

Name: _____

Worksheet 5.3 Gravitation and satellite orbits

Before starting this worksheet, google the mass and radius of **the Earth**, the **Sun**, and the **Moon**.

Mass of Earth =	Mass of Sun =	Mass of Moon =
Radius of Earth =	Radius of Sun =	Radius of Moon =

1. Find the orbital period and speed of a satellite orbiting Earth at an altitude of 1800 km
2. A moon orbits planet Y in a circular path with a radius of 9600 km. If it takes 137 minutes to complete one orbit, find
 - a) the acceleration,
 - b) the mass of planet Y
 - c) If planet Y has a radius of 5600 km, what is the gravitational field strength at its surface?
3. Find the speed of an earth satellite orbiting with a 3.5 hour period
4. A planet orbits a certain star at a distance equal to the distance between earth and the sun, but has a period of 1.5 earth years. What is the mass of the star? (answer in solar masses, eg 2 solar masses is twice the mass of our sun)
5. If the earth had a second moon orbiting at twice the distance of the one we have now, what would its orbital period be?
6. Find the velocity of
 - a) Earth's moon relative to Earth
 - b) Earth relative to the sun
7. The moon orbits around the Earth after 27 days. Calculate the moon's orbital radius.
8. The Earth's orbital radius around the Sun is 149.60 million kilometers. Show that the Earth's orbital period is roughly 1 year.

1. 6980 m/s, 123 min	2. 5.6 m/s, 7.7×10^{24} kg, 16.5 m/s	3. 5840 m/s	4. 8.9×10^{29} kg	5. 6.7×10^6 s	6. 1020 m/s, 29900 m/s	7. 3.8×10^8 m	8. ~1 year
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