SEPUP SUPPORT FOR THE OREGON STATEWIDE ASSESSMENT SYSTEM TEST

The Next Generation Science Standards call for students to develop a deep understanding of disciplinary core scientific ideas and crosscutting concepts by actively engaging in a variety of science and engineering practices. This vision is central to the design approach for *Issues and Science*, developed by the Science Education for Public Understanding Program (SEPUP) at the Lawrence Hall of Science, and published by Lab-Aids®. Each *Issues and Science* unit focuses on a key personal or societal issue and related phenomena that drive learning of disciplinary core ideas and crosscutting concepts, and engage students in sensemaking, problem solving, and design. In addition, in the design of *Issues and Science*, an intentional effort was made to ensure that our units support instruction and assessment of the specific combination of disciplinary core ideas, crosscutting concepts, and science and engineering practices for each performance expectation (PE) as outlined in the NGSS.

The NGSS learning approach has elicited the need for three-dimensional assessments for teachers to monitor student learning, growth, and mastery. Oregon provides teachers with sample questions of their online assessments to help prepare students as well as the OSAS Science Interim Assessments which focus on opportunities for teachers to analyze student learning and understanding. Similarly, *Issues and Science*, has developed and included both embedded formative assessments as well as end-of-unit summative assessment items that have been carefully designed to assess three-dimensional learning of the NGSS disciplinary core ideas, crosscutting concepts, and science and engineering practices. These assessments are closely aligned to the content and three-dimensional approach of the NGSS PEs, and thereby also to the goals of the OSAS. Through this alignment, the *Issues and Science* assessments help prepare students for the type of multidimensional assessment questions they will likely encounter on OSAS online assessments.

The examples below show a side-by-side comparison with selected released assessment items from the OSAS Grade 8 Science Sample Test, alongside comparable items from *Issues and Science* units. These questions were taken from the embedded assessment items in the end-of-activity analysis questions. These assessment items include corresponding scoring guides which directly align to the science and engineering practices. For more information, please contact Lab-Aids (www.lab-aids.com).

Physical Science Example Comparison

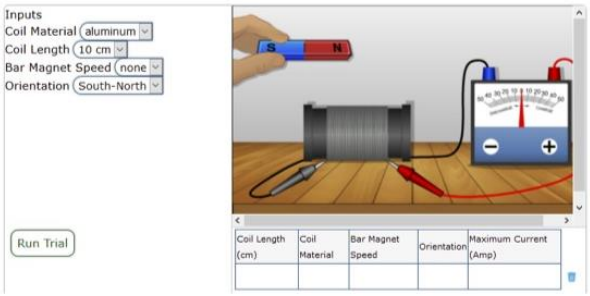
Alignment: MS-PS2-5: Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

OSAS Grade 8 Science Sample Test Item

Part A

Using the simulation, select inputs to design and run a controlled experiment to determine how each coil material affects the movement of the ammeter needle.

- You may run up to 4 trials. If you would like to delete a trial, click on the trash can icon next to the row of data you would like to delete, and generate new data.
- Coil length is measured in centimeters (cm).
- Click Run Trial to run a trial.



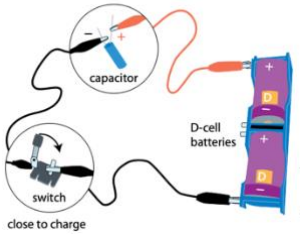
Answer: Responses will vary. The student receives a point for running a controlled experiment to determine the effect of coil material on the movement of the needle. This is an example of a controlled experiment, changing only the coil material:

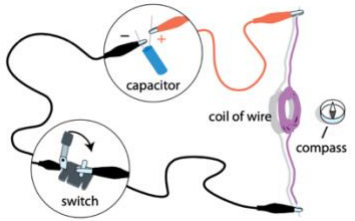
Coil Length (cm)	Coil Material	Bar Magnet Speed	Orientation	Maximum Current (Amp)
10	aluminum	fast	South-North	-50
10	iron	fast	South-North	-14
10	nickel	fast	South-North	-20

Issues and Science Assessment Item

***Issues and Science* Unit:** *Fields and Interactions* Activity 12: Electric and Magnetic Fields

Scoring Guide: Communicating Scientific Ideas





Properties of Electromagnetic Coils

COIL	CAPACITOR VOLTAGE (V)	NUMBER OF WIRE TURNS	LENGTH OF COIL (cm)
1	3.0	30	6
2	1.5	30	6
3	3.0	15	6
4	3.0	15	3

Analysis Item #3: Think about the experiment you conducted in Part C.

a. If a current is sent through the wire, what happens to the compass? Explain the cause and effect, using the terms *force*, *electric field*, and *magnetic field*.

Sample Student Response:

The needle on the compass moves even though it isn't touching the coil. This is because the current caused an electric field around the wire. Through electromagnetic induction, the electric field induced a magnetic field around

Alignment: MS-PS2-5: Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.	
OSAS Grade 8 Science Sample Test Item	***Issues and Science* Assessment Item**
	the coil. The effect of the magnetic field was the force on the compass needle because the needle is magnetized. b. Did the experiment in Part C provide enough evidence to support what you found in Part A? *Sample Student Response:* Yes, because in Part A we saw a magnetic field induced by an electric current. In Part C, we collected data that provided evidence of the effect. c. Explain how the experiment in Part C could be improved. *Sample Student Response:* Part C could have been improved if we had done all the combinations of voltage, number of wire turns, and length of coil. That would have provided even more evidence that supported electromagnetic induction.

Life Science Example Comparison

Alignment: MS-LS4-6: Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

OSAS Grade 8 Science Sample Test Item

Part A

Calculate the rates of change in first flowering dates per degree Celsius for the average species, the highbush blueberry, and the yellow wood sorrel, between 1852 and 2006. Round your answers to one decimal point.

Plant	Rate of Change in First Flowering Date (days per °Celsius)
43 Species	
Highbush blueberry	
Yellow wood sorrel	

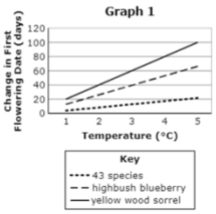
Answer: Responses my vary. Correct responses include +/- 0.1 for each blank. Actual correct values are:

Plant	Rate of Change in First Flowering Date (days per °Celsius)
43 Species	4.4
Highbush blueberry	13.1
Yellow wood sorrel	20

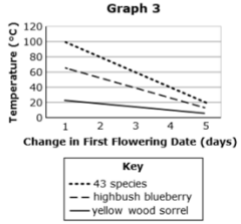
Part B

Which graph matches the rates of change you calculated in part A?

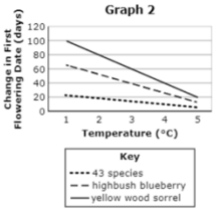
Ⓐ Graph 1



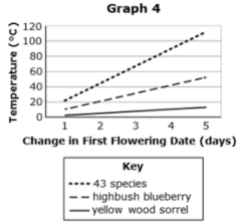
Ⓒ Graph 3



Ⓑ Graph 2

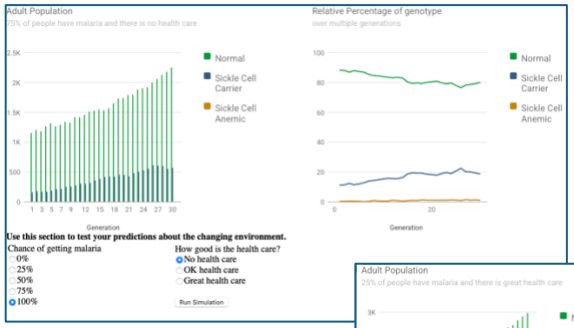


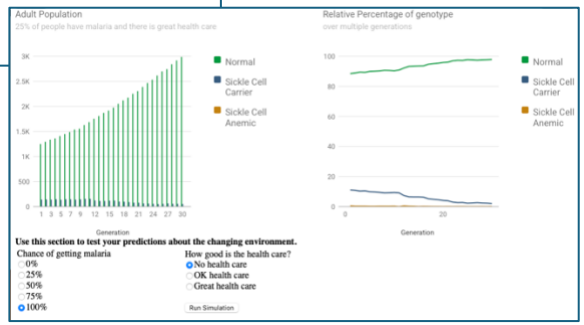
Ⓓ Graph 4



Issues and Science Assessment Item

***Issues and Science* Unit:** *Evolution* Activity 6: Mutations and Evolution
Scoring Guide: Constructing Explanations





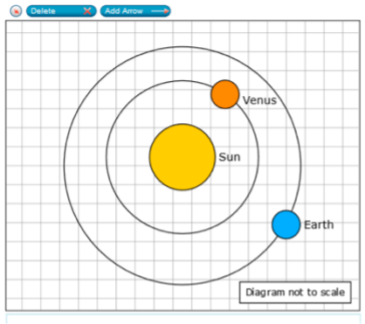
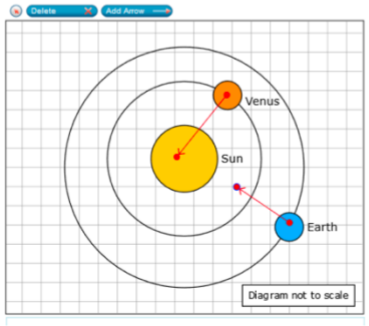
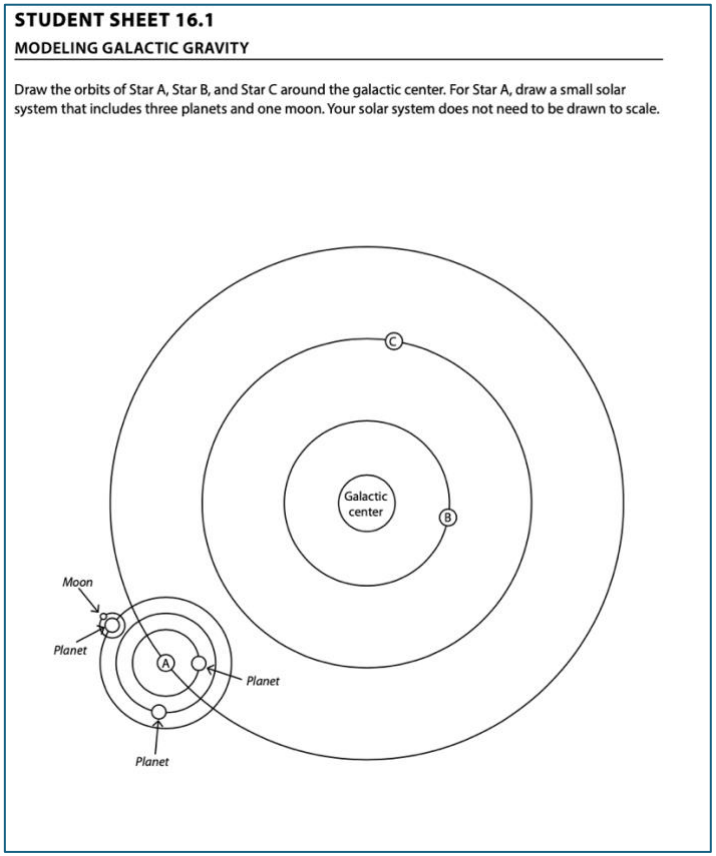
Analysis Item #2: Explain how environmental changes affect the sickle cell trait over time in your population. Use evidence, including mathematical representations, from your investigation to support your explanation.

Sample Student Response:
There are two ways that changes in the environment affected how common the sickle cell trait is—changing the frequency of malaria or changing the quality of the health care. If there was no malaria and no health care, the hemoglobin mutation almost disappeared from our population, going from 10% to 1.8% of our population. There was no selection for the mutation in this case because

Alignment: MS-LS4-6: Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.	
OSAS Grade 8 Science Sample Test Item	***Issues and Science* Assessment Item**
	the sickle cell trait is only an advantage when malaria is common. But when malaria became common (75% or 100% chance) with no health care, there was an increase in the sickle cell mutation in our population because the sickle cell trait increased the chances of survival and reproduction in the presence of malaria when health care is poor. Increasing health care meant that people who contracted malaria could be treated and survive. With greater health care, the percent of sickle cell carriers did not increase over time. Instead I saw that the percentage of carriers dropped to 4.9% from 11%. This occurred because there was no positive selection (advantage) for the trait.

Earth Science Example Comparison

Alignment: MS-ESS1-2: Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.

OSAS Grade 8 Science Sample Test Item	***Issues and Science* Assessment Item**
Create a model to describe the difference in orbital speed. Use the Add Arrow tool and draw one arrow for each planet to show the magnitude and direction of the force of gravity on each planet. Longer arrows represent forces with greater magnitude.  **Answer:** 	***Issues and Science* Unit:** *Solar System and Beyond* Activity 16 **Scoring Guide:** Developing and Using Models  **Analysis Item #3:** Think about all you needed to know to complete Student Sheet 16.1. a. Describe the role of gravity in determining the following: • The orbits of the stars

Alignment: MS-ESS1-2: Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.	
OSAS Grade 8 Science Sample Test Item	***Issues and Science* Assessment Item**
	• The orbits of the planets around Star A • The orbit of the one moon you included in your model *Sample Student Answer:* Gravity causes each star to orbit the center of the galaxy because of all the mass and dark matter in the galaxy. Each planet in the solar system around Star A orbits Star A because it is the closest star to them, and it is more massive than any of the other objects in that solar system. The moon in my model orbits the second planet because it is really close to that planet, so gravity causes it to orbit that planet. b. Do the planets orbiting Star A orbit in the same direction? Explain. *Hint*: Make sure that your answer mentions solar system formation. *Sample Student Answer:* Yes, all the planets in the solar system with Star A orbit in the same direction. This is because when solar systems form, a lot of gas and dust gets pulled together from gravity and starts spinning. The planets orbit in the direction the early solar system was spinning in.