How High Can You Jump On Another Planet?

Gravity: the force that attracts a body toward the center of a planet, or toward any other physical body having mass.

The surface gravity of a star, planet, moon, etc. depends upon the object's **mass** (the amount of stuff present), and the object's **radius**.

The radius is a factor because
(1) An object's gravity acts as though its source is at the object's center
(2) The "strength" of an object's gravity diminishes with distance. For example, suppose that two planets have the same mass, but unequal radii. The planet with the smaller radius will have a stronger surface gravity.

Purpose: How high can you jump on another planet?

Hypothesis: _____

Materials: Meter sticks
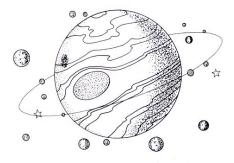   Calculator

Procedure:

1) Working in partner, one student jumps as high as possible. The other partner kneels on the ground holding the meter stick vertical to their partner. Measure how hight the student jumps.
2) Repeat step 1 three times to find **maximum jump height on Earth**.
3) Record height below.

Maximum Jump Height on Earth
Student 1

_____

4) Repeat steps 1-3 to record partners maximum jump height.

Maximum Jump Height on Earth Student
Student 2

_____

Celestial Body	Mass (kg)	Radius (km)
The Sun	2.0×10^{30}	695,500
Mercury	3.3×10^{23}	2 439
Venus	4.87×10^{24}	6 052
Earth	5.98×10^{24}	6 371
Mars	6.42×10^{23}	3396
Jupiter	1.96×10^{27}	71 500
Saturn	5.7×10^{26}	60 268
Uranus	8.68×10^{25}	25 559
Neptune	1.02×10^{26}	24 750
Pluto	1.31×10^{22}	1 195
Earth's Moon	7.347×10^{22}	1 737

Data:

Location	Calculation	Height of Jump(m)
Earth	-	
Sun	Divide by 30	
Mercury	Multiply by 5 then divide by 2	
Venus	Multiply by 10 then divide by 9	
Mars	Multiply by 5 then divide by 2	
Jupiter	Multiple by 2 then divide by 5	
Saturn	Multiply by 7 then divide by 8	
Uranus	Multiply by 11 then divide by 12	
Neptune	Multiply by 5 then divide by 7	
Pluto	Multiply by 30	
Earth's Moon	Multiply by 6	

Conclusions:

1) Was your hypothesis correct or not? Explain using evidence from data.

2) What were the errors that could have occurred?

3) What two factors affect your gravitational force?

4) Looking at your data, what locations have the greatest gravitational force? Least gravitational force? Explain.