

**Grade 6, Strand 1, Standard 0** (this is an introductory activity)

**Title:** What Do Scientists Do?

**Description:** Students will investigate the Science and Engineering Practices found in the SEEd core using literacy and mathematics strategies.

**Time Needed:** 50 minutes

**Procedures:**

1. Phenomenon: People work as scientists. Does anyone have a parent(s) or relative that are scientists? You may need to qualify by listing some scientific industries: healthcare, university laboratories, biomedical or engineering firms, corporations that do testing, manufacturing or computer hardware or software development. Students may know what their parent does at work and be willing to share.
2. Provide a copy of the “Student Sheet”. Read the introduction and ask students to work alone, with a partner, and in groups to brainstorm a list of activities they think scientists engage in when they go to work. This list will most likely be incomplete.
3. Show this video of a biomedical engineer. Ask student to notice the things she does. You may want to shorten it.  
<https://www.youtube.com/watch?v=XNXY6TfaUO4>
4. Complete the discussion by looking at the list of practices in the data table and discussing what each mean. They are the NGSS science and engineering practices.
5. Give students either Scientist #1 or #2 handouts and ask them to fill in the data chart with the number of minutes spent on each activity. Students will first have to identify the name of the practice and may need help with this step as well as the help percentage calculations. You may want to use a computer or phone app to create the pie chart. **To differentiate for students, use only one of the scientists, it is easier to discuss as a class with all students having the same scientist.**
6. Allow time to finish the student sheet.
7. Finish with this video clip:  
<https://www.youtube.com/watch?v=k2epvAUedCl>

**Formative Assessment.** Before the students leave the room, ask them to write down as many of the practices as they can on an exit ticket, without looking at the practices list. Use this information to see which practices the students are least familiar with.

**Title: What Do Scientists DO?**

**Name** \_\_\_\_\_

**Introduction:** Every occupation has a set of duties or activities that the employees do every day or most days.

1. What do you think a scientist does when he or she walks into the workplace on a given day?

I think:

My partner thinks:

2. Listen as the class discusses the question. What can you add now?

3. From the video, what did you see that you didn't think of?

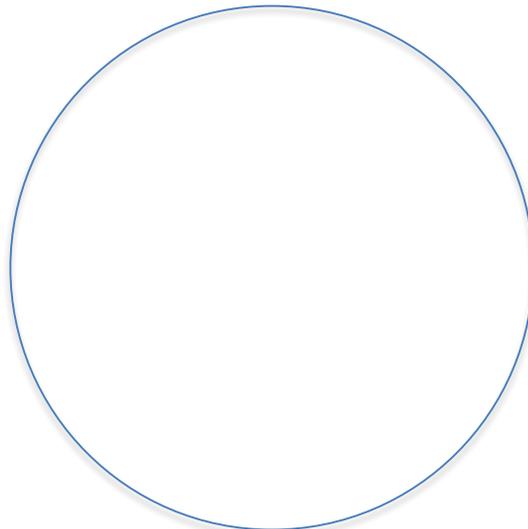
4. According to the SEEd standards (below) scientists also:

5. Read the "Day in the Life of a Scientist 1 or 2". Fill in the number of minutes the scientist spends in each task.

**Scientist #**

Science and Engineering Practices	Time	%	Color
Asking <b>questions</b>			
Developing <b>models</b>			
Planning and carrying out <b>investigations</b>			
<b>Analyzing</b> data			
Using <b>mathematics</b>			
Constructing <b>explanations</b>			
Engaging in <b>argument</b>			
Obtaining and <b>communicating</b> information			
Total		100%	

Complete the pie chart with the data from you table.



**Analysis:**

1. Which tasks did your class not mention?
2. Why do you think that they were not mentioned?
3. Scientists can have very different amounts of each activity based on their type of work and their role in it. Compare your pie chart to others and see if you agree on the percentages. If you were a scientist, which activities would you prefer?
5. What surprised you the most about the tasks scientists perform?

## Scientist #1

This scientist researches what causes children to develop Autism Spectrum Disorders, and how we can best support these individuals lead a fulfilling and happy life.

**6:30am:** I am called to the hospital to collect the all-important umbilical cord blood. I head out. I deliver the umbilical cord blood to the lab for processing and feel glad to no longer be carrying around a vial of blood.

**7:15am:** Arrive at work. Continue responding to emails that flowed in overnight. I keep writing up the results of recently completed paper. I'm on to the "discussion" section, where I'm trying to summarize the results.

**8:00am:** Research team starts getting to work. They tell me we have a particularly interesting family coming in today, who have four children with autism. I make a note in my diary to go down and meet the family at 9:00am. In the meantime, I keep refining the Discussion.

**9:00am:** The family arrives for their assessment session. I talk with the parents while the children are being assessed. We talk about the children's language skills, toilet-training and schooling options.

**9:30am:** I head back to my office and start working on a talk that I'm giving to a group of speech pathologists next month, then create a PowerPoint to help explain my work.

**10:30am:** Deliver a ten-minute talk about autism to touring students, and take a short question and answer session.

**10:50am:** Head back to my office to find a phone message from the mother of a child who has participated in our research. We discuss several options and I refer her to a therapist affiliated with our research group.

**11:00am:** Back to PowerPoint. I am explaining the science basics to the speech pathologists.

**12:30pm:** Lunch with colleagues. We discuss a breadth of topics, ranging from progress on paper writing, to the recent conference in Hawaii to football scores.

**1:00pm:** I go through the monthly budget reports for our various grants. Everything seems to be on track. I email the group statistician give the budget a double check.

**2:00pm:** Meet with a PhD student to review the data from her latest study. The data seem to support our hypothesis, but we need to delve a little deeper. After running a few mathematical analyses, we get down to the task of designing the next experiment for her PhD.

**3:00pm:** The research team tells me another participant in our pregnancy study has arrived for an assessment. I pop down to the clinic rooms to meet her. She's 38 weeks pregnant. I fill out her chart with the information she provides.

**3:30pm:** I read back over the "discussion" section of the paper I worked on in the morning, and decide that I'm not satisfied with it. I read a few more papers in the area, and incorporate the findings into my argument.

**4:10pm:** A research assistant arrives at my office and would like to have a chat about the assessment session with the family this morning.

**4:30pm:** Back to the Discussion. After spending 20 minutes in mortal combat with one infuriating sentence, I realize that perhaps I need to move on. It's time to turn to my email inbox. After responding to a few emails, I find my fingers are working faster than my brain and decide to call it a day.

**6:00pm:** Arrive home and greet the family.

## **Scientist #2**

A day in the life of a research scientist may vary greatly. This scientist is engaged in research concerning cancer cells and ways to keep them from forming tumors.

**7:30 am.** Arrive at work. I place bottles filled with tissue culture media in a water bath and stack culture flasks containing cancer cell lines. These culture flasks are inspected under the microscope to see if changes need to be made.

**8:00 am.** Sterilize the hoods before use in the culture cell feeding procedure. Also, a quick inventory of necessary supplies is made. Cells are fed!

**9:30 am** Project #1: Yesterday, several of us had set-up a series of experiments on cell growth and colony-forming using our cell lines in the presence of anti-tumor agents. Today we are excited to look at the results through powerful microscopes.

**11:00 am** As we discuss our results, there is some indication of our anti-tumor agents have worked. We must further examine our data, change the protocol and plan on performing another study for tomorrow.

**11:30 am** My noon meeting with the Director of Research is approaching. In preparation for this meeting, our staff of scientists is gathering at my office to once again review their recent findings and anticipated follow-up experiments.

**12 noon** The lunch meeting is scheduled for one hour with senior scientists from many departments. The weekly and monthly goals are reviewed. Each of the senior scientists gives a short speech of their work.

**1:00 pm** I walk back to our laboratory and am so excited at the prospects of Project #2 that I skip lunch altogether. I discuss the details further with the research scientists involved in these experiments.

**1:30 pm** We are now preparing cell lines that were harvested in the morning for use this afternoon. The research scientists determine that we have enough cells to supply the physical and analytical chemists for Project #3.

**2:00 pm** Project #3 involves identifying the cell parts that are attacked by the anti-tumor agents. Along with others in the team, I spend the majority of the afternoon isolating and identifying nuclear extracts and proteins using purification procedures.

**5:30 pm** I walk back to my office to return messages received from our collaborators. Later, several research scientists visit my office to further discuss their progress.

**7:00 pm** Home for me.