

Lesson Plan

NEUROHEADWAY

Neuroscience Into Education

Space Flight – Gravity

Learning objectives

- What is gravity?
- What are mass and weight?
- What does gravitational force depend on?
- Effects of gravity

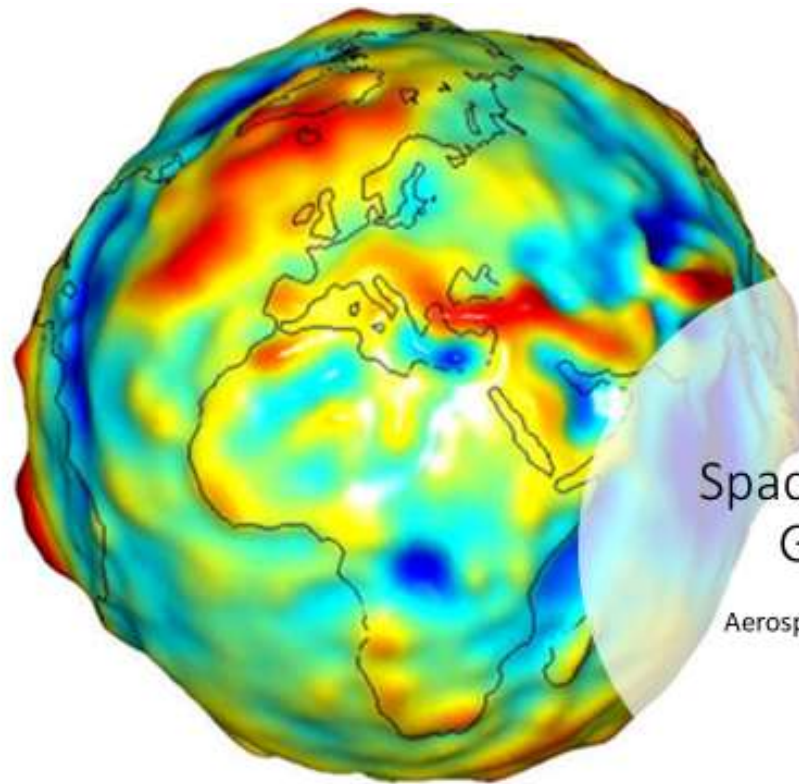
Lesson Plan

Slide	Topic	Description	Time
1	Introduction	Introduction to gravity	2
2	Recap	Recap of module 6	5
3	What is gravity?	Definition of gravity	5
4	Mass and Weight	Difference between mass and weight	5
5	What does gravity depend on?	Gravity and its dependence on distance and mass	5
6	Activity	Gravity on different object is the same	10
7-8	Centrifugal force and gravity. Activity	Demonstration of how centrifugal force counters gravity	15
9	Effects of gravity	Effects of gravity on planets and satellites	5
10	Summary	Summary	5
11	Home assignment	Explain tides as a result of gravity	2

Power point Example

NEUROHEADWAY

Neuroscience Into Education

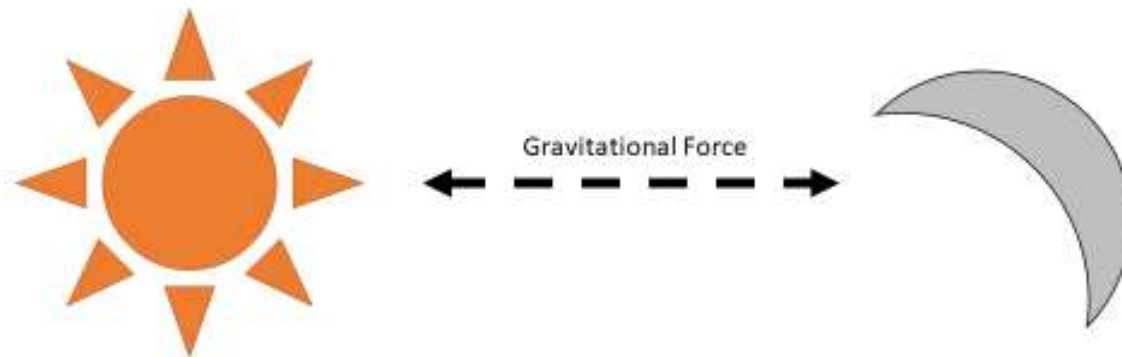


Space Flight – Gravity

Aerospace Engineering

What is gravity?

It is a force of attraction between two objects that have mass.



Each time you jump, you move towards the Earth and the Earth moves a little towards you.

What is mass?

Mass is what matter is made of! It remains constant no matter where you are in space.

Then, What is weight?

Weight is the result of gravity pulling on the mass. It changes according to the gravity in the current location in space.

What does gravitational force depend on?

The attractive force of gravity depends on two factors,

MASS OF OBJECTS

DISTANCE BETWEEN OBJECTS

The object with the lower mass travels more towards the object with the higher mass.

E.g., a person has lower mass than the planet Earth. So, when we jump it appears like only we are moving towards Earth.

The greater the distance between objects, the lower the gravitational force of attraction.

E.g., a person experiences lower weight on an aircraft than on ground.

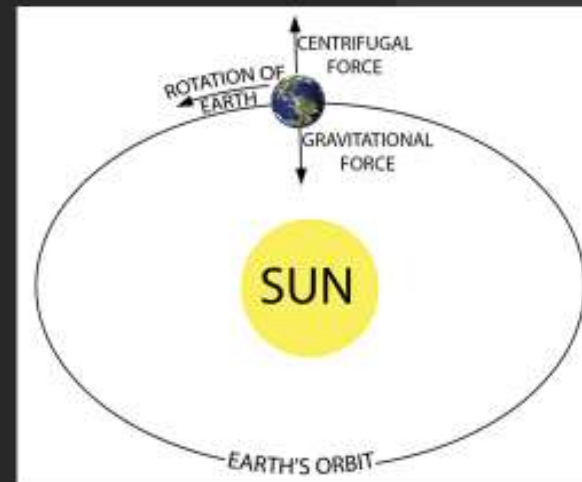
Effects of gravity on planets and orbits

As observed in the activity, the force that you experience in your arms is the centrifugal force and the force that the string is applying on the ball behaves like the gravitational force.

Gravitational force = Centrifugal force

The planets go in circles called orbits around the sun. This is why they don't crash into each other.

The same principle is used while launching satellites which stay in orbit around Earth.



Teachers Evaluation and Handouts

NEUROHEADWAY
Neuroscience Into Education

Slide 1

Ever wondered about why we get pulled back to earth every time we try to jump. You all know that it is because of gravity. So says Isaac Newton, who first formulated the phenomenon while sitting under an apple tree.

Because of Newton's efforts we know a lot more about gravity today. For example, gravity is different on different parts of Earth. Look at this figure. If you go to an area marked red, you will experience more gravity and if you go to an area marked blue, you will experience less gravity. Today's class is about gravity and its relation to space flight. They are very closely related, and one cannot truly understand space flight without understanding gravity.

Slide 2

We are very interested in going to space. We have learnt what parts we need to build a space shuttle, how the propulsion system works and what materials are available for construction. But for going into space we have to overcome a small hurdle called 'gravity'. In this module, we will try to understand gravity and how it affects life around us.

Teacher may elaborate from slide contents

Slide 3

Simply put, what is gravity? *Teacher may prompt students for participation.*

It is a force of attraction between two objects that have mass. We call this force as gravitational force.

Example, each one of you is attracting each other with a gravitational force. Then how come you guys don't seem to move towards each other? We will soon have an answer to that question.

Another example, each time you jump, you move towards the Earth and the Earth moves a little towards you.

Teacher may ask students for more examples.

Slide 4

We talked about mass in the previous slide. We said gravity is an attractive force between objects having mass.

What is mass?

Mass is what matter is made of! It remains constant no matter where you are in space.

If you stand on a weighing scale, would you read mass then?

Actually no! What you see is the weight.

Then, what is weight?

Weight is the result of gravity pulling on the mass. It changes according to the gravity in the current location in space.

If you recall the picture in slide 1, since the gravity is different in different places on earth, your weight will be different too.

Slide 5

What does gravitational force depend on?

We saw earlier that it is an attractive force between masses. So we can say gravitational force definitely depends on mass.

The other thing, gravitational force depends on is the distance between objects.

The sun and the moon have huge masses. The gravitational force is reasonable because they are so far apart. On the other hand if they had been closer, the gravitational force would have been much stronger.

Teacher may elaborate examples in the slide.

Slide 6 – Demonstration: Gravity acting on different masses is same

Materials

1. 1 squash ball
2. 1 feather

Procedure

1. Take both objects and drop them from a height.
2. According to the gravity and the video, they should both reach at the same time.

Observation

What do you observe? Do the objects follow the law of gravity?

Why does it not work? Can you relate your observation with what you learnt in Module 2 on external forces on an aircraft?

Slide 7

We talked about the sun and the moon attracting each other due to gravity. Now the next relevant question that you must have in your mind is, if they attract each other, why does the moon not crash into earth?

The same question extends to all objects in the universe.

Teacher may prompt explanations

Slide 8 – Activity 2: Spinning Bucket

Materials

1. Water
2. Bucket with a handle

Procedure

1. Fill the bucket up to two thirds full with water.
2. Hold the bucket's handle and start swinging the bucket in a vertical circle from the ground up to the sky.
3. Keep rotating your arm as the bucket swings down and keep the speed and motion consistent.

