

52. From Kepler's law of periods (where  $T = 2.4(3600) = 8640$  s), we find the planet's mass  $M$ :

$$(8640\text{ s})^2 = \left( \frac{4\pi^2}{GM} \right) (8.0 \times 10^6\text{ m})^3 \implies M = 4.06 \times 10^{24}\text{ kg} .$$

But we also know  $a_g = GM/R^2 = 8.0\text{ m/s}^2$  so that we are able to solve for the planet's radius:

$$R = \sqrt{\frac{GM}{a_g}} = 5.8 \times 10^6\text{ m} .$$