

Answer on Question ##69412 -Physics / Other

A satellite is placed in the orbit of the earth at a height of $h_1 = 1000$ km from its surface. Calculate its time period, given that a geo stationary satellite has an altitude $h_2 = 36000$ km.

Solution

In terms of a Kepler's third law

$$\frac{T_1^2}{T_2^2} = \frac{a_1^3}{a_2^3}$$

So

$$T_1 = T_2 \sqrt{\frac{a_1^3}{a_2^3}} = T_2 \sqrt{\frac{(R + h_1)^3}{(R + h_2)^3}} = 24 \text{ hr} \times \sqrt{\frac{(6378 + 1000)^3}{(6378 + 36000)^3}} = 1.74 \text{ hr.}$$

Answers: $T_1 = 1.74$ hr.