1st Activity: Which Creature is the Fittest?

- The items in the cup represent three variations in a species that live in an earthquake-prone environment. To survive in this environment, individuals must avoid being swept in the holes created by the earthquakes.

    - **Natural selection** occurs when organisms who possess a certain genetic variation make them better adjusted to an environment that helps them survive and reproduce. As these process continues through succeeding generations, the gene is more likely to be passed on and become a more common trait in the environment.
    - **Adaptation** through natural selection occurs over generations in a population. Traits that support successful survival and reproduction in new environment become more common and those that do not become less common. This leads to trait changes in a population. (**Natural selection and adaptation CANNOT occur with a single organism!)**

QUESTIONS:

1. How many of each variation remained in the cup after the 1st round? **Record in the table below.**
    - Those "organisms" that survive reproduce so we will double the amount that survive each round. **Record the amount of survivors in each round.**

2. Which individuals were most likely to survive in the earthquake-prone environment? Why?

3. Propose an explanation for why some individual species would have a higher probability of surviving and reproducing in a specific environment.

Trial #	# Pieces of Rice	# of _____ Beans	# of _____ Beans
1	10	10	10

2nd Activity (10 min): Adaptive Radiation
On the Galapagos Islands there are 13 species of finches. When Darwin visited the islands, he noticed each island was home to a specific species of finch. The species differed in the shapes of their beaks. The beak of each species was adapted to the food sources on their particular island. All the finches are believed to have evolved from a single species that inhabited the mainland of South America. The evolution of one species to fill many different niches is called **adaptive radiation.**

In this activity you will use 4 different tools to represent the beaks of four species of finches living on one Galapagos island. On the island worms are the main source of food. You will decide which finch has the best beak adaptation for gathering worms.

DIRECTIONS:
1. Yarn worms should be spread on a lab table.
2. Each of you will play the roles of 4 different species of finches feeding on the worms (fork, spoon, tweezers, and clothes pin).
3. Pick one tool to begin. **You all will have 20 seconds to pick up the worms with your "beak" and place them in your plastic cup.**
4. Count the number of worms in your cup and record your findings in the table.
5. Pass your tool to the lab partner on your left until you have tried the experiment with all four tools/beaks.

Type of Beak	# of Worms Collected
Fork Beak	
Clothes Pin Beak	
Spoon Beak	
Tweezer Beak	

1. Which of the tools picked up the most worms?

2. What was it about that particular "beak" that allowed the finch to gather the most worms?

3. What do you think might happen to the other types of finches over time if worms were the only possible food source?

3rd Activity (10 min): **The Importance of Opposable Thumbs**

Adaptations are inheritable characteristics that help organisms survive in the environments in which they live. One important adaptation in primates is the opposable thumb. Opposable thumbs enable primates such as monkeys to grasp tree branches effectively. Humans use their thumbs to manipulate tools. This activity will help you see how important the opposable thumb is for humans.

DIRECTIONS:

1. Place the yarn on a table in front of you. Have your lab partner use the stopwatch to see how quickly you can pick up the yarn, tie it in a bow, and place it back on the desk.
2. Try to beat your time and do 2-3 rounds.
3. Now use the duct tape to tape your thumbs in place to the side of your hand. (This simulates hands with no opposable thumbs). **USE MINIMUL AMOUNT OF TAPE ~ 3-5 INCHES FOR EACH HAND**
4. Repeat step 1 without the use of your thumbs.
5. Switch partner tasks. One is the timer and the other ties the yarn.
6. **Record your time and your partner's time below**

Seconds to Tie Yarn WITH Thumbs	Seconds to Tie Yarn WITHOUT Thumbs

QUESTIONS:

1. Were you faster tying the bow with or without the use of your thumbs? Why?

2. Why do you think humans adapted an opposable thumbs over time?

2. What other activities would be difficult without the use of your thumbs? List at least 3.

4th Activity: Natural vs. Artificial Selection
https://www.youtube.com/watch?v=0jFGNQScRNY

1. How did Dmitry Belyaev choose which foxes to breed and not to breed?

2. Dmitry chose foxes to breed based on their behaviors, but what else transformed in the new generations of foxes that was not expected?

3. How many years did it take before bred foxes showed changes in the behavior and appearance from wild foxes?

4. What physical characteristics and behaviors were shown in the foxes Dmitry bred?

5. When selection is made for tameness, it affects the genetic make-up of the entire animal. For instance, the fight and flight hormone and skin pigment are chemically connected. Knowing this, why would the tame foxes have fur that is consistently black or white when wild foxes do not?

6. Why would this fox breeding be artificial selection? How does it compare to natural selection?

Review:
What is an adaption?

What is the difference between artificial and natural selection?

What does "survival of the fittest" really mean?