Name: _____

IGCSE (9-1) Maths
topics new to Foundation tier:
Semicircles

Date:

Time: 40 minutes

Total marks available: 31

Total marks achieved: _____

Q1. The diagram shows a tile.

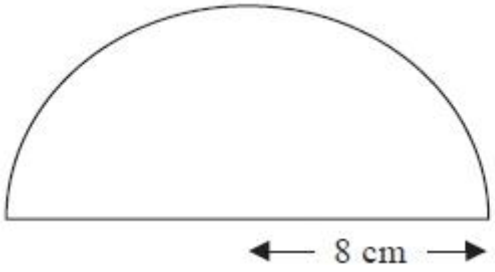


Diagram **NOT** accurately drawn

The tile is in the shape of a semicircle of radius 8 cm.

Work out the perimeter of the tile.
Give your answer correct to one decimal place.

..... cm

(Total 3 marks)

Q2. The diagram shows a semicircle drawn inside a rectangle.

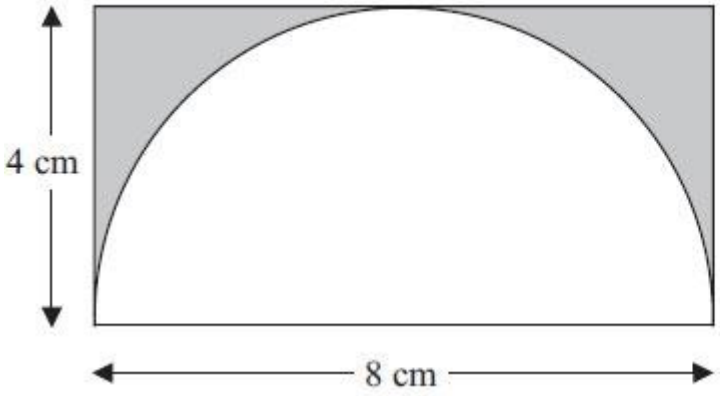


Diagram **NOT** accurately drawn

The semicircle has a diameter of 8 cm.
The rectangle is 8 cm by 4 cm.

Work out the area of the shaded region.
Give your answer correct to 3 significant figures.

. . . . . cm^2

(Total 4 marks)

Q3. The diagram shows the path of an athlete on a running track.

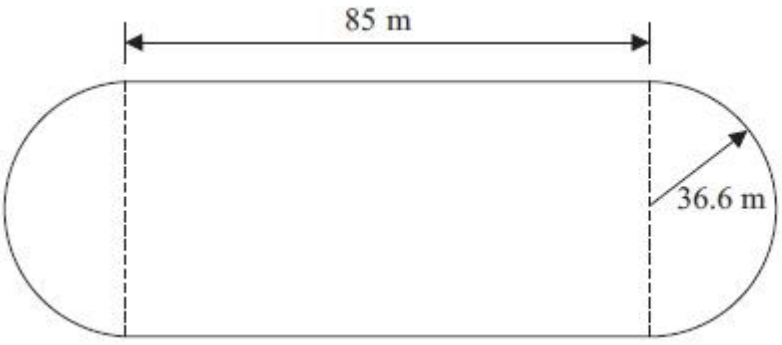


Diagram **NOT** accurately drawn

The path consists of two straight lengths and a semicircle at each end.

Each straight length is 85 metres.
Each semicircle has a radius of 36.6 metres.

Calculate the area enclosed by the path.
Give your answer correct to 3 significant figures.

.....m^2

(Total 4 marks)

Q4.

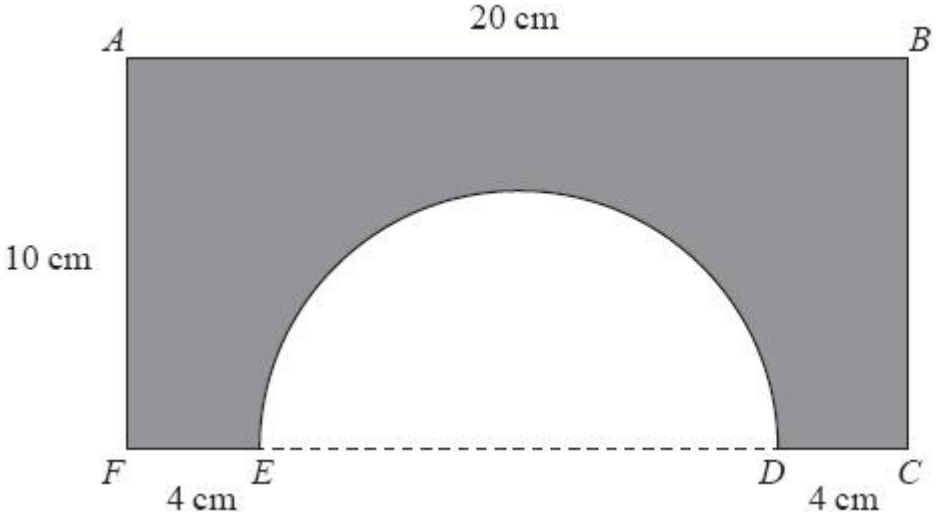


Diagram **NOT** accurately drawn

The shaded shape is made by cutting a semicircle from a rectangular piece of card, *ABCF*, as shown in the diagram.

FEDC is a straight line.
The centre of the semicircle lies on *ED*.
AF = *BC* = 10 cm, *AB* = 20 cm, *FE* = *DC* = 4 cm.

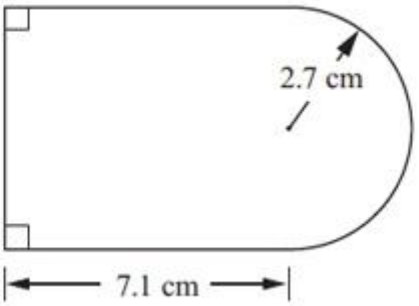
Work out the perimeter of the shaded shape.
Give your answer correct to 3 significant figures.

..... cm

(Total 3 marks)

Q5. Here is a shape made from a rectangle and a semicircle.

Diagram **NOT** accurately drawn

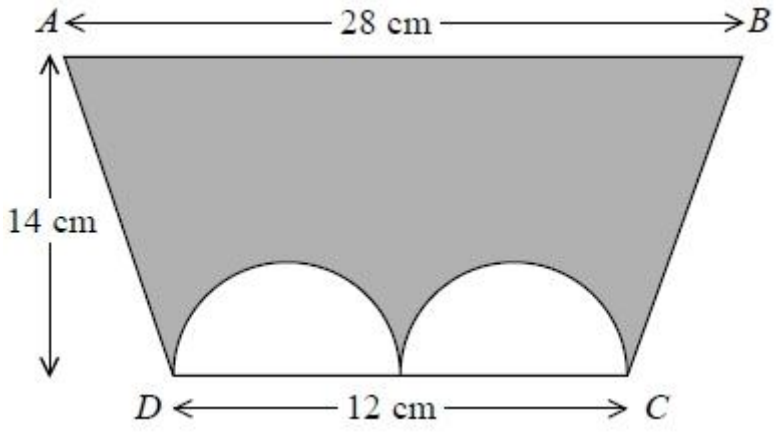


The length of the rectangle is 7.1 cm.
The radius of the semicircle is 2.7 cm.

Work out the area of the shape.
Give your answer correct to 3 significant figures.

(Total 4 marks)

Q6. The diagram shows a trapezium *ABCD* and two identical semicircles.



The centre of each semicircle is on *DC*.

Work out the area of the shaded region.
Give your answer correct to 3 significant figures.

..... cm^2

(Total 4 marks)

Q7.

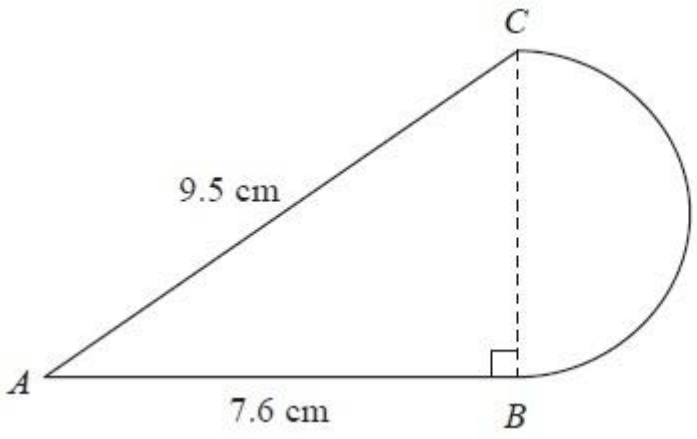


Diagram **NOT** accurately drawn

The diagram shows a shape made from triangle *ABC* and a semicircle with diameter *BC*.

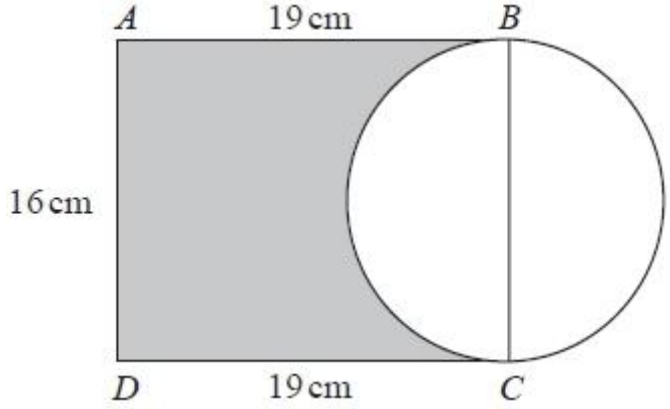
Triangle *ABC* is right-angled at *B*.
AB = 7.6 cm and *AC* = 9.5 cm.

Calculate the area of the shape.
Give your answer correct to 3 significant figures.

..... cm^2

(Total 5 marks)

Q8. Here is a diagram showing a rectangle, *ABCD*, and a circle.



BC is a diameter of the circle.

Calculate the percentage of the area of the rectangle that is shaded.
Give your answer correct to 1 decimal place.

.....%

(Total 4 marks)

Mark Scheme

Q1.

Paper: 5MB3H_01					
Question		Working	Answer	Mark	Notes
			41.1 to 41.2	3	M1 for a method to find the circumference of the circle, eg. $\pi \times 16$ (= 50.265..) M1 for a method to find the length of the semicircle, eg. "50.265.." ÷ 2 (= 25.132..) A1 for answer in the range 41.1 to 41.2

Q2.

		Working	Answer	Mark	Notes
			6.87	4	M1 for $\pi \times 4 \times 4$ or $\pi \times 4^2$ or $\pi \times 16$ or $\pi r^2 = 50.26...$ M1 for 'πr^2' ÷ 2 M1 for $8 \times 4 -$ '$\pi r^2 \div 2$' A1 for 6.86 – 6.88

Q3.

Question	Working	Answer	Mark	Notes
	$\pi \times 36.6^2$ (=4208.35..) 85 x 2 x 36.6 (=6222) "4208.35.." + "6222" (=10430.35..)	10400	4	M1 or x 36.62 ÷ 2 (=2104.17..) M1 M1 dep on both previous method marks A1 awrt 10400 (accept correct answers given in an alternative form eg. 1.04 × 104 ; 104 × 102) **SC:** B2 for an awrt 7320
				Total 4 marks

Q4.

Question	Working	Answer	Mark	Notes
	$\pi \times (20 - 2\times4)$ oe **or** $\pi \times 12$ oe **or** $2\times\pi\times6$ **or** 37.6... **or** 37.7 **or** $\frac{1}{2} \times \pi \times (20 - 2\times4)$ oe **or** $\frac{1}{2} \times \pi \times 12$ oe **or** $\pi\times6$ **or** 18.8…		3	M1 for a correct method to find the circumference or half of the circumference
	$4 + 10 + 20 + 10 + 4 + \frac{1}{2} \times$ "37.6…" **or** $4 + 10 + 20 + 10 + 4 +$ "18.8…"			M1 (dep on previous M1) for complete method
		66.8		A1 66.8 – 66.9
				Total 3 marks

Q5. [part a only]

Question Number	Working	Answer	Mark	Notes
(a)	Splits shape into rectangle & semicircle		4	M1 May be implied by working
	$\frac{\pi \times 2.7^2}{2}$ or value rounding to 11.4 or 11.5			M1 $\pi \rightarrow 11.451105...$ $3.14 \rightarrow 11.4453$ $3.142 \rightarrow 11.45259$ Also award for equivalent multiple of π eg 3.645π, $\frac{729\pi}{200}$
	$2 \times 2.7 \times 7.1$ or 38.34			M1 Also accept 38.3
		49.8		A1 for 49.8 or for answer rounding to 49.78 or 49.79
(b)	$P - 2L = \pi r + 2r$ oe		3	M1 for rearranging with both r terms on one side
	$P - 2L = (\pi + 2)r$ oe			M1 for factorising a correct expression (does not depend on a correct rearrangement)
		$\frac{P - 2L}{\pi + 2}$ oe		A1
				Total 7 marks

Q6.

Paper 1MA1: 3F			
Question	**Working**	**Answer**	**Notes**
		252	P1 For start to process eg. radius = 12 ÷ 4 (= 3) M1 Method to find area of trapezium or semicircle or circle P1 Process to find area of the shaded region A1 251.7 – 252

Q7.

Question	Working	Answer	Mark	Notes
	$\sqrt{9.5^2-7.6^2}$ or $\sqrt{90.25-57.76}$ or $\sqrt{32.49}$ or $\sqrt{32.5}$		5	M1
	$(BC=)$ 5.7			A1
	$\frac{1}{2}\times 7.6\times$"5.7" or 21.6(6) or 21.7			M1 dep on first M1 or eg. $ACB=\sin^{-1}\left(\frac{7.6}{9.5}\right)(=53.1...)$ and $\frac{1}{2}\times 9.5\times$"5.7"$\times\sin$"53.1"
	$\frac{1}{2}\times\pi\times\left(\frac{\text{"5.7"}}{2}\right)^2$ or 12.7(587...) or 12.8			M1 dep on first M1
		34.4		A1 for answer rounding to 34.4 ($\pi\rightarrow$ 34.4187... 3.14→34.4123...)
				Total 5 marks

Q8.

Paper 1MA1: 2F			
Question	**Working**	**Answer**	**Notes**
		66.9	P1 for process to find the area of one shape, eg. 19×16 (= 304) or $\pi \times 8^2$ (= 201.06...) P1 for process to find the shaded area, eg. "304" – "201.06" ÷2 (= 203.46...) P1 for a complete process to find required percentage, eg. $\frac{\text{"203.46"}}{304} \times 100$ A1 for answer in range 66 to 68