ASTRONOMY UNIT 4

Lab One – Surface Gravity

Questions

Do other planets in the solar system have the same gravity as Earth?

Is a planet's size a good indicator of its gravity relative to Earth?

Hypotheses – choose one

1. There are no other planets with the same gravity as Earth.
2. Gravity is proportional to planetary radius. (as radius increases, gravity increases)

Method

1. Calculate the surface gravity of the eight planets in the solar system using known values for their mass and radius. The formula for surface gravity is

   $g = G*M/r^2$

   G = gravitational constant: **6.674×10^(-11)** m^3/kg (s^2) (meters cubed per kilogram second squared)

   M = Mass of planet in kg

   r = radius of planet in km

2. Compare the resulting values for gravitational acceleration to that of Earth's

Data

Planet	Radius (m)	Mass (kg)	Surface Gravity (m/s^2)	Relative Gravity
Mercury	2,440,000 m	3.285 × 10^23 kg		
Venus	6,052,000 m	4.867 × 10^24 kg		
Earth	6,378,000 m	5.972 × 10^24 kg		100%
Mars	3,390,000 m	6.390 × 10^23 kg		
Jupiter	69,911,000 m	1.898 × 10^27 kg		
Saturn	58,230,000 m	5.683 × 10^26 kg		
Uranus	25,360,000 m	8.681 × 10^25 kg		
Neptune	24,629,000 m	1.024 × 10^26 kg		

Conclusion