

Write your name here

Surname

Other names

In the style of:

**Edexcel GCSE**

Centre Number

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Candidate Number

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# Mathematics A

## A\* Type Questions 2H

**Higher Tier**

Extra topics that occur less frequently,  
to help students working towards an A\*

Paper Reference

**1MA0/2H**

**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.**



### Information

- The total mark for this paper is 100
- 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 ►



1. 258 Year 9 were choosing the subjects they would be taking in Year 10. The table shows information about these students.

	Subject to be studied		
	Geography	History	Spanish
Male	45	52	26
Female	25	48	62

A sample, stratified by the subject studied and by gender, of 50 of the 258 students is taken.

- (a) Work out the number of male students studying Spanish in the sample.

.....  
(2)

- (b) Work out the number of female students in the sample.

.....  
(2) Q1

**(Total 4 marks)**

2. Prove that  $(3x + 1)^2 - (3x - 1)^2$  is a multiple of 4, for all positive integer values of  $x$ .

Q2

**(Total 3 marks)**



3.

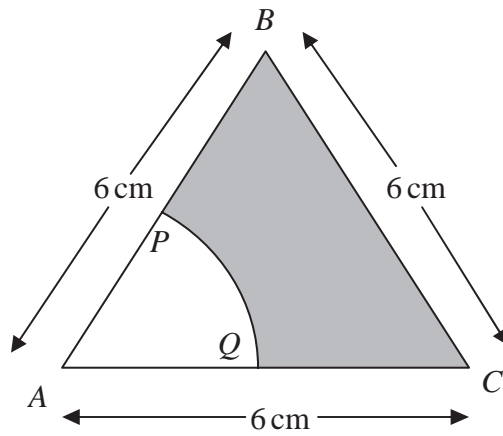


Diagram **NOT**  
accurately drawn

The diagram shows an equilateral triangle  $ABC$  with sides of length  $6\text{ cm}$ .

$P$  is the midpoint of  $AB$ .

$Q$  is the midpoint of  $AC$ .

$APQ$  is a sector of a circle, centre  $A$ .

Calculate the area of the shaded region.

Give your answer correct to 3 significant figures.

.....  $\text{cm}^2$

**Q3**

**(Total 4 marks)**



4. Make  $A$  the subject of the formula

$$x = \sqrt{\frac{A}{3}}$$

$A = \dots\dots\dots$  **Q4**

**(Total 2 marks)**

5. (a) Write 12 500 in standard form.

.....  
**(1)**

(b) Write  $2.48 \times 10^{-3}$  as an ordinary number.

.....  
**(1)**

(c) Work out the value of

$$23\,500 \div (1.25 \times 10^{-4})$$

Give your answer in standard form.

.....  
**(2) Q5**

**(Total 4 marks)**



6. **X** and **Y** are two solid shapes which are mathematically similar.  
The shapes are made from the same material.

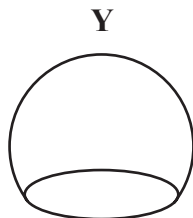
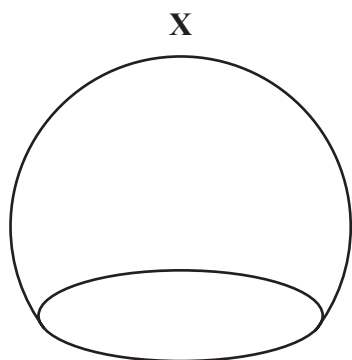


Diagram **NOT**  
accurately drawn

The surface area of **X** is  $50 \text{ cm}^2$ .

The surface area of **Y** is  $18 \text{ cm}^2$ .

The mass of **X** is 500 grams.

Calculate the mass of **Y**.

..... grams

**(Total 4 marks)**



7. The diagram shows a sector of a circle with centre  $O$ .  
The radius of the circle is 8 cm.

$XYZ$  is an arc of the circle.

$XZ$  is a chord of the circle.

Angle  $XOZ = 40^\circ$

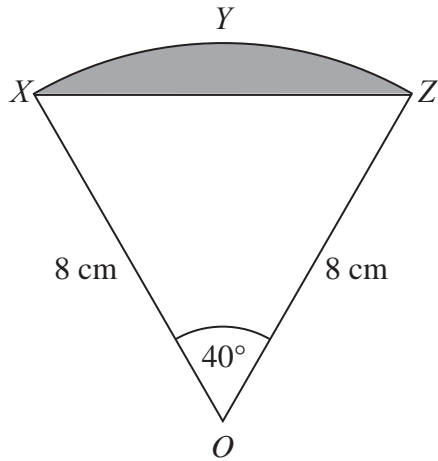


Diagram **NOT**  
accurately drawn

Calculate the area of the shaded segment.  
Give your answer correct to 3 significant figures.

..... cm<sup>2</sup>

(Total 5 marks)



8. The table shows six expressions.  
 $x$  is a positive integer.

$2x - 3$	$3x - 2$	$3(x + 4)$	$4x + 1$	$4(3x + 1)$	$2x + 1$
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(a) From the table, write the expression whose value is

(i) always even

.....

(ii) always a multiple of 3

.....

**(2)**

(b) From the table, write the expression which is a factor of  $4x^2 - 1$

.....

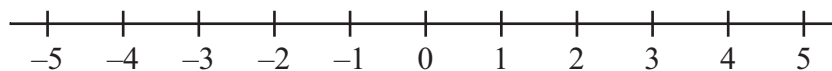
**(1)**

**Q8**

**(Total 3 marks)**

9. (a)  $n > -3$

Show this inequality on the number line.



**(2)**

(b) Solve the inequality  $7x + 36 \leq 8$

.....

**(2) Q9**

**(Total 4 marks)**



**10.** In a sale the normal price of a pen is reduced by 10%.

The sale price of the pen is £4.86

Calculate the normal price of the pen.

£.....

**Q10**

**(Total 3 marks)**





11. The diagram shows two similar triangles.

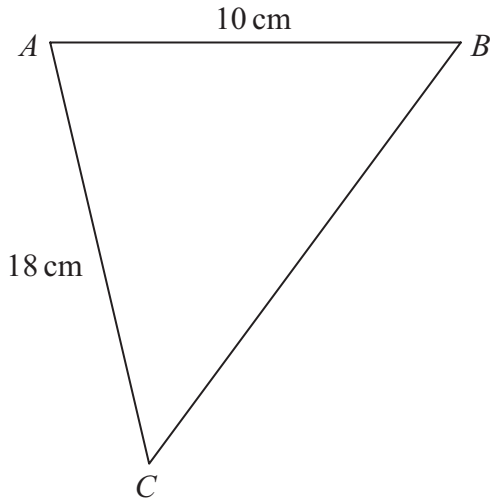
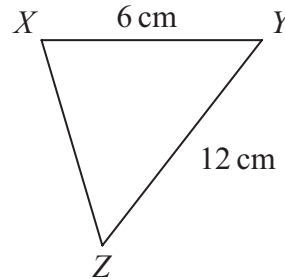


Diagram **NOT** accurately drawn



In triangle  $ABC$ ,  $AB = 10$  cm and  $AC = 18$  cm.  
In triangle  $XYZ$ ,  $XY = 6$  cm and  $YZ = 12$  cm.

Angle  $ABC =$  angle  $XYZ$ .  
Angle  $CAB =$  angle  $ZXY$ .

(a) Calculate the length of  $BC$ .

..... cm  
(2)

(b) Calculate the length of  $XZ$ .

..... cm

(2) Q11

(Total 4 marks)



12. The surface area of Venus is  $510\,072\,000\text{ km}^2$ .  
The surface area of Jupiter is  $6.21795 \times 10^{10}\text{ km}^2$ .

The surface area of Jupiter is greater than the surface area of Venus.  
How many times greater?  
Give your answer in standard form.



13. The table shows some expressions.

$w$ ,  $x$ ,  $y$  and  $z$  represent lengths.

$\pi$  and 2 are numbers that have no dimensions.

$y^2(x+z)$	$\pi w^2 y^2$	$\frac{w^3 x}{y^3}$	$\pi w^2 x$	$\frac{2w^3 z}{y}$	$z^2$	$2w + x^2$

Tick (✓) the boxes underneath the **three** expressions which could represent volumes.

**Q13**

**(Total 3 marks)**



14. There are three big employment sites in Knutsford.  
The table shows the number of employees in each of these sites.

<b>Barclays</b>	<b>Longridge</b>	<b>Parkgate</b>
750	700	900

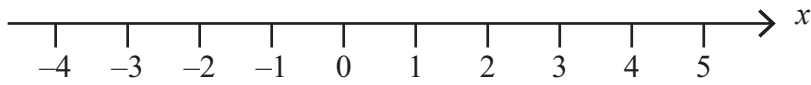
Georgina takes a sample of 50 employees stratified by site. Work out the number of employees from Longridge in the sample.

..... Q14

**(Total 2 marks)**

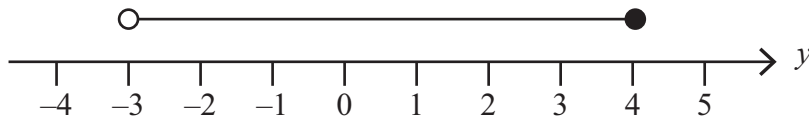


15. (a) On the number line below, show the inequality  $-2 < x < 3$



(1)

(b) Here is an inequality, in  $y$ , shown on a number line.



Write down the inequality.

.....  
(2)

(c) Solve the inequality  $4t - 5 > 9$

.....  
(2) Q15

(Total 5 marks)



16.

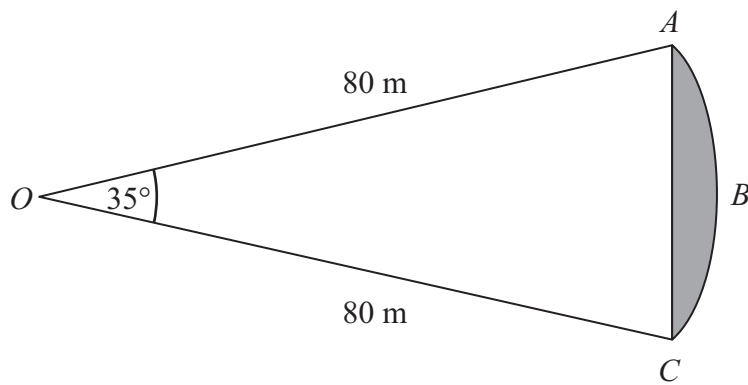


Diagram **NOT**  
accurately drawn

$ABC$  is an arc of a circle centre  $O$  with radius  $80\text{ m}$ .  
 $AC$  is a chord of the circle.  
Angle  $AOC = 35^\circ$ .

Calculate the area of the shaded region.  
Give your answer correct to 3 significant figures.

Q16 .....  $\text{m}^2$

(Total 5 marks)



17. The table below gives some information about some students in a school.

Year group	Boys	Girls	Total
Year 12	126	94	220
Year 13	77	85	162
<b>Total</b>	203	179	382

Andrew is going to carry out a survey of these students.  
He uses a sample of 50 students, stratified by year group and gender.

Work out the number of Year 13 girls that should be in his sample.

..... Q17  
(Total 2 marks)

18.  $y$  is directly proportional to  $x$ .

When  $x = 500$ ,  $y = 10$

(a) Find a formula for  $y$  in terms of  $x$ .

$y =$  .....  
(3)

(b) Calculate the value of  $y$  when  $x = 350$

$y =$  ..... Q18  
(1)

(Total 4 marks)



19.  $A$  and  $B$  are vertices of a cuboid.

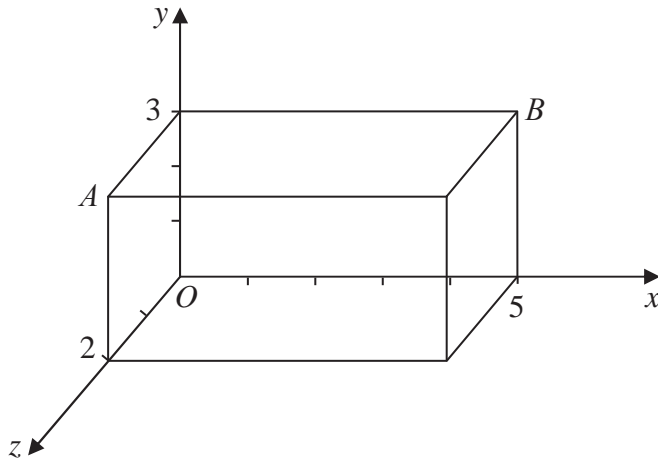


Diagram **NOT** accurately drawn

(a) Write down the coordinates of point  $A$ .

( ..... , ..... , ..... )  
(1)

(b) Write down the coordinates of point  $B$ .

( ..... , ..... , ..... )  
(1)

**Q19**

**(Total 2 marks)**

20. (a) Write 83 500 000 in standard form.

.....  
(1)

(b) Work out  $(5.2 \times 10^{-7}) \times (2.8 \times 10^{-9})$

Give your answer in standard form.

.....  
(2)

**Q20**

**(Total 3 marks)**

