

Planet Holloway - **Websheet 7.2**

AP Physics C - Chapter 7

You may print this out and write on it or work on your own paper.

Show all work.

Assume Planet Holloway is different for each problem below. ($g_{\text{earth}} = 10 \text{ m/s/s}$)

1. The escape velocity on Earth is 11.2 km/s. What is the escape speed on Planet Holloway? Planet Holloway has $\frac{1}{4}$ the mass of Earth and $\frac{1}{2}$ the radius.
2. Geosynchronous satellites orbit over the equator and appear stationary in the sky because they take 24 hours to orbit once. If a 700 kg satellite is in orbit $4.2 \times 10^7 \text{ m}$ above the center of the earth at the equator, what force is acting on it?
3. If Planet Holloway has a gravitational acceleration of 14 m/s/s at the surface, what would the weight of a 50 kg astronaut be if they were 2 radii away from the surface of Planet Holloway?
4. An asteroid has a perihelion (closest approach to the sun) of 2 AU and a period of revolution of 39.5 years. What is its greatest distance (aphelion) from the sun?
5. If Planet Holloway is 6 times farther from the sun than Earth, how long does it take to orbit the sun?
6. An asteroid has a linear speed of 6 km/s when at a perihelion (closest approach to the sun) of $2 \times 10^8 \text{ miles}$. What is its speed at aphelion (furthest) of $12 \times 10^8 \text{ miles}$?

Answers:

1. 7.92 km/s

2. 158.8 N

3. 77.8 N

4. 21.2 AU

5. 14.7 years

6. 1 km/s