APPROXIMATIONS AND ERRORS MARKING SCHEME

1.	R = 8.5 r = 5.5 v = ЛR²h – Лr²h = $\frac{22}{7}$ x 14 (8.5 – 5.5) (8.5 + 5.5) = 44 (3) (14) = 1848cm³ **1996Q15**	B1 M1 A1 3M
2.	a). R $\frac{1}{0.00001}$ = $\frac{1}{1.6}$ x 10^5 = 62500 b). Appropriate value $\frac{1}{0.00315 - 0.00313}$ = $\frac{1}{0.00002}$ = ½ x 105 = 50000 ii). Error = 62500 – 50000 = 12500 **1997Q16**	 A1 M1 A1 B1 3 M
3.	a) c = 2 x 2.8 x $\frac{22}{7}$ = 17.6cm = $\frac{c}{Л}$ = 17. 6 x $\frac{7}{22}$ = 5.6 b) 3.142 x 2.8 x 2 = 17.595 3.142 x 5.5 = 17.281 3.142 x 5.7 = 19.909 Limits : 17.28 + 17.91 **1998Q15**	M1 M1 A1 2M
4.	a). Maximum possible area 4.11 x 2.21 = 9.083m² Minimum possible area 4.09 x 2.19 = 8.9571m² b). Maximum possible wastage 9.0831 – 8.9571= 0.126m² **1999Q9**	 M1 A1 B1 3 M
5.	Maximum perimeter 2(18.5 + 12.5) = 62cm Minimum perimeter 2(17.5 + 11.5) = 58cm	
	Indicated perimeter 2(18 + 12) = 60cm Absolute error = $\frac{62 - 58}{2}$ = 2 = $\frac{2}{60}$ x 100 = 3.$\frac{1}{3}$% avoid $\frac{10}{3}$% **2000Q10**	
6.	Absolute error = 0.5+0.5 + 0.5 = 15 % error = $\frac{1.5}{33}$ x 100% = 4.55% (to 2d.p) = 4.54% (if Logs used) **2002Q8**	M1 M1 A1 3 M
7.	L.U = 1cm A.E = 0.5 Limits of A are 3.5 and 4.5 Limits of 6 are 5.5. and 6.5 Min Area = ½ x 3.5 x 5.5 = 9.625 Maximum area = ½ x 4 x 6 = 14.625 Working area = ½ x 4 x 6 = 12.000 Workign area – Minimum area = 12 – 9.625 = 2.375 Max area – Working area = 14.625 -12 = 2.625 Absolute error in area = $\frac{2.375 + 2.625}{2}$ = 2.5 b). % Error = $\frac{A.E}{A.M}$ x 100 = $\frac{2.5}{12}$ x 100 = 20 $^5/_6$ % **2005Q9**	 A1 M1 A1
8.	800 x 0.006 = 4.8	B1

	% error = $\frac{4.8 - (788 \times 0.006) \times 100\%}{788 \times 0.006}$ $= \frac{0.072}{4.728} \times 100\%$ = 1.523% **2006Q4**	M1 A1 3m
9.	Greatest possible error $= \frac{64(3.15-3.05)}{2}$ $= \frac{201.6 - 195.2}{2}$ = 3.2cm^2 **2007Q8**	M1 A1 2m
10.	0.05 x 6 = 0.3 % error = $\frac{0.3}{50x6} \times 100$ = 0.1% **2008Q5**	M1 M1 A1 3m
11.	$\frac{(7.55 \times 5.25) - (7.45 \times 5.15)}{2}$ $\frac{0.635}{7.5 \times 5.2} \times 100\%$ $\left(\frac{0.05}{7.5} + \frac{0.05}{5.2}\right) \times 100$ = 1.628% **2010Q1**	M1 M1 A1 3
12.	$Max_A = 4Л(7.5)^2$ 4 $Max_A = 4Л(6.5)^2$ Absolute error = $\frac{4Л(7.5^2 - 6.5^2)}{2}$ % Error = $\frac{28Л}{4Л \times 7^2} \times 100\%$ = 14.29% **2011Q9**	M1 M1 M1 A1 4

13.	Minimum possible area. $= \frac{1}{2}(6.35 \times 3.45)$ = 10.95375 cm^2 Maximum possible area $= \frac{1}{2} \times 6.45 \times 3.55$ = 11.44875 cm^2 Maximum absolute error in area $= \frac{11.44875 - 10.95375}{2}$ = 0.2475 cm^2 **2012 Q11 P2**	M1 M1 A1 3