Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

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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P 4 4 7 9 2 A 0 1 2 0

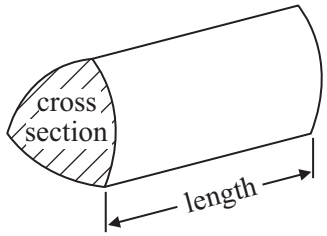
PEARSON

GCSE Mathematics 2MB01

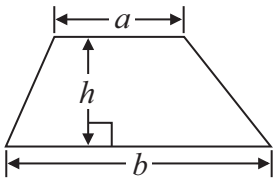
Formulae: Higher Tier

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 × length

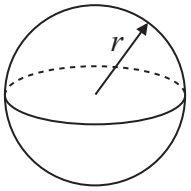


Area of trapezium = $\frac{1}{2}(a + b)h$



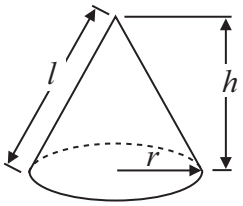
Volume of sphere = $\frac{4}{3}\pi r^3$

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

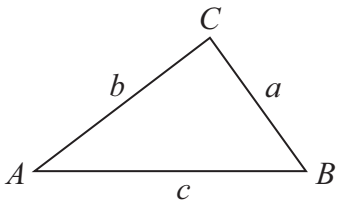


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = πrl



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 $4(y + 3) = 19$

$y =$ .....

(2)

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

.....

(2)

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

.....

(3)

(Total for Question 3 is 7 marks)

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

£4.39 £6.39 £7.95

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.

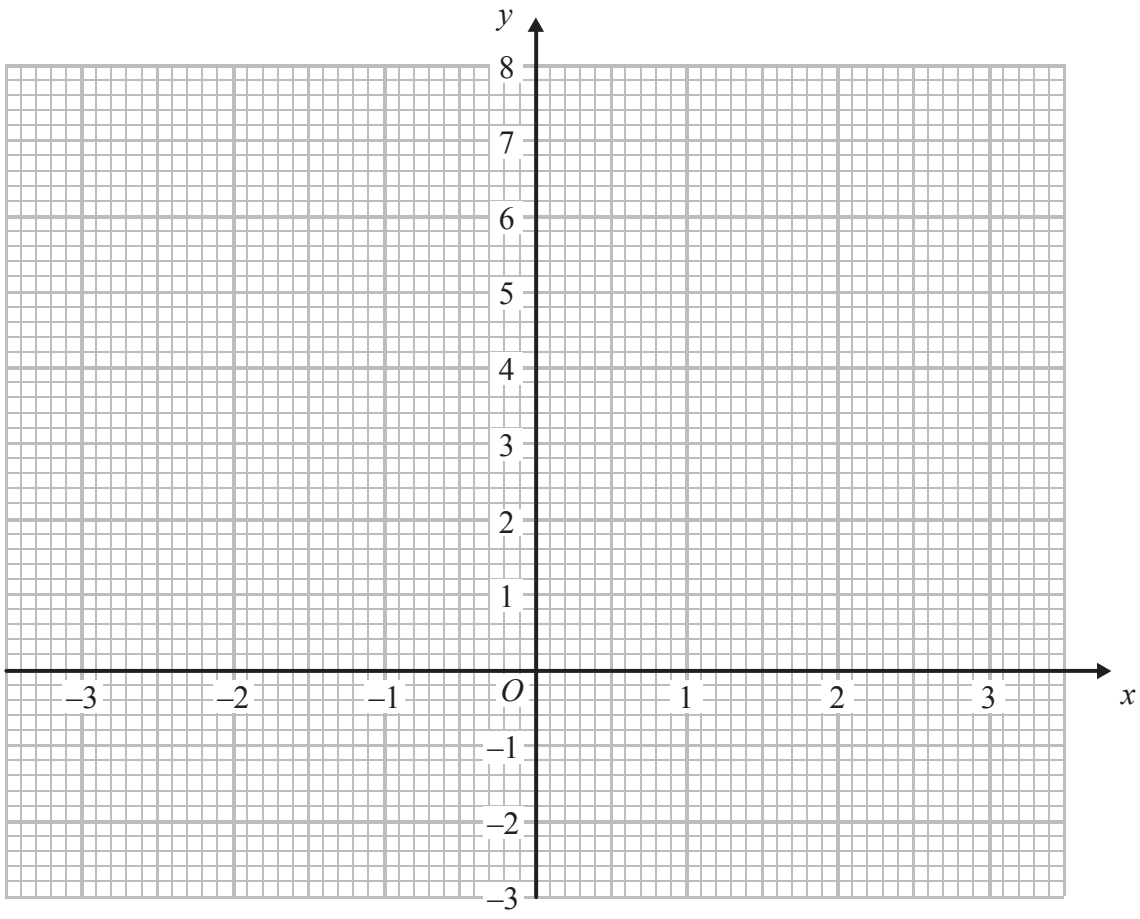
(Total for Question 4 is 4 marks)

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.

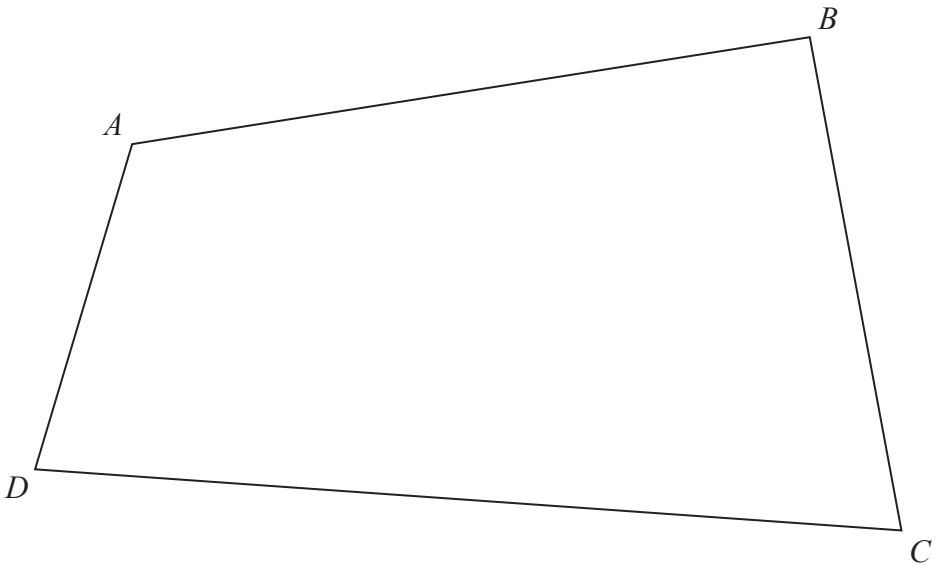
The exchange rate is £1 = 1.20 euros.

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 (×).

(Total for Question 8 is 3 marks)

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

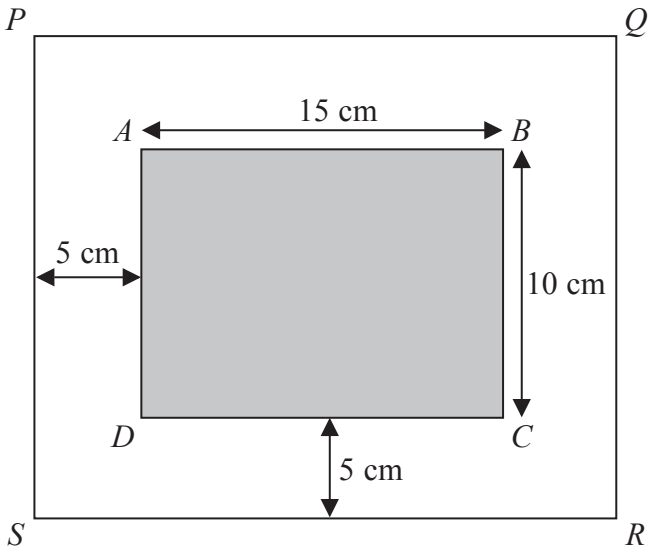


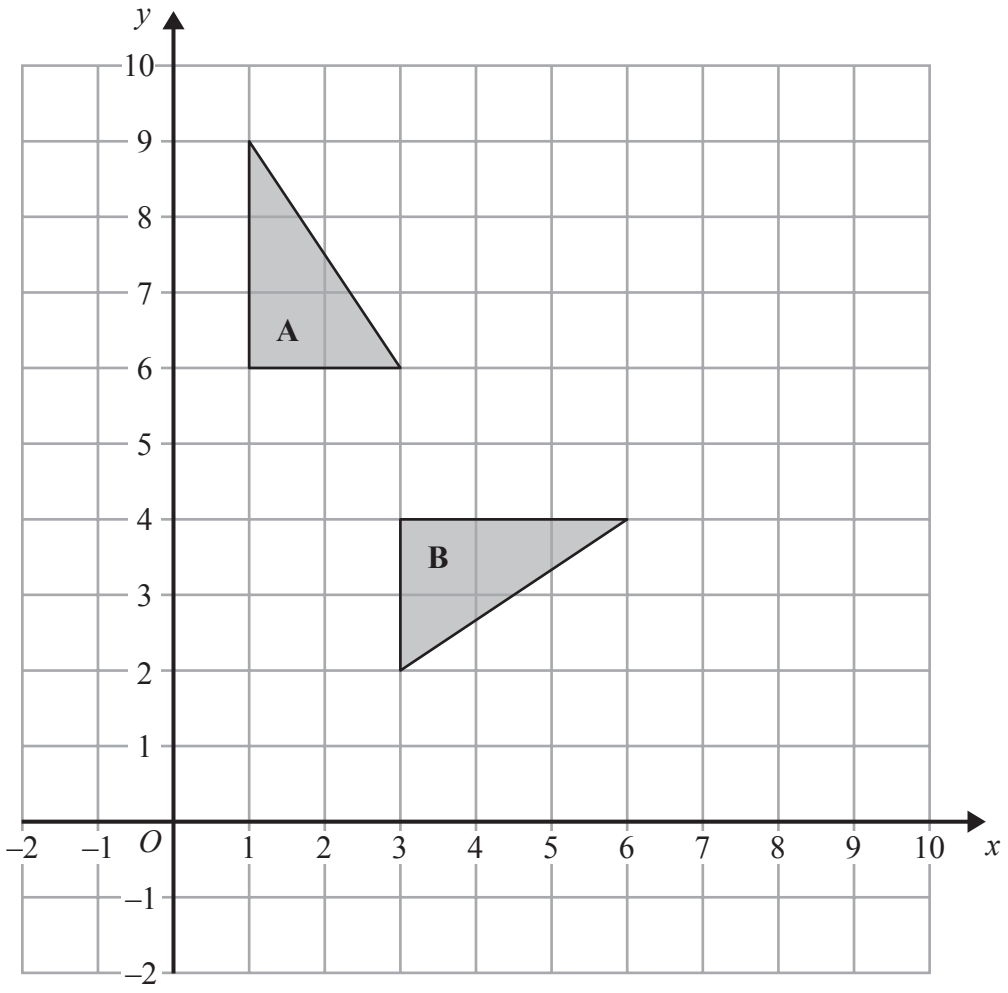
Diagram **NOT** accurately drawn

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)

10



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

.....

.....

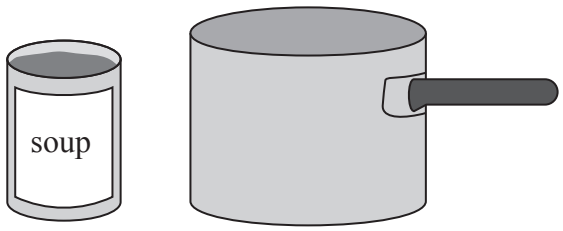
.....

(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 $\dfrac{(2.6 \times 10^7) - (5 \times 10^6)}{2.8 \times 10^{-3}}$

Give your answer in standard form.

.....

(Total for Question 12 is 2 marks)

13

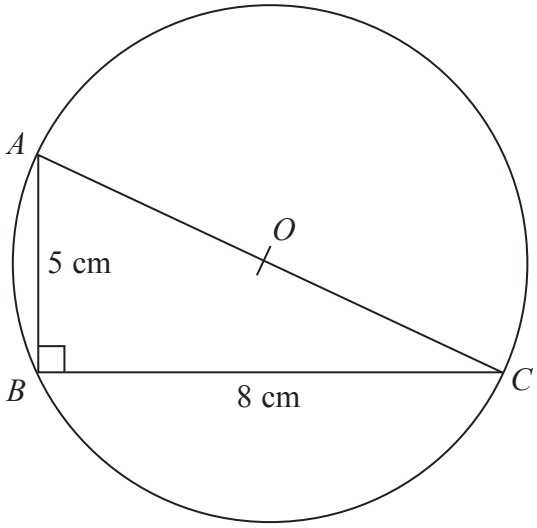


Diagram **NOT** accurately drawn

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**

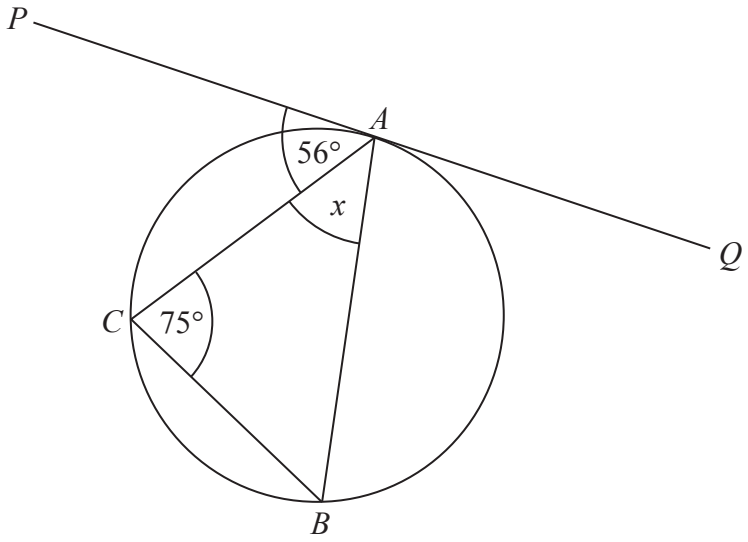


Diagram **NOT** accurately drawn

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°
Angle *ACB* = 75°

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 $y = \dfrac{3x}{x + 5}$

.....

(Total for Question 16 is 3 marks)

17 The diagram shows a regular pentagon *ABCDE*.

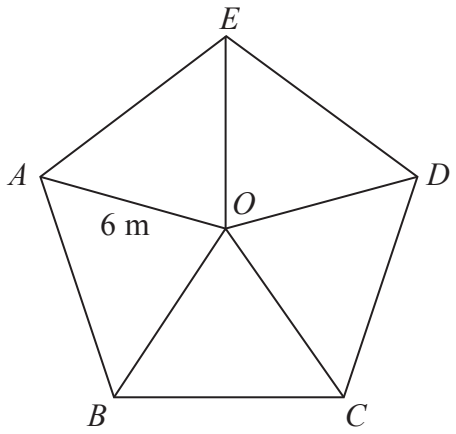


Diagram **NOT** accurately drawn

The pentagon is divided into 5 isosceles triangles.
$OA = OB = OC = OD = OE = 6$ m

Work out the area of the pentagon.
Give your answer correct to 1 decimal place.

..... m^2

(Total for Question 17 is 4 marks)

18 y is inversely proportional to the square of x.
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.

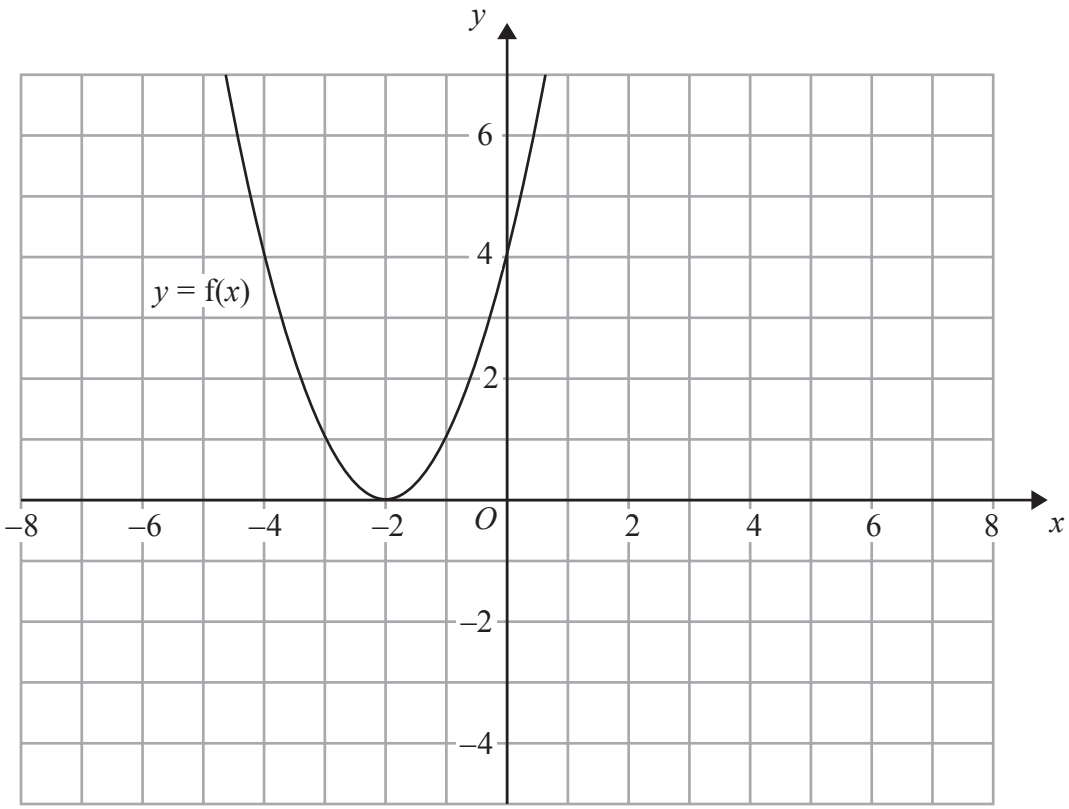
(b) Write down the coordinates of this point.

(..... , ...)

(1)

(Total for Question 20 is 4 marks)

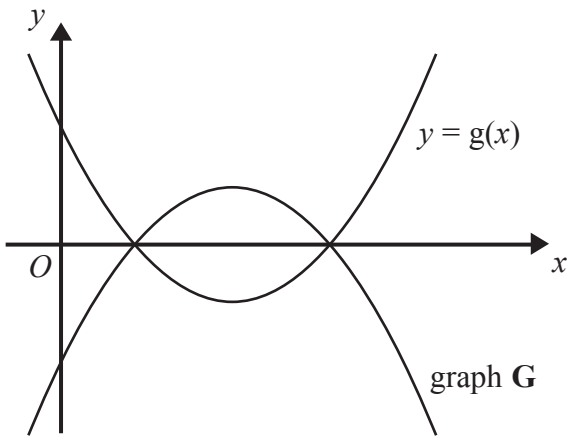
21 The graph of $y = f(x)$ is shown on the grid.



(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)

22

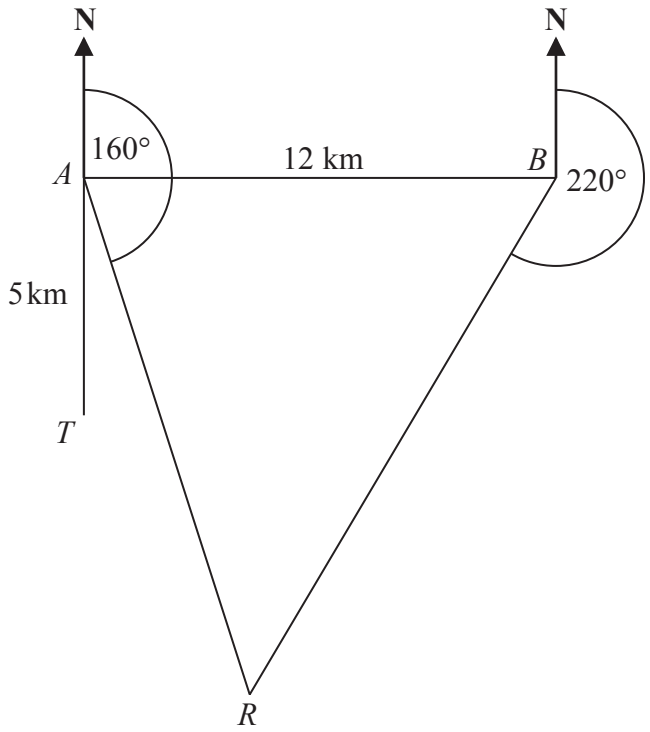


Diagram **NOT** accurately drawn

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)

23

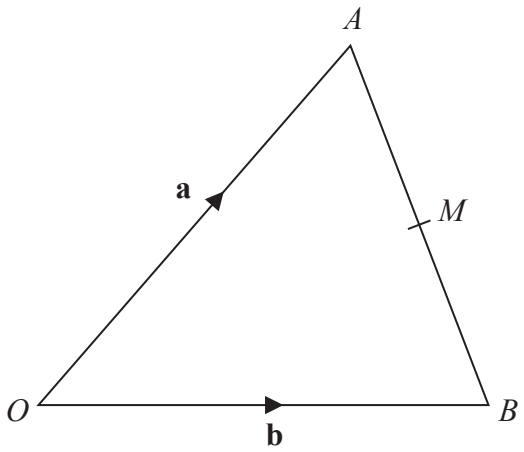


Diagram **NOT** accurately drawn

OAB is a triangle.

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

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

M is the midpoint of *AB*.
OMN is a straight line such that *ON* : *OM* = 3 : 2

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

.....

(Total for Question 23 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS