CALC I

GCSE Mathematics · Higher Tier

40 marks · 45 minutes · Calculator

Name ..... **Class** .....

Answer all questions. Show all your working. Diagrams are NOT accurately drawn unless stated.

1 Ella's salary was £28 400

In 2025 her salary increased by 3.5%.

In 2026 her new salary increased by 2%.

(a) Work out Ella's salary after both increases.

£ .....

(2)

(b) Work out the overall percentage increase in Ella's salary.

..... %

(1)

(Total for Question 1 is 3 marks)

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2 The mass of the Earth is 5.97×10^{24} kg.

The mass of the Moon is 7.35×10^{22} kg.

How many times greater is the mass of the Earth than the mass of the Moon?

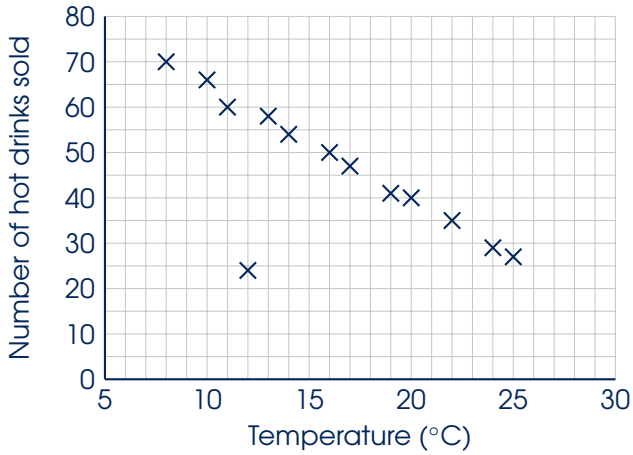
Give your answer correct to 3 significant figures.

.....

(Total for Question 2 is 2 marks)

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3 The scatter graph shows information about the midday temperature and the number of hot drinks sold at a café on each of 13 days.



(a) Describe the relationship between the temperature and the number of hot drinks sold.

.....

.....

(1)

(b) One of the points is an outlier.

Give a possible reason for this outlier.

.....

.....

(1)

(c) Ben uses the scatter graph to estimate the number of hot drinks sold on a day when the temperature was 35°C.

Explain why his estimate may not be reliable.

.....

.....

(1)

(Total for Question 3 is 3 marks)

4 The diagram shows triangle *ABC*.

The sizes of the angles, in degrees, are $2x + 15$, $3x - 10$ and $x + 25$

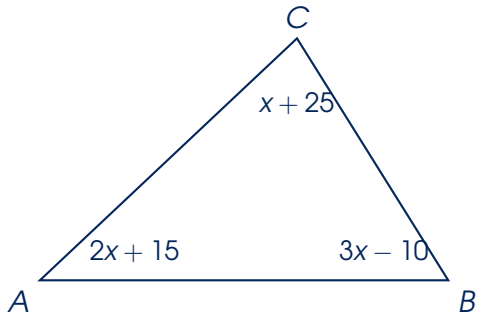


Diagram NOT accurately drawn

Show that triangle *ABC* is an isosceles triangle.

(Total for Question 4 is 3 marks)

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5 A ladder of length 6.5 m leans against a vertical wall.

The foot of the ladder is on horizontal ground, 1.8 m from the bottom of the wall.

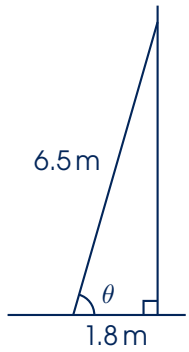


Diagram NOT accurately drawn

Work out the size of the angle, θ, between the ladder and the ground.

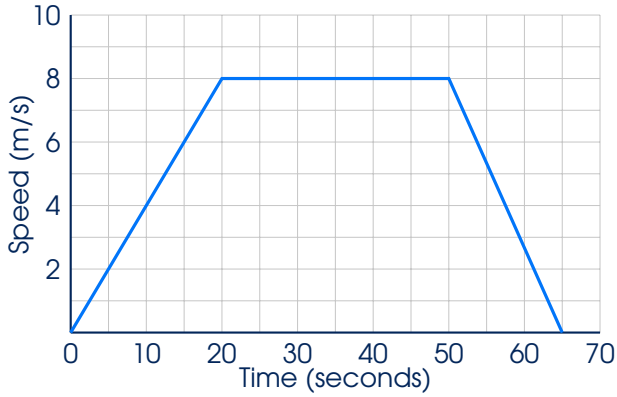
Give your answer correct to 1 decimal place.

..... °

(Total for Question 5 is 2 marks)

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6 The graph shows information about the speed of a cyclist during a journey of 65 seconds.



(a) Work out the acceleration of the cyclist during the first 20 seconds.

..... m/s^2

(1)

(b) Work out the total distance the cyclist travels in the 65 seconds.

..... m

(2)

(Total for Question 6 is 3 marks)

7 Bella drops a drawing pin 200 times.

Each time she records whether it lands point up or point down.

The table shows her results.

	Point up	Point down
Frequency	64	136

(a) Bella is going to drop the drawing pin 350 more times.

Work out an estimate for the number of times it will land point up.

.....

(1)

(b) Ali drops the same drawing pin 20 times. It lands point up 9 times.

Explain why Bella's results give a better estimate of the probability of the drawing pin landing point up.

.....

.....

(1)

(Total for Question 7 is 2 marks)

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8 *PQR* is a triangle.

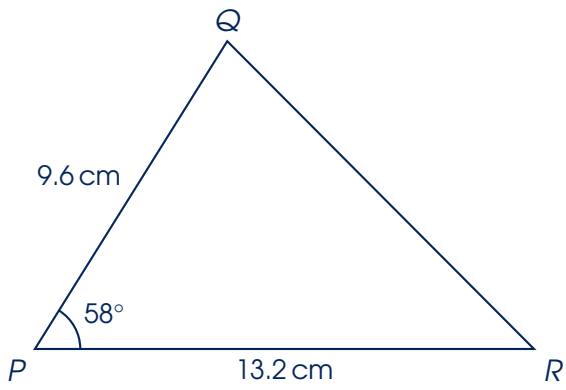


Diagram NOT accurately drawn

Work out the length of *QR*.

Give your answer correct to 3 significant figures.

..... cm

(Total for Question 8 is 3 marks)

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9 The time, T seconds, for one swing of a pendulum is directly proportional to the square root of its length, L metres.

When $L = 0.65$, $T = 1.61$

A clockmaker needs a pendulum with $T = 1.25$

Work out the length of the pendulum the clockmaker needs.

Give your answer in centimetres, correct to 3 significant figures.

..... cm

(Total for Question 9 is 3 marks)

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10 Solve $3x^2 - 7x - 4 = 0$

Give your solutions correct to 2 decimal places.

.....

(Total for Question 10 is 3 marks)

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11 A solid cube has sides of length 8.4 cm, correct to the nearest millimetre.
The mass of the cube is 412 g, correct to the nearest gram.

(a) Work out the upper bound for the density of the cube.
Give your answer correct to 3 significant figures.

..... g/cm^3

(3)

(b) Lucy says,

"The density of the cube is definitely less than 0.7 g/cm^3."

Is Lucy correct? Give a reason for your answer.

.....

.....

(1)

(Total for Question 11 is 4 marks)

12 A bucket is in the shape of a frustum of a cone.

The top of the bucket is a circle of diameter 30 cm.

The base of the bucket is a circle of diameter 20 cm.

The depth of the bucket is 24 cm.

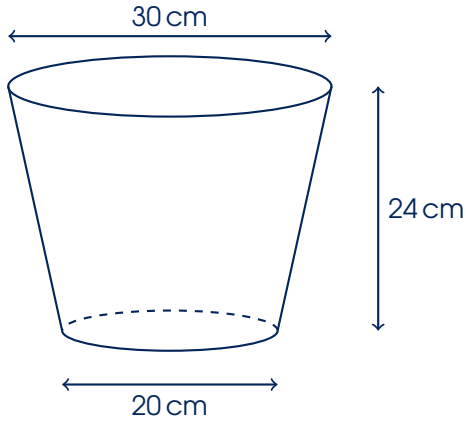


Diagram NOT accurately drawn

Vicky says the bucket will hold 12 litres of water.

Is Vicky correct? You must show all your working.

Volume of a cone $= \frac{1}{3}\pi r^2 h$ 1 litre $= 1000\,\text{cm}^3$

(Total for Question 12 is 4 marks)

13 The line **L** has equation $y = 2x - 3$

The circle **C** has equation $x^2 + y^2 = 40$

L meets **C** at the points A and B.

(a) Show that the x-coordinates of A and B satisfy the equation $5x^2 - 12x - 31 = 0$

(2)

(b) Work out the length of AB.

Give your answer correct to 3 significant figures.

.....

(3)

(Total for Question 13 is 5 marks)

TOTAL FOR PAPER IS 40 MARKS