Parabolic Antenna Project Spreadsheet 11/08/05

frequency *F* (**given**)		2402	MHz		
diameter *D* (**given**)		0.800	m	80.0	cm
beamwidth *theta* (**given**)		130	degrees		
f/D ratio	$\frac{f}{D}=\frac{1}{4\tan(\theta/4)}$	0.392421			
focal length *f*	$f=(\frac{f}{D})D$	0.314	m	31.4	cm
depth	$d=\frac{D^2}{16f}$	0.127	m	12.7	cm
Equation of parabola	$y=ax^2$				
coefficient	$a=\frac{1}{4f}$	0.796338	1/m	0.00796338	1/cm

Length of a parabolic segment

$$L=\frac{\ln(\sqrt{a^2D^2+1}+aD)}{4a}+\frac{D\sqrt{a^2D^2+1}}{4}$$ 0.426 m 42.6 cm

Surface area of a parabolic reflector

$$S=\pi\frac{(a^2D^2+1)^{3/2}-1}{6a^2}$$ 0.551 m^2 5506 cm^2

Gain of a parabolic reflector

Area	$A=\frac{\pi D^2}{4}$	0.503	m^2	5027	cm^2
wavelength *lambda*		0.125	m	12.5	cm
efficiency *eta* (**given**)		50%			

$$G=10\log_{10}\left(\eta\frac{4\pi A}{\lambda^2}\right)$$ 23 dBi

$\sqrt{a^2 D^2+1}$	1.18569