Grade 7 Unit: Plate Tectonics Lesson: Density

Data: Densities of 5 differently colored liquids (sugar solutions), calculated from lab. Students with bad numbers will be given a copy of another student's data sheet.

Question: In what order will the liquids form layers if they do not mix?

Ideal Student Response:

From top to bottom, the order of the liquid layers will be red, yellow, blue, green, and purple. The density of the red liquid is 1.00 g/mL. The density of the yellow liquid is 1.02 g/mL. The blue liquid's density is 1.05 g/mL, and the green liquid's density is 1.07 g/mL. Finally, the density of the purple liquid is 1.11 g/mL. Density is a measure of how tightly packed the particles in a substance are, calculated by dividing the mass of the substance by its volume. If a substance is very dense, its particles are more tightly packed, and gravity can pull it down with a greater force. On the other hand, less dense substances have less tightly packed particles, and gravity pulls down with less force. Therefore, the most dense liquid will sink to the bottom, and the least dense liquid will float at the top, forming layers in order of their densities.

Grade 7 Unit: Energy Lesson: PE & KE

Data:

Mr. Grymonpré used to drop pumpkins out of the window. One year, he dropped three pumpkins with equal masses. He dropped one pumpkin out of the first-story window, one out of the second-story window, and one from the roof. Students measured the speed of the pumpkins *just before they hit the ground*:

Pumpkin	*Speed*
A	14.0 m/s
B	7.7 m/s
C	10.8 m/s

Question: Which pumpkin did Mr. Grymonpré drop from each location?

Ideal Student Response:

Mr. Grymonpré dropped pumpkin A from the roof, pumpkin C from the second-story window, and pumpkin B from the first-story window. Pumpkin A hit the ground with a speed of 14.0 m/s. Pumpkin C hit the ground with a speed of 10.8 m/s, and pumpkin B had a speed of 7.7 m/s. The higher up the pumpkins started, the more gravitational potential energy they had. Each had the potential to drop down, and the pumpkin on the roof had the greatest potential energy (stored energy) because it had the potential to drop the farthest. As each pumpkin falls, its potential energy transforms into kinetic energy, which is energy from movement. The more potential energy it started with, the more kinetic energy it will end up with. If the pumpkins have equal masses, the one with the greatest kinetic energy at the end will have the greatest speed. Therefore, the pumpkin that had the highest starting point will end up with the greatest speed, and vice versa. This is why pumpkin A, with the greatest speed, was dropped from the roof, and pumpkin B, with the slowest speed, was dropped from the first-story window.

Grade 7 Unit: Chemistry Lesson: Water Quality Testing

Data:

Water Quality Test Results:

	Ladybug Pond	Tadpole Pond
pH	7.4	9.0
DO	5 ppm	4 ppm
Temperature	59° F (15° C)	55° F (12.8° C)
Turbidity	Clear water (low turbidity)	Clear water (low turbidity)

Also provided—ranges that various aquatic animals (including small-mouth bass) need for their environment

Question: Which pond is a healthier environment for small-mouth bass?

Ideal Student Response:

Ladybug Pond is a healthier environment for small-mouth bass. Ladybug Pond has a pH of 7.4, 5 ppm dissolved oxygen (DO), a temperature of 15 degrees Celsius, and a low turbidity. A small-mouth bass needs a pH of 6.0 to 8.5, a DO level of at least 5 ppm, a temperature range of 55 to 68 degrees Celsius, and a low turbidity level. The level of pH tells how reactive the water is, basically how safe it is. The DO level shows how much oxygen is in the water for the bass to breathe in through its gills. The temperature measures how hot or cold the water is, and the turbidity measures how clear the water is. The pH is slightly basic, but still close to neutral (pH of 7.0). The DO level of 5 ppm is moderately high, and the temperature of 59 degrees Celsius is also moderate. Finally, the low turbidity means the water is clear. All of these conditions make the water safe for the small-mouth bass to live in Ladybug Pond. In contrast, Tadpole pond's pH is too basic at 9.0, and its DO level is too low at 4 ppm, so small-mouth bass would not be able to survive there.

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Grade: 8
Unit: Population and Ecosystem
Lesson: Abiotic Factor in Mono Lake

Identify what data students will be using:

A chart showing the number of organisms in the Mono Lake vary over the course of a year as shown at the back and how the abiotic factors change over the course of a year.

Question:

Name two abiotic factors that are important to the ecosystem of Mono Lake?

Ideal Student Response:

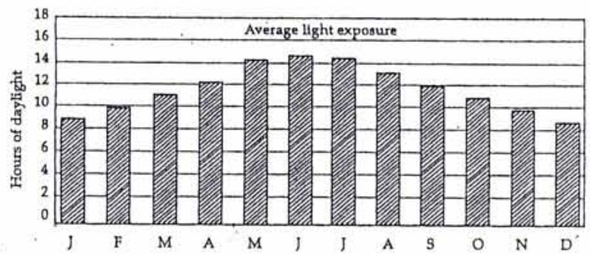
1. Students will be able to identify the abiotic factors.
2. Students will be able to claim the two most important abiotic factors with evidence from the data chart.
3. Students will be able to give reasons to tell why those abiotic factors are the most important ones.

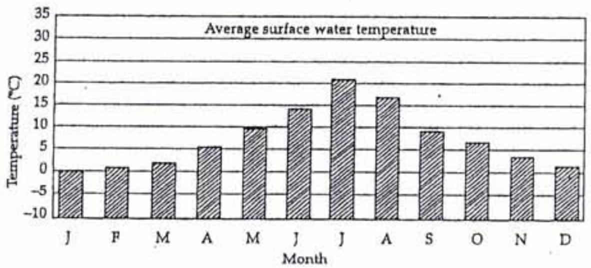
MONO LAKE DATA (1 of 3)

Because of its unique ecology, Mono Lake has been an interesting place for scientists to study. Good scientific study involves accurate data recording. A lot is known about the organisms that live in the lake and the abiotic conditions that affect the organisms in the ecosystem.

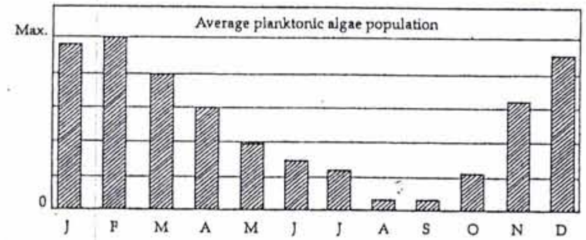
These three pages have graphs that show how some of the populations in the Mono Lake ecosystem vary over the course of a year and how the abiotic factors change over the course of a year.

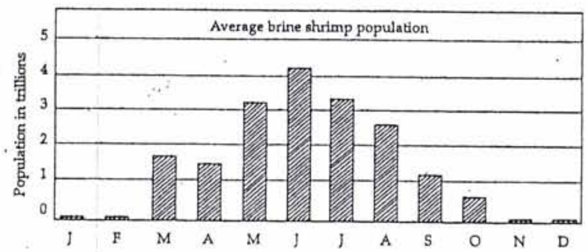
Study the graphs. Look for relationships between populations of different species and between organisms and abiotic factors in the ecosystem.

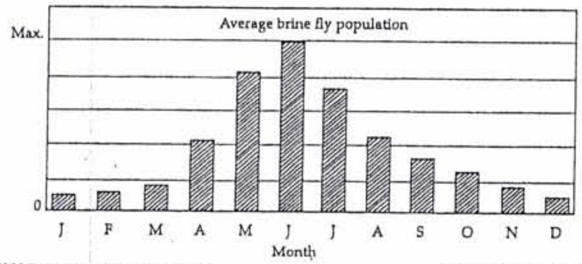




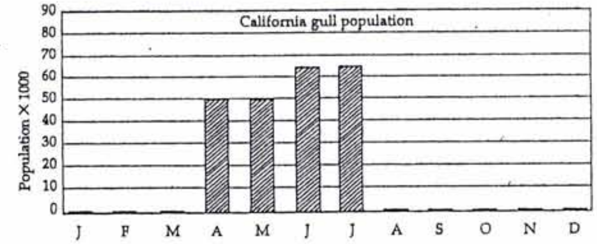
MONO LAKE DATA (2 of 3)

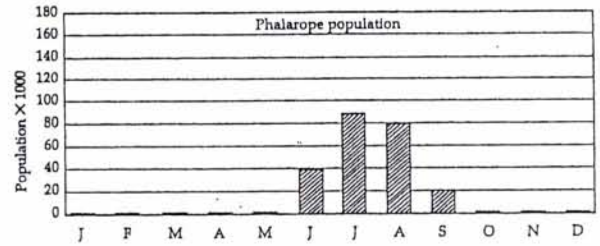


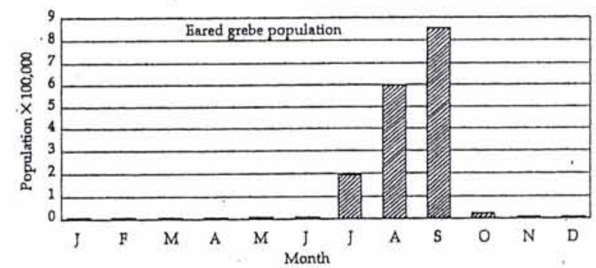




MONO LAKE DATA (3 of 3)







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Grade: 8
Unit: Population and Ecosystem
Lesson: Milkweed Bug Habitat

Identify what data students will be using:

Students will observe and collect data from three milkweed bug habitats created two months before this writing. Data can include but not limit to the amount of food and water consumption, the number of milkweed alive and dead, and specific set up of each habitat.

Question:

What is the most important element for the milkweed bugs to survive? (air, water, food, twigs, cotton, space, or…..?)

Ideal Student Response:

1. Students will claim the most important element for the milkweed bugs to survive.
2. Students give evidences through observing and comparing the three habitats that they created.
3. Students give reasons for their pick based on facts rather than opinions. For instance, the number of milkweed bug born and survived.

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Grade: 8
Unit: Population and Ecosystem
Lesson: Food Web

Identify what data students will be using:

Producer:	wheat plant
Primary Consumer:	field mice, grasshopper
Secondary Consumer:	snake, bird

Question:

1. Create a food web according to the data provided.
2. Explain one change in the wheat plantation that will dramatically change the size of population of the field mice.

Ideal Student Response:

1. Students should be able to tell the relationships among the living organisms in the wheat plantation based on the data shown above. Students will also explain the producer and consumer relationships in the ecosystem.
2. Students will put all the organisms in the food webs with arrows.
3. Students will be able to use one of the following factors to justify the decrease of mouse population:
    a. The decrease of the production of wheat.
    b. The increase of the population of the snake.