CALC D

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 **(a)** Use your calculator to work out $\dfrac{5.7^2 + \sqrt{19.36}}{3.1 \times 0.84}$

Write down all the figures on your calculator display.

.....

(1)

(b) Write your answer to part (a) correct to 3 significant figures.

.....

(1)

(Total for Question 1 is 2 marks)

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2 Country **A** has a population of 5.62×10^6 and an area of 4.3×10^4 km^2.

(a) Work out the population density of Country **A**.

Give your answer correct to 3 significant figures.

..... people per km^2

(2)

(b) Country **B** has a population of 1.27×10^8 and an area of 3.78×10^5 km^2.

Sam says,

"The population density of Country **B** *is more than twice the population density of Country* **A**.*"*

Is Sam correct? You must show how you get your answer.

(2)

(Total for Question 2 is 4 marks)

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3 Ella has £4000 to invest for 6 years. She can choose one of these two accounts.

Account P	**Account Q**
3.5% per year simple interest	3% per year compound interest

Ella says,

"Account Q will give me more money after 6 years, because compound interest is always better."

Is Ella correct? You must show how you get your answer.

(Total for Question 3 is 3 marks)

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4 The table shows information about the number of people in each car passing a check-point.

Number of people	Frequency
1	12
2	m
3	9
4	6
5	3

The mean number of people in each car is 2.4

Work out the value of m.

$m =$ .....

(Total for Question 4 is 3 marks)

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5 **(a)** Solve the inequality $4(x - 2.5) > 7x + 3.2$

.....

(2)

(b) Write down the greatest integer that satisfies the inequality.

.....

(1)

(Total for Question 5 is 3 marks)

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6 Ben spins a four-coloured spinner 250 times. The table shows his results.

Colour	Red	Blue	Green	Yellow
Frequency	82	61	58	49

(a) Work out the relative frequency of the spinner landing on red.

.....

(1)

(b) Do Ben's results suggest that the spinner is fair? Give a reason for your answer.

.....

.....

(1)

(c) Ben says,

"If I spin the spinner 600 more times, it will land on red exactly 197 times."

Is Ben correct? Give a reason for your answer.

.....

.....

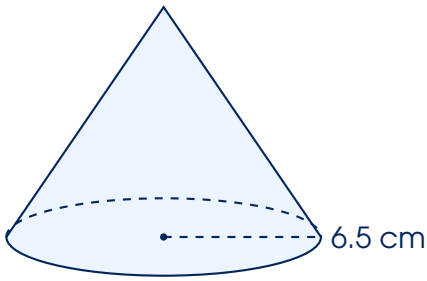
(1)

(Total for Question 6 is 3 marks)

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7 A solid cone has radius 6.5 cm.

The volume of the cone is 420 cm^3.



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

Curved surface area of a cone $= \pi r l$

Diagram NOT accurately drawn

Work out the curved surface area of the cone.

Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 7 is 4 marks)

8 **(a)** Show that the equation $x^3 - 5x + 1 = 0$ has a solution between $x = 2$ and $x = 3$

(2)

(b) Using $x_{n+1} = \sqrt[3]{5x_n - 1}$ with $x_0 = 2$

find the value of x_3 correct to 4 decimal places.

$x_3 =$ .....

(2)

(Total for Question 8 is 4 marks)

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9 The number of bacteria, P, in a sample t hours after the start of an experiment is given by

$$P = ab^t$$

where a and b are constants.

After 2 hours there are 1800 bacteria. After 5 hours there are 6075 bacteria.

Work out the value of a and the value of b.

$a =$ ..... $b =$ .....

(Total for Question 9 is 4 marks)

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10 *ABC* is a triangle.

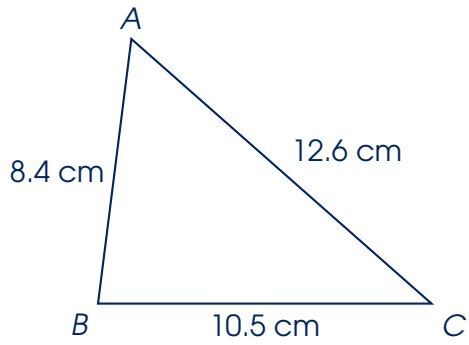


Diagram NOT accurately drawn

(a) Show that angle $ABC = 82.8°$, correct to 1 decimal place.

(2)

(b) Work out the area of triangle *ABC*.

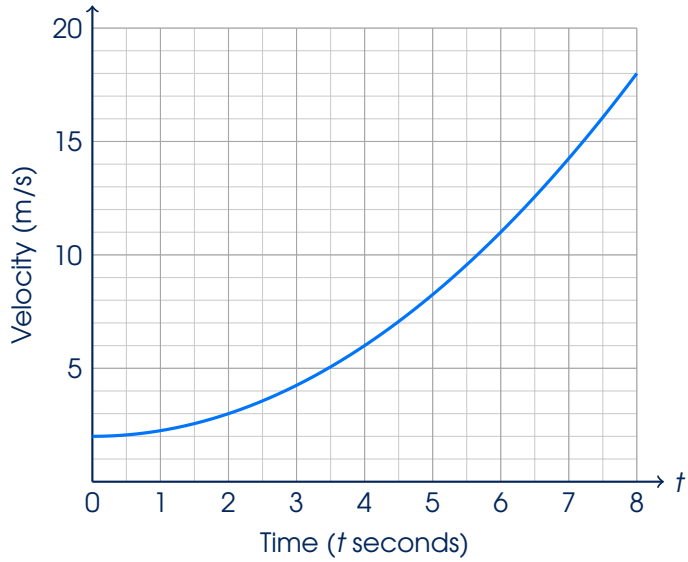
Give your answer correct to 3 significant figures.

..... cm^2

(2)

(Total for Question 10 is 4 marks)

11 The graph shows the velocity of a cyclist, in metres per second, during the first 8 seconds of a race.



(a) Use 4 strips of equal width to find an estimate for the distance travelled by the cyclist in the first 8 seconds.

..... m

(2)

(b) Is your answer to part (a) an overestimate or an underestimate of the actual distance?

Give a reason for your answer.

.....

.....

(1)

(Total for Question 11 is 3 marks)

12 The point $P(3, -5)$ lies on the circle with equation $x^2 + y^2 = 34$

Find an equation of the tangent to the circle at P.

Give your answer in the form $ax + by = c$, where a, b and c are integers.

.....

(Total for Question 12 is 3 marks)

TOTAL FOR PAPER IS 40 MARKS