Gravity and Your Weight in the Solar System

We experience gravity every day, but understanding gravity is quite complex. Take a tour of the solar system to understand the relationship between gravity, mass, and weight.

Grades

- 5

Time

- 45-90 minutes

Next Generation Science Standard

- 5-PS2-1. Support an argument that the gravitational force exerted by Earth on objects is directed down.

Materials

- A scale (or just guess your weight)
- A lab sheet
- A calculator
- Flipgrid on a computer (Extension)
- PowerPoint or Google slides (Extension)

Key words to know

Gravity is a force which tries to pull two objects toward each other. Anything which has mass also has a gravitational pull. The more massive an object is, the stronger its gravitational pull is. Earth's gravity is what keeps you on the ground and what causes objects to fall.

Mass is a measure of the amount of matter (or stuff) in an object. Mass is measured in grams (g) or kilograms (kg). Mass is constant in all circumstances. Objects with more mass exert more gravitational pull.

Weight is the measurement of the pull of gravity on an object. Weight can change. An object weighs the same in China or the US, but take that object to the moon, and it will have a different weight! Why, because the moon places a different force of gravity on that object than the Earth does, this is due to the differences in the moon and the Earth's mass.

Directions

- Start by introducing the concept of gravity through these videos.

EITHER… Watch this video on YouTube as a class and complete the fun informal assessment Kahoot style. Discuss questions that are missed and correct misunderstandings.

- Astrophysicist Explains Gravity in 5 Levels of Difficulty
  https://www.youtube.com/watch?v=QcUey-DVYjk&t=292s
- Kahoot

https://create.kahoot.it/v2/share/gravity-and-your-weight-in-the-solar-system/ffb9dba2-3d19-41da-a374-fc0995a5544b

OR… Have your students watch the video Astrophysicist Explains Gravity independently and answer the questions that pop up in this

- Video EdPuzzle

https://edpuzzle.com/media/5f7b96d6a7099440cf9a599e

- Now provide each student with a lab sheet. Have students weigh themselves on a scale, or guess their weight. Students will write their weight in the space provided on the lab sheet (the 4th column).
- Have students tour several places in the solar system to see how much their weight changes in different locations. Do the math with a calculator, or long hand, to fill out the table on the lab sheet.
- Once the table is completed with the proper calculations, have students complete the vocabulary practice on the back of the lab sheet.
- Encourage students to think about and discuss the main ideas in this activity. Find discussion questions at the bottom of this page.
- Teachers may choose to complete the extension activity on the following page as a review of main ideas.
- While discussing main ideas or creating the extension presentations, encourage students to use their imagination. Concepts for students to discuss:

◊ *Explain what gravity is and why your weight changes as you travel through the solar system.*

◊ *Discuss which place you would like to visit the most and which you would least like to visit.*

◊ *Describe what types of activities would be fun to do on other planets?*

◊ *What challenges would there be living somewhere other than earth?*

◊ *Would you be able to jump 10 or 20 feet on another planet? Which one and why?*

◊ *Would it be fun to experience a different weight due to a different gravitational pull?*

Extension (Optional)

- The best way to retain information is to teach it to someone else. In this extension each student will create a Google slideshow or PowerPoint presentation to explain what they have learned in this activity.
- Teachers should prepare for this activity by creating or using a Flipgrid account to set up a new discussion topic. Add all the students in your class into this discussion using their school email or sending the link produced. You may record a video explaining the steps of this assignment or post the video provided by the Great Basin Observatory in the topic essentials section. For more information about this process please watch the video linked below.
- Begin by having students create a 5-10 slide PowerPoint or Google slideshow presentation about what they learned during this activity. They can be as detailed or simple as the teacher chooses. Then they should write out a few important things they learned to discuss about each slide.
- Once they have created a 5-10 slide presentation and written a short speech/oral presentation, students will log on to Flipgrid and create a response post to share with the class. Students will record their post by hitting the red record button and then selecting options directly next to that button. Select share screen and pull up the PowerPoint or Google slide presentation. As students go through their slides, they will orally share what they learned from this activity. To end the recording select the blue button that says Stop Sharing. Students will then follow prompts on Flipgrid to post their video presentation. For more information about how students can record their slides, please watch the video linked below.

Videos

This video explains how student can add their voice recording to their Flipgrid presentation.

https://www.youtube.com/watch?v=QNXyr1HMWLY&feature=youtu.be

Refer to this video for an example of a presentation.

https://www.youtube.com/watch?v=gSxQwurE8ZI&feature=youtu.be

Teachers can use this video to understand how to set up and use Flipgrid.

https://www.youtube.com/watch?v=vJOoloQ7k5Q