

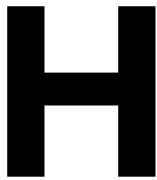
Teach Me Maths

Please write clearly in block capitals.

Name _____

Date _____

GCSE MATHEMATICS



Higher Tier • Paper 2 (Calculator)

Mock Set B

For AQA GCSE Mathematics (8300)

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments
- the Formulae Sheet (the last page of this paper).

Instructions

- Write in black ink or black ball-point pen. Use a pencil for diagrams.
- Write your name and the date at the top of this page.
- Answer **all** questions.
- Write your answers in the spaces provided. If you need more room, use extra paper and write the question number next to your answer.
- Do all your rough work on this paper. Cross out any work you do not want to be marked.

Information

- The marks for each question are shown in brackets.
- The maximum mark for this paper is 80.
- You may use extra answer paper, graph paper and tracing paper.

Advice

In every calculation, show clearly how you get your answer.

For the marker

TOTAL (out of 80)

Practice paper written by Teach Me Maths in the style of AQA GCSE Mathematics (8300). Not an official AQA paper.

Answer **all** questions in the spaces provided.

- 1 (a) Write 905 000 000 in standard form.

[1 mark]

Answer _____

- (b) Work out

$$\frac{8.1 \times 10^7 + 5.6 \times 10^6}{2.4 \times 10^{-3}}$$

Give your answer in standard form to 3 significant figures.

[2 marks]

Answer _____

- 2 On a bank holiday, 2850 people visited a castle.

- 36% of the visitors were members of a heritage trust and did not pay.
- $\frac{5}{8}$ of the other visitors had bought their tickets online.
- The rest of the visitors paid at the gate.

How many visitors paid at the gate?

[3 marks]

Answer _____

3 Which expression is equal to $x^2 - 169$?

Circle your answer.

[1 mark]

$$(x - 13)^2$$

$$(x + 13)(x - 13)$$

$$(x + 13)^2$$

$$x(x - 169)$$

- 4 Asha rolls a biased six-sided dice 250 times.

The table shows her results.

The frequency for 6 is not shown.

Number on dice	1	2	3	4	5	6
Frequency	31	44	38	29	40	

- (a) Work out the relative frequency of rolling a 6

[2 marks]

Answer _____

- (b) Pip is going to roll the same dice 500 times.

She says,

“I will roll a 6 exactly 136 times.”

Is Pip correct?

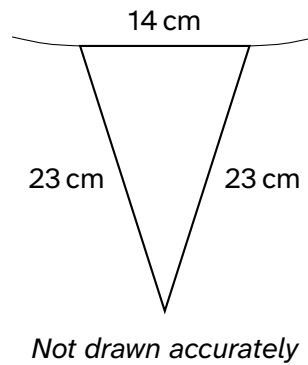
Tick a box.

Give a reason for your answer.

[1 mark]

☐ Yes ☐ No

- 5 The diagram shows one flag from a string of bunting.
The flag is an isosceles triangle.



Work out the area of the flag.
Give your answer to 3 significant figures.

[3 marks]

Answer _____ cm^2

- 6** Lily wants a phone plan for 24 months.
She uses 9 GB of data each month.
Here are two plans.

Plan A	Plan B
Pay £95 for the phone at the start then £17.50 per month Unlimited data	Nothing to pay at the start £15 per month, including 6 GB of data each month Each extra GB costs £1.40

Which plan is cheaper for Lily over the 24 months?

You must show your working.

[3 marks]

Answer _____

7 Poppy is Luke's mother. Georgia is Luke's aunt.

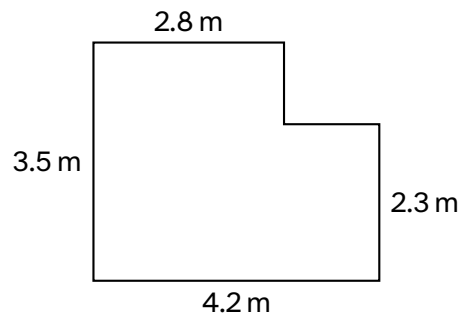
- Poppy is 3 times as old as Luke.
- Georgia is 5 years younger than Poppy.
- Six years ago, Georgia was 4 times as old as Luke.

Work out Georgia's age now.

[4 marks]

Answer _____ years

- 8 Sophie is going to tile her kitchen floor.
The diagram shows the shape of the floor.



Not drawn accurately

- The tiles are squares of side 40 cm.
- The tiles are sold in packs of 9
- Assume that no tiles are wasted.

How many packs of tiles does Sophie need to buy?

[3 marks]

Answer _____

9 Two camper vans are for sale.

- Van *A* costs £46 500

Its value is expected to decrease by 14% each year.

- Van *B* costs £37 500

Its value is expected to decrease by 8% each year.

After how many complete years will van *A* first be worth less than van *B*?

You must show your working.

[3 marks]

Answer _____ years

10 The number of members of a cycling club increased by 15% during 2024.

(a) Write down the decimal multiplier for an increase of 15%

[1 mark]

Answer _____

(b) Over the two years 2024 and 2025, the number of members increased by 38%

Work out the percentage increase in the number of members during 2025.

[2 marks]

Answer _____ %

- 11 (a) Write $x^2 + 16x - 7$ in the form $(x + a)^2 + b$

[2 marks]

Answer _____

- (b) Use your answer to part (a) to explain why the equation

$$x^2 + 16x - 7 = -75$$

has no solutions.

[1 mark]

- 12 A circle has equation $x^2 + y^2 = 38$

What is the radius of the circle?

Circle your answer.

[1 mark]

19

38

1444

$\sqrt{38}$

13 Solve by factorising $6x^2 = 7x + 5$

[3 marks]

Answer _____ and _____

14 360 people went to an ice rink on Saturday.

Each person either hired skates or brought their own skates.

- $\frac{5}{9}$ of the people were children.
- 45 of the adults brought their own skates.
- Altogether, 290 people hired skates.

(a) Use this information to complete the two-way table.

	Hired skates	Own skates	Total
Adults			
Children			
Total			360

[2 marks]

(b) One of the people who hired skates is chosen at random.

Work out the probability that this person is an adult.

[1 mark]

Answer _____

15 Members of a leisure centre use a four-digit PIN to open a locker.

Each digit is chosen from 0 to 9

(a) For the gym lockers, the four digits of a PIN must all be different.

Work out the number of different PINs that are possible for the gym lockers.

[1 mark]

Answer _____

(b) For the pool lockers

- the first digit of a PIN must be 5 or more
- digits can be repeated.

Kamal says,

“There are more possible PINs for the pool lockers than for the gym lockers, because digits can be repeated.”

Is Kamal correct?

Tick a box.

You must show your working.

[2 marks]

☐

Yes

☐

No

16 A juice factory has two machines that fill bottles.

- Machine *A* fills 96 bottles every minute.
- Machine *B* fills 2 bottles every second.

Machine *A* starts at 8:00 am.

Machine *B* starts 20 minutes later.

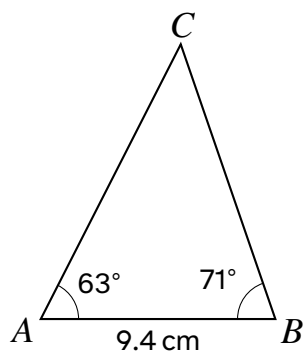
Both machines then work until a total of 30 000 bottles have been filled.

At what time have 30 000 bottles been filled?

[3 marks]

Answer _____

- 17 ABC is a triangle.



Not drawn accurately

Work out the length of BC .

Give your answer to 3 significant figures.

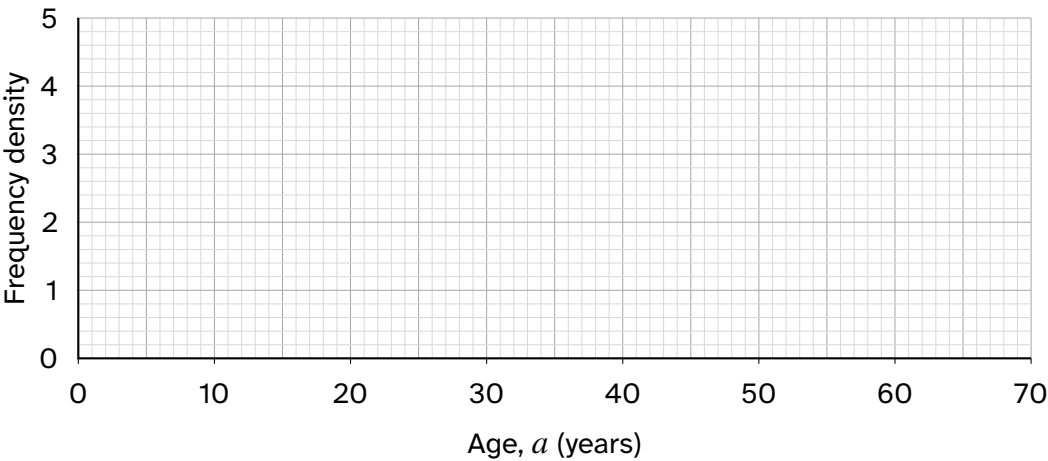
[3 marks]

Answer _____ cm

18 The table shows information about the ages of 121 people at a cinema screening.

Age, a (years)	Frequency
$0 < a \leq 10$	14
$10 < a \leq 15$	21
$15 < a \leq 25$	38
$25 < a \leq 40$	30
$40 < a \leq 70$	18

(a) On the grid, draw a histogram to represent this information.



[3 marks]

(b) Estimate the number of people at the screening who were aged between 20 and 30

[2 marks]

Answer _____

19 Ryan bought a ticket for a rugby match.

- The original price of the ticket was increased by 16%
- Later, the new price was reduced by 5%
- A booking fee of £7.25 was then added to the price.

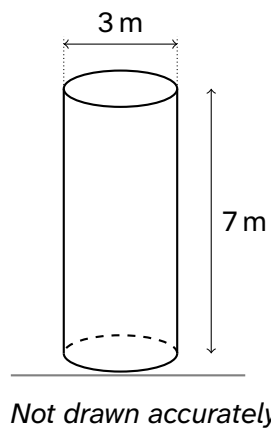
Ryan paid £260.71 altogether.

Work out the original price of the ticket.

[4 marks]

Answer £ _____

- 20** Gabriel has a grain silo on his farm.
The silo is a closed cylinder.
It stands on its circular base on the ground.



Gabriel is going to paint the outside of the silo, but not the base.

- 1 litre of paint covers 5 m^2
- Paint is sold in 5-litre tins.
- Each tin costs £32.50

Work out the cost of the paint he needs.

[4 marks]

Answer £ _____

- 21** (a) Show that the equation $x^3 + 5x^2 - 9 = 0$ can be rearranged to give

$$x = \frac{3}{\sqrt{x+5}}$$

[2 marks]

- (b) Starting with $x_1 = 1$, use the iterative formula

$$x_{n+1} = \frac{3}{\sqrt{x_n + 5}}$$

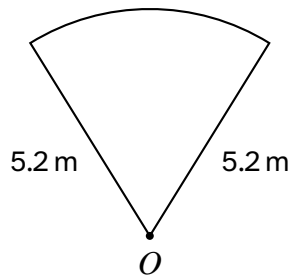
to find a solution to $x^3 + 5x^2 - 9 = 0$ to 3 decimal places.

You must show your working.

[3 marks]

$x =$ _____

- 22** A lawn sprinkler waters a region of grass in the shape of a sector of a circle, centre O .
The radius of the sector is 5.2 m.
The area of the region is 15 m^2



Not drawn accurately

Work out the perimeter of the region.
Give your answer to 1 decimal place.

[3 marks]

Answer _____ m

23 The lines $y = x + 2$, $2x + 3y = 12$ and $x = 5$ are drawn on the grid.

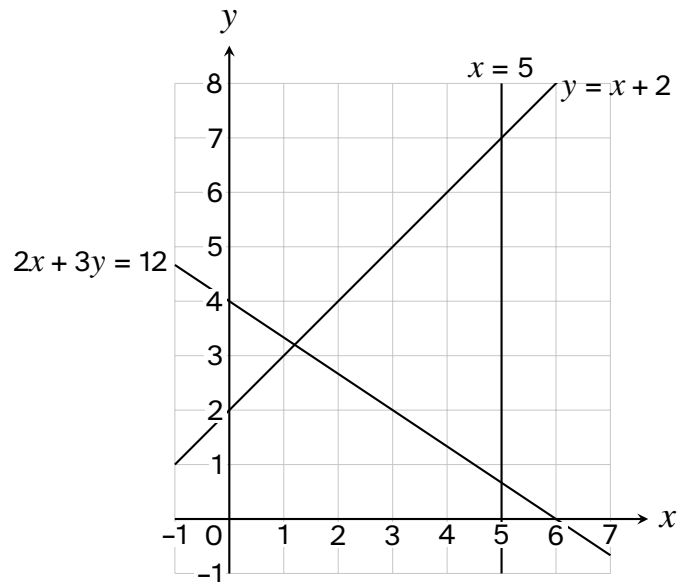
On the grid, shade the region that satisfies all three inequalities.

Label the region R .

$$x - y \geq -2$$

$$3y \geq 12 - 2x$$

$$x < 5$$



[3 marks]

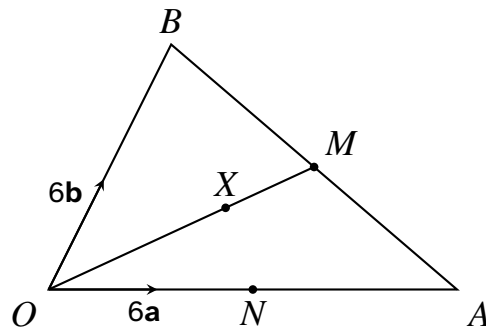
24 OAB is a triangle.

$$\overrightarrow{OA} = 6\mathbf{a} \quad \text{and} \quad \overrightarrow{OB} = 6\mathbf{b}$$

M is the midpoint of AB .

X is the point on OM such that $OX:XM = 2:1$

N is the midpoint of OA .



Not drawn accurately

Prove that B , X and N lie on a straight line.

[4 marks]

25 Show that

$$\frac{9}{2x^2 + 7x - 4} - \frac{5}{2x^2 + 3x - 2}$$

simplifies to $\frac{2}{x^2 + 6x + 8}$

[4 marks]

END OF QUESTIONS

Formulae Sheet

For AQA GCSE Mathematics (8300) • Higher Tier

Perimeter, area and volume

Where a and b are the lengths of the parallel sides and h is their perpendicular separation:

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

Volume of a prism = area of cross section $\times$ length

Where r is the radius and d is the diameter:

$$\text{Circumference of a circle} = 2\pi r = \pi d$$

$$\text{Area of a circle} = \pi r^2$$

Quadratic formula

The solution of
 $ax^2 + bx + c = 0$
where $a \neq 0$:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Pythagoras' Theorem and Trigonometry

In any right-angled triangle where a , b and c are the lengths of the sides and c is the hypotenuse:

$$a^2 + b^2 = c^2$$

In any right-angled triangle ABC where a , b and c are the lengths of the sides and c is the hypotenuse:

$$\sin A = \frac{a}{c} \quad \cos A = \frac{b}{c} \quad \tan A = \frac{a}{b}$$

In any triangle ABC where a , b and c are the lengths of the sides:

$$\text{sine rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{cosine rule: } a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{Area of triangle} = \frac{1}{2}ab \sin C$$

Compound Interest

Where P is the principal amount, r is the interest rate over a given period and n is the number of times that the interest is compounded:

$$\text{Total accrued} = P \left(1 + \frac{r}{100}\right)^n$$

Probability

Where $P(A)$ is the probability of outcome A and $P(B)$ is the probability of outcome B :

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$P(A \text{ and } B) = P(A \text{ given } B) P(B)$$