Write your name here

| Surname | Other names |
|---|---|
| | |

Centre Number | Candidate Number

Edexcel GCSE

# Mathematics A

## Paper 2 (Calculator)

## Practice Papers Set D

**Higher Tier**

**Time: 1 hour 45 minutes**

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 must not 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

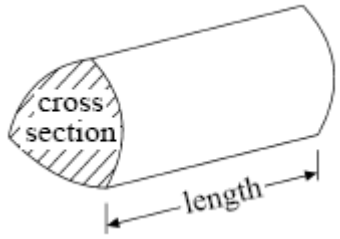
- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

**GCSE Mathematics (Linear) 1MA0**

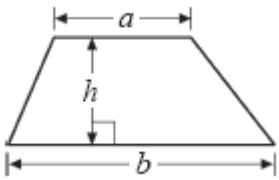
Formulae: Higher Tier

**You must not write on this formulae page.**
**Anything you write on this formulae page will gain NO credit.**

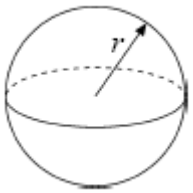
**Volume of prism** = area of cross section × length



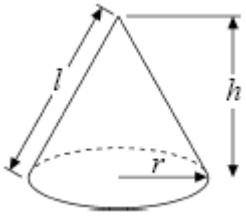

**Area of trapezium** = $\frac{1}{2}(a + b)h$



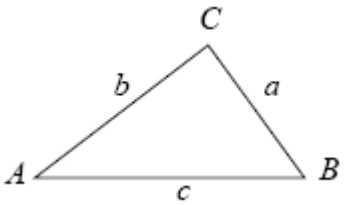

**Volume of sphere** $\frac{4}{3}\pi r^3$
**Surface area of sphere** = $4\pi r^2$




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




**In any triangle ABC**




**The Quadratic Equation**
The solutions of $ax2+ bx + c = 0$
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 TWENTY SEVEN questions.**

**Write your answers in the spaces provided.**

**You must write down all stages in your working.**

**1.** (a) Solve $\frac{5w-8}{3} = 4w+2$

$w =$ .....

**(3)**

(b) Factorise $x^2 - 49$

.....

**(1)**

(c) Simplify $(9x^8y^3)^{\frac{1}{2}}$

.....

**(2)**

**(Total for Question 1 is 6 marks)**

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**2.**

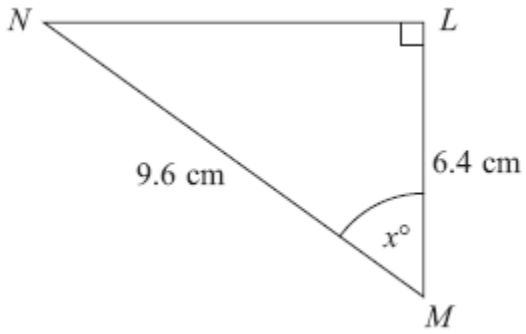



Diagram **NOT** accurately drawn

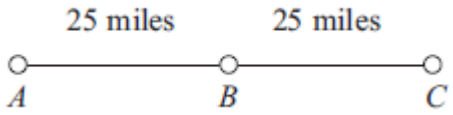
*LMN* is a right-angled triangle.
*MN* = 9.6 cm.
*LM* = 6.4 cm.

Calculate the size of the angle marked *x*°.
Give your answer correct to 1 decimal place.

.....°

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

**3.**




*A*, *B* and *C* are 3 service stations on a motorway.

*AB* = 25 miles
*BC* = 25 miles

Aysha drives along the motorway from *A* to *C*.

Aysha drives at an average speed of 50 mph from *A* to *B*.
She drives at an average speed of 60 mph from *B* to *C*.

Work out the difference in the time Aysha takes to drive from *A* to *B* and the time Aysha takes to drive from *B* to *C*.

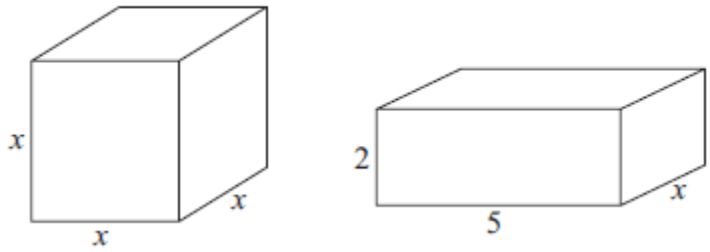
Give your answer in minutes.

..... minutes

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

**4.** The diagram shows a cube and a cuboid.

Diagram **NOT** accurately drawn




All the measurements are in cm.
The volume of the cube is 100 $cm^3$ more than the volume of the cuboid.

(a) Show that $x^3 - 10x = 100$

**(2)**

(b) Use a trial and improvement method to find the value of $x$.
Give your answer correct to 1 decimal place.
You must show **all** your working.

$x$ = .....

**(4)**

**(Total for Question 11 is 6 marks)**

**5.** (a) Factorise $y^2 - 10y + 16$

.....

**(2)**

*(b) (i) Factorise $2t^2 + 5t + 2$

.....

(ii) $t$ is a positive whole number.

The expression $2t^2 + 5t + 2$ can never have a value that is a prime number.

Explain why.

.....

.....

.....

**(3)**

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

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**6.**

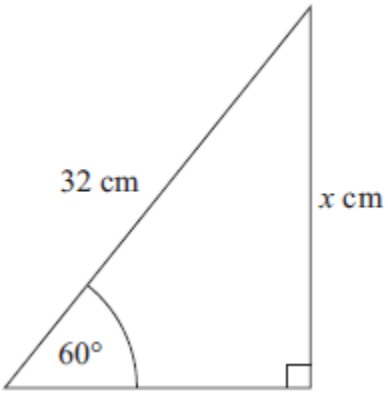



Diagram **NOT** accurately drawn

Calculate the value of $x$.
Give your answer correct to 3 significant figures.

.....

**(Total for Question 6 is 3 marks)**

**7.** The diagram shows a quadrilateral *ABCD*.

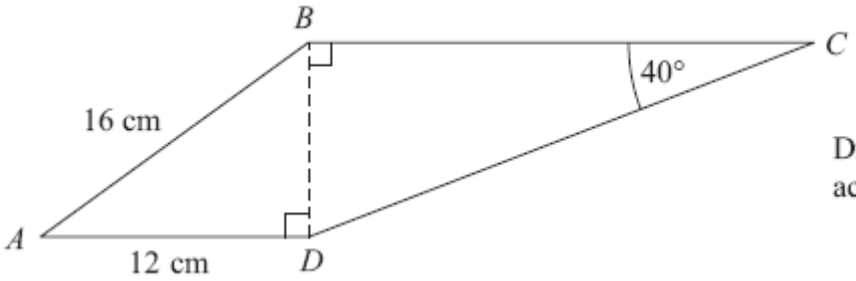



Diagram **NOT** accurately drawn

*AB* = 16 cm.
*AD* = 12 cm.
Angle *BCD* = 40°.
Angle *ADB* = angle *CBD* = 90°.

Calculate the length of *CD*.
Give your answer correct to 3 significant figures.

..... cm

**(Total for Question 7 is 5 marks)**

**8.** Bill's weight decreases from 64.8 kg to 59.3 kg.

Calculate the percentage decrease in Bill's weight.
Give your answer correct to 3 significant figures.

.....%

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

---

**9.** Solve $3y - 2 > 5$

.....

**(Total for Question 9 is 2 marks)**

---

**10.** (a) Max wants to take a random sample of students from his year group.

(i) Explain what is meant by a random sample.

.....

.....

.....

(ii) Describe a method Max could use to take his random sample.

.....

.....

.....

**(2)**

(b) The table below shows the numbers of students in 5 year groups at a school.

| Year | Number of students |
|---|---|
| 9 | 239 |
| 10 | 257 |
| 11 | 248 |
| 12 | 190 |
| 13 | 206 |

Lisa takes a stratified sample of 100 students by year group.

Work out the number of students from Year 9 she has in her sample.

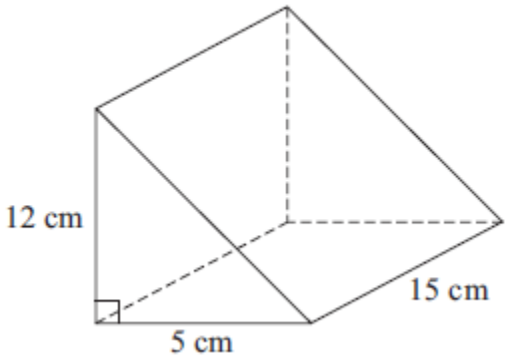
.....

**(2)**

**(Total for Question 10 is 4 marks)**

**11.** The diagram shows a solid triangular prism.

Diagram **NOT** accurately drawn



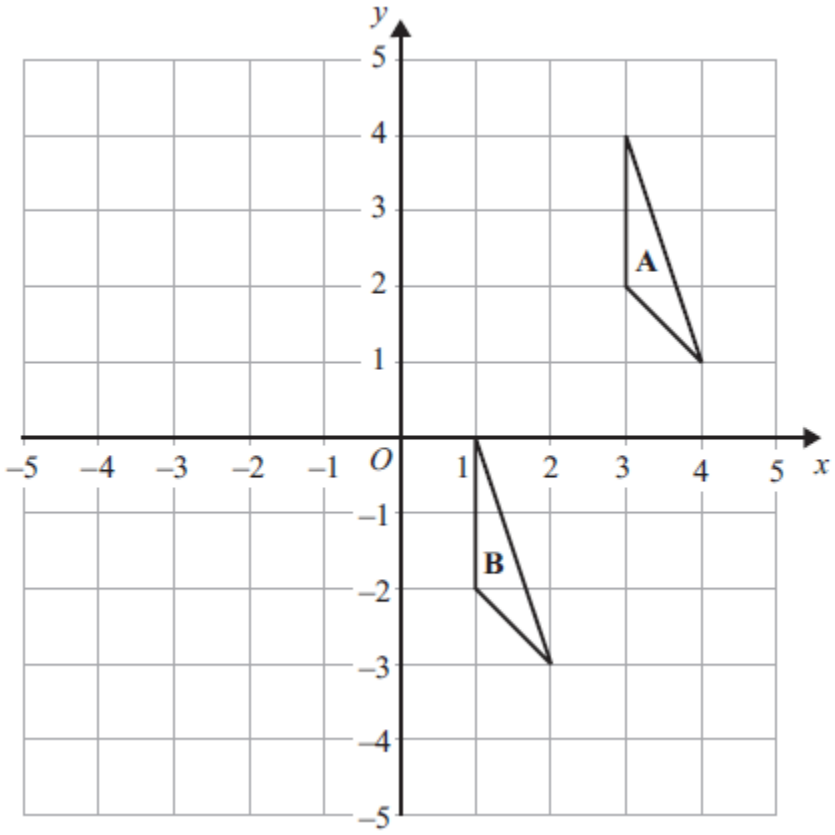

The prism is made from metal.
The density of the metal is 6.6 grams per $cm^3$.

Calculate the mass of the prism.

..... grams

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

**12.**




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

.....

.....

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

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*13. In the UK, petrol costs £1.24 per litre.
In the USA, petrol costs 3.15 dollars per US gallon.

1 US gallon = 3.79 litres
£1 = 1.47 dollars

Is petrol cheaper in the UK or in the USA?

**(Total for Question 13 is 4 marks)**

**14.**

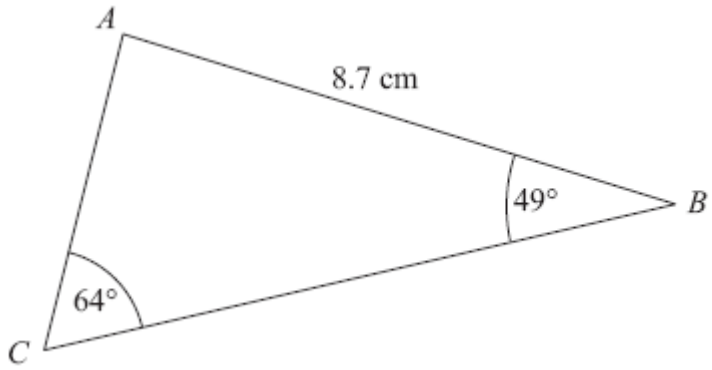



Diagram **NOT** accurately drawn

*ABC* is a triangle.

*AB* = 8.7 cm.
Angle *ABC* = 49°.
Angle *ACB* = 64°.

Calculate the area of triangle *ABC*.
Give your answer correct to 3 significant figures.

.....cm$^2$

**(Total for Question 14 is 5 marks)**

**15.** Carolyn has 20 biscuits in a tin.

She has

12 plain biscuits
5 chocolate biscuits
3 ginger biscuits

Carolyn takes at random two biscuits from the tin.

Work out the probability that the two biscuits were **not** the same type.

.....

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

**16.** Here are seven tiles.


Jim takes at random a tile.
He does **not** replace the tile.

Jim then takes at random a second tile.

(a) Calculate the probability that both the tiles Jim takes have the number 1 on them.

.....

**(2)**

(b) Calculate the probability that the number on the second tile Jim takes is greater than the number on the first tile he takes.

.....

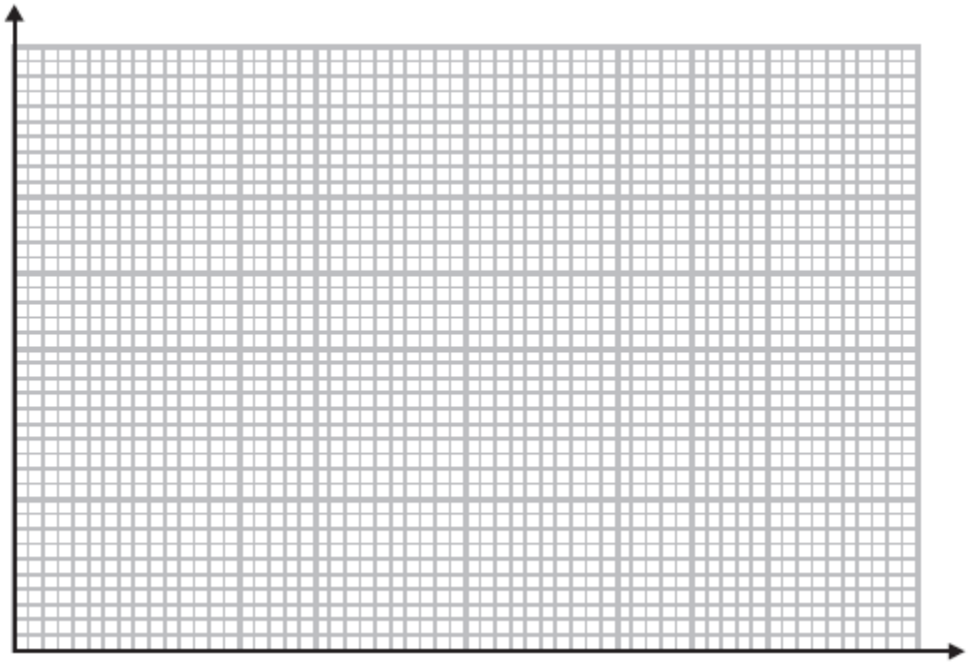
**(3)**

**(Total for Question 16 is 5 marks)**

**17.** The table gives information about the heights, $h$ metres, of trees in a wood.

| **Height ($h$ metres)** | **Frequency** |
|---|---|
| $0 < h \leq 2$ | 7 |
| $2 < h \leq 4$ | 14 |
| $4 < h \leq 8$ | 18 |
| $8 < h \leq 16$ | 24 |
| $16 < h \leq 20$ | 10 |

Draw a histogram to show this information.



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

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**18.** Solve $3x^2 - 4x - 2 = 0$
Give your solutions correct to 3 significant figures.

.....

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

---

**19.** The stem and leaf diagram gives information about the numbers of tomatoes on 31 tomato plants.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 8 | 8 | 9 | | | | |
| 1 | 1 | 1 | 5 | 5 | | | |
| 2 | 1 | 2 | 2 | 6 | 7 | 8 | 8 |
| 3 | 0 | 2 | 5 | 5 | 7 | 9 | |
| 4 | 2 | 2 | 3 | 5 | 8 | 8 | |
| 5 | 1 | 1 | 3 | 4 | 7 | | |

Key: 5 | 7 = 57 tomatoes

Work out the interquartile range.

.....

**(Total for Question 19 is 2 marks)**

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**20.** Simplify $\frac{x+1}{2} + \frac{x+3}{3}$

.....

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

---

**21.** Rob is learning about the planets.

Rob makes a model of the Sun.
He also makes a model of the planet Jupiter.

Rob is going to hang the two models in the school hall.

Rob wants a distance of 16 m between the two models.
The real distance between the planet Jupiter and the Sun is $8 \times 10^8$ km.

Work out the scale Rob should use.
Give your answer in the form 1 : $n$

.....

**(Total for Question 21 is 3 marks)**

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**22.** *ABCD* is a trapezium.

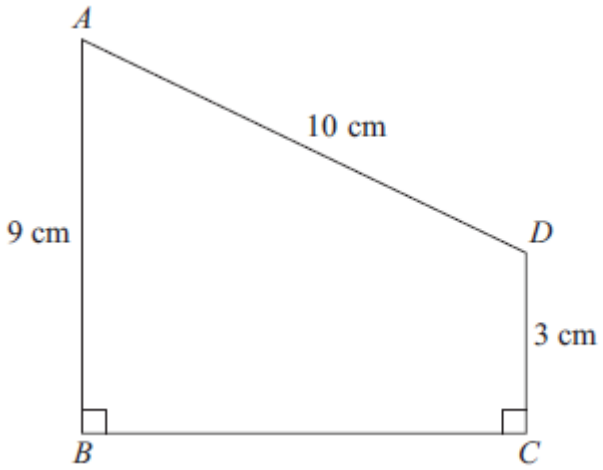


Diagram **NOT** accurately drawn

*AD* = 10 cm
*AB* = 9 cm
*DC* = 3 cm
Angle *ABC* = angle *BCD* = 90°

Calculate the length of *AC*.
Give your answer correct to 3 significant figures.

..... cm

**(Total for Question 22 is 5 marks)**

**23.**

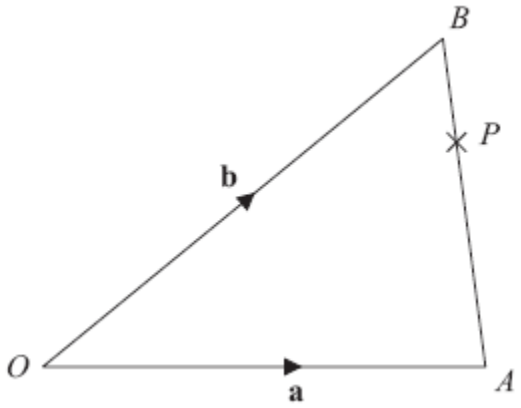


Diagram **NOT** accurately drawn

*OAB* is a triangle.

$\overrightarrow{OA}$ = **a**
$\overrightarrow{OB}$ = **b**

(a) Find $\overrightarrow{AB}$ in terms of **a** and **b**.

.....

**(1)**

*P* is the point on *AB* such that *AP* : *PB* = 3 : 1

(b) Find $\overrightarrow{OP}$ in terms of **a** and **b**.
Give your answer in its simplest form.

.....

**(3)**

**(Total for Question 23 is 4 marks)**

---

**24.** Prove that

$$(2n + 3)^2 - (2n - 3)^2 \text{ is a multiple of } 8$$

for all positive integer values of $n$.

**(Total for Question 24 is 3 marks)**

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***25.** The diagram shows the triangle $PQR$.

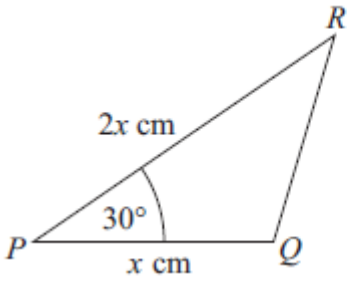


Diagram **NOT** accurately drawn

$PQ = x$ cm
$PR = 2x$ cm
Angle $QPR = 30°$

The area of triangle $PQR = A$ cm$^2$

Show that $x = \sqrt{2A}$

**(Total for Question 25 is 3 marks)**

**26.** The diagram shows a pyramid.

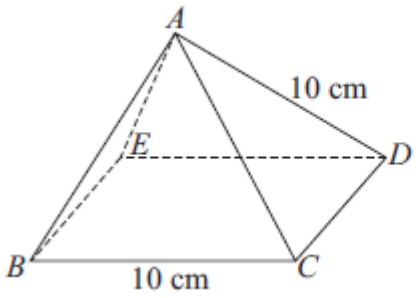


Diagram **NOT** accurately drawn

*BCDE* is a square with sides of length 10 cm.
The other faces of the pyramid are equilateral triangles with sides of length 10 cm.

(a) Calculate the volume of the pyramid.
Give your answer correct to 3 significant figures.

..... $cm^3$
**(4)**

(b) Find the size of angle *DAB*.

.....°
**(2)**

**(Total for Question 26 is 6 marks)**

**27.** (a) Solve $2x^2 + 9x - 7 = 0$

Give your solutions correct to 3 significant figures.

.....

**(3)**

(b) Solve $\frac{2}{y^2} + \frac{9}{y} - 7 = 0$

Give your solutions correct to 3 significant figures.

.....

**(2)**

**(Total for Question 27 is 5 marks)**

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**TOTAL FOR PAPER IS 100 MARKS**