

1	$\tan x = \frac{3.4}{4.7}$ oe eg $\cos x = \frac{4.7}{\sqrt{3.4^2 + 4.7^2}}$			M1 or $\sin x = \frac{3.4 \sin 90}{\sqrt{3.4^2 + 4.7^2}}$ oe
	$(x =) \tan^{-1}\left(\frac{3.4}{4.7}\right)$ oe eg $(x =) \cos^{-1}\left(\frac{4.7}{\sqrt{3.4^2 + 4.7^2}}\right)$			M1 or $(x =) \sin^{-1}\left(\frac{3.4 \sin 90}{\sqrt{3.4^2 + 4.7^2}}\right)$ oe
		35.9	3	A1 accept 35.7 - 36.1
Total 3 marks				

2	$\cos 63 = \frac{24.3}{(PQ)}$ or $\sin 27 = \frac{24.3}{(PQ)}$ or $\frac{(PQ)}{\sin 90} = \frac{24.3}{\sin 27}$ or $\frac{\sin 90}{(PQ)} = \frac{\sin 27}{24.3}$ oe		3	M1 for a correct trigonometric ratio	M2 for $(RQ) = 24.3 \times \tan 63 (= 47.6914...)$ oe and $(PQ) = \sqrt{47.6914^2 + 24.3^2}$ oe
	$(PQ) = \frac{24.3}{\cos 63}$ or $(PQ) = \frac{24.3}{\sin 27}$ or $(PQ) = \frac{24.3}{\sin 27} \times \sin 90$			M1 for a correct rearrangement for PQ	
		53.5		A1 Accept 53.5 - 53.53	
Total 3 marks					

3	e.g. $\sin 65 = \frac{16}{AB}$ or $\cos 25 = \frac{16}{AB}$ or $\frac{AB}{\sin 90} = \frac{16}{\sin 65}$ or $\tan 65 = \frac{16}{AD}$ or $\tan 25 = \frac{AD}{16}$ or $\frac{AD}{\sin 25} = \frac{16}{\sin 65}$		4	M1 for a correct trig ratio for AB or AD accept 180 – 90 – 65 for 25
	e.g. $(AB) = \frac{16}{\sin 65} (= 17.654...)$ or $(AB) = \frac{16}{\cos 25} (= 17.654...)$ or $(AB) = \frac{16 \sin 90}{\sin 65} (= 17.654...)$ and $(AD) = \frac{16}{\tan 65} (= 7.460...)$ or $(AD) = 16 \times \tan 25 (= 7.460...)$ or $(AD) = \frac{16 \sin 25}{\sin 65} (= 7.460...)$			M1 for finding AB and AD Allow use of Pythagoras $(AD) = \sqrt{17.654...^2 - 16^2} (= 7.460...)$ or $(AB) = \sqrt{7.460...^2 + 16^2} (= 17.654...)$
	$(“17.654...” \times 2) + (“7.460...” \times 2)$ oe			M1 for a complete method to find the perimeter
		50.2		A1 accept 49.6 – 50.6
Total 4 marks				

4	eg $\tan BAP = \frac{2}{5}$ or $\sin BAP = \frac{2}{\sqrt{5^2 + 2^2}}$ or $\frac{\sin BAP}{2} = \frac{\sin 90}{\sqrt{5^2 + 2^2}}$ $\cos BAP = \frac{5}{\sqrt{5^2 + 2^2}}$ or $\cos BAP = \frac{5^2 + (\sqrt{5^2 + 2^2})^2 - 2^2}{2 \times 5 \times \sqrt{29}}$		5	M1 for setting up a trig equation for angle BAP
	eg $(BAP) = \tan^{-1}\left(\frac{2}{5}\right) (= 21.8...)$ or $(BAP) = \sin^{-1}\left(\frac{2}{\sqrt{5^2 + 2^2}}\right)$ or $(BAP) = \sin^{-1}\left(\frac{2 \sin 90}{\sqrt{5^2 + 2^2}}\right)$ $(BAP) = \cos^{-1}\left(\frac{5}{\sqrt{5^2 + 2^2}}\right)$ or $BAP = \cos^{-1}\left(\frac{5^2 + (\sqrt{5^2 + 2^2})^2 - 2^2}{2 \times 5 \times \sqrt{5^2 + 2^2}}\right)$			M1 for a complete method to find angle BAP (= 21.8...) [M2 for $90 - \tan^{-1} \frac{5}{2}$ ie 90 – 68.2]
	eg (int angle =) $(6 - 2) \times 180 \div 6 (= 120)$ or (ext angle =) $360 \div 6 (= 60)$			M1 Indep for a method to find the size of one interior or one exterior angle in a regular hexagon – could be seen on diagram
	eg “120” – “21.8” or 180 – “60” – “21.8”			M1 for a complete method to find angle PAF where all values have come from a correct method
		98.2		A1 accept 98.1 – 98.3
Total 5 marks				

5	$\cos 42 = \frac{x}{9.5}$ or $\tan 42 = \frac{9.5 \sin 42}{x}$ or $\sin(90 - 42) = \frac{x}{9.5}$ or $\frac{x}{\sin 48} = \frac{9.5}{\sin 90}$ or $9.5^2 - (9.5 \sin 42)^2$		3	M1 a correct trig statement for x or correct Pythagoras for x^2
	$(x =) 9.5 \cos 42$ or $(x =) \frac{9.5 \sin 42}{\tan 42}$ or $(x =) 9.5 \sin(90 - 42)$ or $(x =) \frac{9.5 \sin 48}{\sin 90}$ or $(x =) \sqrt{9.5^2 - (9.5 \sin 42)^2}$			M1 a fully correct calculation to find x
		7.1		A1 awrt 7.1
Total 3 marks				

6	$\sin 52 = \frac{12 \div 2}{r}$ oe or $\frac{r}{\sin 90} = \frac{6}{\sin 52}$ oe or $\cos(90 - 52) = \frac{12 \div 2}{r}$ oe or $(r^2 =)(12 \div 2)^2 + \left(\frac{12 \div 2}{\tan 52}\right)^2$ oe $[r^2 = 6^2 + 4.687...^2]$ or $\frac{r}{\sin 38} = \frac{12}{\sin 104}$ oe		4	M1 A correct trig statement for the radius use of tan must also include a correct Pythagoras statement.
	$r = \frac{6}{\sin 52}$ (=7.614) oe or $r = \frac{6}{\cos 38}$ oe or $(r =) \sqrt{(12 \div 2)^2 + \left(\frac{12 \div 2}{\tan 52}\right)^2}$ $[r = \sqrt{6^2 + 4.687...^2}]$ oe or $\frac{12 \sin 38}{\sin 104}$ oe			M1 A correct method to find the radius of the circle use of tan must also use Pythagoras to find an expression for r
	(Area =) $\pi \times ("7.61...")^2$			M1 the radius must come from a completely correct method
	Correct answer scores full marks (unless from obvious incorrect working)	182		A1 Accept 181 - 183
Total 4 marks				

7	$\sin 32 = \frac{(BC)}{50}$ or $\cos 32 = \frac{(CD)}{50}$ or $\frac{(BC)}{\sin 32} = \frac{50}{\sin 90}$ oe or $\frac{(CD)}{\sin (90 - 32)} = \frac{50}{\sin 90}$ oe		6	M1
	$(BC =) 50 \sin 32 (= 26.4(959...))$ or $(BC =) \sqrt{50^2 - (50 \cos 32)^2} (= 26.4(959...))$ or $(BC =) \sqrt{50^2 - "42.4..."^2} (= 26.4(998...))$ or $(BC =) \frac{50}{\sin 90} \times \sin 32$ oe			M1 for finding BC or AD Can be written on the diagram
	$(CD =) 50 \cos 32 (= 42.4(024)...)$ or $(CD =) \sqrt{50^2 - (50 \sin 32)^2} (= 42.4(024...))$ or $(CD =) \sqrt{50^2 - "26.4..."^2} (= 42.4(622...))$ or $(CD =) \frac{50}{\sin 90} \times \sin (90 - 32)$			M1 for finding CD or BA Can be written on the diagram
	$(r =) "42.4(024...)" \div 2\pi (= 6.74(855...))$			M1 for finding the radius of the cylinder
	$(V =) \pi \times "6.74(855...)"^2 \times "26.4(959...)"$			M1 dep on previous M mark for the use of $\pi r^2 h$
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	3790		A1 allow answers in the range 3737 – 3794 Accept answers in standard form
Total 6 marks				

8	$\cos BAD = \frac{8}{14}$ or $\sin ABD = \frac{8}{14}$ or $\sin ABD = \frac{8 \sin 90}{14}$ or $(BD =) \sqrt{14^2 - 8^2} (= \sqrt{132} = 2\sqrt{33} = 11.489...)$		4	M1
	$BAD = \cos^{-1}\left(\frac{8}{14}\right) (= 55.1(5...))$ or $\cos^{-1}\left(\frac{14^2 + 8^2 - "11.489..."^2}{2 \times 14 \times 8}\right)$ $BAD = \sin^{-1}\left(\frac{"11.489..."^2}{14}\right) (= 55.1(5...))$ or $BAD = \tan^{-1}\left(\frac{"11.489..."^2}{8}\right) (= 55.1(5...))$ or $BAD = 180 - 90 - \sin^{-1}\left(\frac{8}{14}\right) (= 180 - 90 - 34.8... = 55.1(5...))$ or $CAD = 180 - 38 - \sin^{-1}\left(\frac{8}{14}\right) - 90 (= 180 - 38 - 34.8 - 90 = 17.2)$			M1 (accept 55.1 or 55.2 without working)
	$\tan("55.15..." - 38) = \frac{CD}{8}$ oe eg $\tan 17.2 = \frac{CD}{8}$ oe or $\frac{CD}{\sin(55.1... - 38)} = \frac{8}{\sin(90 - (55.1... - 38))}$ oe			M1 A correct equation with CD being the only unknown value
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	2.47		A1 2.44 – 2.48
Total 4 marks				