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Lesson 16. Traveling Through the Solar System *Activity 2, Handout 1: Data Sheet*

**Activity 2. Weight Through the Solar System**

**Revised Lesson using CER Format**

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**School District of Philadelphia May 2013**

**Handout 1: Data Sheet**

**Prerequisite Note: Students should have already learned the difference between weight and mass, and the concept of gravity as a force. For example, visit** [**www.mathisfun/measure/weight-mass.html**](http://www.mathisfun/measure/weight-mass.html)

**Warm-up (Access misconception, prior knowledge, predictions):**

**If you were to travel to Mars, do you expect that your weight would remain the same? Would your mass remain the same? Would your mass be the same as your weight? Why?**

**Inquiry Scenario**

Your character is about to embark on an extended space mission to explore the planets in the solar system. S/he wants to visit all of the planets. However, at the planet docking station they must be weighed, and there is a 500 pound weight limit that they must not exceed. In order to complete their mission, they will need to carry probes that weigh 20 pounds each. The more probes they carry, the more data they can collect.

**Choose a character** (note: use fictional characters from books or movies would be less stressful than using student data, especially in middle school.)

**Avengers Characters Earth Weight List (Unofficial)**

Iron Man........................................ 165 pounds

Incredible Hulk ...................................300 pounds

Hawkeye ........................................ 150 pounds

Thor................................... 220 pounds

Captain America.................................. 190 pounds

Black Widow..................................130 pounds

**Investigation Question:**

Will your character be able to carry out their mission on each planet? If so, how many probes can they bring with them?

**Make a Claim**

Calculate (calculator is optional) the values for the following table. The following formula will be useful: Planet Weight = Earth Weight \* Planet’s Gravitational Factor (Gravitational factors are in comparison to the gravity on Earth; i.e., Earth = 1)

*\*Different sources may give different values for gravitational factors: the ones in the table are approximate.*

**Planets**

**Planet Gravitational Factor Earth Weight \* grav. Factor = Weight on planet**

**Weight**

Mercury 0.38

Venus 0.91

Earth 1

Mars 0.38

Jupiter 2.54

Saturn .93

Uranus 0.8

Neptune 1.2

Pluto 0.04

**Evidence**

Create a chart using the results of the data showing the weight of the person and the number of probes they can carry on each planet.

Create a bar graph. Make sure it has a title. Label the x-axis as the planets and the y-axis as the weight of the person and probes. Choose an appropriate scale.

**Reasoning**

What is the relationship between mass and weight? How does the gravitational force of each planet affect the weight of your character? Explain.

**Extension Questions**

1. Which planet produced the highest weight?
2. Which planet produced the lowest weight?
3. What was the range of the weights?
4. What surprised you the most about the differences in the weights?
5. Name the planets that have similar gravitational pull. List the reason(s).
6. Why would you want to know what you weigh on different planets?
7. Use your graphing calculator to find your own weight across the solar system and to make a bar graph showing the data. Record your data in the following chart and sketch the bar graph in the space below the chart.

**ORIGINAL LESSON….**

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**Activity 2. Weight Through the Solar System Handout 1: Data Sheet**

**Unofficial Celebrity Earth Weight List**

Lisa Leslie ........................................ 165 pounds

Rebecca Lobo ................................... 185 pounds

Brett Favre ........................................ 225 pounds

John Stockton ................................... 175 pounds

Jackie Joyner-Kersee ........................ 154 pounds

Oprah Winfrey .................................. 150 pounds

Anfernee Penny Hardaway ............... 210 Pounds

1. Choose a celebrity from the list above.

2. On which planet would you expect the celebrity you chose to weigh the most?

3. On which planet would you expect the celebrity you choose to weigh the least?

4. Calculate (calculator is optional) the values for the following table. The following formula will be useful: Planet Weight = Earth Weight \* Planet’s Gravitational Factor (Gravitational factors are in comparison to the gravity on Earth; i.e., Earth = 1)

*\*Different sources may give different values for gravitational factors: the ones in the table are approximate.*

**Planets**

**Planet Gravitational Factor Earth Weight \* grav. Factor = Weight on planet**

**Weight**

MMercury 0.38

V enus 0.91

Earth 1

Mars 0.38

Jupiter 2.54

Saturn .93

Uranus 0.8

Neptune 1.2

Pluto 0.04

5. Create a bar graph using the results of the data showing the weight of the person on each planet.

6. Give the bar graph a title. Label the x-axis as the planets and the y-axis as the weight of the person. Choose an appropriate scale.

7. Which planet produced the highest weight?

8. Which planet produced the lowest weight?

9. What was the range of the weights?

10. What is the relationship between mass and weight?

11. What surprised you the most about the differences in the weights?

12. Name the planets that have similar gravitational pull. List the reason(s).

13. Why would you want to know what you weigh on different planets?

14. Use your graphing calculator to find your own weight across the solar system and to make a bar graph showing the data. Record your data in the following chart and sketch the bar graph in the space below the chart.