

At what velocity and altitude must a satellite be placed above Neptune to be a geostationary satellite? A day on Neptune is 16 hours.

$T = 16 \text{ h} \times 60 \times 60$
 $T = 57600 \text{ s}$

$F_{cp} = F_g$
 $\frac{m v^2}{R} = \frac{G M m}{R^2}$
 $\frac{m \left(\frac{2\pi R}{T} \right)^2}{R} = \frac{G M m}{R^2}$
 $\frac{4\pi^2 R^2}{T^2} = \frac{G M}{R}$
 $4\pi^2 R^3 = G M T^2$

$V = \frac{2\pi R}{T}$
 $V = \frac{2\pi (8.3 \times 10^7)}{57600}$
 $V = 9049 \text{ m/s}$

$Alt = R_0 - R_N$
 $= 8.3 \times 10^7 - 2.47 \times 10^7$
 $= 5.83 \times 10^7 \text{ m}$

$R^3 = \frac{G M T^2}{4\pi^2} = \frac{(6.67 \times 10^{-11}) (1.02 \times 10^{26}) (57600)^2}{4\pi^2}$
 $R = 8.50 \times 10^7 \text{ m}$

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