

Name: _____ Class: _____ Date: _____

How does the mass of a planet affect jump height?

Independent variable (IV): _____ (2 points)

Dependent variable (DV): _____ (2 points)

Hypothesis: _____
_____ (4 points)

Materials:

- 1 meter stick
- ___ calculators
- ___ people

Procedure:

- 1) Have one student hold a meter stick vertically with zero touching the floor.
- 2) Have another student jump straight up next to the meter stick.
- 3) Have a third student observe the height of the jump.
- 4) Repeat steps 2-3 two more times.
- 5) Switch places to have a new person jump.
- 6) Repeat steps 1-4.
- 7) Switch places to have last person jump.
- 8) Repeat steps 1-4.

Observations: (4 points)

Person	Jump Height (cm)			
	Trial 1	Trial 2	Trial 3	Average
(if needed)				

The force due to gravity (g) is different on each planet. It is dependent on the mass and radius of the planet. We need to use the ratio of that planet to that of Earth ($g_{\text{planet}}/g_{\text{Earth}}$) to help with our calculations. Please use the table below to help.

Planet	Mass [kg]	Radius [m]	Acceleration Due to Gravity, "g" [m/s^2]	$g_{\text{planet}}/g_{\text{Earth}}$
Mercury	3.18×10^{23}	2.43×10^6	3.59	0.37
Venus	4.88×10^{24}	6.06×10^6	8.87	0.90
Earth	5.98×10^{24}	6.38×10^6	9.81	1.00
Mars	6.42×10^{23}	3.37×10^6	3.77	0.38
Jupiter	1.90×10^{27}	6.99×10^7	25.95	2.65
Saturn	5.68×10^{26}	5.85×10^7	11.08	1.13
Uranus	8.68×10^{25}	2.33×10^7	10.67	1.09
Neptune	1.03×10^{26}	2.21×10^7	14.07	1.43

Fill out the table below: (12 points)

- 1) Fill in the first column with each planet based on mass. Put the planet with the least mass first.
- 2) Fill in your average jump height on Earth.
- 3) Fill in the third column with $g_{\text{planet}}/g_{\text{Earth}}$ from the table above.
- 4) Calculate your jump height on each of the planet's listed. Round the last column to the nearest whole number.

Planet	Your average jump height (cm)	$g_{\text{planet}}/g_{\text{Earth}}$	Jump Height on Planet (cm)
<i>Mercury</i>			
<i>Jupiter</i>			

Use this information to write a conclusion on a separate sheet of paper. Please check your Essential Science Information packet for all requirements of a conclusion. (15 points)