

# 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 screenshot shows a PDF document titled "MS-ESS1-2 Formation of the Solar System Stations Lab.pdf" open in a web browser. The document is a multi-page lab activity with various stations including Science Skills, Narrative, Assessment, and Problem-Solving. It features diagrams, tables, and text boxes.

**Science Skills Station 1:** Includes a table with columns for Planet, Mass (Earth = 1), and Average Density. The table lists Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.

Planet	Mass (Earth = 1)	Average Density
Mercury	0.055	5.4
Venus	0.815	5.2
Earth	1.000	5.5
Mars	0.107	3.9
Jupiter	317.8	1.3
Saturn	95.2	0.7
Uranus	45.9	1.2
Neptune	171.5	1.6

**Science Skills Station 2:** Includes a pie chart showing the composition of the solar system by mass.

Component	Percentage
Gas Giants (Jupiter, Saturn, Uranus, Neptune)	91%
Terrestrial Planets (Mercury, Venus, Earth, Mars)	1%
Other (Asteroids, Comets, etc.)	8%

**Assessment Station:** Includes multiple-choice questions (Question #1 to #8) and a problem-solving station (Problem-Solving Station) with a table for data collection.

**Problem-Solving Station:** Includes a table for data collection and a graph for plotting data.

Planet	Distance from Sun (AU)	Orbital Period (Years)
Mercury	0.39	0.088
Venus	0.72	0.225
Earth	1.00	1.000
Mars	1.52	1.88
Jupiter	5.20	11.86
Saturn	9.54	29.46
Uranus	19.20	84.01
Neptune	30.07	164.8

## 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

MS-ESS1-2 Formation of the Solar System Digital Lab — Saved to my Mac

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

Comments Share

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

Slide 17 of 17 English (United States) Accessibility: Investigate 66%

## 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 MS-ESS1-2 Formation of the Solar System Editable Lab Stations

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

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Formation of the Solar System Overview

**Objectives**

1. Discuss the formation of our solar system.
2. Describe the role of gravity in the solar system's formation.
3. Explain how the temperature of the solar system was an abundance of elements impacted the formation of planets.
4. Model how matter formed together under the force of gravity to form the celestial objects of our Solar System.

**MSL Science and Engineering Practices**

Disciplines and cross-cutting practices (1)

Analyzing and interpreting data (Practice 4)

Using mathematics and computational thinking (Practice 5)

Constructing explanations (For science) (Practice 7)

**Science Skills Station**

Students will track the relationship between the distance from the Sun and temperature. Students will explore the role of temperature and abundance of elements in forming the planets many years ago. Specifically, they will study how temperature influenced the composition of planets and abundance of elements influenced the size of the planets.

**Narrative Station**

Students will track a text and watch a video about the formation of the solar system. They will learn about the stages of our solar system's formation and the role of gravity in the formation of celestial objects in the solar system.

**Assessment Station**

At this station, students will answer questions about key terms and ideas relating to the formation of our solar system. Students must employ **6-8** grade higher-order thinking skills to answer these questions.

**Problem-Solving Station**

Students will use construct a model of the formation of our solar system. Specifically, students will infer a hypothesis that summarizes the events that led to the structure of the solar system we know today.

MS-ESS1-2 Formation of the Solar System © Stephanie D'Amico

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Formation of the Solar System Pre-Lab Assignment

**Directions**

1. Read through the Lab Overview.
2. Create a new entry for Formation of the Solar System in the table of contents in your lab manual and identify the pages of your lab manual that contain the following in your **first page of this entry**.
3. Define the following terms in your lab journal:
  - The Solar System
  - Molecular Cloud
  - Protostellar Disk
  - Gravity
4. Write a 4-6 sentence summary about what you will do in this laboratory.

**Science Skills Station**

**Objectives**

1. Identify the relationship between the distance from the Sun and temperature.
2. Make inferences about how temperature impacted the solar system formation.
3. Use how the abundance of elements in our early solar system impacted the formation of the planets.

**Activity #1**

The data below displays each planet's distance from the Sun and the temperature at each distance. The distance is measured in astronomical units. An astronomical unit is the average distance between the Sun and Earth. The temperature is based on an amount of solar radiation that reaches that distance. Solar radiation is the power per unit area received from the Sun. It is a way of describing solar energy.

Planet	Distance from Sun (AU)	Temperature (Kelvin)	Density (g/cm <sup>3</sup> )
Asteroid Belt	2.2	273	1.7
Mercury	0.39	219	5.4
Venus	0.72	229	5.2
Earth	1.0	279	5.5
Mars	1.52	226	3.9
Jupiter	5.2	112	1.3
Saturn	9.5	95	0.7
Uranus	19.2	76	1.2
Neptune	30.1	72	1.6
Pluto	39.5	47	1.9

**Activity #2**

Read and use two sets of a graph displaying the relative abundance of elements in our solar system and a table of the mass and common elements found in each planet. Use the data to answer the questions.

Element	Earth (%)	Jupiter (%)	Neptune (%)	Common Abundance
Hydrogen	75.0	91.0	80.0	Most abundant
Helium	24.0	9.0	19.0	Second most abundant
Oxygen	46.0	2.0	1.0	Third most abundant
Carbon	18.0	0.5	0.5	Fourth most abundant
Nitrogen	19.0	0.2	0.2	Fifth most abundant
Sulfur	17.0	0.1	0.1	Sixth most abundant
Iron	5.0	0.1	0.1	Seventh most abundant
Calcium	3.6	0.05	0.05	Eighth most abundant
Magnesium	14.0	0.05	0.05	Ninth most abundant
Silicon	21.0	0.05	0.05	Tenth most abundant

**Activity #3**

Read the passage Formation of the Solar System. Then answer the questions.

**FORMATION OF THE SOLAR SYSTEM**

Earth is part of a planetary system called the **Solar System**. The solar system includes the Sun, eight planets and their moons. The formation of the solar system began 4.6 billion years ago. There are four distinct stages in our solar system's formation.

1. The solar system formed from a giant cloud of gas and dust. This cloud was called a **molecular cloud**. The molecular cloud contained mainly hydrogen.
2. The molecular cloud started to collapse because of gravity at the center of the cloud to form a ball of hydrogen. As the ball became more massive, its gravity became stronger. Eventually, it grew so massive that it was no longer able to hold itself together.
3. The remainder of the gas and dust in the molecular cloud formed a spinning, flattened disk around the Sun. This disk is called a **protostellar disk**. The region of the disk closest to the Sun was the hottest. It was too hot for **ices** for rocks and rocky particles could stick to the Sun. Gases collected far from the Sun. As the materials gathered, they began to clump together. They first formed small objects. These objects collided with each other to form larger objects. As time passed longer, these particles became **planetesimals** and they attracted more raw material and objects to form primary planets. Scientists estimate that took 100,000 years for the collisions to form primary planets.
4. Most scientists think our primitive solar system had more than eight planets. Some primitive planets collided and merged. Some collapsed under the planet's own gravity. Eventually, only eight planets were left orbiting the Sun. Over time, they completely cleared their orbital paths of debris. As collisions became less common, the orbital paths solidified. The stabilization of the orbits also caused the planets' movements to change and stabilize as well.

Some of the debris from the formation of the planets is still found in the solar system. There is a collection of small objects that orbit the Sun in the outermost regions of our solar system. The **Solar Belt** region most likely contains remnants from the Solar System's formation.

**Questions:**

1. What four major events led to the formation of the solar system we know today?
2. "Just" means original or primitive, who do we call the protostellar disk?
3. How was gravity important to the formation of the Sun and the planets?
4. Why would collisions be important in including the objects in the Solar Belt?

MS-ESS1-2 Formation of the Solar System © Stephanie D'Amico

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Formation of the Solar System Pre-Lab Assignment

**Objectives**

1. Discuss the formation of our solar system.
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**Problem-Solving Station**

Students will use construct a model of the formation of our solar system. Specifically, students will infer a hypothesis that summarizes the events that led to the structure of the solar system we know today.

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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

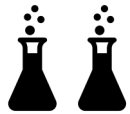
## DISTANCE – INDEPENDENT LEARNING COMPATIBILITY

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 requires common arts and crafts materials, including colored pencils, index cards, scissors and a stapler. Because these materials are common household items, the hands-on component of this lab should be able to be completed independently.
- Alternatively, students can create a digital version of the hands-on activity using Microsoft PP or Google Slides.



# 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>)**