

**Activity 3.2.6 Orbital Mechanics Physics**

Introduction

Satellites need a tremendous amount of energy to be raised from the Earth’s surface to the altitude where they can orbit the Earth. Engineers must design systems to place such satellites in orbit.

In this activity you will calculate the energy required for satellites to orbit Earth.

Equipment

* Engineering notebook
* Notes from Orbital Mechanics Physics presentation

Procedure

Answer the following questions and show all formulas, units, and calculations.

1. A 15,000 kg satellite is orbiting at 800km above the Earth’s surface. How much potential energy?
2. At what distance from the Earth’s surface is a 10,000kg satellite if its potential energy is equal to -5.58 x 1011J?
3. What is the total energy of a 175,000kg shuttle orbiting the Earth at 600km above Earth’s surface?
4. A satellite has a total energy of -4.4x1011J. The satellite is orbiting 650km above Earth’s surface. What is the mass of the satellite?
5. A research satellite (14000kg) is orbiting planet Julu at an altitude of 400km. The researchers want their satellite to be at an altitude of 700km to take some specific pictures. How much energy is needed for this orbit change? (RJulu=5.4x103km; MJulu=3.74x1021kg)

**Conclusion**

1. How will a satellite gain the energy to change its orbit to a higher altitude?