Godalming College

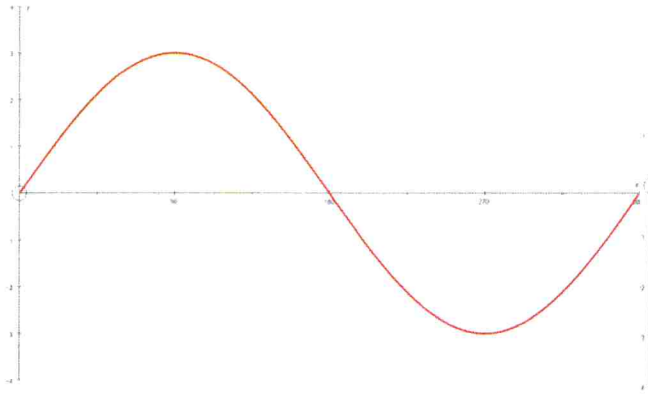
Radians, Arcs and Sectors

SOLUTIONS

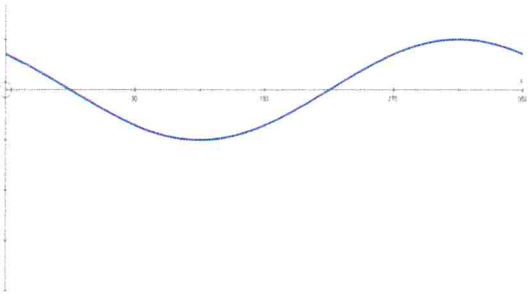
Section 1

1) 52.4 and 127.6
2) a) 34.2cm b) 4.39cm
3) a) 37.1° b) 91.7°
4) a) 3.26m² b) 14.3cm²

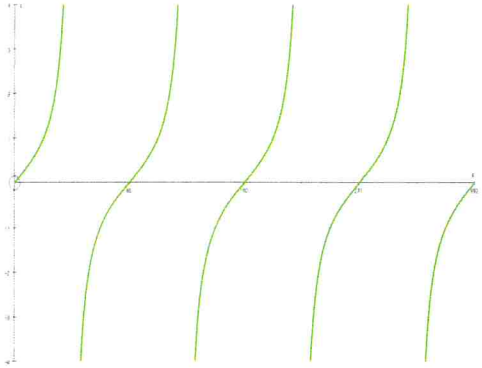
4a)



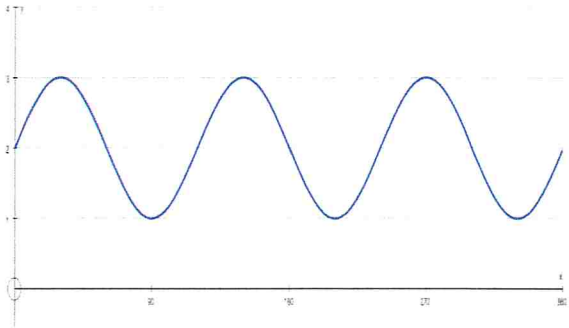
b)



c)



d)



Section 2 (Total 48marks)

1) a) $30 \times \frac{\pi}{180} = \frac{\pi}{6}$ b) $720 \times \frac{\pi}{180} = 4\pi$ c) $18 \times \frac{\pi}{180} = \frac{\pi}{10}$

(2 marks each)

2) a) $\frac{\pi}{3} \times \frac{180}{\pi} = 60°$ b) $\frac{\pi}{18} \times \frac{180}{\pi} = 10°$ c) $\frac{2\pi}{15} \times \frac{180}{\pi} = 24°$

(2 marks each)

3) a) $s = 12 \times \frac{\pi}{4} = 3\pi\ cm$ b) $60° = \frac{\pi}{3} => s = 15 \times \frac{\pi}{3} = 5\pi$

(2 marks each)

4) a) $P = (2 \times 5.2) + (5.2 \times 1.2) = 16.6cm$ **(2 marks)**

b) $P = (2 \times 19.6) + \left(19.6 \times \frac{2\pi}{3}\right) = 80.3cm$ **(2 marks)**

c) $360° - 97° = 263° = 4.5902^c$

$P = (2 \times 8.5) + (8.5 \times 4.5902) = 56.0cm$ **(3 marks)**

5) a) $\theta = 11 \div 16 = 0.69^c$

b) $\theta = 35 \div 7.2 = 4.86^c$

(2 marks each)

6) a) $A = \frac{1}{2} \times 50^2 \times \frac{\pi}{3} = 1309.0cm^2$

(2 marks)

b) $94° = 1.6406^c$

$A = \frac{1}{2} \times 14.2^2 \times 1.6406 = 165.4cm^2$

(3 marks)

c) $A = \frac{1}{2} \times 7^2 \times 4.3 = 105.4cm^2$

(2 marks)

7)

(a)	$11^2 = 8^2 + 7^2 - (2 \times 8 \times 7\cos C)$	M1
	$\cos C = \dfrac{8^2 + 7^2 - 11^2}{2 \times 8 \times 7}$ (or equivalent)	A1
	$\{\hat{C} = 1.64228...\} \Rightarrow \hat{C} =$ awrt 1.64	A1 cso
		(3)
(b)	Use of Area $\Delta ABC = \dfrac{1}{2}ab\sin(\text{their } C)$, where a, b are any of 7, 8 or 11	M1
	$= \dfrac{1}{2}(7 \times 8)\sin C$ using the value of their C from part (a)	A1 ft
	$\{= 27.92848...$ or $27.93297...\}$ = awrt 27.9 (from angle of either 1.64^c or 94.1°)	A1 cso
		(3)
		(6 marks)

8)

(a)	In triangle OCD **complete method** used to find angle COD so: Either $\cos C\hat{O}D = \dfrac{8^2 + 8^2 - 7^2}{2 \times 8 \times 8}$ or uses $\angle COD = 2 \times \arcsin\frac{3.5}{8}$ oe **so** $\angle COD =$	M1
	($\angle COD = 0.9056(331894)$) = 0.906 (3sf) * accept awrt 0.906	A1 *
		(2)
(b)	Uses $s = 8\theta$ for any θ in radians or $\dfrac{\theta}{360} \times 2\pi \times 8$ for any θ in degrees	M1
	$\theta = \dfrac{\pi - "COD"}{2}$ $(= awrt\ 1.12)$ or $2\theta (= awrt\ 2.24)$ and Perimeter = $23 + (16 \times \theta)$	M1
	accept awrt 40.9 (cm)	A1
		(3)
(c)	Either Way 1: (Use of Area of two sectors + area of triangle)	
	Area of triangle = $\frac{1}{2} \times 8 \times 8 \times \sin 0.906$ (or 25.1781155 accept awrt 25.2) or $\frac{1}{2} \times 8 \times 7 \times \sin 1.118$ or $\frac{1}{2} \times 7 \times h$ after h calculated from correct Pythagoras or trig.	M1
	Area of sector = $\frac{1}{2}8^2 \times "1.117979732"$ (or 35.77535142 accept awrt 35.8)	M1
	Total Area = Area of two sectors + area of triangle =awrt 96.7 or 96.8 or 96.9 (cm^2)	A1
		(3)
		(8 marks)