Chapter 2, #2, 3, 6

2.2 $T_e = \sqrt[4]{\frac{S/4(1-\alpha)}{\sigma}} = \sqrt[4]{\frac{1367 \times .7\,(0.7)}{\sigma}} = 233K$

2.3 $T_e = \sqrt[4]{\frac{S/4(1-.1)}{\sigma}} = \sqrt[4]{\frac{1367}{4} \cdot .9} = 271K$

2.6 $\cos\theta_s = \sin\phi \sin\delta + \cos\phi \cos\delta \cos h$

$\phi = 47 \quad \delta = \pm 23.45 \quad h = 45°$

Summer $\theta_s = \cos^{-1}\left(\sin 47 \sin 23.45 + \cos 47 \cos 23.45 \cos 45°\right)$

$= 0.731\,(0.3987) + 0.682 \cdot 0.9174 \cdot 0.707$

$= 0.291 + 0.4424$

$= \cos^{-1}(0.734)$

$\theta_s = 42.8°$ ← Summer — Your home town

Winter $\theta_s = 81.3°$

Chapter 2, #7, 8

2.7 $\theta = S_0 \left(\frac{\bar{d}}{d}\right)^2 \cos\theta_s$

	N Face		S Face	
Summer #	1098	(38.55°)	1358	$\theta_s = 8.55°$
Nuts	156	(85.45°)	814	(55.45°)

$$\theta_s = \phi - \delta \pm 15$$

2.8 $S_0(1-\alpha) A_{sh} = \sigma T_e^4 A_{sh}$

One face only

$$T_e = \sqrt[4]{\frac{S_0(1-\alpha)}{\sigma}} = 360K$$

Two faces only $T_e = \sqrt[4]{\frac{S_0(1-\alpha)}{2\sigma}} = 303K$