

Tina DeSoto  
May 13, 2019

## GENERAL INFORMATION

**Lesson Title & Subject(s):** Why do we stick to the ground? Science

**Topic or Unit of Study:** Gravitational Force

**Grade/Level:**5

**Instructional Setting:**

*Fifth grade classroom with 26 students (15 boys and 11 girls.) Five students read two grades above grade level and two students are intermediate level ELL. Classroom consists of 6 tables: four tables with four students and two tables with five students. The seating arrangement is heterogeneous.*

## STANDARDS AND OBJECTIVES

**Standard:**

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

**Lesson Objectives:**

*When given paperclips and cotton balls to drop and throw, the student will verbally predict with 100% accuracy that the items will always fall down and land on a supporting surface, as assessed by teacher questioning.*

*When given a 10-question summative quiz, the student will be able to identify definitions of key vocabulary (gravity, gravitational force, supporting surface) and show understanding that the Earth's gravity pulls objects towards its core with 90% accuracy.*

## MATERIALS AND RESOURCES

**Instructional Materials:**

- Cotton balls and paper clips – enough for each student
- 6 sensory bottles (one for each table)
- Various objects that are safe for the teacher to drop
- Video/movie screen and computer to play You Tube videos
- KWL charts for each student (KWL chart is the additional Word file; it should be folded in half with "OBSERVATIONS" on the outside before distribution to the students.)
- PowerPoint and CPS remote controls (Classroom Performance System) for summative assessment

Tina DeSoto  
May 13, 2019

## Resources:

Burden, P. R., & Byrd, D. M. (2013). [\*Methods for effective teaching: Meeting the needs of all students\*](#) (6th ed.). Boston, MA: Allyn & Bacon. ISBN: 978-0132901703

Erickson, K. (2017, May 4). What is Gravity? Retrieved from <https://spaceplace.nasa.gov/what-is-gravity/en/>

States, N. L. (2013). *Next Generation Science Standards: For States, By States*. Washington: National Academies Press.

YouTube. (2015, March 24). *Defining Gravity: Crash Course Kids #4.1* [Video file]. Retrieved from <https://www.youtube.com/watch?v=ljRIB6TuMOU>

YouTube. (2015, March 26). *Down to Earth: Crash Course Kids #4.2* [Video file]. Retrieved from [https://www.youtube.com/watch?v=BIPtF\\_NqIQI](https://www.youtube.com/watch?v=BIPtF_NqIQI)

<b>INSTRUCTIONAL PLAN</b>
---------------------------

## Sequence of Instructional Procedures/Activities/Events

### 1. Student Prerequisite Skills/Connections to Previous Learning:

- *Students will know how to use a KWL chart.*
- *Students will understand the effects of balanced and unbalanced forces on the motion of an object, from the third grade Next Generation Science Standard 3-PS2-1. The teacher will revisit this previous skill by using the terms “unbalanced force” and “balanced force” while dropping/moving the objects at the beginning and throughout the rest of the lesson.*
- *This lesson also helps students identify and state what they intuitively know: that a dropped object will always fall to the ground or other supporting surface.*

### 2. Presentation Procedures for New Information and/or Modeling:

#### ***Presentation Procedures for New Information:***

The purpose of this lesson is to help students clarify why all objects on earth will drop toward earth

*-Teacher asks for silent observation, hands out KWL chart for each student, and instructs each table group to examine the sensory bottles for a few minutes. Then teacher will ask for eyes on her and will safely drop and roll various items from various heights and ramps. She will also make a point of sitting down in a chair, standing up, jumping in place, and walking through the classroom. She will ask the students to write on the “observation” section of their papers what the actions were, what they have in common, and what they believe the lesson is about. They can quietly discuss their ideas with their table-mates and come to a consensus.*

*-The teacher will survey each table group for their observations and conclusions. If it hasn't been stated yet, she will ask leading questions to direct students to identify “What is gravity?” as the concept being*

Tina DeSoto  
May 13, 2019

learned. She will ask the students to write what they already know about gravity in the appropriate section of their KWL charts. They can brainstorm with their table-mates about what they want to know about gravity and record on KWL charts.

-Next, the teacher will play "Defining Gravity #4.1" and "Down to Earth #4.2," pausing the video to discuss the questions being asked in the video.

-The teacher will assist the students, whole class, with formulating a statement regarding gravity: "Gravity is the invisible force that pulls ALL objects on earth towards its center, where they are held in place on supporting surfaces."

-Introduce the term "supporting surface: the place an object rests or moves on top of."

-Introduce the term "gravitational force: the force that attracts any two objects that have mass."

Time: Approximately 20 minutes

### **Modeling:**

At the beginning of the lesson (inductive lesson presentation anticipatory set,) the teacher will be modeling activities that feature falling objects, as well as objects sitting still (including the teacher!) The teacher will also be vocally modeling the key terms throughout the lesson. The next step of instruction (showing YouTube videos) will model more information regarding gravity.

### **3. Guided Practice:**

-Students will practice what they observed regarding how the gravitational force exerted by Earth on objects is directed down by dropping cotton balls and paper clips from different heights, and gently throwing them in various directions. They can write on their KWL charts what they observe re: how gravity affects these objects.

-The teacher will monitor the students' activity, identifying key terms in her verbal interactions: "I see an unbalanced force being applied to that cotton ball! Oh, now it's landed on a supporting surface! It's stopped moving; it now has balanced force acting on it!"

-The teacher will ask formative "thinking" questions, beginning with simple concepts and adding complexity according to student response and understanding. The following questions can be used:

- Where did the cotton balls go when dropped?
- Where did the paper clips go?
- How do their shapes affect the way they fell? How do their weights affect the way they fell?
- When does a dropped object go "down"? Where is "down"? Where does it stop?
- Does the item being dropped always have to be: round? Heavy? Nonliving? Visible?
- How can we observe gravity working without dropping or throwing things?
- What if a marble is dropped from an airplane onto the top of a mountain?
- What if a marble is dropped from an airplane over the ocean? A lake?
- What if you dig a hole and drop a marble in it? How deep does the hole have to be? What will the marble always do?

-Instruct students to quietly fill out the vocabulary section of their KWL charts

-Have the students fill out the section "Some of the things that gravity keeps attached to the surface of the earth" on their KWL charts.

Tina DeSoto  
May 13, 2019

*-When finished, ask students to share some of the things they wrote on their KWL charts.  
-Students who complete work early can answer the Challenge Question on the KWL chart: "If gravity is shaped by the mass of a planet, what do you think gravity is like on other planets in our solar system?" They can then access a classroom computer and visit the NASA website "What is Gravity?" (<https://spaceplace.nasa.gov/what-is-gravity/en/>)*

*Time: Approximately 20 minutes*

#### **4. Independent Student Practice: Each student will be able to independently demonstrate their understanding of the definitions of key vocabulary (gravity, gravitational force, supporting surface) and show understanding of the way the earth**

*-This assessment will be administered via Power Point using CPS remote controls. It will consist of 10 multiple choice questions, using illustrations with images labeled "A, B, C, and D" as possible answers. There will also be questions that ask for the definition of the key terms.*

#### **5. Culminating or Closing Procedure/Activity/Event:**

*-The teacher will end the lesson with a short discussion while students get ready for their next activity. She will ask students to anticipate the actions they will witness during their recess where they can identify balanced forces, unbalanced forces, supporting surfaces, and how the gravitational force exerted by Earth on objects they play with will be directed down.*

#### **Instructional Strategy (or Strategies):**

*This lesson uses a combination of inquiry teaching and the general model of inductive lesson presentation. The teacher uses inductive lesson presentation at the beginning of the lesson when she asks the students to observe the various objects dropping. The remainder of the lesson utilizes inquiry teaching. The students observe the actions, practice the actions, and develop answers to questions regarding how they know that the gravitational force exerted by Earth on all objects is directed towards its core.*

#### **Differentiated Instruction Accommodations:**

*This class has five above-grade level readers, two of whom are identified as gifted students, and two ELL students. This lesson differentiates to accommodate both of these exceptionalities. The gifted students will be able to share within their table groups, can work ahead, and move on to the KWL Chart Challenge question and the NASA webpage for enrichment activities during Part 3 Guided Practice.*

*The KWL chart, used throughout the lesson, differentiates for the ELL students. The chart helps to clearly define the purpose of the lesson and provides opportunities to practice writing and discussing in their new language. By omitting the word "gravity" from the KWL chart (ostensibly to prevent students from peeking during the anticipatory set) all learners, but especially the ELLs, get practice by repetitively writing and saying the new term: gravity. The KWL chart also differentiates for the ELLs with its clearly defined sections, sentences with blank spaces, and leading questions. The seating arrangement also differentiates by creating small groups with mixed abilities. These small groups generate a supportive environment for ELLs to apply new content and language knowledge.*

#### **Use of Technology:**

*21<sup>st</sup> century technology is incorporated into this lesson by using YouTube videos, using the PowerPoint assessment with personal remote control "clickers" to record individual student responses, and a computer to access the NASA website "What is Gravity?" for students who finish the KWL chart early.*

Tina DeSoto  
May 13, 2019

### **Student Assessment:**

*The teacher will know that the learning objectives have been met by assessing the students via verbal questioning and a brief formal assessment.*

*During the hands-on activity, the students will be given cotton balls and paper clips to drop and gently throw. The teacher will ask questions about the behavior of these dropped objects and extrapolate how this behavior applies to every object on Earth. The students will be able to predict, 100% of the time, that these objects will always fall down to a supporting surface.*

*The formal assessment, administered by Power Point, will consist of 10 multiple choice questions. The questions, which correspond with the 2<sup>nd</sup> objective, will cover key vocabulary terms and the behavior of dropped items. Students will have met the 2<sup>nd</sup> objective of this lesson if they complete this summative assessment with 90% accuracy.*

### **B. Justification of hands-on activity**

For this hands-on activity, students will practice what they observed regarding how the gravitational force exerted by Earth on objects is directed down by dropping cotton balls and paper clips from different heights, and gently throwing them in various directions. This activity helps the students understand the science objective because they are practicing with intent what they intuitively know: that all dropped objects fall down. This activity also helps them identify what the key term “supporting surface” means when they drop and toss their items. The leading questions asked by the teacher help the students understand the larger concept: the gravitational force of the earth exerts itself on all objects on and near the planet.

### **C. Justification of Summative Assessment via PowerPoint and CPS remote controls**

The 10-question summative assessment, delivered via PowerPoint, asks questions that support the 2<sup>nd</sup> objective. It features graphics where students will be able to identify the answer choices as “a,” “b,” “c,” and/or “d” with their CPS remotes. The questions ask students to determine where dropped objects will go, and to identify which items are supporting surfaces. The assessment also has questions where students can show mastery of the vocabulary terms. Students will have met the objective of this lesson if they complete the summative assessment with 90% accuracy.

This summative assessment is an appropriate way to gauge the students’ understanding of the objective. This is a single class-period lesson with compact information; it teaches terms and ideas that can be quickly assessed at the end of the lesson with a summative quiz. This PowerPoint and student-held remote control assessment is meant to be brief, succinct, and fun. Most importantly, it will provide the appropriate feedback to the teacher on whether the students met the lesson objective.