

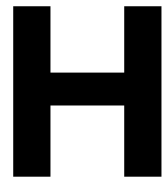
Teach Me Maths

Please write clearly in block capitals.

Name _____

Date _____

GCSE MATHEMATICS



Higher Tier • Paper 2 (Calculator)

Mock Set A

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 756 as a product of its prime factors.

Give your answer in index form.

[2 marks]

Answer _____

(b) $N = 2^3 \times 3^2 \times 5$

Work out the lowest common multiple (LCM) of 756 and N .

[1 mark]

Answer _____

- 2** Which line is parallel to $y = 3x - 5$?

Circle your answer.

[1 mark]

$y = 5x - 3$

$y = -3x - 5$

$y = 2 + 3x$

$y = -\frac{1}{3}x - 5$

- 3** (a) Use your calculator to work out

$$\frac{\sqrt{48.7} + 2.3^3}{6.1 - 0.84^2}$$

Write down all the figures on your calculator display.

[1 mark]

Answer _____

- (b) Give your answer to part (a) to 3 significant figures.

[1 mark]

Answer _____

- 4** Harriet runs a stall selling refurbished bicycles.
She buys a bicycle for £145 and sells it for £203

Harriet says,

“My percentage profit is 28.6%”

Is Harriet correct?

Tick a box.

You must show your working.

[2 marks]

☐ Yes

☐ No

- 5** The council in Brantwell wants to know what the people of the town think about the opening hours of the town library.

Four ways of choosing a sample of 100 people are described below.

Which sample is most likely to be biased?

Tick **one** box.

[1 mark]

- ☐ 100 people chosen at random from the electoral register for Brantwell
- ☐ 100 people leaving the library on a Saturday morning
- ☐ 25 people chosen at random from each of the four areas of the town
- ☐ 100 addresses chosen at random from a list of all the homes in the town

- 6** In a sale, the price of an electric scooter is reduced by 12%

The sale price is £338.80

Work out the price of the scooter before the sale.

[3 marks]

Answer £ _____

- 7 The table shows information about the lengths, t minutes, of 40 episodes of a podcast.

Length (t minutes)	Frequency
$0 < t \leq 20$	7
$20 < t \leq 40$	12
$40 < t \leq 60$	11
$60 < t \leq 90$	6
$90 < t \leq 120$	4

- (a) Work out an estimate of the mean length of an episode.

[3 marks]

Answer _____ minutes

- (b) Niamh finds out that each of the 4 longest episodes lasted more than 105 minutes.

She says,

“So the actual mean must be more than the estimate in part (a).”

Is Niamh correct?

Tick a box.

Give a reason for your answer.

[1 mark]

☐

Yes

☐

No

- 8 Imani has £6000 to save for 5 years.
She can choose one of these two accounts.

Account A	Account B
Simple interest 3.6% per year	Compound interest 3.4% per year

Which account will give Imani more money at the end of 5 years, and how much more?
You must show your working.

[4 marks]

Answer _____

- 9 Expand and simplify $(2x - 3)(x + 4)(3 - x)$

[3 marks]

Answer _____

10 The Okafor family drive 225 miles on a road trip.

- Their car travels 16 kilometres on 1 litre of petrol.
- Petrol costs 148.9p per litre.

(a) Use 5 miles = 8 kilometres

Work out the cost of the petrol for the road trip.

Give your answer in pounds.

[3 marks]

Answer £ _____

(b) In fact, 5 miles is slightly more than 8 kilometres.

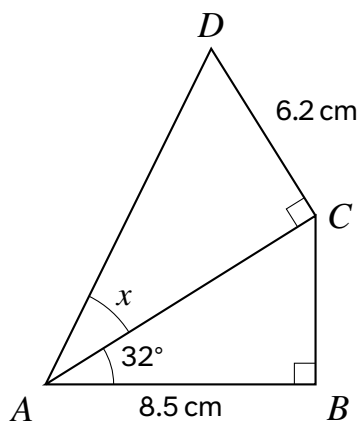
What does this mean about the actual cost of the petrol for the road trip?

Tick **one** box.

[1 mark]

- ☐ It is less than the answer to part (a)
- ☐ It is the same as the answer to part (a)
- ☐ It is more than the answer to part (a)
- ☐ It could be more or less than the answer to part (a)

- 11 The diagram shows two right-angled triangles, ABC and ACD .



Not drawn accurately

Work out the size of angle x .

Give your answer to 1 decimal place.

[4 marks]

$x =$ _____ degrees

12 A metalworker melts together

- 210 g of copper, which has a density of 8.96 g/cm^3
- 90 g of zinc, which has a density of 7.13 g/cm^3

to make brass.

(a) Work out the density of the brass.

Give your answer to 3 significant figures.

[2 marks]

Answer _____ g/cm^3

(b) Yusuf says,

“The density of the brass is the mean of 8.96 g/cm^3 and 7.13 g/cm^3 ”

Explain why Yusuf is wrong.

[1 mark]

13 Solve $x(3x - 4) = 3x + 7$

Give your solutions to 2 decimal places.

[3 marks]

Answer _____ and _____

14 Ruby tests a remote-controlled car on a straight track.

- The car travels 150 metres, to the nearest 10 metres.
- It takes 9.6 seconds, to the nearest 0.1 second.

Ruby says,

“The average speed of the car could have been more than 16.1 m/s”

Is Ruby correct?

Tick a box.

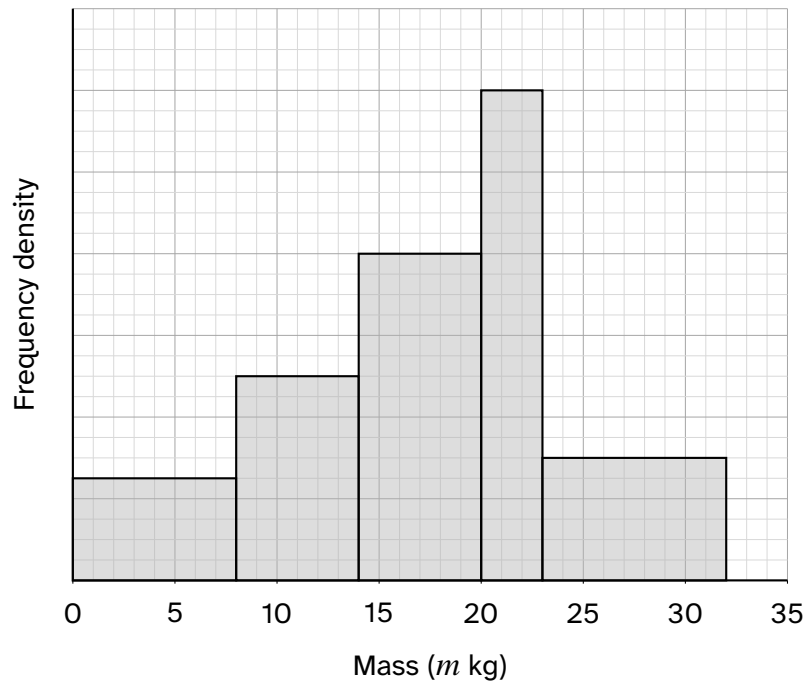
You must show your working.

[3 marks]

☐ Yes

☐ No

- 15** The histogram shows information about the masses of the suitcases checked in for a flight.
- 20 of the suitcases had a mass of 8 kg or less.
- The scale on the frequency density axis is not shown.

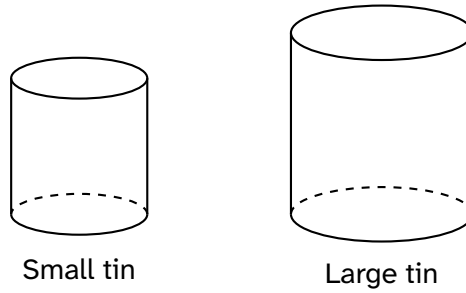


Estimate the number of suitcases with a mass between 10 kg and 26 kg.

[4 marks]

Answer _____

- 16 Two tins of paint are mathematically similar.



Not drawn accurately

The surface area of the small tin is 900 cm^2

The surface area of the large tin is 1600 cm^2

The small tin holds 1.35 litres of paint.

How many litres of paint does the large tin hold?

[3 marks]

Answer _____ litres

17 At a museum open day

- 24% of the adults went on a guided tour
- 40% of the children went on a guided tour
- the same number of adults and children went on a guided tour.

There were 1440 people at the open day altogether.

How many people went on a guided tour?

[4 marks]

Answer _____

- 18** (a) Show that the equation $x^3 + 4x - 11 = 0$ has a solution between $x = 1$ and $x = 2$
[1 mark]

- (b) Starting with $x_1 = 1.5$, use the iterative formula

$$x_{n+1} = \sqrt[3]{11 - 4x_n}$$

to work out the value of x_4

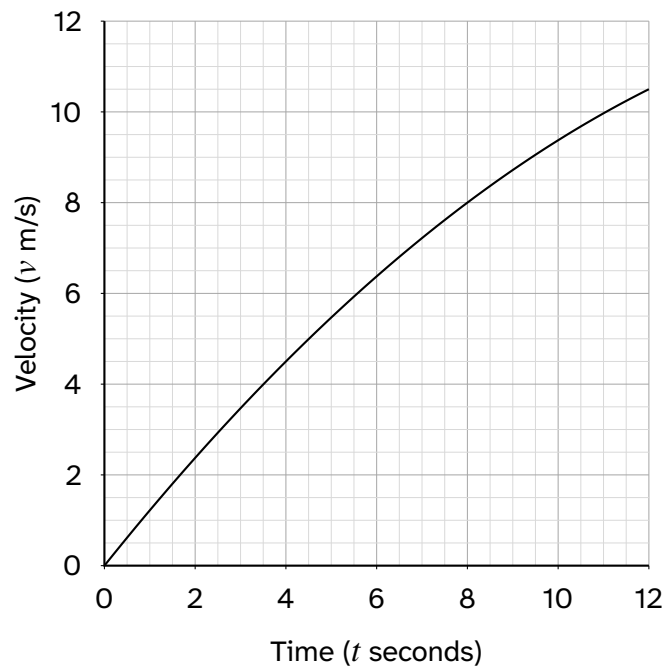
Give your answer to 4 decimal places.

[2 marks]

$x_4 =$ _____

- 19 A cyclist starts from rest at a set of traffic lights.

The graph shows her velocity, v metres per second, for the first 12 seconds.



- (a) Use three strips of equal width to estimate the distance the cyclist travels in the first 12 seconds.

[3 marks]

Answer _____ metres

- (b) Is your answer to part (a) an overestimate or an underestimate?

Tick a box.

Give a reason for your answer.

[1 mark]

☐

Overestimate

☐

Underestimate

20 $f(x) = 5 - 2x$ and $g(x) = x^2 + 1$

(a) Work out an expression for $gf(x)$

Give your answer in the form $ax^2 + bx + c$

[2 marks]

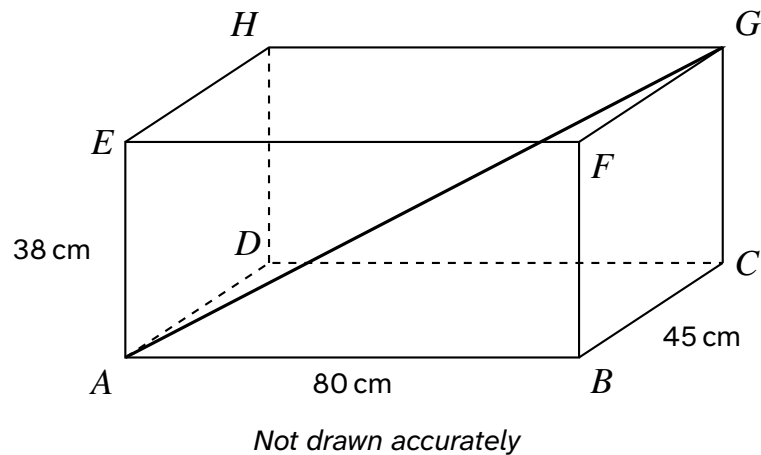
$$gf(x) = \underline{\hspace{10cm}}$$

(b) Work out $f^{-1}(x)$

[2 marks]

$$f^{-1}(x) = \underline{\hspace{10cm}}$$

- 21** A storage box is a cuboid $ABCDEFGH$ with a horizontal base $ABCD$.
A thin straight rod fits exactly inside the box from corner A to corner G .



Work out the angle between the rod and the base of the box.

Give your answer to 1 decimal place.

[4 marks]

Answer _____ degrees

22 A school spends £180 on some calculators.

Each calculator costs the same amount.

A year later, the price of each calculator has gone up by £1.50

The school spends £180 on calculators again.

This time it gets 4 fewer calculators.

Work out the price of one calculator before the price went up.

You must show your working.

[5 marks]

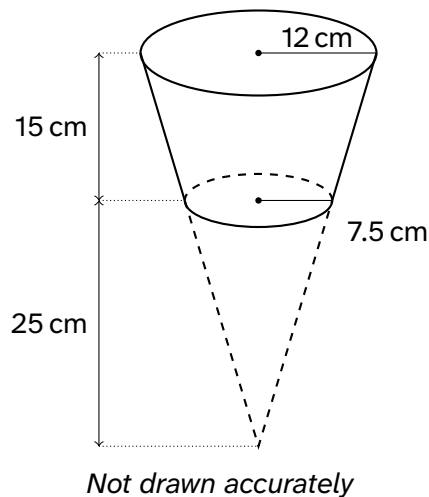
Answer £ _____

23 The diagram shows a plant pot.

The pot is a frustum. It is made by removing a small cone from a large cone.

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

where r is the radius and h is the perpendicular height



Compost is sold in 50-litre bags.

Faisal fills some of these plant pots with compost from one bag.

How many pots can he fill completely?

You must show your working.

[4 marks]

Answer _____

24 A bag contains only red counters and blue counters.

There are 6 blue counters in the bag.

Jamal takes two counters at random from the bag, without replacement.

The probability that the two counters are different colours is $\frac{8}{15}$

Work out the number of red counters in the bag.

You must show your working.

[5 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 :

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

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