

Write your name here

Surname

Other names

Centre Number

Candidate Number

**Edexcel GCSE**

# Mathematics B

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

**Higher Tier**

Wednesday 6 March 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  $\pi$  button, take the value of  $\pi$  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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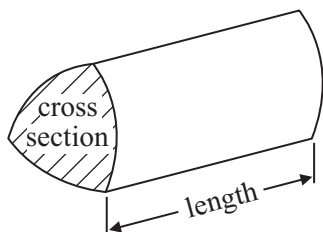
**PEARSON**

## GCSE Mathematics 2MB01

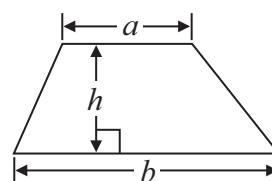
Formulae: Higher Tier

**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

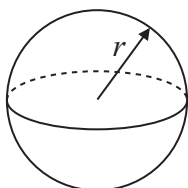


**Area of trapezium** =  $\frac{1}{2} (a + b)h$



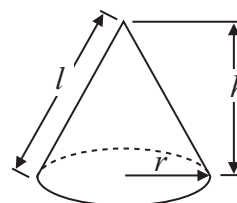
**Volume of sphere** =  $\frac{4}{3} \pi r^3$

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

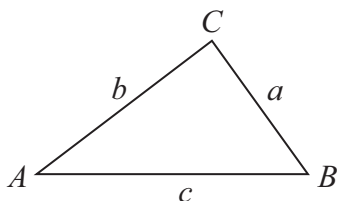


**Volume of cone** =  $\frac{1}{3} \pi r^2 h$

**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** Soap powder is sold in two sizes of box.

<p style="text-align: center;"><b>Small</b></p> <p style="text-align: center;">1.75 kg for £4.20</p>
--

<p style="text-align: center;"><b>Large</b></p> <p style="text-align: center;">3.5 kg for £8.68</p>
---

Which size of box gives the better value for money?  
Explain your answer.

---

**(Total for Question 1 is 3 marks)**



- 2 A taxi company uses this formula to calculate taxi fares.

$$f = 7d^2 + 320$$

where  $f$  is the taxi fare, in pence, and  $d$  is the distance travelled, in km.

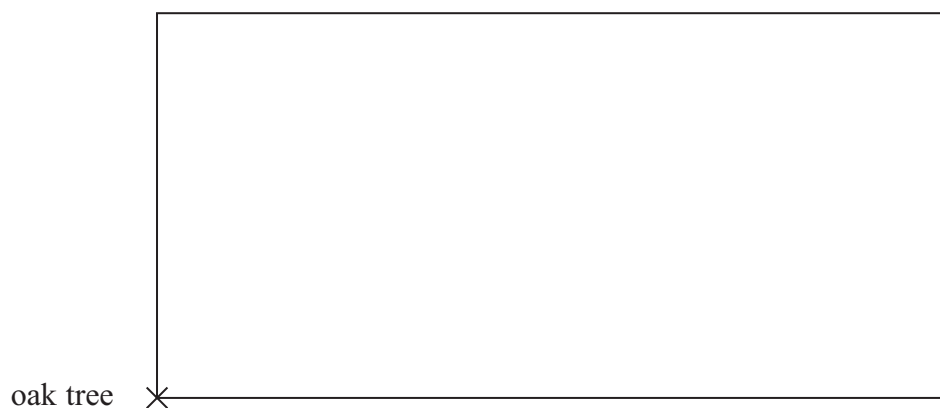
Aziz uses this taxi company to travel a distance of 8 km.

Work out the taxi fare.

.....

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

- 3 Here is a scale drawing of Gilda's garden.



Scale: 1 cm represents 1 m

Gilda is going to plant an elm tree in the garden.

She must plant the elm tree at least 4 metres from the oak tree.

On the diagram, show by shading the region where Gilda can plant the elm tree.

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



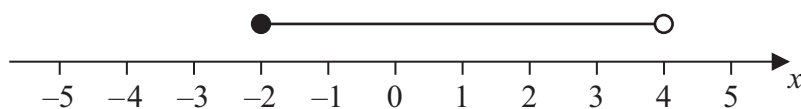
4  $-4 < n \leq 1$

$n$  is an integer.

(a) Write down all the possible values of  $n$ .

.....  
(2)

(b) Write down the inequalities represented on the number line.



.....  
(2)

**(Total for Question 4 is 4 marks)**

5 Here is a circle.

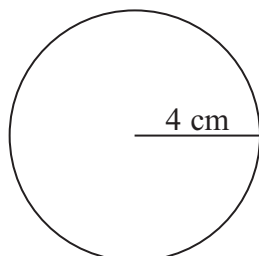


Diagram **NOT**  
accurately drawn

The radius of the circle is 4 cm.

Work out the circumference of the circle.

..... cm

**(Total for Question 5 is 2 marks)**

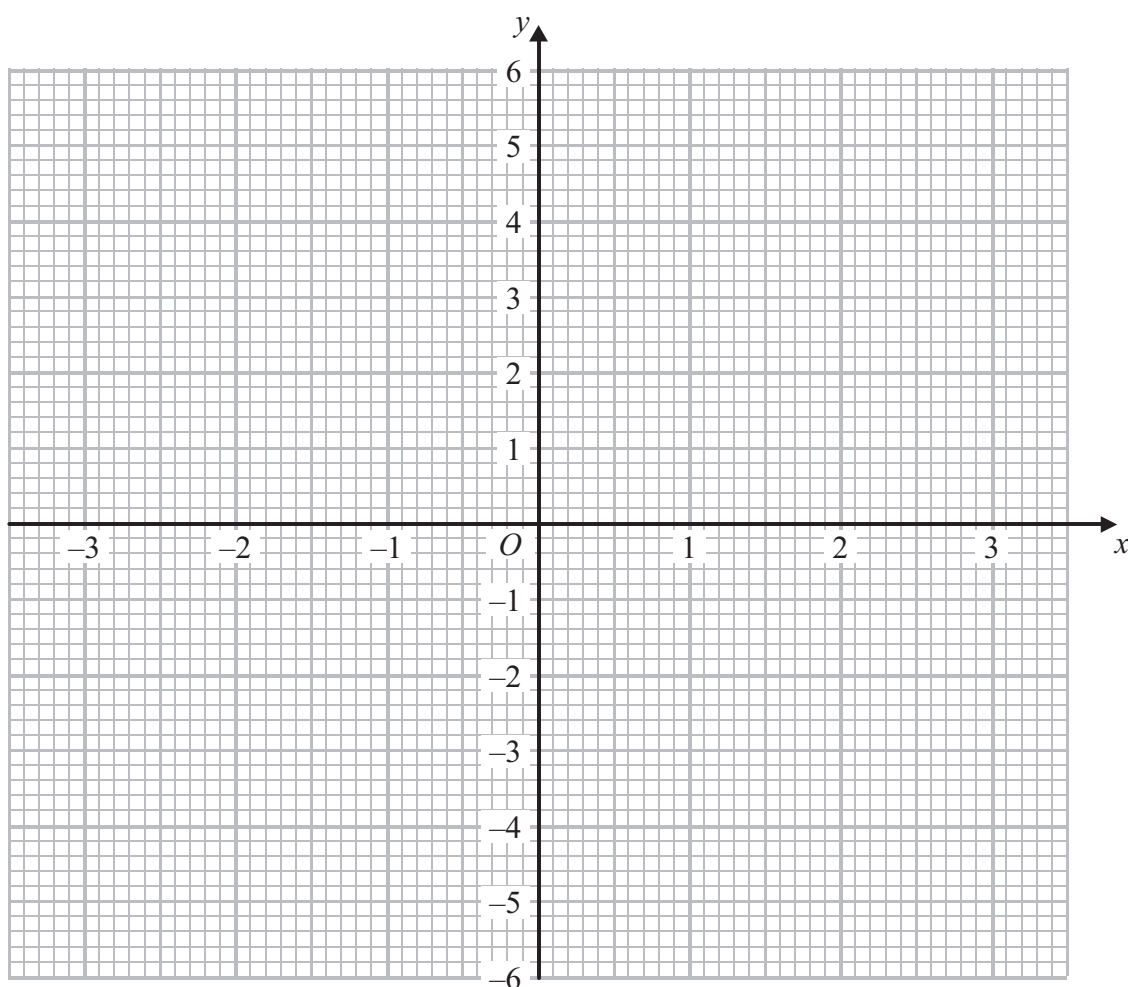


6 (a) Complete the table of values for  $y = x^2 - 4$

$x$	-3	-2	-1	0	1	2	3
$y$		0	-3			0	5

(2)

(b) On the grid, draw the graph of  $y = x^2 - 4$  for  $x = -3$  to  $x = 3$

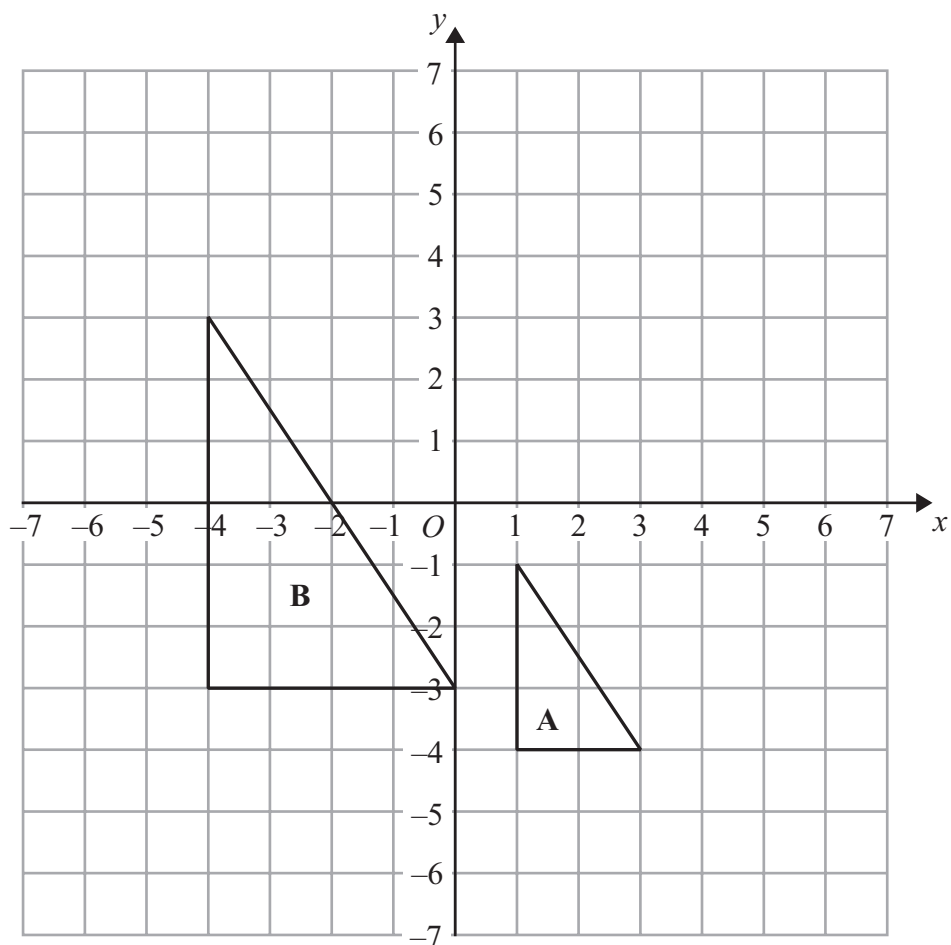


(2)

(Total for Question 6 is 4 marks)



7



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

.....

.....

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



\*8 Zara is the manager of a shop.

The table gives information about the expenses the shop had last year.

Expense	Wages	Rent	Goods	Other expenses
Amount	£92 000	£10 800	£72 000	£7000

This year

the wages will increase by 7.5%,

the rent will be  $\frac{7}{9}$  of the rent last year,

the other expenses will halve.

Zara wants to increase the amount of money she spends on goods.

She also wants the total expenses the shop has this year to be the same as last year.

Can Zara increase the amount of money she spends on goods?

(Total for Question 8 is 4 marks)





- 9 (a) Work out the value of  $\frac{\sqrt{30}}{2.5^2}$

Give your answer correct to 3 decimal places.

.....  
(2)

- (b) Change  $4.5 \text{ km}^2$  to  $\text{m}^2$ .

.....  $\text{m}^2$   
(2)

**(Total for Question 9 is 4 marks)**

---



10 The equation

$$x^3 - 2x = 30$$

has a solution between 3 and 4

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 10 is 4 marks)

---



**11** Sam has a swimming pool.

There are 60 000 litres of water in the swimming pool.

Sam wants to put chlorine powder in the water.

She needs 0.75 mg of chlorine powder for each litre of water.

Work out the total amount of chlorine powder Sam needs.

Give your answer in grams.

..... g

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

**12** (a) Solve  $2x + 3 = x - 4$

$x =$  .....  
(2)

(b) Solve  $4(x - 5) = 14$

$x =$  .....  
(2)

**(Total for Question 12 is 4 marks)**



**\*13** Here are two schemes for investing £2500 for 2 years.

**Scheme A**

gives 4% **simple** interest each year.

**Scheme B**

gives 3.9% **compound** interest each year.

Which scheme gives the most total interest over 2 years?

You must show all your working.

---

(Total for Question 13 is 4 marks)



14 Solve the simultaneous equations

$$3x - 2y = 7$$

$$7x + 2y = 13$$

.....  
(Total for Question 14 is 3 marks)

---



15 (a) Write 0.0037 in standard form.

.....  
(1)

(b) Write  $4.9 \times 10^4$  as an ordinary number.

.....  
(1)

(c) Work out the value of

$$\frac{500}{250 \times 10^3}$$

Give your answer in standard form.

.....  
(2)

**(Total for Question 15 is 4 marks)**

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16 Here is a vase in the shape of a cylinder.

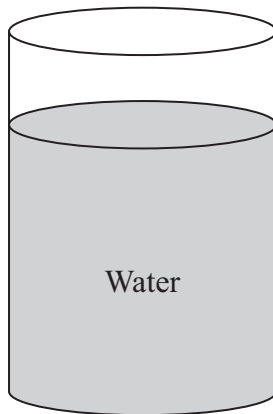


Diagram **NOT**  
accurately drawn

←5 cm→

The vase has a radius of 5 cm.

There are  $1000 \text{ cm}^3$  of water in the vase.

Work out the depth of the water in the vase.

Give your answer correct to 1 decimal place.

..... cm

**(Total for Question 16 is 3 marks)**



17 Make  $x$  the subject of  $4x - 3 = 2(x + y)$

$x = \dots\dots\dots$

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

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18

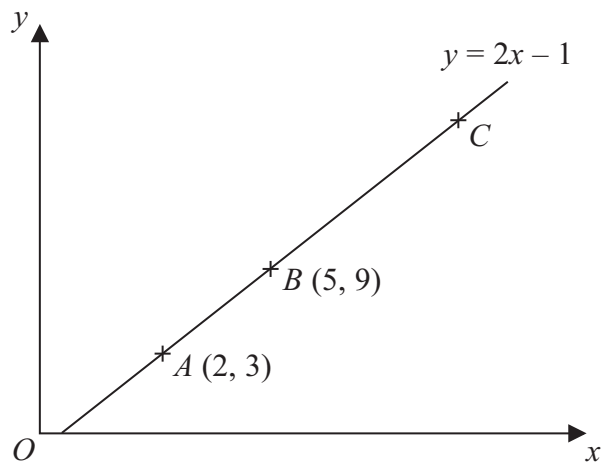


Diagram **NOT**  
accurately drawn

In the diagram,

the points  $A$ ,  $B$  and  $C$  lie on the straight line  $y = 2x - 1$

The coordinates of  $A$  are  $(2, 3)$ .

The coordinates of  $B$  are  $(5, 9)$ .

Given that  $AC = 3AB$ , find the coordinates of  $C$ .

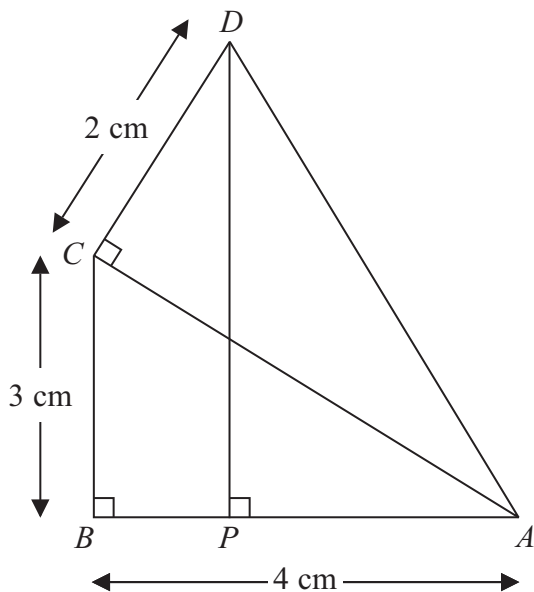
(....., .....) )

(Total for Question 18 is 3 marks)



19

Diagram NOT accurately drawn



In the diagram,

- $ABC$ ,  $ACD$  and  $APD$  are right-angled triangles.
- $AB = 4$  cm.
- $BC = 3$  cm.
- $CD = 2$  cm.

Work out the length of  $DP$ .

..... cm

(Total for Question 19 is 5 marks)



20 Solve  $2x^2 + 5x - 3 = 0$

.....  
(Total for Question 20 is 3 marks)

21 A solid sphere has

a mass of 1180 g measured to the nearest gram  
and a radius of 6.2 cm measured to the nearest millimetre.

Given that

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

find the upper bound for the density of the sphere.  
Give your answer to 3 significant figures.

..... g/cm<sup>3</sup>

(Total for Question 21 is 4 marks)



22

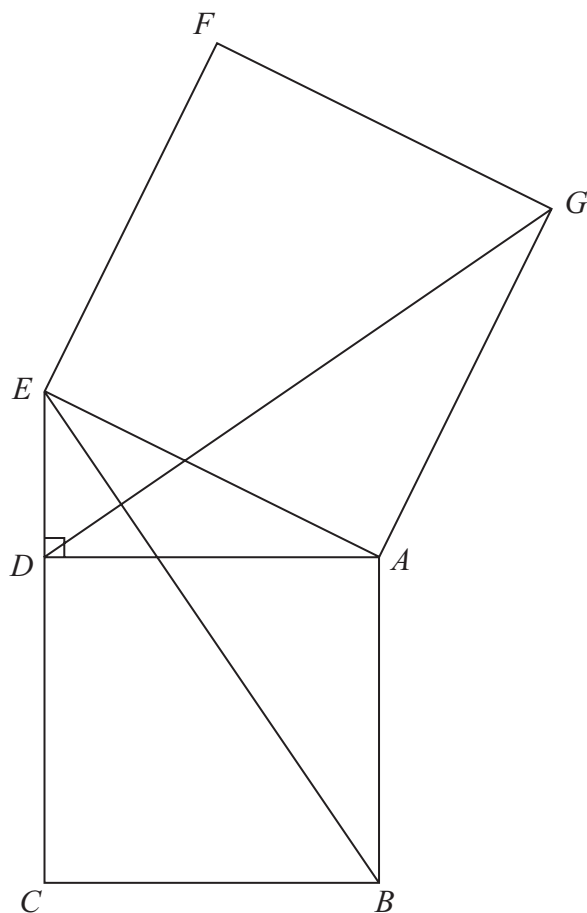


Diagram NOT  
accurately drawn

In the diagram,

$ADE$  is a right-angled triangle,  
 $ABCD$  and  $AEFG$  are squares.

Prove that triangle  $ABE$  is congruent to triangle  $ADG$ .

(Total for Question 22 is 3 marks)



23

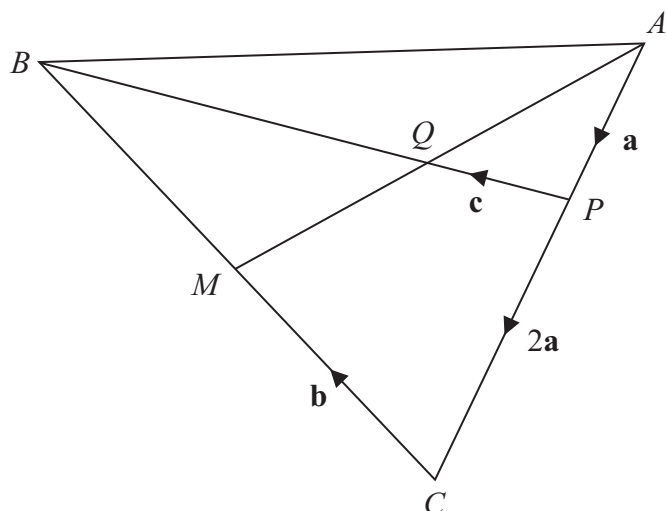


Diagram **NOT** accurately drawn

$M$  is the midpoint of  $BC$ .  
 $Q$  is the midpoint of  $AM$ .

$$\vec{AP} = \mathbf{a} \quad \vec{PC} = 2\mathbf{a} \quad \vec{CM} = \mathbf{b} \quad \vec{PQ} = \mathbf{c}$$

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

$$\vec{AM} = \dots\dots\dots (1)$$

(b) Find  $\vec{QB}$  in terms of  $\mathbf{c}$ .

$$\vec{QB} = \dots\dots\dots (4)$$

(Total for Question 23 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS



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