

Solar System High Jump Olympics 2857

References:

Some material was adopted from the “How much do you weigh?” activity from the Hawaii Space Grant College site:

http://www.spacegrant.hawaii.edu/class_acts/Weight.html

Some conversions were calculated using gravity values from “Gravity on Other Planets” site:

<http://van.physics.uiuc.edu/qa/listing.php?id=1108>

Grade: 8

Time: 30 minutes

Lesson Plan –Learn about the different gravities and properties of the planets in our Solar System

Materials Needed:

- pencils
- paper
- worksheets (see attached)
- calculators
- meter sticks
- Smart Board

Goals/ Objectives:

- Introduce students to the different properties of planets and how they affect a planet’s gravity
- Have students understand that each planet has its own gravity
- Explain to students that their weight will vary on different planets, depending on their gravity
- Students will calculate different weights of a student on different planets
- Students will calculate the height a student can jump on different planets
- Students will understand how gravity affects weight

NJCCCS Addressed

- Standards 5.1.8B, 5.3.8A, 5.7.8A, 5.8.8A, 5.9.8B in Sciences
- Standards 4.1.8A, 4.1.8B, 4.3.8C, 4.5A, 4.5B, 4.5C in Mathematics

Activities and Procedures:

- Part 1. Introduce students to the different gravities found on different planets and then explain how gravity affects properties such as weight and height jumped.
- Part 2. Generate classroom discussion about the effects of different gravities would have on how high someone can jump on different planets.
- Part 3. Pass out worksheets to students and break up students into nine teams. Each team will represent a planet's Olympic team.
- Part 4. Have each team measure how high students in their team can jump. Have each team select their highest jumper to be their team planet's "high-jumper".
- Part 5. Collect the measurements for each team's highest jump and have each student fill in the high jumper's name and the height jumped for each planet.
- Part 6. Have each team calculate the weight and height jumped on each planet for each high jumper.
- Part 7. Input calculated data into Smartboard and have the students discuss their results.

Accommodations:

SLD

- Students will work in teams
- Check up on students as they work
- Offer help to students as they work

ELL

- Students will be allowed to work in teams with bilingual students
- Translations will be offered when possible
- Use words and ideas that are easier to understand in place of more complicated vocabulary

Assessment/Homework:

- Monitor students as they work to make sure everyone is doing the assignment
- Have students share their work with others upon completion
- Make sure that all members in each team is doing work
- Students will be asked questions about the work they did
- Material covered will be reintroduced during a trip to the Newark Museum

Follow-up:

Students will be reminded of this activity before their trip to the Newark Museum.

Name: _____

Date ___/___/___

Solar System High Jump Olympics 2857

It is year 2857. Earth has found that there is life on every other planet in the Solar System, including Pluto. (Pluto was reinstated as a planet in the year 2576 after its residents petitioned the United Solar System Council...but we will not get into politics right now.) It is Earth's turn to host the Solar System Olympics. You are coaching a High Jump Team and you want to see how possible it will be for your team to win a gold medal this year. You can do this by comparing the heights jumped by each planet's best high jumper. You know that gravity has an effect on the weights of athletes as well as the height jumped by athletes, so you will have to do some converting.

Gravity Conversion Chart (fill in the proper equations for each blank square)

Planet	Gravity	Equation used to determine weight on other planets	Equation used to determine height jumped on other planets
Mercury	38% of Earth's	.38 X Weight on Earth	Height Jumped on Earth/.38
Venus	91% of Earth's	.91 X Weight on Earth	Height Jumped on Earth/.91
Earth	100% of Earth's	_____ X Weight on Earth	Height Jumped on Earth / _____
Mars	38% of Earth's	_____ X Weight on Earth	Height Jumped on Earth / _____
Jupiter	254% of Earth's	_____ X Weight on Earth	Height Jumped on Earth / _____
Saturn	108% of Earth's	1.08 X Weight on Earth	Height Jumped on Earth/1.08
Uranus	91% of Earth's	_____ X Weight on Earth	Height Jumped on Earth / _____
Neptune	119% of Earth's	_____ X Weight on Earth	Height Jumped on Earth / _____
Pluto	8% of Earth's	.08 X Weight on Earth	Height Jumped on Earth/.08

Procedure:

1. The class will be broken up into nine planet teams. Each team will measure the heights jumped for each team member. The heights you measure will represent the heights jumped by your team on your home planet.
2. Each team will then select their best jumper to be the official Olympic high jumper for their planet. The best height jumped by each Olympic high jumper will then be shared with the rest of the class.
3. In the Gravity Table below, fill in the athlete name in the “Athlete’s Name” column and then fill in the height jumped by this athlete in the “Height Jumped on Home Planet” column. **Use the Gravity Conversion Chart above to convert the weights and heights jumped for each player.**
4. Once you have filled out the different heights jumped for each Olympic high jumper, calculate the weight and height jumped by each player if they were to travel to Earth.
5. Convert the weight on Earth from pounds to kilograms. **Remember, there are 2.2 pounds in a kilogram.**
6. Once you have the stats for all of the players, discuss your results with the rest of the class.
7. Depending on how many volunteers we get, compare heights jumped for Earth Athletes with the heights of other athletes.

Gravity Table:

ATHLETE'S NAME	HOME PLANET	WEIGHT ON HOME PLANET IN POUNDS	WEIGHT ON EARTH IN POUNDS	WEIGHT ON EARTH in KILOGRAMS	HEIGHT JUMPED ON HOME PLANET	HEIGHT JUMPED ON EARTH
	Mercury	120 pounds				
	Venus	120 pounds				
	Earth	120 pounds				
	Mars	120 pounds				
	Jupiter	120 pounds				

4. What do you think should be done by the Solar System Olympics committee to keep the games as fair as possible for athletes that are used to different gravities? Give examples of what you would do to make these games fairer.

Homework: Find the best height jumped by a friend, family member, or favorite athlete and determine how high this person would jump on each planet of the solar system.