CALC F

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 Washing powder is sold in two shops.

Shop A	Shop B
1.2 kg box	2 kg box
£3.78	£6.80
	20% off

In which shop is the washing powder better value for money?

You must show how you get your answer.

(Total for Question 1 is 3 marks)

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2 The mass of one virus particle is 3.6×10^{-16} grams.

A sample contains 8.5×10^{11} virus particles.

Work out the total mass of the virus particles in the sample.

Give your answer in standard form.

..... g

(Total for Question 2 is 2 marks)

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3 Some Year 10 and Year 11 students were each asked to choose one sport.
The two-way table shows their choices.

	Football	Tennis	Swimming	Total
Year 10	34	24	22	80
Year 11	25	21	14	60
Total	59	45	36	140

(a) One of the students is chosen at random.
Write down the probability that this student is in Year 11 and chose football.

.....

(1)

(b) Ali says,

"A Year 10 student is more likely to choose tennis than a Year 11 student, because 24 is more than 21"

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

(2)

(Total for Question 3 is 3 marks)

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4 A is the point $(-2, 7)$ and B is the point $(5, -4)$
Work out the length of the line segment AB.
Give your answer correct to 1 decimal place.

.....

(Total for Question 4 is 2 marks)

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5 A radioactive substance has a half-life of 6 hours.
At 08:00 on Monday there are 360 mg of the substance.

(a) Work out the mass of the substance at 02:00 on Tuesday.

..... mg

(1)

(b) Kiera says,

"After 2 days, there will be less than 1 mg of the substance."

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

(2)

(Total for Question 5 is 3 marks)

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6 The 4th term of an arithmetic sequence is 23
The 10th term of the same sequence is 53
Work out the 50th term of the sequence.

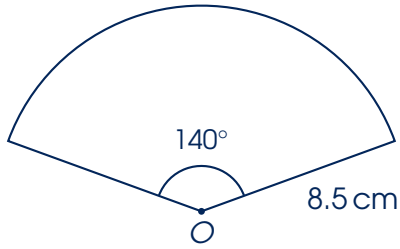
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(Total for Question 6 is 3 marks)

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7 The diagram shows a sector of a circle, centre O.

The radius of the circle is 8.5 cm. The angle of the sector is 140°.



Work out the perimeter of the sector.

Give your answer correct to 3 significant figures.

..... cm

(Total for Question 7 is 2 marks)

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8 Triangles **P** and **Q** are mathematically similar.

The area of triangle **P** is 45 cm^2. The area of triangle **Q** is 80 cm^2.

One side of triangle **P** has length 9.6 cm.

Kai says,

"The corresponding side of triangle **Q** *is* $9.6 \times \frac{80}{45} = 17.1$ *cm, to 1 decimal place."*

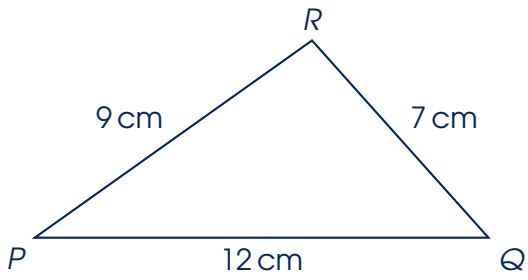
Is Kai correct? You must show how you get your answer.

(Total for Question 8 is 2 marks)

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9 PQR is a triangle.

$PQ = 12\,\text{cm}$, $PR = 9\,\text{cm}$ and $QR = 7\,\text{cm}$.



Work out the size of angle PRQ.

Give your answer correct to 1 decimal place.

..... °

(Total for Question 9 is 3 marks)

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10 $a = 8.4$ correct to 1 decimal place.

$b = 2.3$ correct to 1 decimal place.

$p = \dfrac{a}{b}$

(a) Work out the upper bound for the value of p.

Write down all the figures on your calculator display.

.....

(2)

(b) By considering bounds, decide whether the value of p can be given correct to 1 decimal place.

You must give a reason for your answer.

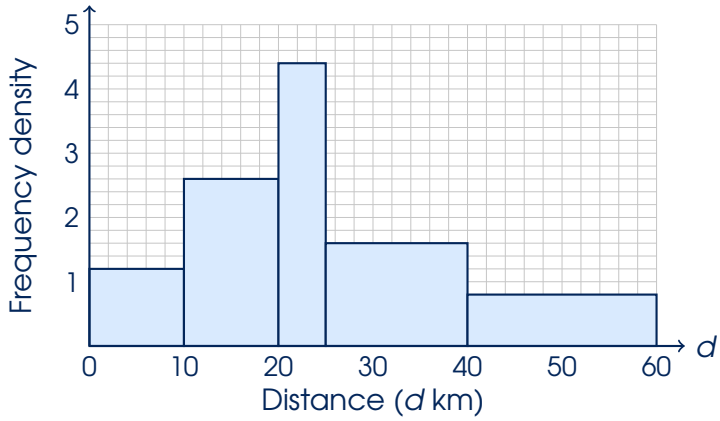
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(2)

(Total for Question 10 is 4 marks)

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11 The histogram shows information about the distances, d km, that some people travel to work.

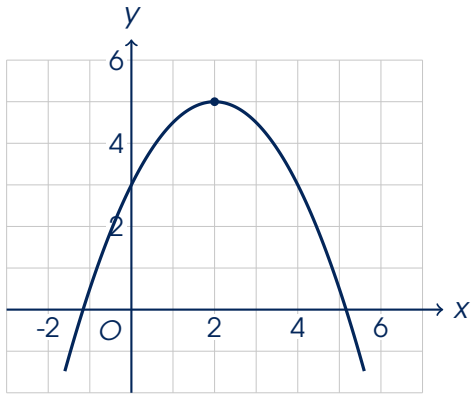


Work out an estimate for the median distance.

..... km

(Total for Question 11 is 3 marks)

12 The graph of $y = f(x)$ is shown on the grid.
The graph has a maximum point at $(2, 5)$.



Write down the coordinates of the maximum point of the graph with equation

(a) $y = f(x + 4)$

.....

(1)

(b) $y = f(x) - 3$

.....

(1)

(c) $y = -f(x)$ (this point is now a minimum point)

.....

(1)

(d) $y = f(2x)$

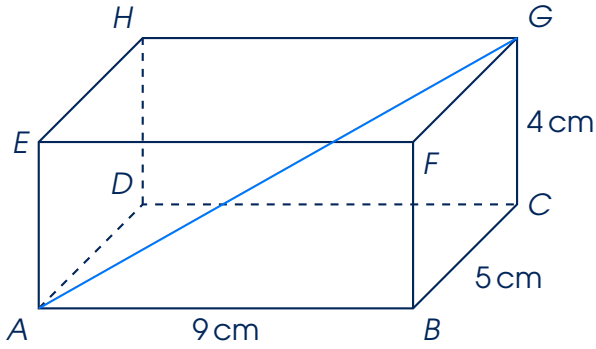
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(1)

(Total for Question 12 is 4 marks)

13 The diagram shows a cuboid *ABCDEFGH*.

$AB = 9\,\text{cm}$, $BC = 5\,\text{cm}$ and $CG = 4\,\text{cm}$.



Work out the size of the angle between the line *AG* and the plane *ABCD*.

Give your answer correct to 1 decimal place.

..... °

(Total for Question 13 is 3 marks)

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14 A ball is thrown upwards from the top of a wall.

The height, *h* metres, of the ball above the ground *t* seconds after it is thrown is given by

$$h = 1.5 + 14t - 4.9t^2$$

Work out how long it takes for the ball to reach the ground.

Give your answer correct to 3 significant figures.

..... seconds

(Total for Question 14 is 3 marks)

TOTAL FOR PAPER IS 40 MARKS