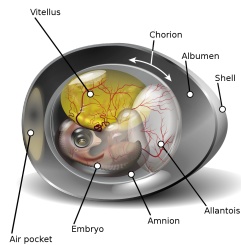


Egg Osmosis Phenomenon

Worksheet

You may work with up to two additional students to complete it. This activity will let you think like a scientist using many of the key concepts you have learned this year. **Your observations, use of cross-cutting concepts, and questions should show thought and effort!**



Part 1 - Introduction to the egg. - 20 Points for the completion of all questions below.

Before exploring our egg phenomenon, we need to talk about the importance of the egg, and in particular, the **amniotic egg**. The egg you are most familiar with, the chicken egg, is an amniotic egg. Answer the two questions below about amniotic eggs.

1. Shape of the egg - Give me two reasons that eggs are egg shaped...remember our Crosscutting Concept of Structure and Function.
2. Evolutionary advantage - The amniotic egg gives an advantage that the previous eggs (fish and amphibians) don't have, what is it?

Part 2 - Egg Preparation and Experiment - Your egg will be submerged in vinegar overnight. There will be a chemical reaction between your egg shell and the vinegar.
Original Mass of your "Naked Egg". _____g

Egg Results

1. Go to this [Google Sheet](#) and make a copy.
2. Put the masses of the eggs into the Spreadsheet, create a bar graph, and paste it below
3. Make an observation of what you see when you first put the egg into the vinegar.
4. What is the chemical reaction that occurred to cause your egg shell to dissolve (a chemical reaction is when two substances interact to create a new substance(s))?

Phenomenon: Depending upon what an egg is submerged in, it gets larger or smaller.

PART 1 - Observations: Observations are information that you can get from using any of your senses. They are statements of fact. During class, you watched a “naked egg” submerged in either water or corn syrup and it changed size over time. What are three observations you made as you watched this process (Make at least three good observations. You may notice more - if so, feel free to add more numbers! **Your observations are all written in complete sentences and should show the meaningful ideas, grammar and spelling of hard working 7th grade student...**

1.

2.

3.

PART 2 - Earlier this year, you learned about the **Crosscutting Concepts**. These are concepts that are frequently found in all areas of science. The crosscutting concepts are: **1. Patterns, 2. Cause and effect. 3. Scale, proportion, and quantity 4. Systems and system models 5. Energy and matter 6. Structure and function 7. Stability and change.** If you would like to review the CrossCutting Concepts presentations as a whole before doing this step of the activity, here is the [link to the complete presentations: Crosscutting Concepts Presentation](#). The links to the individual slides for each CrossCutting Concept are also listed next to the Concepts below.

For as many of the concepts as you can (at least 3!), explain where or how you can see the Crosscutting Concepts represented in the egg activity and why you believe this. (The links take you to the specific slides from the presentation about that Concept...you can click on each link to review a concept as needed.) **Your answers are all written in complete sentences and should show the meaningful ideas, grammar and spelling of hard working 7th grade student...**

Your answers could be about what you observed about the egg up to this point of anything you observed/learned during the [Egg Presentation](#).

1. **Patterns.** (Is there anything that is **repeating** or anything that you can **predict** from the pictures?)([LINK](#))
2. **Cause and Effect.** (What **caused** what you are seeing in the pictures?) ([LINK](#))
3. **Scale, Proportion, and Quantity.** (Are there things **too small to see, too large to see, or happening outside of the picture** that is important?) ([LINK](#))
4. **Systems and Systems Models.** (Are there things that are **working together** to make something happen?) ([LINK](#))
5. **Energy and Matter.** (Is there **energy** in the picture? Is there **matter changing** in the picture?) ([LINK](#))
6. **Structure and Function.** (Does something **look like it does because of what it does**?) ([LINK](#))
7. **Stability and Change.** (Considering events can happen extremely quickly or slowly, can you see any **changes that must have happened** before these pictures or **changes that you think will happen.**) ([LINK](#))

Guiding Question - Why does an egg get bigger in water and shrink in corn syrup?



Part 1: Vocabulary

You will need to know and understand the following vocabulary words in order to be successful at this task. State **IN YOUR OWN WORDS** what the following vocabulary words mean and/or how they are related to the egg increasing or decreasing in size. You should be using the [resource guide](#) in Google Classroom to complete this.

Osmosis: _____

Selectively Permeable: _____

Cell Membrane: _____

Hypertonic Solution _____

**Hypotonic
Solution**

**Isotonic
Solution**

Solute- A substance that is dissolved in a solution.
Example: Salt dissolves in water and therefore, salt is the solute.

Solvent- The substance that dissolves the solute.
Example: Salt dissolves in water and therefore, water is the solvent.

Part 2: Model/ Drawing

Planning Before You Start:

- Think about the **crosscutting concepts** you've identified as you begin your design
- Refer to the vocabulary you completed above and the [resource guide](#)
- You will create a drawing that will be a "model" that answers the question because it will show the processes, in order, that explains why the egg either expanded or shrank in the different liquids. **Your artistic ability is NOT important at all in this process.**

- You will use **BLACK ARROWS** to show the flow of **matter** or movement of molecules from one place to another.

The following words and explanations should be included in your model:

- ☐ **Osmosis**
 - ☐ **Selectively Permeable**
 - ☐ **Cell Membrane**
 - ☐ **Hypertonic Solution**
 - ☐ **Hypotonic Solution**
 - ☐ **Isotonic Solution**
-
- ☐ Pictures **and** words **OR** that show what is happening in your model

Part 3: Explanation

Summarize in your own words below, what is happening at each stage of your model. This will let you explain items or pictures in your drawing that you did not have room to place directly on your drawing in a way that we can see or read them clearly.

Your explanation should include the following things:

- ☐ **Your explanation should be at least 6 sentences long**

- [illegible]

RUBRIC

Criteria	Exceeds Expectations (10 pts)	Meets Expectations (8 pts)	Approaching Expectations (6 pts)	Beginning (4 pts or below)	Score
1. Scientific Model (Drawing) – Shows molecular movement and energy flow using black and red arrows– Includes all vocabulary terms and visual processes	Clearly and accurately shows osmosis, membrane function, and direction of movement using arrows; all key vocabulary is integrated and labeled	Mostly accurate model with clear labels and arrow use; includes most required vocabulary and shows general understanding	Some vocabulary or arrows are missing; diagram may be disorganized or partially incorrect	Model is missing, incomplete, or inaccurate; few or no vocabulary terms used correctly	___ /10
2. Written Explanation (8+ Sentences) – Explains both egg expansion and shrinking– Uses scientific reasoning and vocabulary to support the model	Thorough explanation includes accurate use of vocabulary and clearly connects to the model; strong understanding of osmosis and solution types	Addresses both phenomena with correct vocabulary and some scientific reasoning; mostly clear connection to model	Incomplete or unclear explanation; uses few vocabulary terms or incorrectly applies concepts	Short or unrelated explanation; lacks vocabulary or scientific reasoning	___ /10
3. Vocabulary Use – Defines and uses the following correctly: osmosis, selectively permeable, cell membrane, hypertonic, hypotonic, isotonic, solute, solvent	All terms are accurately defined in the student's own words and used correctly in the model and/or explanation	5–6 terms defined and used correctly	3–4 terms defined or used; may contain minor errors	0–2 terms used or most terms misunderstood or copied without comprehension	___ /10
4. Crosscutting Concepts (CCCs) – Includes systems thinking, cause & effect, energy/matter movement, and scale	Thoughtful and accurate inclusion of two CCCs (system models and energy/matter movement that clearly shows how concentration differences and membrane structure drive change	Includes 2 CCCs (system models and Energy & Matter) that; demonstrates some understanding of molecular movement and concentration	One CCC present; vague or incomplete connection to science ideas	No CCCs evident; lacks depth in scientific reasoning	___ /10

STEELS / NGSS Alignment:

- Performance Expectation - Students will be able to:

1. Develop and use a model to describe the function of a cell as a whole and ways the parts of cells contribute to the function.

SEPs: Developing and using models, constructing explanations, communicating information

DCIs: LS1.A (Structure of Cells), LS1.C (Energy Flow in Organisms), LS2.B (Matter Cycling)

CCCs: Cause & Effect, Systems, Energy & Matter