One Froggy Evening

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<th>PISA Team: Cordero</th>
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<tr>
<td>Name</td>
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<td>Barbara V. Henderson</td>
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**Strand(s):** Membranes – Meeting Basic Needs

**Grade(s):** 3rd

**Key Science Terms:** Survival, Habitat, Amphibian, Mammal, Membrane, Moisture, Basic, Model, Engineer

**Key Science Concepts:**

- Frogs and humans share basic needs for survival: water, food, air and shelter.
- Successful habitats satisfy all of these needs.
- Frogs are amphibians and require a water and land habitat.
- Humans are mammals and are able to survive in many different habitats.
- A membrane lets things in and out, while keeping harmful things out.
- A raisin’s skin is a model of a membrane.
- A Frog’s skin is a membrane letting in moisture and keeping other things out.
- Frogs take in water through their skin/membrane.
- Humans have numerous membranes in their bodies.
- Membranes control the size of things that pass through the membrane.
- Membranes control the rate things pass through the membrane.
- An Engineer is someone who uses his/her knowledge of science, math, and creativity to design objects or processes to solve problems.
NJCCC Standards:

Standard 5.1 (Scientific Processes) All students will develop problem-solving, decision-making, and inquiry skills, reflected by formulating useable questions and hypotheses, planning experiments, conducting systematic observations, interpreting and analyzing data, drawing conclusions and communicating results. Standard 5.5 (Characteristics of Life) All students will gain an understanding of the structure, characteristics, and basic needs of organisms and will investigate the diversity of life.

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- Do frogs and humans share basic needs?
- Do successful habitats satisfy these needs?
- Do Frogs satisfy their need for water through their skin/membrane?
- What is used for the frog’s habitat?
- Was the frog’s habitat in the cartoon successful?
- What frog’s needs were not met?

Key Concepts:

- Frogs and humans share basic needs for survival: water, food, air and shelter.
- Successful habitats
satisfy all of these needs.

- Frogs are amphibians and require a water and land habitat.

**Procedure:**

- Students will complete Man vs. Frog worksheet using prior knowledge.
- Ask how each species satisfies these needs and where.
- Show cartoon: “One Froggy Evening.”*
- Review cartoon and ask how successful was this frog’s portable habitat, if all his needs were being met, and how they could be met.

*Search for cartoon on [www.youtube.com](http://www.youtube.com) website.

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<td><strong>Days/Hours:</strong> Day 2</td>
<td>- How does a raisin skin membrane work?</td>
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- Does a raisin skin membrane control the rate (how quickly or how slowly) things pass through it?
- Does a raisin skin membrane control the size of things that pass through it?

**Key Concepts:**

- The size of the pores determines what will be allowed to pass through a membrane and at what rate.

**Procedure:**

- Introduce Raisin Activities.
- Students will record their results on “Exploring Membranes: Raisin Skin.”
- Label a piece of chart paper: “What Have We Learned about Membranes?”

Refer to Page 73, Lesson 3 for 24-hour setup. Refer to Pages 77 – 80, Lesson 3, for a list of each group’s materials and directions for activities. (EIE)

Page 3.1, Lesson 3, B. (EIE)

Rubric for Raisin Activities, Pages 3-4, and 3-5, Lesson 3. (EIE)

Refer to Page 81, Lesson 3 for suggested responses. (EIE)
**Explain**

**Days/Hours:** Day 3

**Key Questions:**
- What is an Engineer?
- How do Engineers solve problems?
- What are the steps to the Engineering Design Process?

**Key Concepts:**
- An Engineer is someone who uses his/her knowledge of science, math, and creativity to design objects or processes to solve problems.
- Engineers use the Engineering Design Process.
- The five steps to the Engineering Design Process are:
  1. Ask
  2. Imagine
  3. Plan
  4. Create
  5. Improve

**Procedure:**
- Introduce job of an Engineer.
- Introduce Engineering Design Process

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<th>What is an Engineer?</th>
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Elaborate

Key Questions:

- What materials make the best model membranes?
- Would you be able to design a model membrane/habitat that will allow water through at a slow rate so that the water supply will last for an extended period of time?

Key Concepts:

- The size of the pores determines what will be allowed to pass through a membrane and at what rate.

Procedure:

- Review chart “What Have We Learned About Membranes?”
- Introduce concept of “rate” to refer to speed at which water flows through model membranes.
- Introduce”Testing Model
Membrane Materials.”

- Prior 24-hour set-up.
- Question students about what rate they want the water to pass through these materials.
- Groups will test possible model membrane materials and record results.
- Explain they are currently in the “Ask” phase of the Design Process.
- Introduce the “Designing a Model Membrane” project and complete worksheet.

- Brainstorm model membrane design and complete worksheet.
- Draw a diagram of model membrane design and complete worksheet.

Refer to Page 84, Lesson 3 for list of materials. Refer to Page 85, Lesson 3. (EIE)

Refer to Pages 88-89, Lesson 3, for Activity Procedure. (EIE) “Testing Model Membrane Materials” worksheet. 3.3 B (EIE)

“Designing a Model Membrane: Ask” Page 4-4 B (EIE) Refer to Page 96, Lesson 4 for list of materials. (EIE) Refer to Page 100. Lesson 4 for diagram of model membrane container. (EIE)

“Designing a Model Membrane Imagine” Page 4-5 B (EIE) “Designing a Model Membrane Plan”
- Build the model membrane/habitat.
- Set in a shady spot for 24 hours.
- After 24 hours, retrieve model and complete worksheet.
- Allow time for redesigning and rebuilding.

**Evaluate**

**Key Questions:**

- Were you working like Engineers?
- Would your first Model Membrane/ Habitat keep a frog alive for an extended period of time?
- Would your improved Model?
- Did using the Engineering Design Process help you to succeed?

**Days/Hours:**
Day 7

**Key Concepts:**

- An Engineer is someone
who uses his/her knowledge of science, math, and creativity to design objects or processes to solve problems.

- A successful design has less than a ¼ cup of water collected in the measuring cup after 24 hours.

Procedure:

- As a group present diagram of first model and improved second model.
- Each member of the group writes a one-page presentation responding to questions on worksheet.

Part 2:Reflection, Page 107, Lesson 4 (EIE)

Rubric for “Model Membrane/Habitat Design. Pages 4-12 and 4-13, Lesson 4. (EIE)

Timeline: Create a timeline for this project.

Engage:
Day 1 - Complete Frog vs. Human worksheet, View and discuss cartoon: “One Froggy Evening.”

Explore:
Day 2 - Raisin Activities.

Explain:

Elaborate:
Day 4 – Introduce "Testing Model Membrane Materials."
Day 5 – Introduce "Designing a Model Membrane"
Day 6 – Reevaluate design and “Improve” Membrane/Habitat Model.

Evaluate:
Day 6 – Presentations: Groups and Individual.