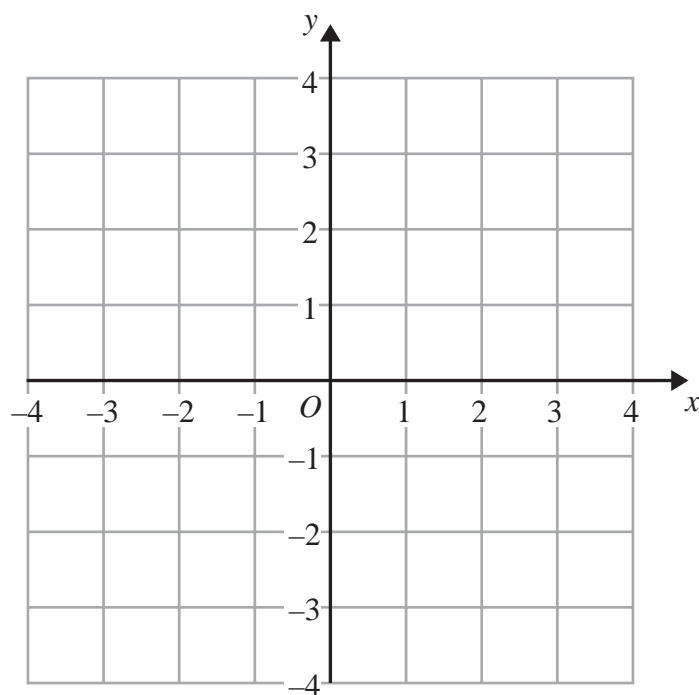
.....
(Total for Question 11 is 3 marks)



12 (a) Solve the inequality $5e + 3 > e + 12$

.....
(2)

(b) On the grid, shade the region defined by the inequality $x + y > 1$

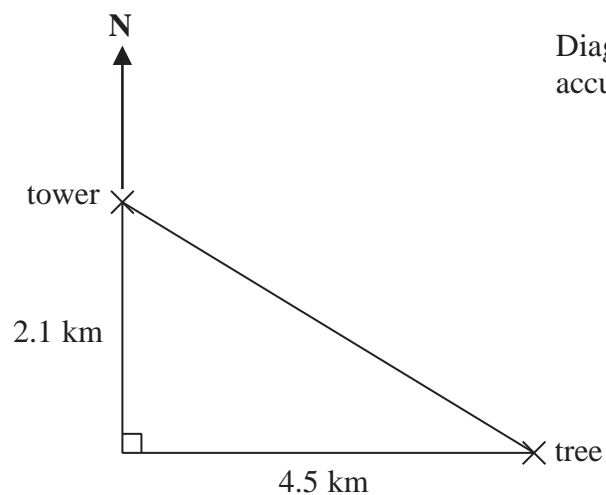


(2)

(Total for Question 12 is 4 marks)



13 The diagram shows the positions of a tower and a tree.



The tree is 2.1 km South of the tower and 4.5 km East of the tower.

- (a) Work out the distance between the tower and the tree.
Give your answer correct to one decimal place.

..... km
(3)

- (b) Work out the bearing of the tree from the tower.
Give your answer correct to the nearest degree.

.....
(4)

(Total for Question 13 is 7 marks)



14 The value of a car depreciates by 25% each year.

At the end of 2013 the value of the car was £4800

Work out the value of the car at the end of 2015

£

(Total for Question 14 is 3 marks)



15 D is directly proportional to x .

$$D = 36 \text{ when } x = 5$$

Work out the value of D when $x = 8$

$$D = \dots\dots\dots$$

(Total for Question 15 is 2 marks)

16 (a) Write 4.5×10^{-3} as an ordinary number.

.....
(1)

(b) Work out the value of $(2.5 \times 10^{-2}) \div (3.8 \times 10^3)$
Give your answer in standard form correct to 3 significant figures.

.....
(2)

(Total for Question 16 is 3 marks)



*17 Paper clips are sold in small boxes and in large boxes.

There is a total of 1115 paper clips in 4 small boxes and 5 large boxes.

There is a total of 530 paper clips in 3 small boxes and 2 large boxes.

Work out the number of paper clips in each small box and in each large box.

(Total for Question 17 is 5 marks)



*18 The diagram shows a solid wooden sphere.

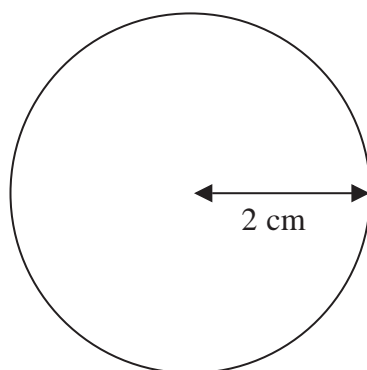


Diagram **NOT**
accurately drawn

The radius of the sphere is 2 cm.

The mass of the sphere is 45 grams.

Wood will float on the Dead Sea only when the density of the wood is less than 1.24 g/cm^3 .

Will this wooden sphere float on the Dead Sea?

(Total for Question 18 is 4 marks)



19

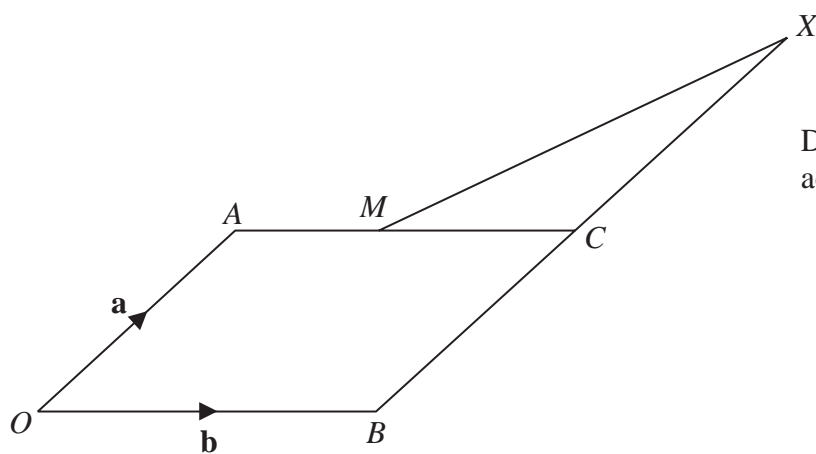


Diagram **NOT**
accurately drawn

$OACB$ is a parallelogram.

M is the midpoint of AC .

C is the midpoint of the straight line BX .

$$\vec{OA} = \mathbf{a} \quad \vec{OB} = \mathbf{b}$$

Prove that OMX is a straight line.

(Total for Question 19 is 4 marks)



20 Jerry wants to cover a triangular field, ABC , with fertiliser.

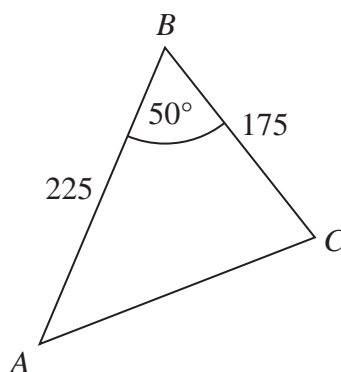


Diagram **NOT**
accurately drawn

Here are the measurements Jerry makes

angle $ABC = 50^\circ$ correct to the nearest degree,
 $BA = 225$ m correct to the nearest 5 m,
 $BC = 175$ m correct to the nearest 5 m.

Work out the upper bound for the area of the field.
 You must show your working.

..... m²

(Total for Question 20 is 3 marks)



21 Solve $\frac{4 - 2x}{x + 1} = x$

.....
(Total for Question 21 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS



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