

Write your name here

Surname

Other names

Centre Number

Candidate Number

Edexcel GCSE

Mathematics B

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

Higher Tier

Monday 17 June 2013 – 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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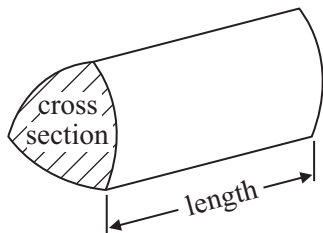
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GCSE Mathematics 2MB01

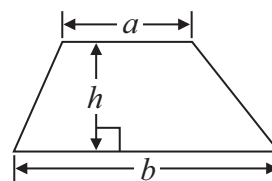
Formulae: Higher Tier

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

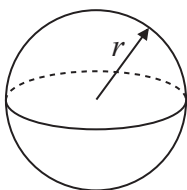


Area of trapezium = $\frac{1}{2} (a + b)h$



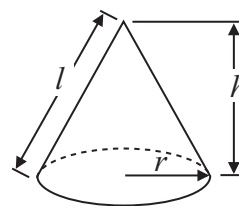
Volume of sphere = $\frac{4}{3} \pi r^3$

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

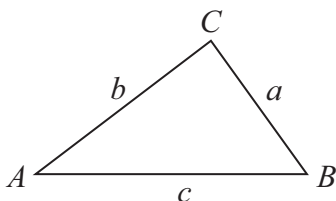


Volume of cone = $\frac{1}{3} \pi r^2 h$

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.

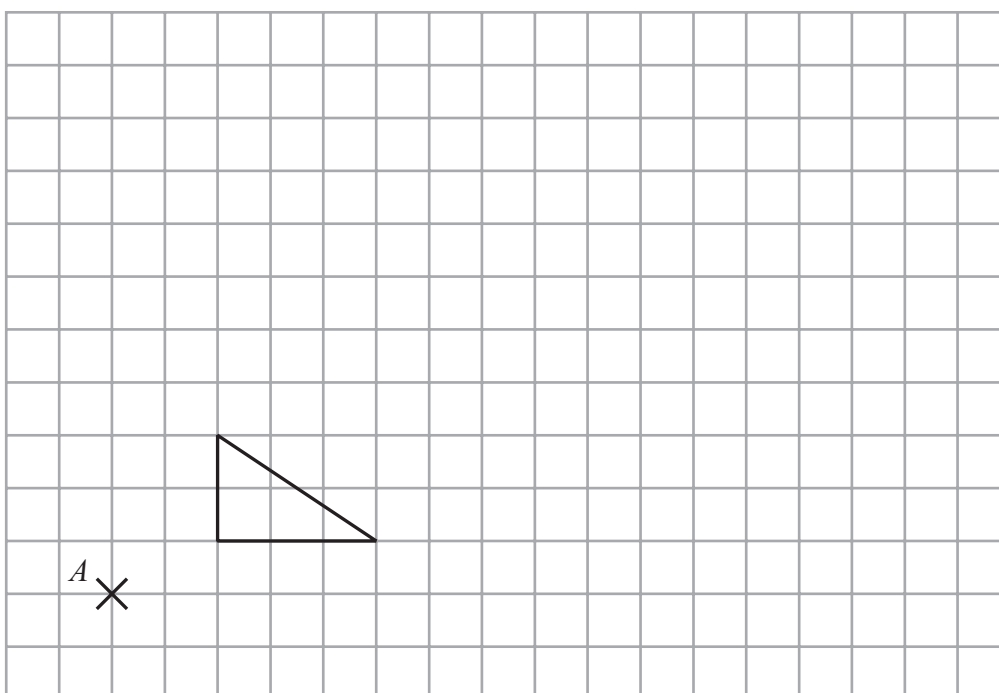
You must write down all stages in your working.

- 1** The cost of 6 cups is £7.80
Work out the cost of 10 of these cups.

£.....

(Total for Question 1 is 2 marks)

2



On the grid, enlarge the shape with scale factor 3, centre A .

(Total for Question 2 is 3 marks)



- 3 Use your calculator to work out $\frac{\sqrt{40.96}}{7.1 - 2.48}$

Write down all the figures on your calculator display.
You must give your answer as a decimal.

(Total for Question 3 is 2 marks)

- *4 The diagram shows a flower bed in the shape of a circle.

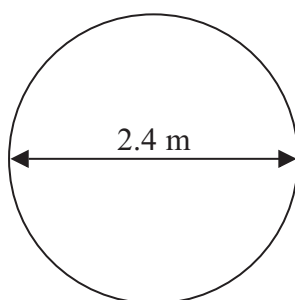


Diagram **NOT**
accurately drawn

The flower bed has a diameter of 2.4 m.

Sue is going to put a plastic strip around the edge of the flower bed.
The plastic strip is sold in 2 metre rolls.

How many rolls of plastic strip does Sue need to buy?
You must show all your working.

(Total for Question 4 is 4 marks)



5 $k = 3e + 5$

(a) Work out the value of k when $e = -2$

.....
(2)

(b) Solve $4y + 3 = 2y + 14$

$y =$
(2)

(c) Solve $3(x - 5) = 21$

$x =$
(2)

$-3 < n < 4$

n is an integer.

(d) Write down all the possible values of n .

.....
(2)

(Total for Question 5 is 8 marks)



- 6 The diagram shows the position of two boats, B and C .



Boat T is on a bearing of 060° from boat B .
Boat T is on a bearing of 285° from boat C .

In the space above, draw an accurate diagram to show the position of boat T .

Mark the position of boat T with a cross ($\times$).
Label it T .

(Total for Question 6 is 3 marks)



7 Petra booked a family holiday.

The total cost of the holiday was £3500 **plus** VAT at 20%.

Petra paid £900 of the total cost when she booked the holiday.

She paid the rest of the total cost in 6 equal monthly payments.

Work out the amount of each monthly payment.

£.....

(Total for Question 7 is 5 marks)



- 8 Dan has some marbles.
Ellie has twice as many marbles as Dan.
Frank has 15 marbles.

Dan, Ellie and Frank have a total of 63 marbles.

How many marbles does Dan have?

.....
(Total for Question 8 is 3 marks)



*9 Ketchup is sold in three different sizes of bottle.



Small bottle



Medium bottle



Large bottle

A small bottle contains 342 g of ketchup and costs 88p

A medium bottle contains 570 g of ketchup and costs £1.95

A large bottle contains 1500 g of ketchup and costs £3.99

Which bottle is the best value for money?

You must show your working.

(Total for Question 9 is 4 marks)



10 $G H J$ is a right-angled triangle.

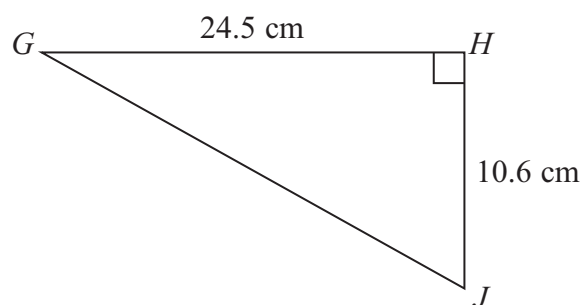


Diagram **NOT**
accurately drawn

- (a) Calculate the length of GJ .
Give your answer correct to one decimal place.

..... cm
(3)

LMN is a different right-angled triangle.

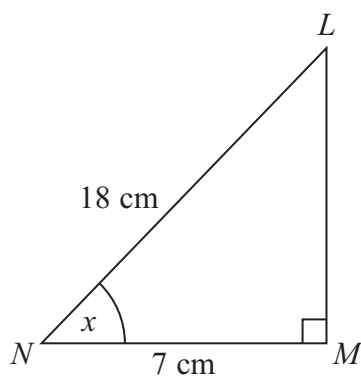


Diagram **NOT**
accurately drawn

- (b) Calculate the size of the angle marked x .
Give your answer correct to one decimal place.

.....
(3)

(Total for Question 10 is 6 marks)



11 The equation

$$x^3 - 6x = 84$$

has a solution between 4 and 5

Use a trial and improvement method to find this solution.

Give your answer correct to one decimal place.

You must show all your working.

.....
(Total for Question 11 is 4 marks)

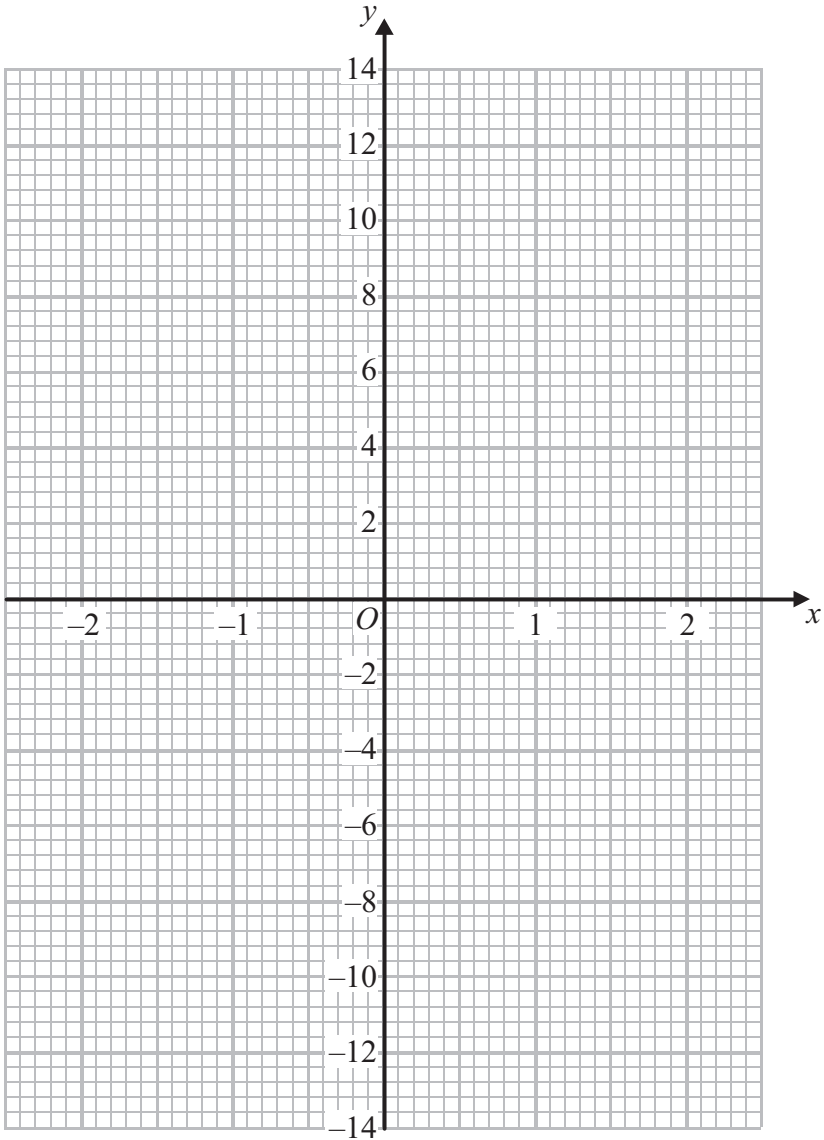


12 (a) Complete this table of values for $y = x^3 + 2x - 1$

x	-2	-1	0	1	2
y		-4			11

(2)

(b) On the grid, draw the graph of $y = x^3 + 2x - 1$



(2)

(Total for Question 12 is 4 marks)



13 Solve the simultaneous equations

$$3x + 10y = 7$$

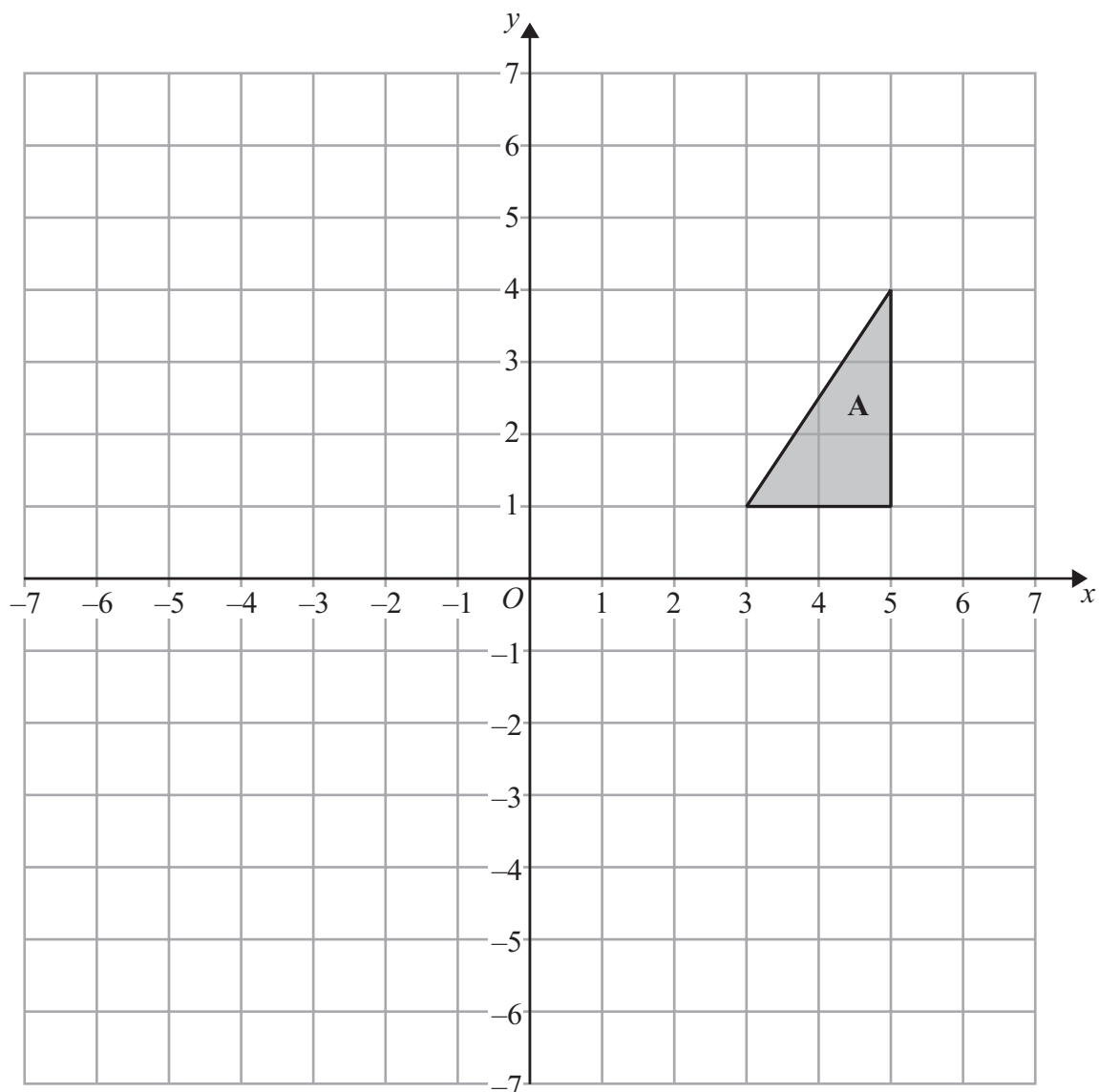
$$x - 4y = 6$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(Total for Question 13 is 3 marks)





Triangle **A** is reflected in the x -axis to give triangle **B**.

Triangle **B** is then reflected in the line $x = 1$ to give triangle **C**.

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

.....

.....

.....

(Total for Question 14 is 3 marks)



***15** Ella wants to invest £6000 in a savings account for 2 years.

She finds information about savings accounts at two different banks.

Northway Bank
Compound interest
of
3.8% per annum

Portland Bank
Compound interest
of
5% per annum in year 1
3.2% per annum in year 2

Ella wants to choose the bank that pays the greater total amount of interest for the 2 years.

Which bank should she choose?
You must show all your working.

(Total for Question 15 is 4 marks)



16 Work out $\frac{4 \times 10^9 + 3.2 \times 10^7}{1.6 \times 10^{-6}}$

Give your answer in standard form.

.....
(Total for Question 16 is 2 marks)

17 T is inversely proportional to d^2

$T = 160$ when $d = 8$

Find the value of T when $d = 0.5$

.....
(Total for Question 17 is 3 marks)



18 Solve $5x^2 + 6x - 2 = 0$

Give your solutions correct to 2 decimal places.

.....
(Total for Question 18 is 3 marks)



P 4 3 6 1 4 A 0 1 7 2 0

19 ABC is a triangle.

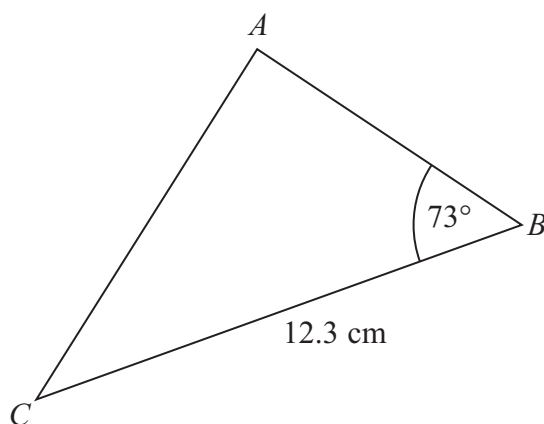


Diagram **NOT**
accurately drawn

$BC = 12.3$ cm

Angle $ABC = 73^\circ$

The area of triangle ABC is 50 cm².

Work out the length of AC .

Give your answer correct to 3 significant figures.

..... cm

(Total for Question 19 is 6 marks)



20 OAB is a triangle.

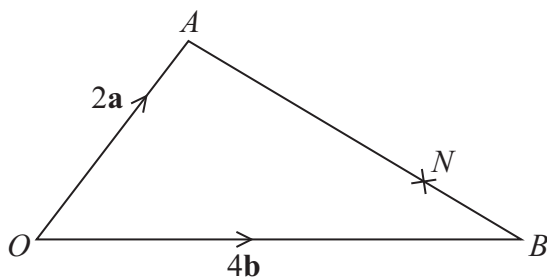


Diagram **NOT**
accurately drawn

N is the point on AB such that $AN : NB = 3 : 1$

$$\vec{OA} = 2\mathbf{a}$$

$$\vec{OB} = 4\mathbf{b}$$

(a) Find $\vec{AB}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.

(1)

(b) Find $\vec{ON}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.
Give your vector in its simplest form.

(3)

(Total for Question 20 is 4 marks)

Turn over for Question 21



21 Sasha drops a ball from a height of d metres onto the ground.

The time, t seconds, that the ball takes to reach the ground is given by

$$t = \sqrt{\frac{2d}{g}}$$

where $g \text{ m/s}^2$ is the acceleration due to gravity.

$d = 35.6$ correct to 3 significant figures.

$g = 9.8$ correct to 2 significant figures.

(a) Write down the lower bound of d .

.....
(1)

(b) Calculate the lower bound of t .
You must show all your working.

.....
(3)

(Total for Question 21 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

