

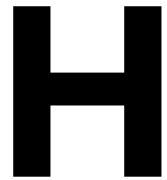
Teach Me Maths

Please write clearly in block capitals.

Name _____

Date _____

GCSE MATHEMATICS



Higher Tier • Paper 3 (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 Write these numbers in order of size.

Start with the smallest number.

37.6% $0.\dot{3}\dot{7}$ $\frac{3}{8}$ $0.3\dot{7}$ 0.374

[2 marks]

Answer _____

2 A park has two fountains.

- Fountain *A* starts a jet of water every 36 minutes.
- Fountain *B* starts a jet of water every 1 hour 30 minutes.

Both fountains start a jet of water at 10:15 am.

The park closes at 5 pm.

How many more times will both fountains start a jet of water at the same time before the park closes?

[3 marks]

Answer _____

3 Here are the first four terms of a linear sequence.

11 18 25 32

Abi says,

‘303 is one of the numbers in this sequence.’

Is Abi correct?

Tick a box.

You must show your working.

[2 marks]

☐ Yes

☐ No

- 4 Here is a list of ingredients for vegetable chilli for 8 people.

Vegetable chilli (serves 8)
2 onions
3 peppers
800 g chopped tomatoes
500 g kidney beans
560 ml vegetable stock
2 teaspoons chilli powder

Nour is making vegetable chilli for 75 people at a community lunch.

Vegetable stock is sold in 1 litre cartons.

How many cartons of vegetable stock does Nour need to buy?

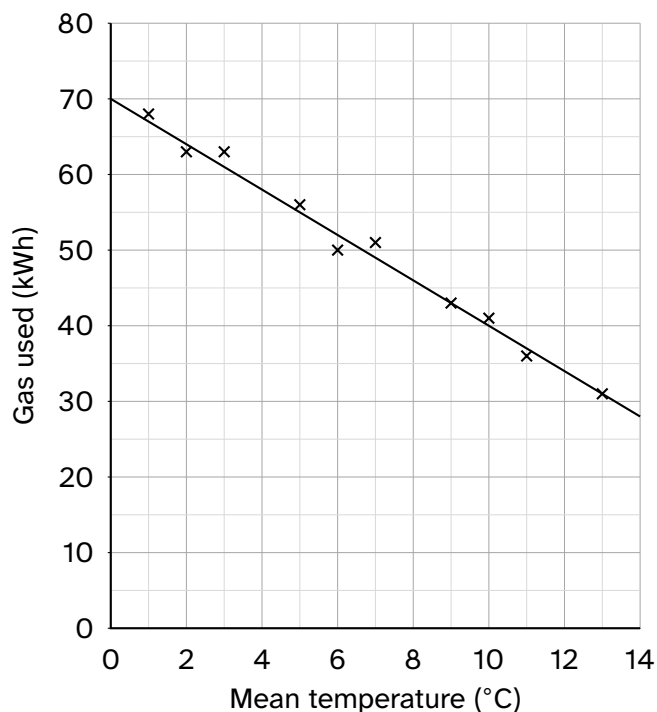
[2 marks]

Answer _____

- 5 Lara records the mean temperature and the amount of gas her house uses on 10 days in winter.

The scatter graph shows this information.

A line of best fit has been drawn.



- (a) Use the line of best fit to estimate the amount of gas used on a day when the mean temperature is 8 °C.

[1 mark]

Answer _____ kWh

- (b) Lara wants to use the line of best fit to estimate the amount of gas used on a day when the mean temperature is 25 °C.

Give a reason why this estimate may not be reliable.

[1 mark]

- 6 Freddie and Jade each run a 5 km race in March and again in June.

The table shows their times.

	March	June
Freddie	34 minutes 0 seconds	31 minutes 15 seconds
Jade	27 minutes 30 seconds	25 minutes 15 seconds

Freddie says,

‘My time improved by more than Jade’s time, so I made the greater percentage improvement.’

Is Freddie correct?

Tick a box.

You must show your working.

[3 marks]

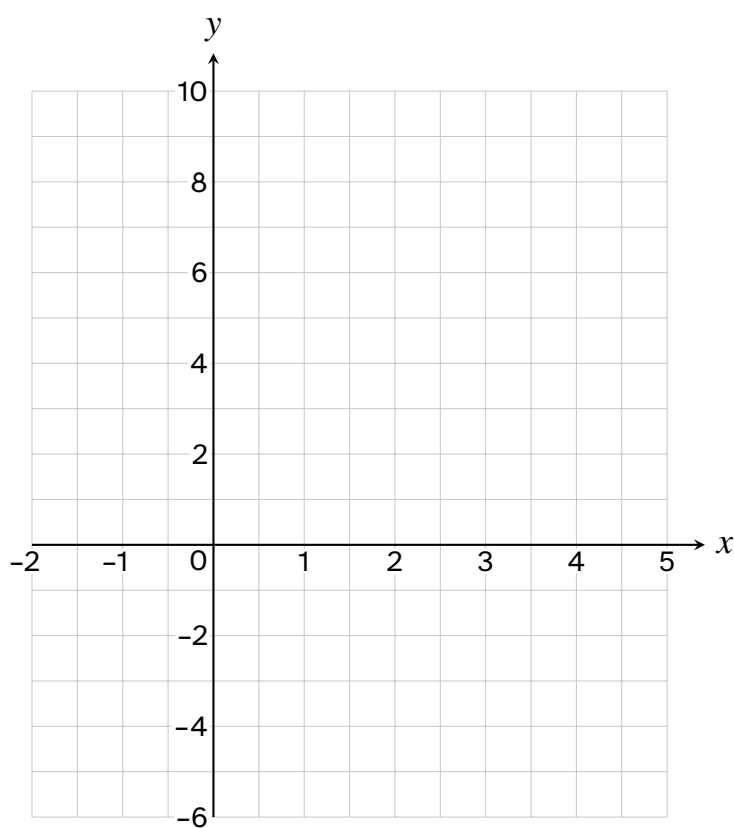
☐ Yes

☐ No

- 7 (a) Draw the graph of $y = x^2 - 3x - 2$ for values of x from -2 to 5

You may use the table to help you.

x	-2	-1	0	1	2	3	4	5
y	8		-2			-2		8



[2 marks]

- (b) Use your graph to estimate the solutions of $x^2 - 3x - 2 = 4$

[1 mark]

Answer _____

8 Ewa gives the same test to two classes.

- There are 24 students in class $10P$. Their mean score is 15.5
- There are 28 students in class $10Q$.
- The mean score of all 52 students is 16.2

Work out the mean score of the students in class $10Q$.

[3 marks]

Answer _____

9 $y = 650$ correct to 2 significant figures.

(a) Complete the error interval for y .

[2 marks]

Answer _____ $\leq y <$ _____

(b) Owain says,

‘When y is rounded to 1 significant figure, the answer must be 700’

Is Owain correct?

Tick a box.

Give a reason for your answer.

[1 mark]

☐

Yes

☐

No

- 10** The scale diagram shows a field with two gates, G and H , and a water tap, T .
Rory is going to put a water trough in the field.

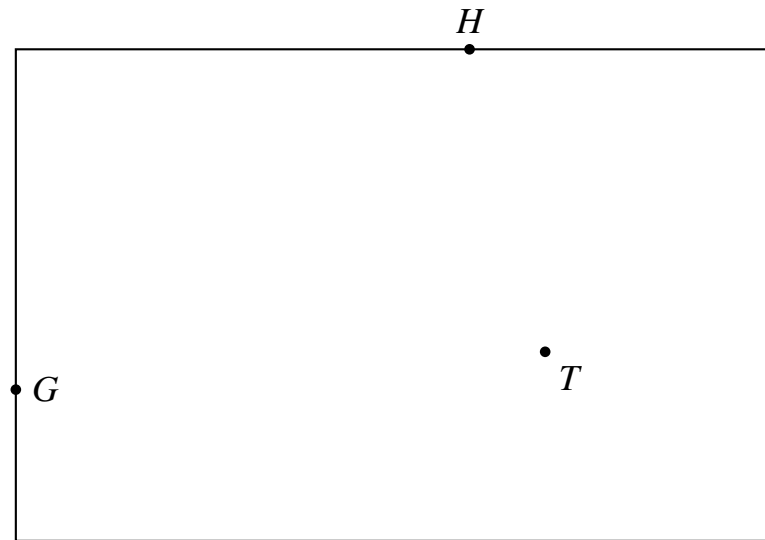
Scale: 1 cm represents 10 m

The trough must be

- less than 40 m from the tap, T
- closer to gate G than to gate H

Use a ruler and compasses to show, by shading, the region where the trough can be placed.

You must show your construction lines.



[3 marks]

11 A mobile crane stands on four legs.

- The total force of the crane on the ground is 96 000 newtons.
- The force is shared equally between the four legs.
- Each leg stands on a circular pad with diameter 60 cm.

The ground can safely take a pressure of up to 80 000 newtons/m²

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

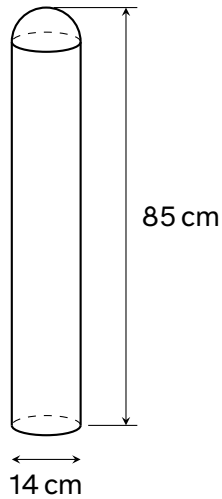
Is it safe to use the crane here?

You must show your working.

[3 marks]

Answer _____

- 12 A solid metal bollard is a cylinder with a hemisphere on top.



Not drawn accurately

The metal has a density of 7.2 g/cm^3

Volume of a sphere = $\frac{4}{3}\pi r^3$ where r is the radius

Work out the mass of the bollard.

Give your answer in kilograms to 3 significant figures.

[3 marks]

Answer _____ kg

13 (a) Solve $-3 \leq 5 - 2x < 11$

[2 marks]

Answer _____

(b) n is an integer.

Which set lists all the values of n for which $-3 \leq 5 - 2n < 11$ is true?

Circle your answer.

$\{-3, -2, -1, 0, 1, 2, 3, 4\}$

$\{-2, -1, 0, 1, 2, 3, 4\}$

$\{-2, -1, 0, 1, 2, 3\}$

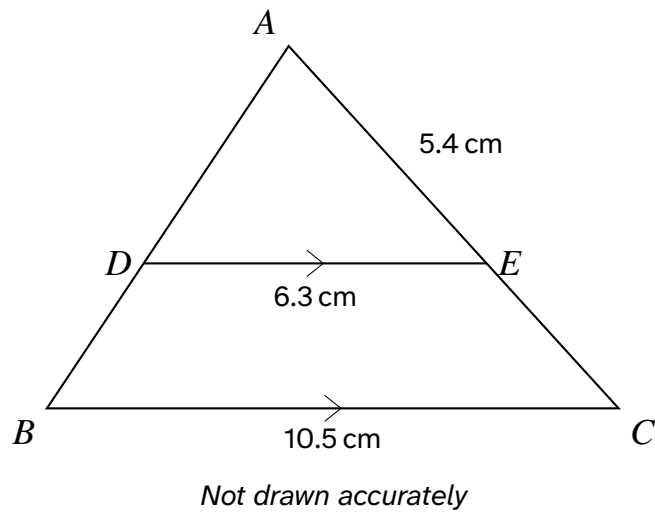
$\{-3, -2, -1, 0, 1, 2, 3\}$

[1 mark]

14 ABC is a triangle.

D is a point on AB and E is a point on AC .

DE is parallel to BC .



(a) Give a reason why triangle ADE is similar to triangle ABC .

[1 mark]

(b) Work out the length EC .

[2 marks]

Answer _____ cm

15 Alina has a map of a nature reserve.

- The scale of the map is 1:50 000
- The area of the nature reserve on the map is 11.6 cm^2

Work out the real area of the nature reserve.

Give your answer in hectares.

$$1 \text{ hectare} = 10\,000 \text{ m}^2$$

[3 marks]

Answer _____ hectares

16 Make m the subject of $k = \sqrt{\frac{m+4}{m-1}}$

[3 marks]

Answer _____

17 Ruth is a forest ranger.

There are 3600 ash trees in a forest.

Ruth checks a random sample of 150 of these ash trees.

38 of the trees in her sample have a disease.

- (a) Work out an estimate for the number of ash trees in the forest that have the disease.

[2 marks]

Answer _____

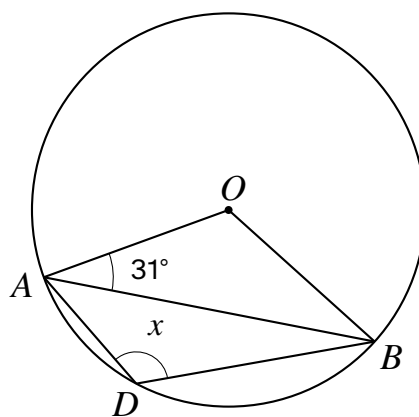
- (b) Ruth says that her answer to part (a) is the exact number of ash trees in the forest that have the disease.

Give a reason why she may be wrong.

[1 mark]

18 A , B and D are points on a circle, centre O .

D is on the minor arc AB .



Not drawn accurately

Work out the size of angle x .

You must show your working.

[3 marks]

$x = \underline{\hspace{10cm}}^\circ$

19 $f(x) = x^2 - 5$ and $g(x) = 3x + 1$

(a) Work out $fg(-3)$

[2 marks]

Answer _____

(b) Solve $fg(x) = 4$

[2 marks]

Answer _____

20 Rahul's greyhound runs a 480 m race in 28.4 seconds.

An ostrich can run at an average speed of 56 km/h.

Suppose the ostrich ran the same 480 m race at this average speed.

Which animal would finish first, and by how many seconds?

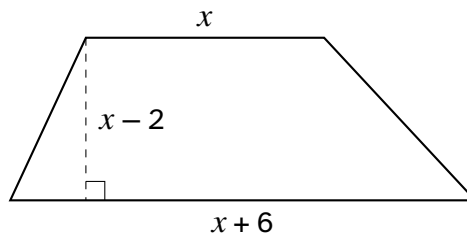
You must show your working.

[3 marks]

Answer _____ by _____ seconds

21 Here is a trapezium.

All measurements are in centimetres.



Not drawn accurately

The area of the trapezium is 40 cm^2

Work out the height of the trapezium.

Give your answer to 3 significant figures.

You must show your working.

[4 marks]

Answer _____ cm

22 Amara makes dog leads to sell at a craft fair.

- She has a rope of length 45 m, to the nearest metre.
- She cuts the rope into pieces.
- Each piece is 1.6 m long, to the nearest 10 cm.

Amara needs 27 pieces.

Can Amara be certain that she can cut 27 pieces from the rope?

Tick a box.

You must show your working.

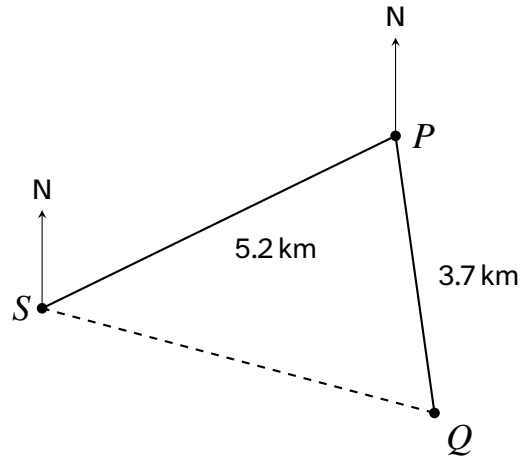
[4 marks]

☐ Yes

☐ No

23 A research ship sails from its base, S , to a point P , then to a point Q , and then straight back to S .

- P is 5.2 km from S on a bearing of 064°
- Q is 3.7 km from P on a bearing of 172°



Not drawn accurately

Work out the bearing of S from Q .

Give your answer to the nearest degree.

You must show your working.

[5 marks]

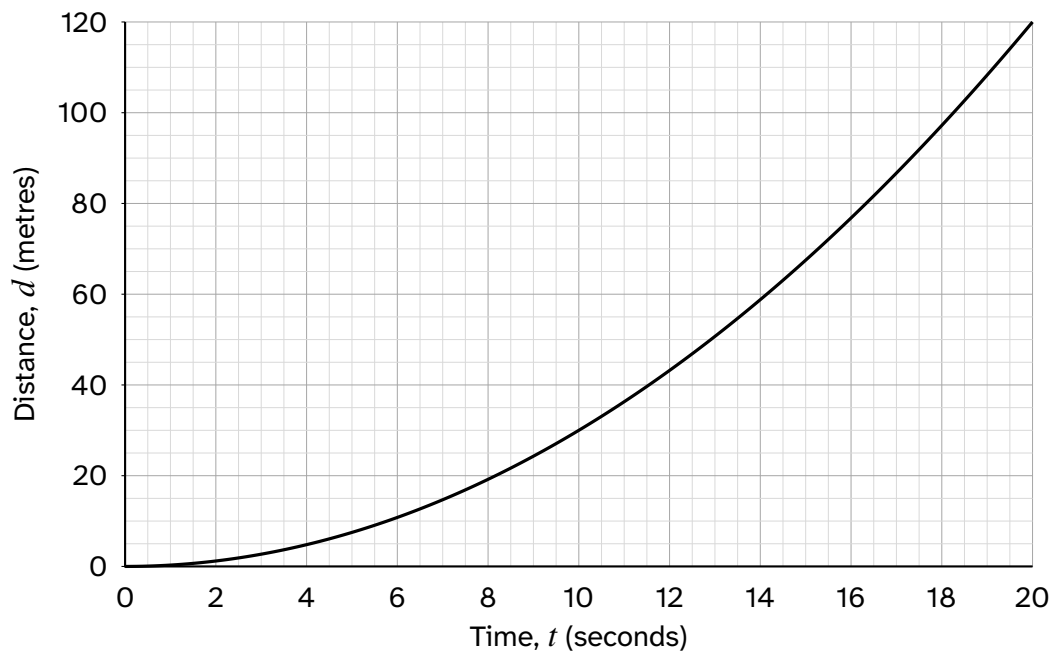
Answer _____ $^\circ$

24 A tram leaves a tram stop.

The graph shows the distance, d metres, travelled by the tram in the first 20 seconds.

(a) By drawing a tangent, estimate the speed of the tram at 15 seconds.

You must show your working.



[2 marks]

Answer _____ m/s

(b) Tariq divides the distance at 15 seconds by 15 to estimate the speed of the tram at 15 seconds.

Explain why his method does not give the speed at 15 seconds.

[1 mark]

25 a and b are positive constants.

$$(x + a)^2 + b(x - 1) \equiv x^2 + 10x + 5$$

Work out the values of a and b .

[3 marks]

$a =$ _____ $b =$ _____

26 Vera checks the weather forecast every morning.

- The probability that the forecast says it will rain is 0.3
- If the forecast says it will rain, the probability that Vera takes an umbrella is 0.85
- If the forecast does not say it will rain, the probability that Vera takes an umbrella is 0.2

On one morning, Vera takes an umbrella.

Work out the probability that the forecast said it would rain on that morning.

[4 marks]

Answer _____

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 :

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

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