

Science

Unit 2

Plant Growth

- Where does the energy in our food come from?
- Why do we experiment in science?

Culminating Performance Task¹

¹ The performance task is designed to showcase student mastery on a set of unit targets that are integrated into a multi-part task. Although this is a culminating task, kids are working toward the targets throughout the unit and finalizing the task in the last week. Students see a model early in the unit, and lessons equip students with the knowledge and skills required to complete the performance task. Students work on parts of the task across the weeks, and the task culminates in students finalizing and presenting in the final week of the unit. The task is evaluated using a rubric that describes performance indicators for each target.

TASK DESCRIPTION

TITLE	GROUPING FOR FINAL PRODUCT (Individual, Partner, Group)	Approx. # Lessons to Finalize	Approx. # Lessons to Present
Seed Germination Experiment	Group	8	2

OVERVIEW: *Students will design their own experiment on seed germination in groups and present their project to the class in a science fair-style event in Set 6. Students prepare for the Performance Task over time: in Set 2, students will learn about how seeds germinate and generate a list of variables and questions that students can experiment with; in Sets 3 and 4, students will collect data about their seeds as they grow into plants and conduct mini-experiments as a class. In Set 5, students will begin to work on the development of their seed germination experiment.*

PURPOSE & ROLE²	Conducting experiments requires students to apply both their content knowledge as well as their scientific practice skills to the process of seed germination. Through the process of experimentation, students are engaging in both the process of scientific investigation and communication. Students will assume the roles of scientists as they communicate their findings to the class.
AUDIENCE	Students will present their experiments to the class at the end of Set 6, and ideally other members of the school community will be invited. If presented digitally through photos or websites, the experiments can reach a larger online audience.
FORMAT	Part 1: Groups will submit a final handwritten or typed mini tri-fold poster of their experiments (for grading, see Performance Task Description and Rubrics). The mini tri-fold poster will include all of the components listed in the Unit 2 Performance Task Guide and the Unit 2 Performance Task Poster Checklist. Part 2: Students will present their mini tri-fold poster boards in a science fair-style poster session on the last two days of the unit.
TOPIC	Students will generate their experiment based on the knowledge gained from germinating seeds and growing plants in Sets 2-4. These can include changes to the types of seeds, type of water, temperature of water, temperature of germination location, or other ideas from students.
DIFFERENTIATION	Students who can write more independently will be encouraged to support other students in their group in the production of the poster. Students who need more support may use word banks. Materials and methods can be drawn and labeled, or written in lists and steps. Students can also choose to write 1-3 questions

² This comes from RAFT (role-audience-format-topic), a widely used writing framework: <http://www.readwritethink.org/professional-development/strategy-guides/using-raft-writing-strategy-30625.html>.

	during the science fair poster session, depending on their needs and proficiency.
TECHNOLOGY	The mini tri-fold poster (Part 1) will be completed in class, on poster board folded into thirds, appropriate for the presentation format: a science fair poster session. Students may use cameras to take pictures of their experimental setup, materials, and results. As with all projects, if teachers have access to technology, they can choose for students to create digital components of their poster or complete the entire project in a digital form.
PRESENTATION	Students will present to the class on the last two days of Week 6. Groups will set up in the style of a science fair, where half the class will present on one day while the rest of the class moves around to visit and evaluate posters. Groups will be switched for the second day of the science fair poster session.
OTHER NOTES	Because most students will not yet have the English language to design and present an entire experiment, students will work in groups to co-construct the experiment and poster collaboratively. Every student will be required to contribute to the experiment, and to present one part of it.



KEY TARGETS AND RUBRIC: FOR TEACHERS

Targets	Needs Support	Approaching Target	Meets Target	Exceeds Target
I can set up an experiment with a control group and an experimental group where only one variable is changed. (NGSS P1, NGSS P3, CCLS)	Does not include a control group or an experimental group.	Includes a control group and an experimental group, but changes more than one variable.	Includes a control group and an experimental group, and changes only one variable.	Clearly includes a control group and an experimental group, and changes only one variable.
I can predict what I think will happen in my experiment and support my prediction. (NGSS P1, NGSS P3, CCLS)	Does not predict the outcome of the experiment.	Predicts of the outcome of the experiment, but does not support prediction with knowledge of seed germination.	Predicts the outcome of the experiment and somewhat supports prediction with knowledge of seed germination.	Predicts the outcome of the experiment and supports prediction with knowledge of seed germination.
I can illustrate my experiment, including a control group, experimental group, materials, and methods. (NGSS P2, CCLS)	Does not include any parts of experimental design.	Includes only one part of experimental design.	Includes but does not clearly label all parts of experimental design.	Includes and clearly labels all parts of experimental design.
I can collect and display results in a data table and bar graph. (NGSS P4, CCLS)	Does not present results in either a data table or bar graph.	Presents results in either a data table or bar graph, and clearly and properly labels it.	Presents results in both a data table and bar graph, and clearly and properly labels both.	Presents results in both a data table and bar graph, and clearly and properly labels and captions both.
I can interpret my data table and bar graph and communicate conclusions. (NGSS P4, CCLS)	Does not describe the results of the data table and/or bar graphs.	Describes the results of the data table and/or bar graphs, and includes one piece of information from the data.	Describes the results of the data table and bar graphs, and includes at least two pieces of information from the data.	Describes the results of the data table and bar graphs, and includes at least three pieces of information from the data.

TARGETS AND RUBRIC: FOR STUDENTS

Long-Term Targets	Needs Support	Approaching Target	Meets Target	Exceeds Target	Teacher Comments
I can set up an experiment with a control group and an experimental group where only one variable is changed. (NGSS P1, NGSS P3, CCLS)					
I can predict what I think will happen in my experiment and support my prediction. (NGSS P1, NGSS P3, CCLS)					
I can illustrate my experiment, including a control group, experimental group, materials, and methods. (NGSS P2, CCLS)					
I can collect and display results in a data table and bar graph. (NGSS P4, CCLS)					
I can interpret my data table and bar graph and communicate conclusions. (NGSS P4, CCLS)					



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Performance Task Model

Student Model of Performance Task That Meets Targets

The Effect of Light on Green Bean Seed Germination

Research Question:
How does light affect seed germination?

Hypothesis:
Light will make seeds germinate faster than dark

Materials:

- Green bean seeds (20)
- Bounty paper towels
- Water
- Shoe box

Experimental Design Diagram:

	EXPERIMENTAL GROUP	CONTROL GROUP
What is DIFFERENT about the groups?	SEEDS PLACED IN A DARK PLACE	SEEDS PLACED IN A LIGHT PLACE
What is the SAME for both groups?	# of seeds kind of seeds paper towel (kind) amount of water	# of seeds kind of seeds paper towel (kind) amount of water

Procedure:

1. Gather all materials
2. Place all 20 seeds in a paper towel (1 seed per paper towel)
3. Wet paper towels with water
4. Place 10 seeds in paper towels in a shoebox and 10 on a windowsill in light.
5. Check for germination each day for 5 days

Data Collected

Table: # of Seeds Germinated (new seeds each day)

Day	EXPERIMENTAL GROUP	CONTROL GROUP
1	0	0
2	0	1
3	1	2
4	2	5
5	6	2
TOTAL SEEDS	9	10

Results:

10 seeds in our control group germinated. 9 seeds in our experimental group germinated. 1 seed in our experimental group did not germinate. The data show most of our seeds in both groups germinated. One reason for these results is that green bean seeds do not need light to germinate.