

Lesson Topic: Gravitational Force

Objective:

Students will be able to:

1. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

Time Required: 65 mins

Materials Needed:

- Laptops or Chromebooks
- Rock/pebbles
- Leaf
- Balloon (with or without air)

Teacher Preparation:

- Watch the video <https://www.youtube.com/watch?v=ljRIB6TuMOU>
- Print out worksheets at the bottom of lesson plan

Engage (15 minutes):

1. Students will be put into groups and given a rock, leaf, and balloon. Students will discuss different attributes about each item in their journals and through group discussion.
 - a. Students could discuss weight, mass, texture, size or any other attribute.
2. Ask students, "If you were to drop these items from chest level, what would happen?"
3. Next ask students, "Which item would reach the floor the fastest if they were dropped from chest level?"
 - a. Have students write their predictions on the Gravitational Forces handout.
4. Allow time for groups to experiment with dropping these items and observing the speed at which they drop. (Note: there is not a need to time the drops exactly with a stopwatch, just visual observations will be fine). Have students attempt dropping each item 3 times, record their findings, and answer question 1 on the Gravitational Forces handout.

Explore (10 minutes):

1. Have student groups share about what they observed during the Engage activity.
2. Ask students why they think the items dropped at different speeds.
 - a. Student answers will vary. They do not need to know the correct answer just yet.
3. Have your students [sign in to Legends of Learning](#). Instruct students to complete the Instructional playlist.
4. Have students right down the definitions for the key vocabulary words Gravitational Forces handout.

Explain (10 minutes):

1. Students will watch a video to recap what was learned through the instructional game. Stop the video during examples to see if students can relate what was done in the game to the video.

- a. [Defining Gravity: Crash Course Kids #4.1](#)

Elaborate (20 minutes):

1. With students in pairs, have them complete questions 3 and 4 in the Gravitational Forces handout.
2. Discuss answers with students to help clarify any misconceptions.

Evaluate (10 minutes):

1. Have your students [sign in to Legends of Learning](#). Instruct students to complete the Content Review playlist.
2. [Analyze student results](#) to determine what concepts need to be a focus for reteaching.

Additional Lesson Strategies:

- To use Legends for additional instruction, create a [custom playlist](#) with an [instructional game](#) and pre and post [assessment](#).
- To use Legends for a quick formative assessment, create a 5-question [assessment](#) in a [playlist](#).
- To use Legends for a student-directed experience, create a [targeted freeplay](#) playlist.
- Encourage students to play on their own at home in [Legends of Learning: Awakening](#) for a student-driven experience including avatars, battling, and quests all centered around topics they are covering in class.



Name _____

Date _____

Gravitational Forces

1. Which item did you believe would reach the ground the fastest? Were you correct in your findings?

2. While playing the game in Legends of Learning, define the following terms
 - a. Gravity-

 - b. Mass-

 - c. Weight-

 - d. Acceleration-

3. After playing the game in Legends of Learning, what can you say was the reason the items reached the floor when you let them go?



4. Why did their times differ if they are travelling the same distance?



Name _____

Date _____

Gravitational Forces
ANSWER KEY

1. Which item did you believe would reach the ground the fastest? Were you correct in your findings?
 - Students can give their opinion to begin
 - Will add to the response once they have completed the lesson, similar to a hypothesis and conclusion

2. While playing the game in Legends of Learning, define the following terms
 - a. Gravity- the force that attracts a body toward the center of the earth, or toward any other physical body having mass

 - b. Mass- the quantity of matter which a body contains, as measured by its acceleration under a given force or by the force exerted on it by a gravitational field

 - c. Weight- the measure of the gravitational force between a mass and Earth.

 - d. Acceleration- the rate of change of velocity per unit of time

3. After playing the game in Legends of Learning, what can you say was the reason the items reached the floor when you let them go?
 - Students learned that The gravitational force between any objects is directed towards the center of mass of the objects

4. Why did their times differ if they are travelling the same distance?
 - The greater the mass of objects, the greater the gravitational force between them or something similar