

Investigation Two - Jump

Standard IV Students will understand that objects near Earth are pulled toward Earth by Gravity.
Objective 1 Demonstrate that gravity is a force.
Intended Learning Outcomes <ol style="list-style-type: none">1. Use science process and thinking skills.2. Manifest scientific attitudes and interests3. Understand science concepts and principles4. Communicate effectively using science language and reasoning

**Standard
IV**

**Objective
1**

Background Information

A force is required to overcome gravity. When a person jumps, he applies a force that is able to briefly overcome the pull of gravity. The more weight a person has, the more force is required to lift him. If you are carrying a weight, you need more force to jump. In this activity, students will see how high they can jump without extra weight and with extra weight.

Pre-Assessment/Invitation to Learn

Ask students how high they can jump. Show them the meter sticks and have them guess. Then ask them how holding a weight will affect the height of their jump. Tell them they are going to find out the answers to these questions.

Instructional Procedure

1. Have meter sticks taped to the walls with the 0 down on the floor.
2. Each student needs a partner to watch his or her jump and write down how high it is.
3. Each jump should be as high as the student can go.
4. Each student is to jump 3 times.
5. The student who is observing should sit on the floor and watch the jumping student's feet. She/he should note the highest point of the set of three jumps.
6. Students should make their second jumps holding the weights. They can start with small amounts of weight and move up or just try one time with a heavy weight. They should record their data.
7. The students should record their data and take turns jumping. They can record data on paper like this:

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|---------------------------|----|----|
| 1. First jumps: 1. | 2. | 3. |
| 2. Jumps with weights: 1. | 2. | 3. |

Materials <ul style="list-style-type: none">• Meter or yard sticks• Masking tape• Weights (books, canned food, bags of sand, etc.)

8. Finish the activity by asking if any students were able to jump as high with weights. Ask them how their legs felt when they jumped with the weights. See if students can summarize that more weight requires more force to lift.

Curriculum Extensions

Language Arts –

- Read about the height that some animals can jump compared to their weight. Compare them with each other. (*Standard VII, Objective 3*)
- Watch a video clip of watching a rocket or the space shuttle go up into space. Notice the force that it takes to lift it up. Have the students write what they see happening. Ask them questions to answer about the lift-off. (*Standard VII, Objective 3*)

Math –

- Measurement of how high each child jumps. The first time compare how high each child jumps the second time. Subtract the numbers to see the difference. (*Standard IV, Objective 2*)
- Have a standing broad jump activity to see how far each can jump. (*Standard IV, Objective 2*)

Assessment suggestion

- Check to see that the math is correct as the students subtract one jump from another.
- Have the students write in their journals the conclusions they come up with as to why they can't jump the same height or higher with weights in their hands.
- Review with the students that gravity has more of a pulling force with heavy objects that are on the ground than light objects on the ground. It takes more energy to lift them off the ground.

Resources

Books:

- *Gravity Works* by B. K. Hixson
- *Forces* by Graham Peacock