

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

Monday 8 June 2015 – 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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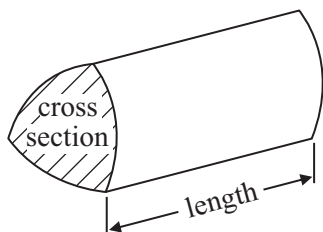
PEARSON

GCSE Mathematics 2MB01

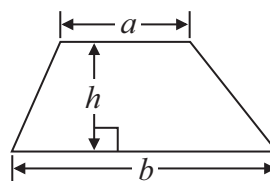
Formulae: Higher Tier

**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

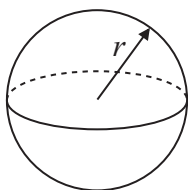


Area of trapezium = $\frac{1}{2} (a + b)h$



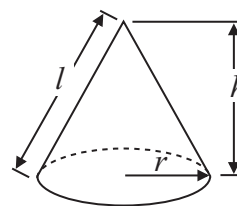
Volume of sphere = $\frac{4}{3} \pi r^3$

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

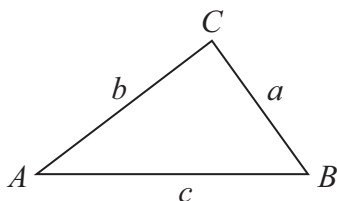


Volume of cone = $\frac{1}{3} \pi r^2 h$

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 7 calculators cost £41.65

Work out the cost of 12 of these calculators.

£.....

(Total for Question 1 is 2 marks)

2 Jane invests £300 at a simple interest rate of 4.5% per year.
At the end of each year Jane gives the interest to a charity.

Work out the least number of years it will take for the total amount given to the charity
to be greater than £50

.....
(Total for Question 2 is 3 marks)



3 (a) Solve $4(y + 3) = 19$

$y = \dots\dots\dots$
(2)

(b) Solve the inequality $2p - 8 > 7$

$\dots\dots\dots$
(2)

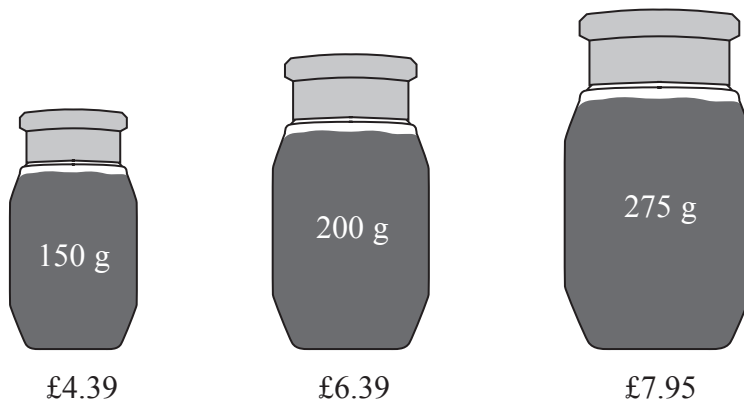
(c) Solve $x^2 + 2x - 15 = 0$

$\dots\dots\dots$
(3)

(Total for Question 3 is 7 marks)



*4 A shop sells coffee in 3 different sizes of jar.



A 150 g jar of coffee costs £4.39

A 200 g jar of coffee costs £6.39

A 275 g jar of coffee costs £7.95

Which size of jar is the best value for money?

You must show all your working.

(Total for Question 4 is 4 marks)

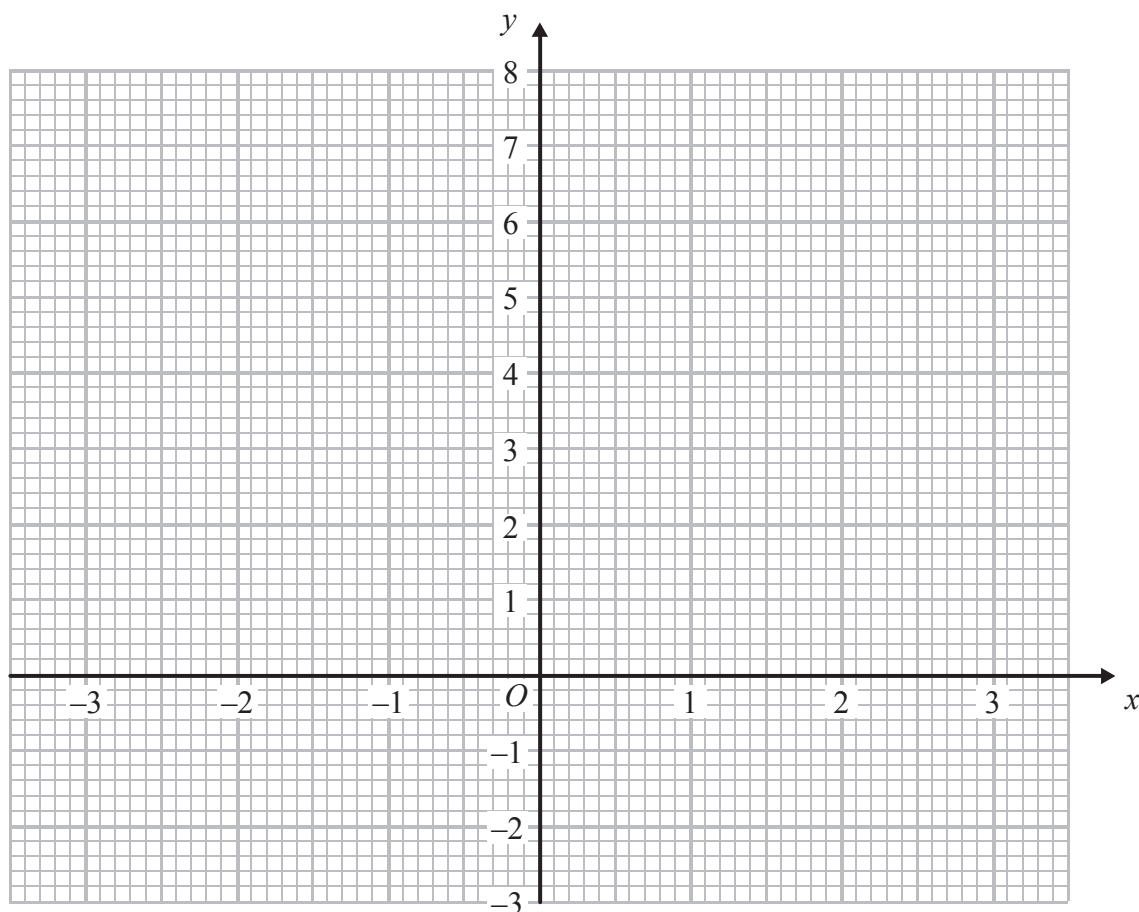


5 (a) Complete the table of values for $y = x^2 - 2$

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

(2)

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



(2)

(Total for Question 5 is 4 marks)



- 6 Asha and Lucy are selling pencils in a school shop.
They sell boxes of pencils and single pencils.

Asha sells 7 boxes of pencils and 22 single pencils.
Lucy sells 5 boxes of pencils and 2 single pencils.
Asha sells twice as many pencils as Lucy.

Work out how many pencils there are in a box.

.....
(Total for Question 6 is 4 marks)

- 7 Callum has £240
He wants to buy some tickets that cost 10 euros each.

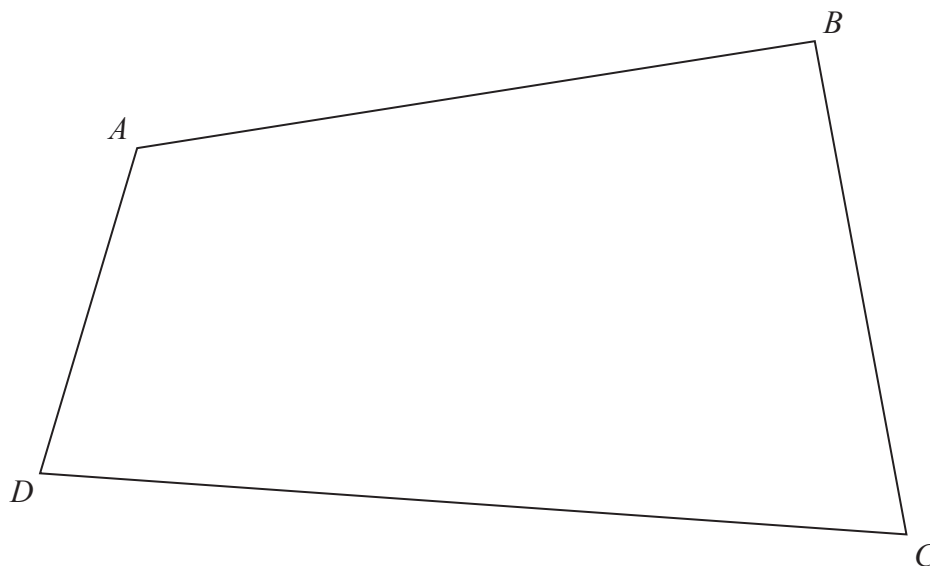
The exchange rate is $\text{£}1 = 1.20$ euros.

Work out the greatest number of tickets that Callum can buy.

.....
(Total for Question 7 is 3 marks)



8 The diagram shows the plan of a park.



Scale: 1 cm represents 100 m

A fountain in the park is equidistant from A and from C .
The fountain is exactly 700 m from D .

On the diagram, mark the position of the fountain with a cross (X).

(Total for Question 8 is 3 marks)



*9 $ABCD$ and $PQRS$ are two rectangles.

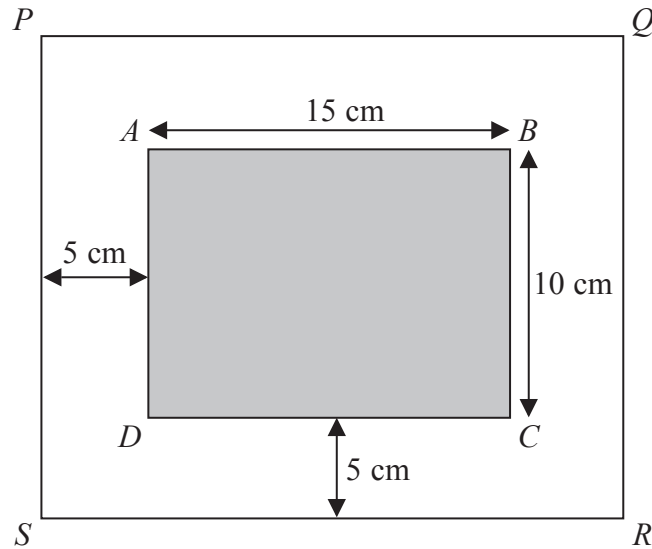


Diagram **NOT** accurately drawn

Rectangle $ABCD$ is 15 cm by 10 cm.

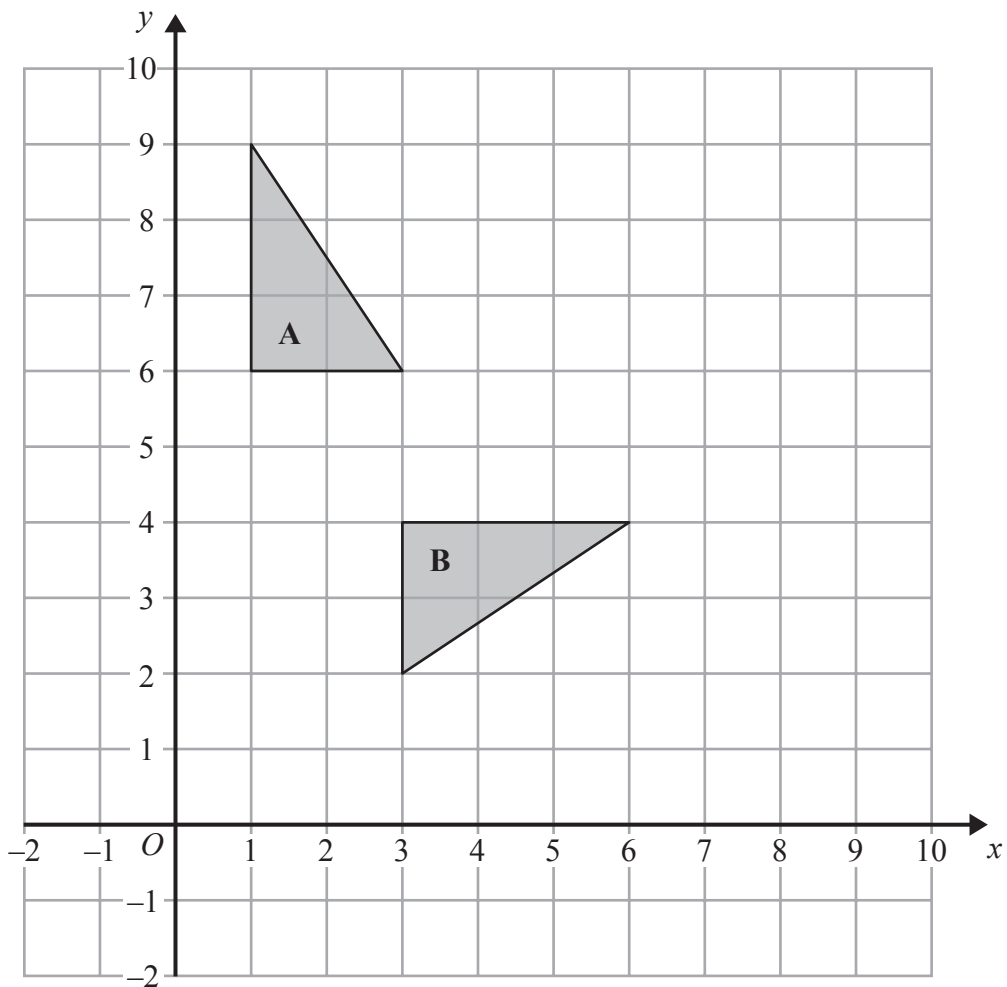
There is a space 5 cm wide between rectangle $ABCD$ and rectangle $PQRS$.

Are rectangle $ABCD$ and rectangle $PQRS$ mathematically similar?

You must show how you got your answer.

(Total for Question 9 is 3 marks)





Describe fully the single transformation that maps triangle **A** onto triangle **B**.

.....

.....

.....

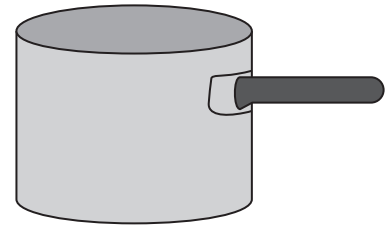
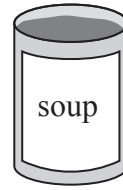
(Total for Question 10 is 3 marks)



- 11** A can of soup is a cylinder with diameter 7 cm.
The can is 10 cm high.
The can is full of soup.

The soup is poured into a saucepan.
The saucepan is a cylinder with diameter 12 cm.

Work out the depth of the soup in the saucepan.
Give your answer correct to 1 decimal place.



..... cm

(Total for Question 11 is 3 marks)

- 12** Work out $\frac{(2.6 \times 10^7) - (5 \times 10^6)}{2.8 \times 10^{-3}}$

Give your answer in standard form.

.....
(Total for Question 12 is 2 marks)



13

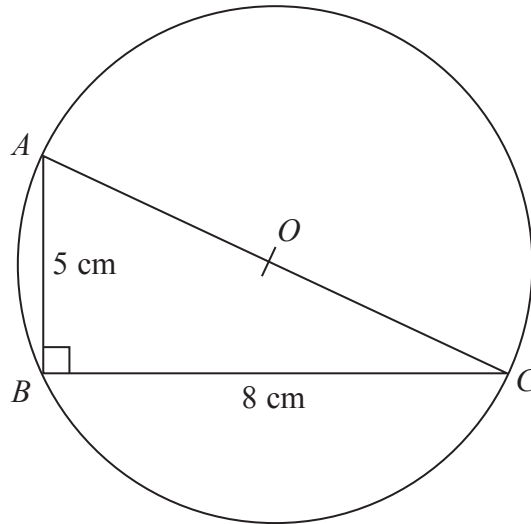


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.

A , B and C are points on the circumference of a circle centre O .

$AB = 5$ cm

$BC = 8$ cm

AOC is a diameter of the circle.

Calculate the circumference of the circle.

Give your answer correct to 3 significant figures.

..... cm

(Total for Question 13 is 4 marks)



*14

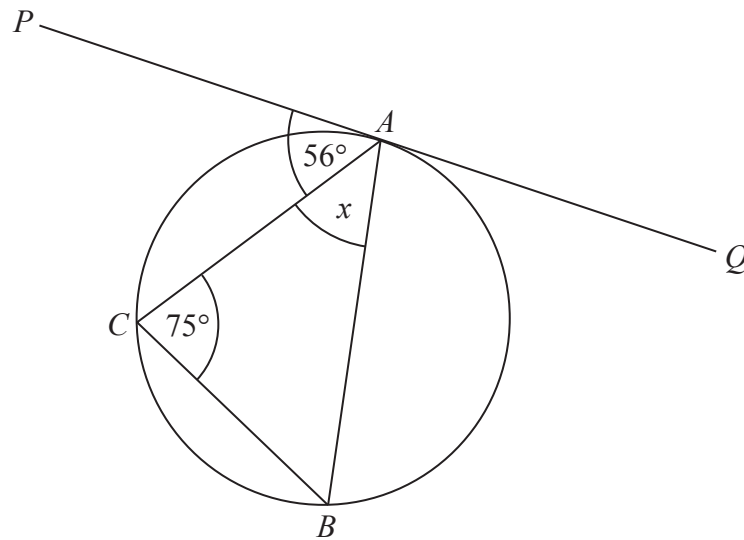


Diagram **NOT**
accurately drawn

A , B and C are points on the circumference of a circle.

The straight line PAQ is a tangent to the circle.

Angle $PAC = 56^\circ$

Angle $ACB = 75^\circ$

Work out the size of the angle marked x .

Give reasons for each stage of your working.

(Total for Question 14 is 3 marks)



15 A ball fell 2 metres onto horizontal ground.

The ball hit the ground and bounced up and down 3 times.

The first time the ball bounced, it rose to 75% of the height it fell from.

The second time the ball bounced, it rose to 75% of the height it reached after the first bounce.

The third time the ball bounced, it rose to 75% of the height it reached after the second bounce.

Work out the height the ball reached after the third bounce.

Give your answer correct to 2 decimal places.

..... m

(Total for Question 15 is 3 marks)

16 Make x the subject of the formula $y = \frac{3x}{x+5}$

.....

(Total for Question 16 is 3 marks)



17 The diagram shows a regular pentagon $ABCDE$.

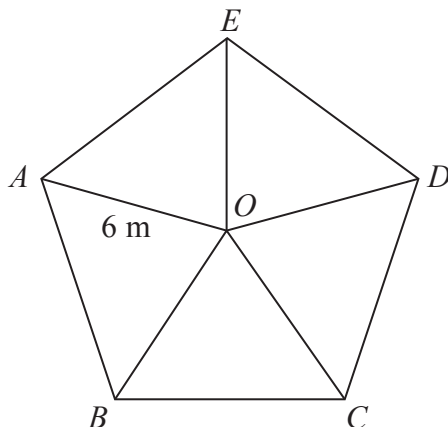


Diagram **NOT** accurately drawn

The pentagon is divided into 5 isosceles triangles.

$$OA = OB = OC = OD = OE = 6 \text{ m}$$

Work out the area of the pentagon.

Give your answer correct to 1 decimal place.

..... m²

(Total for Question 17 is 4 marks)

18 y is inversely proportional to the square of x .

$$\text{When } x = 5, y = 15$$

Write a formula for y in terms of x .

.....

(Total for Question 18 is 3 marks)



- 19 $a = 40$ correct to 1 significant figure.
 $b = 0.2$ correct to 1 significant figure.

Calculate the upper bound of $\frac{a}{b}$

.....
(Total for Question 19 is 3 marks)

- 20 The expression $x^2 - 8x + 6$ can be written in the form $(x - p)^2 + q$ for all values of x .

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

$p =$

$q =$

(3)

The graph of $y = x^2 - 8x + 6$ has a minimum point.

(b) Write down the coordinates of this point.

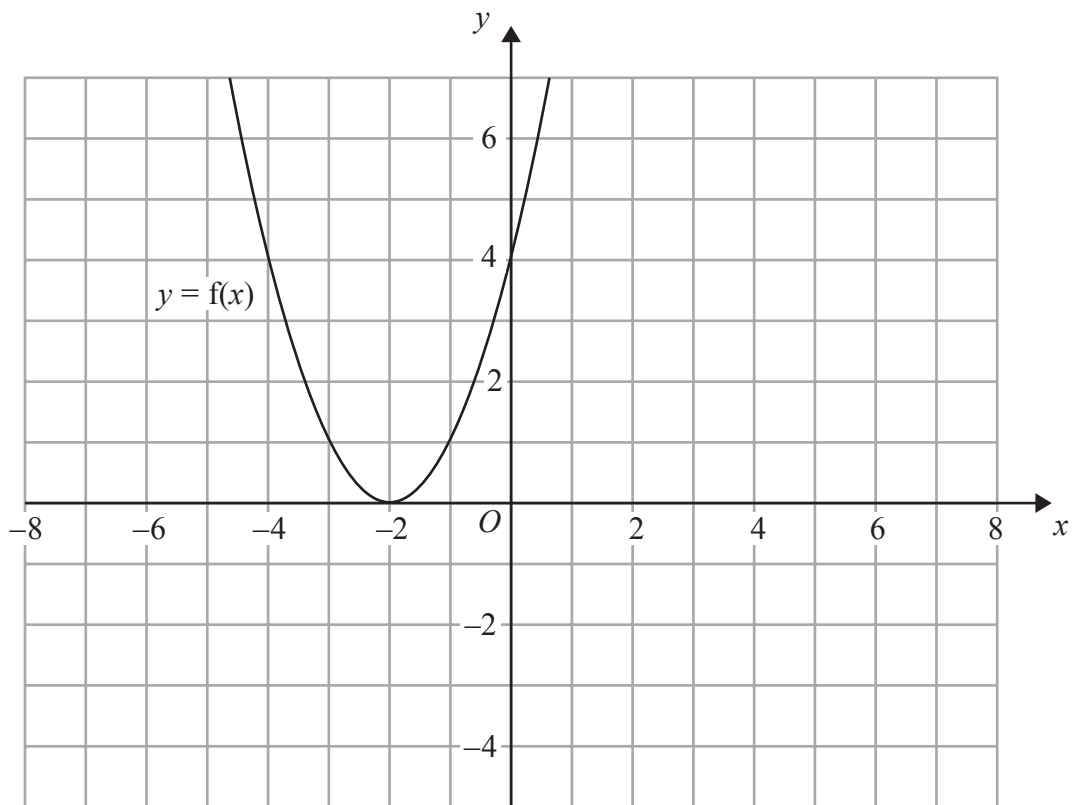
(..... ,)

(1)

(Total for Question 20 is 4 marks)



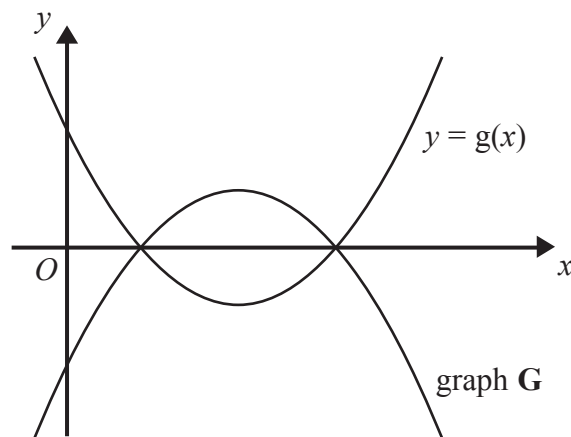
21 The graph of $y = f(x)$ is shown on the grid.



(a) On the grid above, sketch the graph of $y = f(x + 3)$

(2)

The graph of $y = g(x)$ is shown below.



The graph **G** is the reflection of $y = g(x)$ in the x -axis.

(b) Write down an equation of graph **G**.

(1)

(Total for Question 21 is 3 marks)



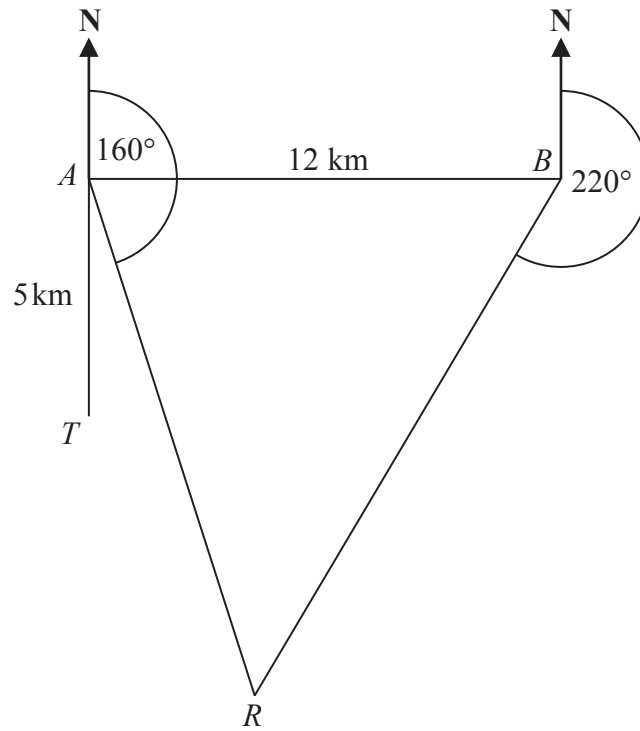


Diagram **NOT**
accurately drawn

There is a coastguard station at point A and at point B .
 B is due East of A .
 The distance from A to B is 12 km.

There is a rowing boat at point R .
 R is on a bearing of 160° from A .
 R is on a bearing of 220° from B .

There is a speedboat at point T .
 T is 5 km due South of A .

Work out the shortest distance from T to R .
 Give your answer correct to 1 decimal place.
 You must show all your working.



..... km

(Total for Question 22 is 5 marks)



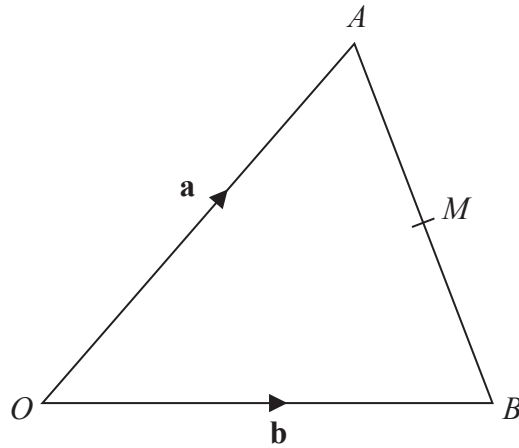


Diagram **NOT**
accurately drawn

OAB is a triangle.

$$\vec{OA} = \mathbf{a}$$

$$\vec{OB} = \mathbf{b}$$

M is the midpoint of AB .

OMN is a straight line such that $ON : OM = 3 : 2$

Find, in terms of \mathbf{a} and \mathbf{b} , an expression for the vector \vec{ON} .
Write your answer in its simplest form.

(Total for Question 23 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

