Science, Engineering, Technology & Math

Triassic Triops

Introduction

- Welcome to the world of Triops! A living fossil from ages pass, come to delight and teach your students about:
  - **Water quality**
  - **Aquaculture**
  - **Prehistoric invertebrates**
  - **Taxonomy**
  - **The Food Chain**
  - **Biology**
  - **Quality Scientific Note Taking**
  - **The Scientific Method**

Created by: Timothy O’Leary

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Triop Kahoot!!!

- Go to https://kahoot.com/welcomeback/
- Type **Triops** into the search bar
- Click on **Triassic Triops Pre-Survey** by YouthCityTim1

Why are we raising Triops?

- *Kids will be learning about the….*
    - Week1: Understanding what **Triops** are and an intro to **Observation notes.**
    - Week2: How scientists classify animals and understanding what is **Taxonomy**.
    - Week3: What is in the our drinking water and why is it harmful to water based life.
    - Week4: The biology of the Triops
    - Week5: How to test the speed of a triops.
    - Week6: How the triops are an important part of the ecosystem and the key role in preventing the spread of disease in Utah.

Weekly Learning Goals

Week #1:

- What are Triops? What are observation notes?

Week #2:

- What is taxonomy? How do we classify organisms?

Week #3:

- What is in our drinking water and why is it healthy for us but harmful to water based life?

Week #4:

- What are all the parts of a triop and how do we talk about biology?

Week #5:

- What is the scientific method? How fast is a triop?

Week #6:

- What part do triops play in our ecosystem?

Utah Core Standard Connection

Framing questions: Observe using senses, create a hypothesis, and focus a question that can lead to an investigation.

Designing investigations: Consider reasons that support ideas, identify ways to gather information that could test ideas, design fair tests, share designs with peers for input and refinement.

Conducting investigations: Observe, manipulate, measure, describe.

Drawing conclusions: Analyzing data, making conclusions connected to the data or the evidence gathered, identifying limitations or conclusions, identifying future questions to investigate.

Developing social interaction skills with peers.

Sharing ideas with peers.

Connecting ideas with reasons (evidence).

http://www.uen.org/core/

Grant Outcomes

Academic Success

Scientific method, analysis, communication

https://educationendowmentfoundation.org.uk/public/files/Publications/EEF_Lit_Review_Non-CognitiveSkills.pdf

Non-Cognitive Success

Self Perceptions, Resilience and Coping, Creativity

Class Structure

INTRODUCTION

- Triassic Triop Kahoot!
- What are triops?
- Intro to Observation notes

Setting up the Triop Habitat

- What is animal husbandry?
- Creating a healthy environment for our Triops
- What is Taxonomy?
  - Guess the scientific name game
  - Taxonomy order game

Our Drinking Water

- What makes our drinking water safe for us and poison to aquatic life?
-

Triops Biology

- What are the various parts of the triops body?
- Making anatomically correct triops out of clay

Triop Speed Experiment

- What is the scientific method?
- The Triop Speed Test

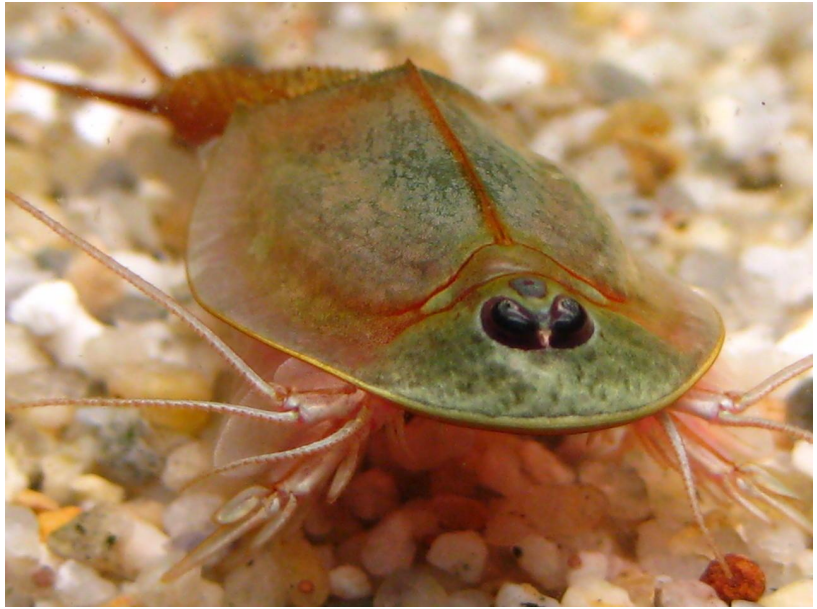
How do the Triops help our ecosystem?

- Talk about Triops in Utah
- Play Triops and mosquito larva (Sharks and minos)

EGG FUN!

- FUN DAY!
  - Egg Races

Week #1: What are Triops?



Triops on the Solway

Triops Longicaudatus

Week #1: Vocabulary

Terms unique to the week or class that would be beneficial for the kids to learn.

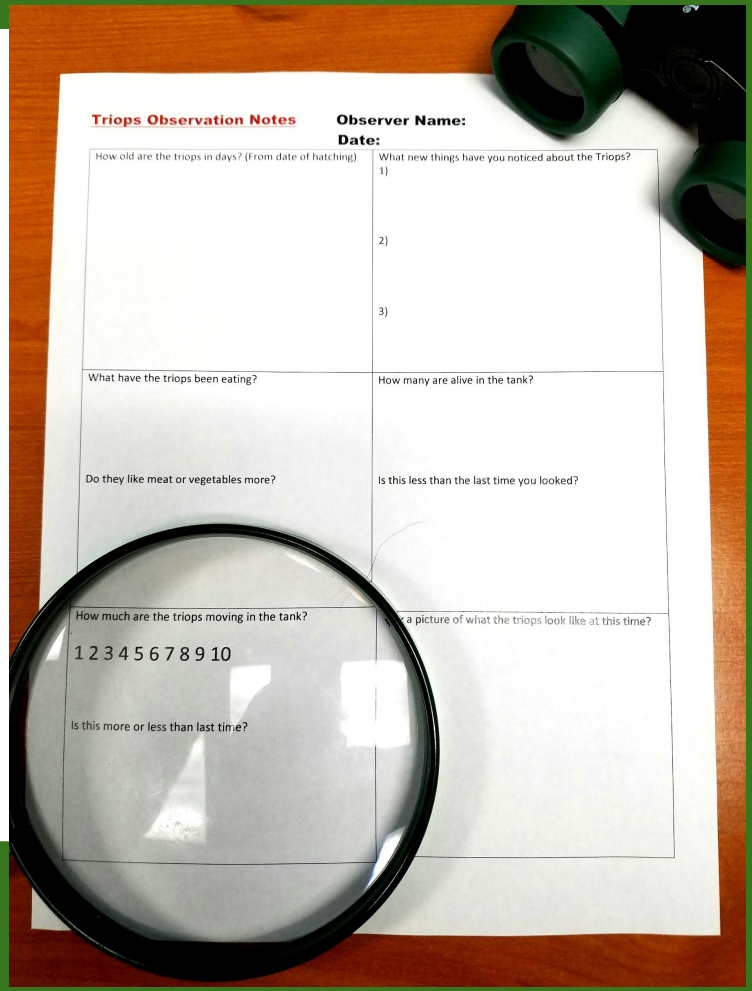
Term 1) Diapause: a period of suspended development in an insect, other invertebrate, or mammal embryo, especially during unfavorable environmental conditions.

Term 2) Crustacean: any of a large class (Crustacea) of mostly aquatic mandibulate arthropods that have a chitinous exoskeleton, a pair of often much modified appendages on each segment, and two pairs of antennae. These include the lobsters, shrimp, crabs, wood lice, water fleas, barnacles, and Triops

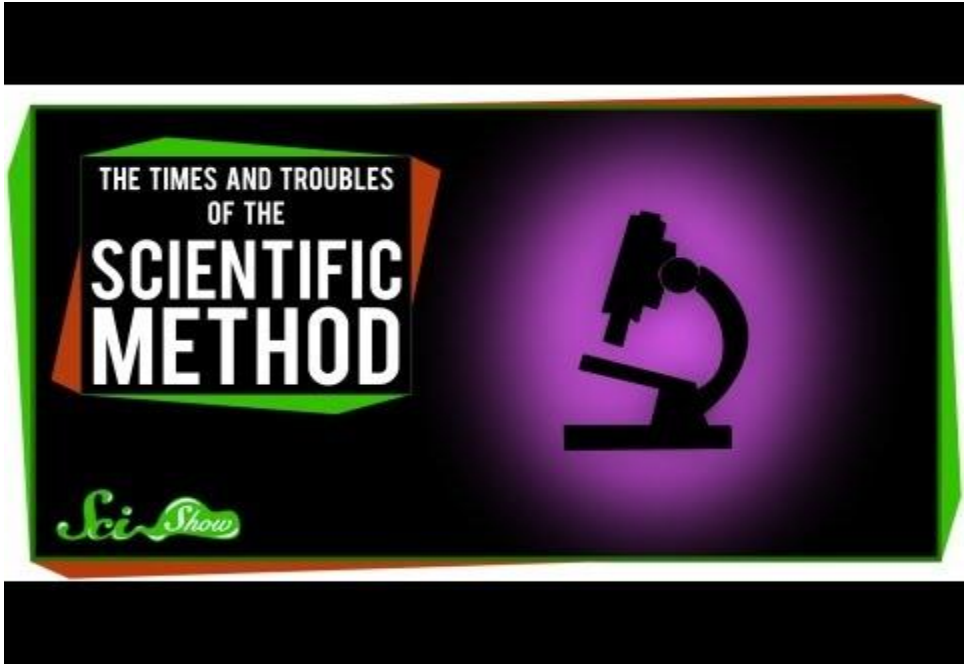
What are observation notes?

- They are notes that let you track an experiment over a period of time
    - We will take them once per week
    - We will use our notes to finish our presentation from science summit.
- If you are consistent about taking observation notes they can make your final project very easy.
- They let you look back at your experiment and clearly remember what you have been working on.

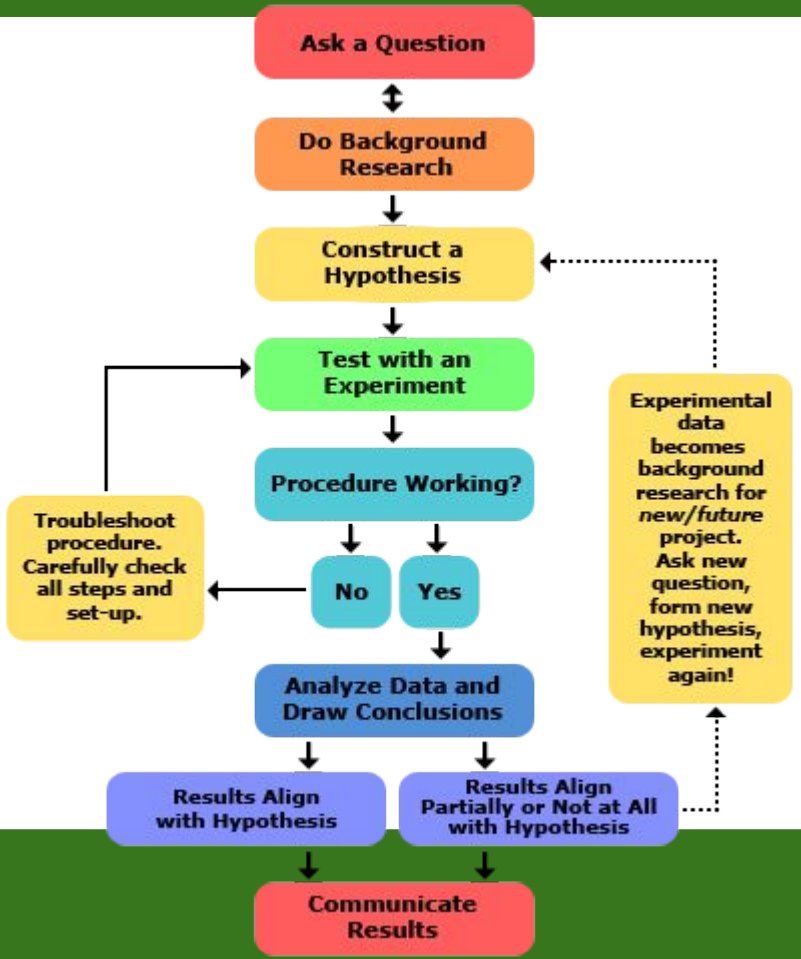
What will our notes look like?



What is the Scientific method?



Scientific method Flowchart



Challenge

Challenge 1

Play Triops and mosquito larvae.

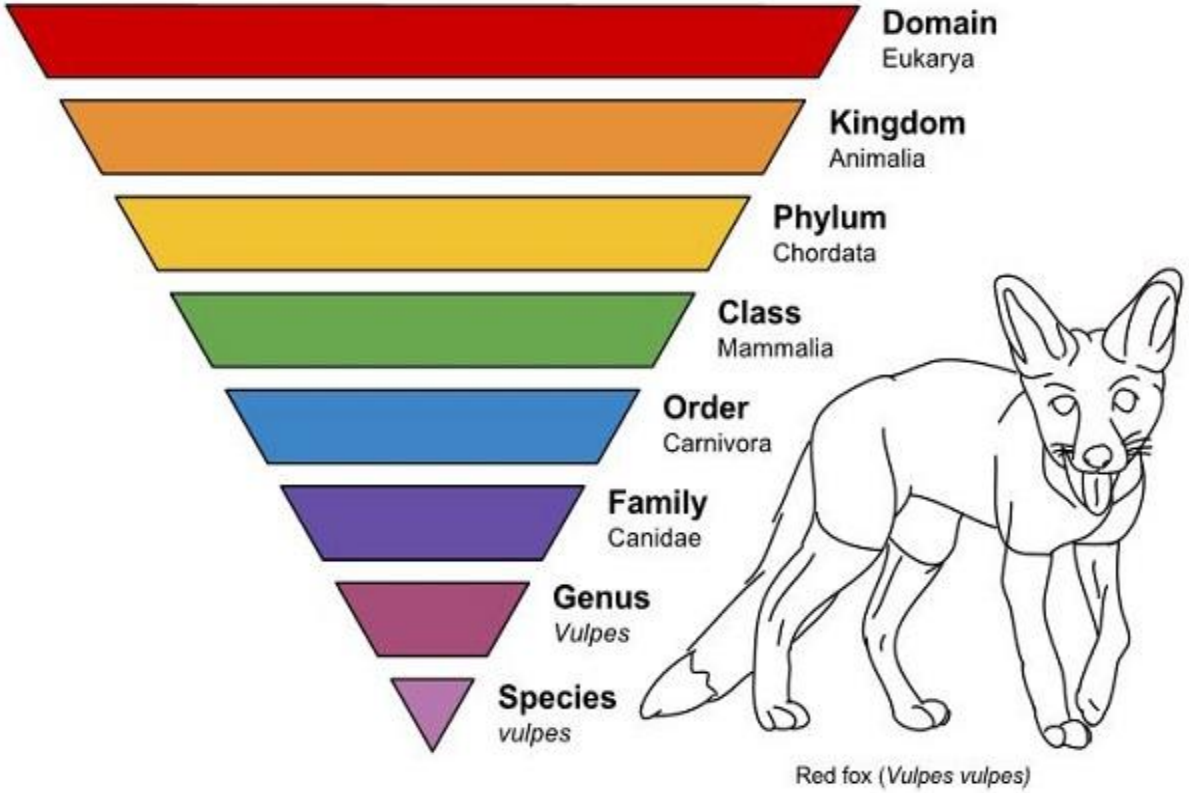
(It’s just rebranded sharks and minnows)

- Start with one kid as the triops and the rest of the group as mosquito larvae.
- Each round of the game is a generation of the species.
- Any mosquito larvae caught by the triops becomes a triops.
- If the triops don't catch any larvae one triops from the group dies off.

Challenge 2

Play the Scientific Method Speed Trial.

- See who can put the different parts of the scientific method in order from top to bottom.
- Maximum time limit of 1 minute.



Setting up the Triops Tank/ What is taxonomy? How do we classify organisms?

Week #2: Vocabulary

Taxonomy:

a branch of science that encompasses the description, identification, nomenclature, and classification of organisms

Aquaculture:

the rearing of aquatic animals or the cultivation of aquatic plants for food

Let's set up our Triop habitat

What kind of water can we use for our triops?

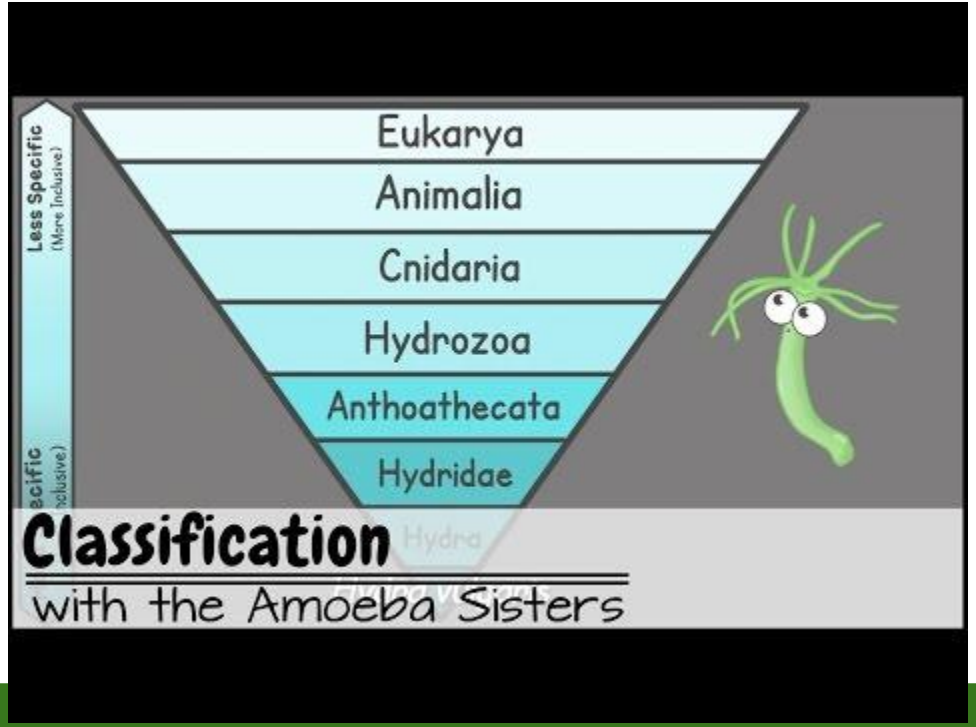
Petco Betta Water

What are some criteria for aquatic life safe water?

- UV purified water
- No chlorine, chloramines or ammonia
- Contains essential electrolytes


AN INTRODUCTION TO:
Taxonomy
ECO
Sapien

Taxonomy


Less Specific
(More Inclusive)
Eukarya
Animalia
Cnidaria
Hydrozoa
Anthoathecata
Hydridae
Hydra
Classification
with the Amoeba Sisters

Challenge

Challenge 1

Taxonomy speed trail, how can put the different taxonomic levels in order the fastest?

Challenge 2

Using the Ipads Who can find the funniest soundings scientific name for an animal.

(Everyone come with your top 3)

Week #3:

What is in our drinking water?

Week #3: Vocabulary

What's REALLY in Our Drinking water?

Why we need to drink water

Foldable Egg

Materials: Raw Egg, Vinegar, Cup, Spoon, Pin or Toothpick

Acetic acid in the vinegar breaks down the calcium carbonate in the eggshell, and the bubbles that form on the surface of the egg are CO_2. Eventually the hard shell of the egg disappears entirely and all that remains is the egg membrane. Because you have already blown out the contents of the egg, the membrane is just full of air. You can fold it up and the air will sneak out the tiny hole in the membrane that you used to blow the yolk out of the egg. The membrane will compress down into practically nothing. As you gently toss around and bounce the “folded egg” on your hand, the air will re-enter the membrane, expanding back into its original shape and volume.

Naked Egg (Part 2)

Materials Needed: toothbrushes, corn syrup, water, food coloring

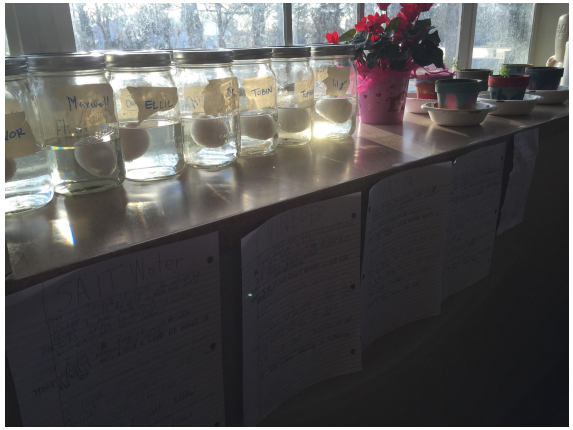
Carefully take the eggs out of their mason jars after 3 days. The shell should be gone or close to it. Also very carefully, scrub the egg with a toothbrush to remove all of the remaining shell. After cleaning it off, replace the vinegar in the jar with corn syrup. The corn syrup with shrink the egg. This process should take a day to occur.

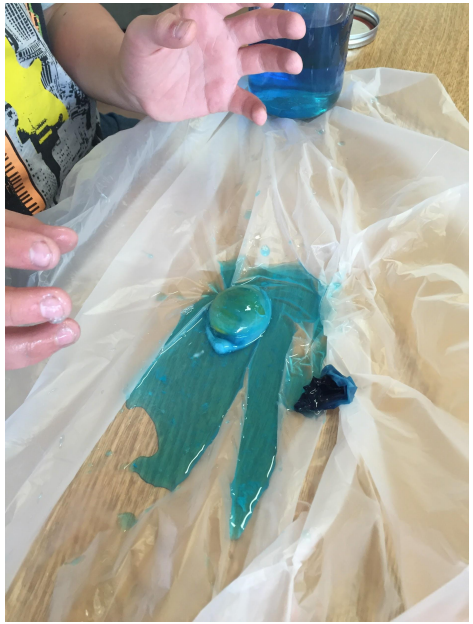
After shrinking the egg, replace the corn syrup with colored water and place the egg inside the jar. Leave them for a few days. At the end, you should have a bouncy, colorful egg!

Source:
http://www.playdoughtoplato.com/cool-science-experiments/#_a5y_p=3482934

Naked Egg (Part 2)

Naked Egg (Part 2)





Naked Egg (Part 2)

Naked Egg: Why Does it Work?

Let's start with the bubbles you saw forming on the shell. The bubbles are carbon dioxide (CO_2). Vinegar is an acid called acetic acid (CH_3COOH), and white vinegar from the grocery store is usually about 4% acetic acid and 96% water. Eggshells are made up of calcium carbonate ($CaCO_3$). The acetic acid in the vinegar reacts with the calcium carbonate in the eggshell to make calcium acetate plus water and carbon dioxide bubbles that you see on the surface of the shell.

The egg looks translucent when you shine a flashlight through it because the hard outside shell is gone. The only part that remains is the thin membrane called a semipermeable membrane.

You might have noticed that the egg got a little bigger after soaking in the vinegar. Here's what happened…Some of the water in the vinegar solution (remember that household vinegar is 96% water) traveled through the egg's membrane in an effort to equalize the concentration of water on both sides of the membrane. This flow of water through a semipermeable membrane is called **osmosis**.

If you take your naked egg and place it in a glass filled with corn syrup, the egg will shrivel. Since corn syrup has a lower concentration of water than an egg does, the water in the egg moves through the membrane and into the corn syrup to equalize the water concentration levels on both sides.

Week #4:

Hard Boiled!

Week #4: Vocabulary

Terminal velocity

the greatest velocity a falling object reaches

Acceleration

(physics) a rate of change of velocity

Hard Boiling Eggs-The Science of It All

Materials: 1 ½ inch boxes (cardboard will do), rubber bands, hard boiled eggs

Objective #1: Teach how to hard boil an egg

Objective #2: Teach about what is happening to the egg while it is boiling

Objective #3: Change the shape of the egg

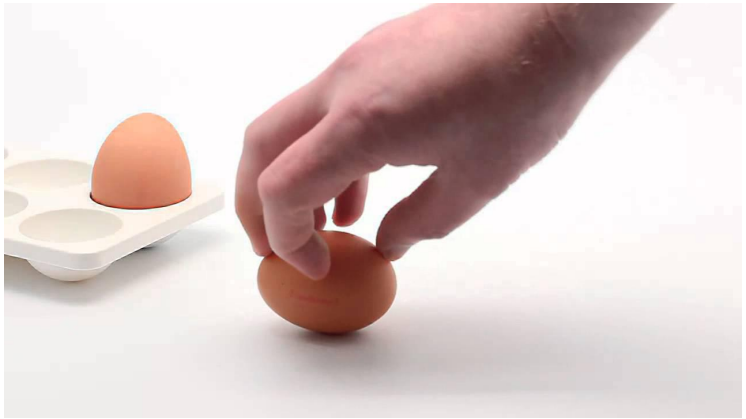
Source: http://www.scientificamerican.com/article/shape-shifting-science-molding-hard-boiled-eggs/

Check out the link...it's awesome!

Spinning Around

Materials: 1 hard-boiled egg, 1 raw egg

Ever wondered how you can tell the difference between a hard-boiled egg and a raw egg? Just spin them to figure it out. Place a hard-boiled egg and a raw egg on the table. Spin each of them and observe what happens. The boiled egg will spin faster. The raw egg will spin slowly. The reason for this has to do with the insides. The boiled egg is one solid piece. Therefore the whole egg spins in the same direction. The raw egg has liquid inside which moves separately from the shell. The movement of the inside of the raw egg keeps the whole egg from spinning quickly.



Observe what happens when you try to stop the spinning of the eggs. Spin the eggs and then put your finger on them to stop them. The boiled egg should stop immediately. The raw egg will keep spinning for a moment because the liquid inside the egg will keep moving.

Suck It In

Materials: Glass bottle or jar with a narrow opening, Matches, Newspaper, Hard-boiled, peeled egg

In this experiment, the egg will be sucked into the bottle. First, sit the egg in the mouth of the bottle. The egg should sit in the opening without falling in. Now move the egg away and light the piece of newspaper and drop it into the bottle. Quickly place the egg over the opening of the bottle with the narrow part of the egg pointing down into the bottle.

As you watch, the egg will get sucked down into the bottle. Now try to get the egg back out of the bottle. It won't be able to go back through the opening without breaking apart.

The egg gets sucked into the bottle because the fire causes the air pressure inside the bottle to become less than the air outside. The air on the outside of the bottle is greater than the air in the bottle, so the egg gets sucked in. The egg won't come back out of the bottle easily because the pressures have stabilized and there is no force acting on the egg.

Egg Etching

Materials Needed: vinegar, food coloring, tape, crayons, hardboiled eggs, plastic cups, newspaper/garbage bags

Let them design whatever they want with the crayons on the eggs before dipping them into the vinegar. You could also buy egg coloring kits and add vinegar for brighter colors.

http://www.instructables.com/id/Egg-Etching/

Natural Egg Dyes

Many common foods and spices make great dyes. To make the dye, take 4 cups of chopped or mashed fruits and veggies, or 4 Tablespoons of spice, and boil them in 4 cups of water (use less if you're working with watery produce, such as spinach) and 2 Tablespoons of white vinegar. Let that simmer for 30 minutes. Then, strain out the bits of fruits or vegetables, and the remaining liquid is your dye.

Have fun trying other items you may have around: If it's brightly colored and stains your cutting board or fingers, chances are good it will stain eggshells nicely too.

Yellow onion skins = Yellow to dark orange

Turmeric or cumin = Bright yellow

Red beets = Pink to red

Red onion skins = Pale purple to red

Red cabbage = Blue (strange, but true)

Spinach = Green

Purple grape juice (use as is) = Lavender

Coffee (use as is) = Tan to brown

Chili powder = Orange

Raspberries or blackberries = Pink to purple

Yellow or green apple peels = Yellow-green

Egg Etching- Egg Hunt

Materials Needed: the hardboiled eggs from the past lesson!

I hid all of the eggs from the previous lesson all over a certain section of the park. They had to find the ones that they made from the day before. People with the earliest finishing time get a prize.

I also hid plastic eggs filled with candy for an extra prize.

Challenge

Challenge 1

Optional difficulty, advancement or continuation of class idea for kids who are succeeding

Challenge 2

Week #5:

Flying Eggs

Week #5: Vocabulary

Kinetic energy

energy of motion

Mass

The amount of matter that an object has

Egg Drops

Materials needed: raw eggs, crayons, different soft materials (sand, packing peanuts, bubble wrap)

After showing the video, challenge the kids to create their own Humpty Dumpty story. They can decorate their own Humpty Dumpty egg and then drop him off of a wall! Place their choice of packing materials (in a plastic Ziploc) on the ground and drop the egg off!

Egg Drops

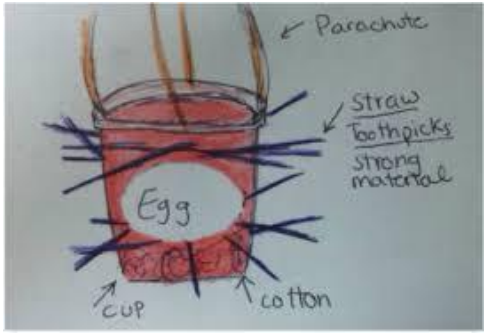
Materials needed: raw eggs, cardboard tubes, water filled glasses, tray

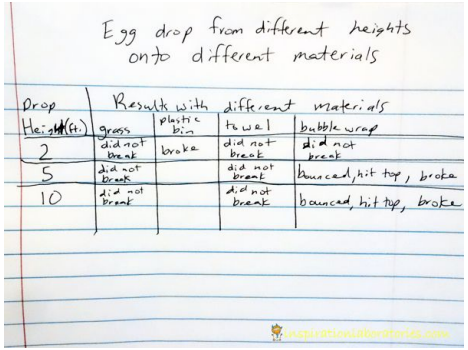
The goal is to get an egg to drop into a glass of water. Sound easy enough? Did I mention that the egg is perched high above the water on a cardboard tube and that a pie pan sits between the tube and the water? Still think it's easy? Sir Isaac Newton does. Once you try it, you'll be hooked!

Egg Drops

Materials Needed: whatever you want to give them to create their own egg drop!

There are a million ways to go with an egg drop, and it's really up to you. They love this activity! I suggest giving out prizes...it's really motivating.




Egg drop from different heights onto different materials

Drop Height (ft)	Result with different materials: grass	plastic bin	towel	bubble wrap
2	did not break	broke	did not break	did not break
5	did not break		did not break	bounced, hit top, broke
10	did not break		did not break	bounced, hit top, broke

http://inspirationlaboratories.com/egg-drop-experiments/

Cascarones

Materials Needed: eggs, confetti, fruity pebbles, tissue paper, glue, pin/toothpicks, scissors

Source: The website below is really what I used for this activity… I thought it gave an excellent description of what to do, and I don't have to recount it here!

http://ohhappyday.com/2011/04/diy-party-confetti-egg-game/

After we finished making our eggs, we played egg russian roulette with them!

Challenge

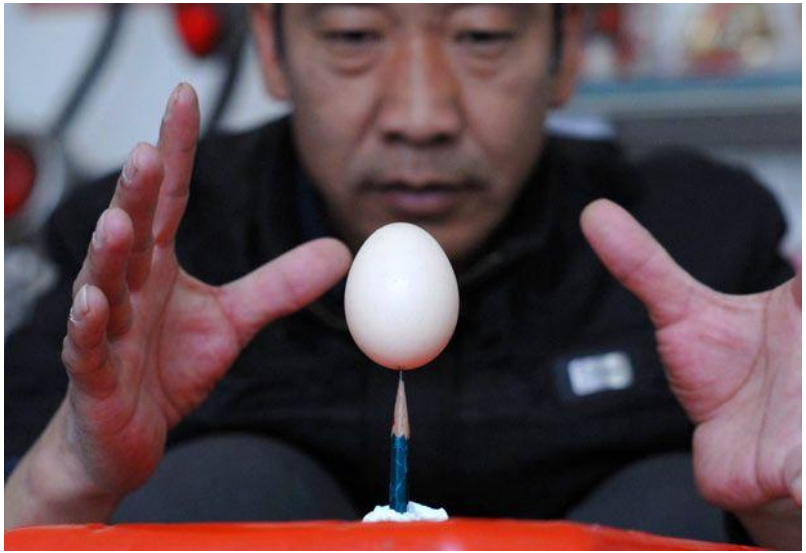
Challenge 1

How simple of an egg drop can you successfully make?

Challenge 2

Can you tie dye eggs?

Week #6:



Eggcelent!

Week #6: Vocabulary

potential energy

energy stored due to an object's position or arrangement

momentum

the product of a body's mass and its velocity

EGG FUN!

I chose to finish the Egg session playing tons of fun egg games like…

- Egg/Spoon races
- Egg Russian Roulette (with raw eggs)
- Egg Tosses
- Another egg hunt

It was a fun way to end the session!

https://www.babble.com/babble-voices/25-easter-party-ideas-for-kids/

COOKING WITH EGGS

Scrambled Eggs 3 Ways

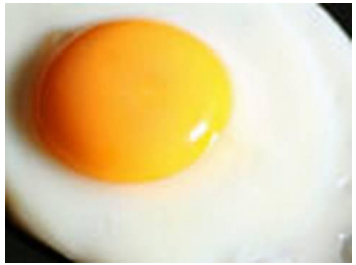
Omelets

Eggs Over Easy

Crepes

Poached Eggs 3 Ways

Fried Eggs



Frittata

Even More Ways to Cook Eggs!

Egg Crush Example Video

Challenge

Challenge 1

Have the kids try cooking different styles of eggs.

Challenge 2

Have the kids try doing the fun egg activities with two eggs at a time.

Kids With Eggs

Egg Tour - Backyard Chickens

Backyard chickens are getting easier to find as there is a growing interest in urban farming and healthier eating. Ask around to see if you can find anyone with chickens that would be willing to host a group of eager kiddos to tour their coops.

Backup tours:
Wheeler Farm
IFA Stores
Wasatch Community Gardens

https://www.ksl.com/?nid=148&sid=28941574
http://www.offthegridnews.com/how-to-2/7-tips-for-keeping-backyard-chicken-eggs-safe-to-eat/
http://modernfarmer.com/2014/07/raising-backyard-chickens-dummies/

SOL Videos/Activities

Materials & Supplies

- *Please list all needed supplies here with locations, quantities needed, and any tips or directions to make obtaining these supplies easier. (Like if they need to be cut, or modified.)*
- Please also note how many kids this will service (like a recipe) that way the materials can be modified per attendance.

Global Connections

http://www.smithsonianmag.com/arts-culture/around-the-world-in-80-eggs-87987638/

https://www.egginfo.co.uk/schools/all-about-eggs/7-11/eggs-around-world

http://www.foodtimeline.org/foodeggs.html

Career Connections

Farmer-Providing food for the future

Chef-Cooking and cuisine!

Biomechanical Engineer-Organisms and mechanics!

What Power of One ideals does your class connect with? And why is it important to your class?
Curiosity: a strong desire to know or learn something.
Resilience: the capacity to recover quickly from difficulties; toughness.
Cognizance (Because John): knowledge, awareness, or notice.
Creativity: the use of the imagination or original ideas, especially in the production of an artistic work.

Power of One

Real World Connections

- Does your class improve:
- Academic Success?
- Improve social skills?
- Health and Well Being?
- Decrease Risky Behaviors?
- Improve non-cognitive skills?
  - https://educationendowmentfoundation.org.uk/public/files/Publications/EEF_Lit_Review_Non-CognitiveSkills.pdf

EGG-STRAS

https://www.buzzfeed.com/kasiagalazka/things-you-can-do-with-eggs-besides-coloring-them?utm_term=.ogWr1z3gB#.jlJ2pBwRQ

http://www.stevespanglerscience.com/lab/experiments/amazing-egg/

https://www.exploratorium.edu/cooking/eggs/eggscience.html

http://tinkerlab.com/60-egg-activities-for-kids/

http://www.studentguide.org/all-things-eggs-activities-experiments-art-more/

https://owlcation.com/academia/Egg-tremelyFunandEasyEggExperiments