

21. From Eq. 14-13, we see the extreme case is when “ g ” becomes zero, and plugging in Eq. 14-14 leads to

$$0 = \frac{GM}{R^2} - R\omega^2 \implies M = \frac{R^3\omega^2}{G} .$$

Thus, with $R = 20000$ m and $\omega = 2\pi$ rad/s, we find $M = 4.7 \times 10^{24}$ kg.