

INTRODUCTION TO SNAPS LABS

A SNAPS laboratory includes station activities designed to develop students' science skills with hands-on activities and thought-proving exercises. The labs require students to use science, math, literacy, problem-solving and engineering skills so to expand their understanding scientific ideas and apply scientific concepts to the real world.

Science Skills Station

Students explore a concept using science and math skills. The skills may be procedural that a student must physically do. The skills may be mathematical or require scientific thinking and reasoning.

Narrative Station

Students employ literacy skills important to understanding scientific text as well as illustrations, tables and graphs. In many labs, students will explore multimedia sources, such as videos, audio files or animations.

Assessment Station

Students answer multiple choice questions, short answer questions and/or open-ended, thought-provoking questions. The questions progressively get "harder" and require students to employ lower, mid and higher order thinking.

Problem-Solving Station

Students utilize the engineering design process and problem-solving skills so to identify problems, test solutions and/or make improvements to solutions.

Synthesis Station

Students compose a CER report as a lab conclusion so to relate the observations, data and other information gathered in the lab to the objective(s) of the lab.

Synthesis Project

Students complete an activity or project that helps summarize information studied and learned in the lab. This facilitates "bringing it all together" while getting students to think harder and deeper about a concept.

SNAPs LAB STATIONS ACTIVITY

The image shows a digital PDF viewer displaying a multi-page document titled "5-PS2-1 Earth's Gravity Stations Lab". The document is organized into several distinct sections:

- Science Skills Station:** Focuses on understanding the effects of gravity, including a table for recording data and a graphing activity.
- Narrative Station:** Contains a story about a character named "Gravity" and a series of questions related to the narrative.
- Assessment Station:** Includes a "Vocabulary" section with terms like "gravity", "weight", and "mass", and a "Concepts" section with multiple-choice and short-answer questions.
- Problem Solving Station:** Features a "Problem Solving Station" section with a scenario about a ball being thrown, followed by a "Problem Solving Station" section with a scenario about a ball being thrown from a height.
- Synthesis Project:** A final section where students create a project related to gravity, including a table for recording data and a graphing activity.

The document also includes various diagrams, such as a diagram of a ball being thrown, a diagram of a ball being thrown from a height, and a diagram of a ball being thrown from a height.

Features:

- ✓ Connects Science, Math, ELA & Engineering (Problem-Solving) Skills
- ✓ Requires easy-to-get and inexpensive materials
- ✓ **Printable lab** for traditional classrooms included
- ✓ Student Recording Sheets, Teacher Guide and Answer Key included

Printable Lab downloaded as a PDF file. Teacher Guide and Key not shown.

DIGITAL SNAPS LAB STATIONS ACTIVITY

5-PS2-1 Earth's Gravity Digital Lab — Saved to my Mac

Home Insert Draw Design Transitions Animations Slide Show Review View Acrobat Tell me

Share Comments

1. Earth's Gravity Lab Overview

2. Earth's Gravity Lab Assignment

3. Science Skills Station

4. Science Skills Station

5. Science Skills Station

6. Assessment Station

7. Assessment Station

8. Assessment Station

9. Problem-Solving Station

10. Problem-Solving Station

11. Problem-Solving Station

12. Problem-Solving Station

13. Problem-Solving Station

14. Problem-Solving Station

15. Problem-Solving Station

Slide 1 of 15 English (United States) Accessibility: Good to go 70%

Features:

- ✓ **Digital lab** for distance learning and paper-free classrooms included
- ✓ Fillable slides (pptx file) compatible with both Microsoft PP and Google Slides
- ✓ Assessment station available as self-grading Google Form (via force copy link)

EDITABLE SNAPS LAB STATIONS ACTIVITY

AutoSave OFF Home Insert Draw Design Layout References Mailings Review View Grammarly Acrobat Tell me 5-PS2-1 Earth's Gravity Editable Lab Stations — Saved to my Mac

Home Insert Draw Design Layout References Mailings Review View Grammarly Acrobat Tell me Share Comments

1 2 3 4 5 6 7 8 9 10

Name: _____ Date: _____

Earth's Gravity Lab Overview

Objectives

1. Conduct an investigation to determine the effect of Earth's gravity.
2. Engage in discussion about Earth's gravity.
3. Argue that Earth's gravity is directed downward.

NGSS Science and Engineering Practices

Planning and carrying out investigations [Practice 3]
Designing solutions for engineering [Practice 4]
Engaging in argument from evidence [Practice 7]

MS-ESS1-1 Engineering Standards

ETS1-1 Developing possible solutions (ex. identifying failure points)

Science Skills Station

In this station, students will investigate the direction of Earth's gravity and how Earth's gravity affects objects of different masses.

Narrative Station

In this station, students will be presented with three statements about gravity. Students will conduct short research and cite information from two or more sources to refute or verify those statements.

Assessment Station

In this station, students will answer questions about key terms and ideas relating to gravity. Students must employ lower, middle, and higher-order thinking skills to answer these questions.

Problem-Solving Station

In this station, students will design, build, and test a rocket that will overcome Earth's gravity to "leave a payload" in the classroom ceiling. The rocket must carry a payload as it travels upward, against the force of gravity. Students will improve and retest their designs to transport as many payloads as possible.

5-PS2-1 Earth's Gravity © Stephanie Okamoto

Name: _____ Date: _____

Earth's Gravity Pre-Lab Assignment

Directions

1. Read through the Lab Overview.
2. Create a new entry for Gravity in the table of contents in your lab journal and determine the pages of your lab entry. Complete the following steps on the first page of the entry.
3. Define the following terms in your lab journal:
 - Force
 - Gravity
 - Mass
4. Write a 4-5 sentence summary about what you will do in this laboratory.

Science Skills Station

Determine how Earth's gravity impacts objects of different masses.

Materials Required

- Stopwatch
- Tape measure
- Objects of different sizes and masses

Activity

Obtain the materials. Follow the directions. Then answer the questions.

Directions

1. Measure the mass of each object. Record the object's mass on the recording sheet.
2. Predict if you dropped each object from three US Feet above the ground, which object would hit the ground first? In other words, which object would be most impacted by gravity and thus, fall to Earth's surface in the shortest amount of time? Defend your prediction. Record your prediction on the recording sheet.
3. Use a tape measure to measure two meters above the floor. You will use the tape measure to help you drop each object exactly two meters above the floor.
4. Choose one object. Hold the object at the two meters above the floor. Use a stopwatch to measure how long it takes the object to fall to the ground. Record the time it takes for the object to fall on the recording sheet. Conduct **three trials**.
5. Repeat steps three for each of the other objects. Record all time measurements on the recording sheet.

Questions

1. Calculate the average time it took for each object to fall. To calculate average:
 - 1. Find the sum of the three trials (Trial 1 + Trial 2 + Trial 3)
 - 2. Divide the sum by the number of trials (Sum ÷ 3)
2. What is the relationship between the mass of an object and the time it takes to fall two meters?
3. Do the results of this investigation support or refute your prediction?
4. Why was it important to conduct three trials—make three measurements of the same thing in the investigation?
5. What do the results of the investigation tell you about the direction of gravity?
6. **GRAPH** Graph the average time it took each object to fall against its mass. You can draw a bar graph or a line graph.

5-PS2-1 Earth's Gravity © Stephanie Okamoto

Narrative Station

Objective(s)

1. Form an argument that supports 5-PS2-1 about Earth's gravity.
2. Describe the direction and magnitude of Earth's gravity.

Activity

Directions: Below are three statements made by three students. For each statement:
1. Determine if the statement is true or false or fair.
2. Conduct research using textbooks and/or the computer to help you evaluate the statement. Is the statement a fact, opinion, or rational idea?
3. Cite evidence in at least one source that supports or refutes the statement. Provide the source of your evidence.

STATEMENT #1

Earth's gravity is directed downward towards the center of Earth. This is why objects in the sky fall to the ground. The gravity of Earth is pulling them towards Earth's center.

STATEMENT #2

Gravity is an insignificant force. In fact, to be on either Earth or Mars didn't even gravity. Without gravity, it would be easier to move around and we (humans) could fly!

STATEMENT #3

Only objects with enormous mass, like planets and stars, exert gravity. An object must have a certain mass to pull or exert gravity.

Problem Solving Station

Objective(s)

Design a rocket that travels upward against the force of gravity and delivers a payload to a specified distance.

Materials Required

- Straw
- Balloon
- Adhesive tape, rubber bands, etc.)
- Paper or plastic cup
- Various materials for building
- Payloads

Background Information

Rockets launch into space and carry passengers and/or equipment. The rockets must exert a strong upward force to overcome Earth's gravity. In this activity, you will build a balloon-powered rocket that will deliver "equipment" (paperclips) to the ceiling of the classroom. The goal of this activity is to design a rocket that transports a large delivery of payloads to the ceiling. Your design must adhere to the following constraints:
• The rocket must be built in a bowl, which will stabilize a string.
• The string will guide the rocket's path vertically to the classroom ceiling.
• You must use a balloon to power the rocket to the ceiling of the classroom.
• You can use any of the materials provided to build a "straw" that fits the payload.
• You can modify the design after testing the rocket (you can perform multiple tests and revisions. (Time allows))

Directions

1. Brainstorm ways to design the rocket. Record your ideas on your answer sheet.
2. Choose the best design that you think will carry the most paperclips to the ceiling of the classroom. Draw a picture of your design.
3. Build and test your rocket. First, use the string to see how much you must attach the balloon for it to make it to the ceiling. Then add paperclips to the cargo hold. Determine the maximum number of paperclips the rocket can carry.
4. Improve the rocket design. Record the changes you make to your design on your answer sheet.
5. Improve and retest the rocket until you are satisfied with your design or you run out of time.

5-PS2-1 Earth's Gravity © Stephanie Okamoto

Assessment Station

Recall concepts, terms and ideas relating to Earth's gravity.

Skills Utilized

- Define key terms
- Summarize a concept
- Determine relationship
- Interpret data
- Compare and contrast
- Illustrate a concept
- Make predictions

Assessment Directions

1. Answer the following questions. Write down your answers on the recording sheet.
2. There are two bonus questions. If time allows, try to answer these questions.

Question #1

What is **gravity**?

Question #2

Is gravity an attractive force or repulsive force? Explain.


Question #3

True or False: Earth's gravity only impacts objects with a lot of mass. Earth's gravity doesn't "pull" on objects with very little mass.

If false, change the statement to make it true.

Question #4


Draw an arrow on Earth to show the direction of Earth's gravity.



5-PS2-1 Earth's Gravity © Stephanie Okamoto

Question #5

The graph below illustrates the relationship between the mass of an object and the force of gravity exerted to that object. According to the graph, what is the relationship between these two factors?



BONUS Question #7

The Sun also exerts gravity. The Sun's gravity pulls on Earth and keeps Earth (and other planets) in orbit around it.

What could happen if the Sun did not exert gravity? How would this impact life on Earth?

BONUS Question #8

Astronauts live in space high above Earth's surface at the International Space Station (ISS). The ISS orbits Earth because of Earth's gravity. However, the astronauts within the ISS are not pushed down by Earth's gravity—they "float around" in space!

What does this suggest about the strength of Earth's gravity as you move away from the surface of Earth?

5-PS2-1 Earth's Gravity © Stephanie Okamoto

Claim

Earth's gravity pulls objects near its surface toward the planet's center in a downward direction.

Evidence

1. On the template, cite evidence from the science skills, narrative and/or problem-solving station that supports the claim above. You can refer back to the lab.
2. On the template, cite logical implications and scientific principles that explain how and why the evidence supports the claim above. You can bullet point the ideas.
3. Write a one paragraph CER report. Write in complete sentences. The CER report is the conclusion to the lab. It should include the claim, evidence, and reasoning.

5-PS2-1 Earth's Gravity © Stephanie Okamoto

Name: _____ Date: _____

Earth's Gravity Post Lab Reflection

1. Write a 4-5 sentence summary about what you learned in this lab.
2. Write a 4-5 sentence post-lab self-assessment. Answer at least two of the questions below in your reflection.
 - How well did you participate today?
 - What do you know now that you didn't know before?
 - What questions do you have about things you don't understand?
 - What do you need to do better understand what you studied in lab today?
 - What did you do well today? What can you do better?
 - Rate your performance today on a scale from 1 to 5.
 - Rate your understanding of what you learned on a scale from 1 to 5.
3. Do you notice any patterns when you learn better? Do you notice any patterns when you struggle with a topic?
4. Could you use what you learned today to help you with something else?

IMPORTANT NOTE: Instead of writing formally, you can draw, do down bullet points or make a diagram to complete the last two parts of this post-lab reflection.

5-PS2-1 Earth's Gravity © Stephanie Okamoto

Features:

- ✓ **100% Editable** stations downloaded as a docx file
- ✓ Necessary diagrams, tables and graphs included
- ✓ Illustrative graphics and clipart NOT included

TEACHER GUIDE

PRINTABLE LAB SETUP AND PREPARATION

Each “traditional PDF file” includes directions and questions for each station. Print one copy of these materials for each station. Place copies of the letter-sized directions questions in sheet protectors or use self-laminating sheets to protect the documents. Position the materials at each station with the general supplies of that station.

TEACHING DURATION

Most SNAPS lab activities require **two class periods** or **90 to 120 minutes**. However, the time needed to require one lab can vary with grade level, student autonomy and difficulty of content. Allowing two class periods allows ample time – regardless of these factors – for students to finish the four in-class stations.

Suggestions for shortening the lab:

1. Assign the Narrative Station as pre-lab work. By doing this, you ensure your students have first-order knowledge of the concepts and ideas explored in the lab. If you are using this lab to introduce new concepts, using the narrative station as a pre-lab will increase student success at the other lab stations.
2. Assign the Assessment Station as post-lab work. By doing this, you ensure your students are evaluated on the concepts and ideas in this lab after completing ALL stations.

DOCUMENT DISTRIBUTION

1. Distribute student copies of the lab overview and pre-lab assignment the night before the laboratory. The pre-lab is a ½ page assignment. Staple the pre-lab to the lab overview before distributing these documents.
2. Distribute student copies of the recording sheet at the beginning of the laboratory.
3. Distribute copies of the post-lab, synthesis station and synthesis project at the end of the lab. The post-lab is a ½ page assignment. Staple the post-lab to the synthesis station and project before distributing these documents.
4. Assign a due date for the synthesis project. The post-lab reflection is a formative assessment and should not require a formal “due date.”

TEACHER GUIDE

DIGITAL VERSION OF SNAPs LAB ACTIVITIES

This download includes a digital lab/fillable slides that allow students to complete the laboratory on a computer or tablet. This file was created to work with a variety of online platforms and secure file-sharing platforms. The digital lab has been modified so students record answers directly following questions rather than in a student packet.

Important Notes

- The answer key is removed from the digital lab.
- The answer key is included in the traditional PDF file.
- The digital laboratory CANNOT be edited; only fillable areas can be manipulated.
- When applicable, videos are included to help students create digital graphs.

The digital laboratory can be used a variety of ways:

- Distribute paper-free laboratories as part of regular instruction
- Use to assign at-home work as part of a remote or distance learning plan
- Send work to acutely or chronically absent students
- Support tutoring or at-home instruction for homebound students

How can you distribute and share the digital laboratory with your students?

- The laboratory CAN be distributed directly to students through email.
- The laboratory CAN be distributed or assigned with Google Classrooms, Microsoft Teams, Blackboard, Canvas, Schoology and other like platforms that are password-protected or require a code to enroll.
- The laboratory CAN be distributed with secure file sharing platforms like Google Drive, OneDrive and DropBox that are password-protected or shared only with students with their email or student account.
- Printable SNAPs labs can be shared or distributed just like the digital labs.

TEACHER GUIDE

To use the digital laboratory with Microsoft Teams:

1. Upload an assignment to your One Drive.
2. Create a new assignment. Add the file as a "resource."
3. Assign to the appropriate class or students.

To use the digital laboratory with Google Classrooms:

1. Upload the assignment to your Google Drive. Add the file using the upload tool in a web browser or drag and drop the file into your Drive. Watch a demonstration of the process: <https://safesha.re/3h6n>
2. Create a new assignment and add the digital lab to it. Make a copy for each student.
3. Assign to the appropriate class or students.

GOOGLE FORM ASSESSMENT

To better support digital classrooms, I created a Google Form version of the assessment station. There are two ways the Google Form assessment station can be used:

1. If using the digital lab, you can remove slides for the assessment station and use the Google Form assessment station instead. This makes the assessment station "more formal" since it is separate from the rest of the lab station activities.
2. If looking for a way to shorten the in-class lab, remove the assessment station – including the assessment station student recording pages – and assign the Google Form assessment station as an at-home assessment. Alternatively, you can use the Google Form assessment station as an in-class quiz if students have their own digital personal learning device.

TEACHER GUIDE

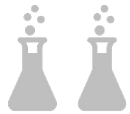
DISTANCE – INDEPENDENT LEARNING COMPATIBILITY

SNAPs lab activities are rated for their ease with distance – independent learning. Some lab activities are very hands-on and require a lot of materials whereas other lab activities are more thought-provoking and require minimal – or no – additional materials.

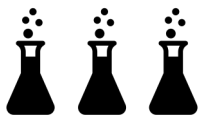
This lab has been rated the following:



The lab requires no modification to the required materials for distance – independent learning. All materials important to the lab are included in the digital lab. A calculator, colored pencils or a ruler may be needed.



The lab requires some modification to the required materials for distance – independent learning. Students can use household items, if needed, to complete hands-on activities.



The lab requires significant modification. Teacher should demonstrate or perform activities in a live session or prerecorded video and/or provide materials needed for the science skills or problem-solving station.

Suggestions

- This lab includes hands-on activities so to make observations and measurements. The activity at the science skills could be performed by the teacher in a pre-recorded video or in a live teaching session.
- The activity at the problem-solving station station requires the construction of a physical prototype; students could build this at home using common household materials but the activity that involves this prototype must be completed in a classroom.

TEACHER GUIDE

EDITABLE COMPONENTS OF SNAPs LAB ACTIVITIES

This download includes an editable word document of all lab components. The stations are available as fully editable DOCX files., Diagrams, illustrations, tables and/or graphs that are essential to lab activities are included in the editable document. Illustrative clipart is NOT included in the editable document.

Some labs have a directed synthesis project. When applicable, the directed synthesis project is available as an editable word document as well. Editable documents and rubrics important to standard synthesis projects are included in the [SNAPs Lab Stations Setup Guide](#).

There are three important reasons for creating editable versions of these stations:

1. Most lab station activities utilize five or more stations with relatively simple and short activities. However, my SNAPs lab activities include four comprehensive stations. The science skills station and problem-solving station could be used independently as single class period laboratories. To better allow for this option, I have made these stations editable. Teachers can use the narrative station as "pre-lab" work and the assessment station as "post-lab" work.
2. The science skills and problem-solving stations are the only stations that will require materials other than computers or calculators. By providing these stations in an editable format, you can manipulate the materials required and/or the directions so the activities work for your classroom.
3. By making the science and problem-solving station editable, you can alter the scope of the activities to suit your students' needs. You can also edit the questions so to evaluate your students in a manner that is best for you and your classroom.

MAKE SURE YOU DOWNLOAD the FREE [SNAPs Lab Stations Setup Guide](#) for SIGNAGE, BEST PRACTICES & EDITABLE DOCUMENTS (<https://www.teacherspayteachers.com/Product/SNAPs-Lab-Stations-Guide-2953726>)