Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_ Hour \_\_\_\_\_\_\_\_

Purple **Evolution and Extinction Stations**

* Corrections should be done in a different color than your assignment.
* If you have a correct answer make sure to check mark the answer on your assignment
* If you have an incorrect or incomplete answer be, sure to correct it.
* My corrections are done in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ color.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Check if completed | Check if corrected in class | Points Possible | Teacher score |
| Station 1: Darwin’s Finches |  |  | 30 |  |
| Station 2: Fossil Lab |  |  | 20 |  |
| Station 3: Dem Bones! |  |  | 25 |  |
| Station 4:Natural Selection and the Peppered Moth |  |  | 35 |  |
| Station 5: Brain Pop: Extinction Explained |  |  | 20 |  |
| Station 6: Geological Dig |  |  | 30 |  |
|  |  |  | 160 | Total: |

**Station #1: Darwin’s Finches(30)**

**Unit Essential Question:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(.5)

**Focus Question:** How might a genetic trait affect an organism’s chance of survival?

**Task:** Your group will demonstrate how different adaptations help different birds collect different types of food. Imagine you are one of Darwin’s finches; the tools provided represent the various beak sizes. You must collect enough of the available food to survive and reproduce.

|  |  |
| --- | --- |
| **Materials Available**   * 1 Spoon * 1 Fork * 1 Tongs * 1 Chopstick/popsicle stick * Large flat area | * Stopwatch * Bag of dry beans of many different types |

**Part I Research, Plan, and Investigate:**

1.Partner or group read the laminated background information titled *Charles Darwin’s Finches.* Be sure to summarize after every paragraph andanswer this question: what is unique about the finches of the Galapagos Islands? (1)

2. Plan an investigation using the provided materials that will help answer the focus question; you can use as many or as few of the materials as you choose.

3.Ask for the [*Investigation Proposal Sheet*](https://docs.google.com/document/d/1L5tHT64JiMgFB_JxhHy-tEyBFAh6i7q37aIiNed3hQQ/edit?usp=sharing) for your planning; use it to plan an investigation that should take no longer than 20 minutes to conduct.

4.Once your investigation proposal has been approved by your teacher, gather the materials your group needs to carry out your investigation.

**Part II Analyze Results:**

1. Look back at your Investigation Proposal Sheet to reference how you intended to analyze your data; do this now and write your conclusion below or create a graph with a conclusion sentence answering your question.

This can be done on your investigation proposal sheet

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Ms. Murphy approval (After you have gathered your data and analyzed your results (.5)**

**Part III Draw Conclusions:**Answer the following questions using complete sentences with a restate:

1. Based on your data, what’s happening to the bird population for each kind of beak you tested? (2)

2. How does your investigation compare to what happens in reality (to actual beaks)? (2)

3. How do genetic traits affect an organism’s chances of survival?(2)

4. What is Charles Darwin known for?(2)

5. What is natural selection? (2)

6. Summarize what Darwin discovered about Finches and Evolution.(2)

**Investigation Proposal**

|  |  |
| --- | --- |
| **The Focus Question** | *How might a genetic trait affect an organism’s chance of survival?* |
| **Task** | ***Task:*** *Demonstrate how different adaptations help different birds collect different types of food. Imagine you are one of Darwin finches. The tools provided represent the various beak sizes. You must collect enough of the available food to survive and reproduce.* |
| **Our investigation question(2)** |  |
| **Our hypothesis(2)** |  |
| **What data will we collect?(2)** |  |
| **The materials we will use (2)** |  |
| **How will we**  **collect our data?(2)**  **(Procedure Steps and data table )(2)** | *Steps:*   |  | | --- | |  | |
| **How will we analyze our data?**  **(Graph? Written Description? (4)** |  |

Investigation Approval: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Purple Station #2: Fossil Lab**

**Unit Essential Question:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(2)

**Focus Question:** How do scientists use the fossil record and strata to establish a geologic timeline?

**Task:** In this lab you will be working with a fictitious organism of the genus *Adventurian*, You will categorize *Adventurian* fossils by similarities in morphology and age in an attempt to give specific evidence that organisms of the genus *Adventurian* evolved.

**Background:** Fossils are traces of organisms that lived in the past. When fossils are found, they are carefully excavated and then analyzed. Most fossils form by one of three methods. Sometimes the hard structures such as bones, teeth or shells create an imprint in rocks. Another way fossils are formed is by the replacement of structures in the organism with minerals in a process known as petrification. The third procedure resulting in the creation of a fossil is simply when the body part is preserved when sediment covers it. Analysis of fossils includes dating and careful observations of morphology, or the changes in physical characteristics, so that relations to other fossils or existing organisms can be determined.

**Part I Directions:** Use a dictionary andfollow the step-by-step directions, in order, below.

After reading the **Background Information** above, make a Hypothesis: If *Adventurian* has evolved, then… (tell me how you’ll know by examining “fossils”.) (2)

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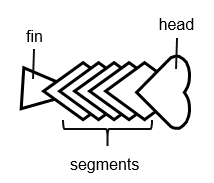
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Define *morphology(2):*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. Locate the “Fossil Lab Table” found on the long sheet of laminated paper in the tub. Use the geologic time scale in the textbook to calculate the duration (in millions of years) for each era/epoch, and find your answers among the laminated number cards; place it in the correct column on that table.

2. The "fossils" you will work with are fictitious animals; locate the bag of laminated fossil cards in the tub. Notice that each fossil is marked with a time period with the exception of the “mystery fossil”. The parts of the *Adventurian* can be identified below:



3. Attempt to arrange the fossils by age. On your chart, place each fossil in the period from which the fossil came from. As is true in the real fossil record, some fossils are “missing”.

4. While keeping the fossils in the proper age order, arrange them by morphology (appearance). To help you understand the morphology of the specimen, view the labeled specimen under step #2.

5. Arrange the fossils on your chart using the following steps.

A. Center the oldest fossil at the bottom of the fossil column (toward the oldest layer).

B. Throughout the chart, those fossils that appear to be the same (or close to the same) as the fossils preceding them should be placed in a **vertical** line.

C. During a certain period, **the fossils will split into two branches**. In other words, one fossil from that period will show one type of change, and another fossil will show a different change. When this happens, place the fossils **side by side in the appropriate time period**. From this point on you will have two lineages.

6. Once all the fossils have been placed correctly according to time and morphology, ask for a check-in.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Ms. Murphy approval.(.5)**

**Part II Directions:** Answer the follow-up questions below using complete sentences with a restate.

1. Did the *Adventurian* show signs of evolution? How do you know?(2)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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2. How did you determine the placement of the “mystery fossil”?(2)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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3. At what time period did the *Adventurian* will split into two branches?(2)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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4. What are some possible reasons that the *Adventurian* split into two branches (What causes an organism to evolve?(2)

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5. How did this activity help you to understand evolution better?(2)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Part III:** Check in the following items with Ms. Murphy. You must get her signature to receive credit. (Have everything open at one time)

1. Show Ms. Murphy your Student Record Keeping\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.(1)

2. Work on station work or missing assignments. Then select something from the “What to do when you’re done list”

**Purple Station #3: Dem Bones! (25)**

**Unit Essential Question:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(1)

**Focus Question:** What evidence shows that different species are related?

**Task:** In this lab you will identify, describe, and compare homologous, analogous, and vestigial structures in different organisms.

**Part I Homologous Structures Directions:** Follow the step-by-step directions, in order, below.

1. Define homologous structure. You can use the definition found in the laminated background information card in the tub (1)

2. Read the laminated passage in the tub titled ‘Homologous Structures”.

3. Select one homologous structure from the laminated information sheet. Draw three different versions of that structure in three different animals. (color and label) (10)

|  |  |  |
| --- | --- | --- |
| Animal-  Structure-  Illustration | Animal-  Structure-  Illustration | Animal-  Structure-  Illustration |

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Ms. Murphy approval(1)**

**Part II Analogous Structure Directions:** Follow the step-by-step directions, in order, below.

1. Define analogous structure. You can use the definition found in the laminated background information card in the tub.(1)

2. Go get the Chromebook that is assigned to you and login.

3. Go to the blog and click on the link for the video titled “Analogous Structures” and watch it. <https://www.youtube.com/watch?v=2N3OPRodRvk>

4. Compare and contrast homologous and analogous structures below (3 each)(6):

|  |  |
| --- | --- |
| Homologou | Analogous |

**\_\_\_\_\_ Ms. Murphy approval; keep the Chromebook.(1)**

**Part III Vestigial Structures Directions:** Follow the step-by-step directions, in order, below.

1. Define vestigial structure. You can use the definition found in the laminated background information card in the tub.(1)

2. Go to the blog and click on the link for the video titled “Vestigial Structures” and watch it. <https://www.youtube.com/watch?v=lMrPxwl4OUo>

3. List three examples of vestigial structures below:(3)

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Return all supplies.**

**Station 4: Natural Selection and the Peppered Moth (35)**

**Unit Essential Question:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(.5)

**Focus Question:** How can our understanding of adaptation and natural selection help us make predictions about populations?

**Task:** You will visit a website and collect information about peppered moths before completing an online simulation of the process of natural selection.

**Background Information:** Peppered moths are common insects living in England, Europe, and North America. They are small moths, only 1.5 to 2.5 inches across. Their light wings are “peppered” with small dark spots.

**Part I Directions:**

1. Get the Chromebook you are assigned and **go** to the blog.

2. Click on the link for the Peppered Moths website; it should take you directly to the page titled “Peppered Moth”. <https://askabiologist.asu.edu/peppered-moths-game/peppered-moth.html>

3. You will use the different tabs to fill in the blanks and answer questions from each section; the titles on the webpage match the titles above the fill in the blank paragraphs and questions.

**Life Cycle**

Peppered moth eggs hatch during \_\_\_\_\_\_\_\_\_\_\_\_. Larvae (caterpillars) feed on the leaves of birch, willow, and oak trees. The larvae look much like a small branch. Having a body that looks like a stick helps the larvae hide from \_\_\_\_\_\_\_\_\_\_\_\_. The larvae can even adjust their color from brown to green to best match the branches they are feeding on.(1)

Cold weather is difficult for insects. To avoid \_\_\_\_\_\_\_\_\_\_, peppered moth larvae change into pupae (cocoons) for the winter. In \_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_ the pupae open to reveal a new adult moth. These adults will lay eggs and die by the end of summer. No peppered moth lives for more than \_\_\_\_\_\_\_\_\_\_\_ year. (2)

**Predators**

Predators of the peppered moth include flycatchers, nuthatches, and the European \_\_\_\_\_\_\_\_\_\_. Like most moths, peppered moths avoid \_\_\_\_\_\_\_\_\_\_\_\_\_ that hunt in daylight by \_\_\_\_\_\_\_\_\_ at night and \_\_\_\_\_\_\_\_\_\_ during the day. Any animal \_\_\_\_\_\_\_\_\_\_\_ still is harder to see than a moving one. (2.5)

Peppered moths have extra \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to help them hide. The trees they live in have light-colored \_\_\_\_\_\_\_\_\_\_\_\_\_ and are covered with small lichens, organisms that are part \_\_\_\_\_\_\_\_\_\_\_and part algae or bacteria. The \_\_\_\_\_\_\_\_\_\_\_\_ on peppered moth wings looks very similar to lichens. (2)

**Part II Directions:** Click on **Natural Selection** Tab to fill in the blanks and answer the questions below.

Who is RS Edleston and what was his unusual discovery? (2)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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What was rare in 1848 that became common by 1900?(2)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Industrial Revolution**

During that time, England was experiencing what is known as the\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_. Factories were being built, and they ran by burning \_\_\_\_\_\_\_\_\_\_\_\_ for fuel. The result was a dark smoke that covered the surrounding countryside. \_\_\_\_\_\_\_\_\_\_\_ that had been light and covered by lichens now were dark and bare. This clearly was having some impact on the moths. Scientists began to try to find out why.(2)

**Genetic Changes**

Some thought the adults were changing their \_\_\_\_\_\_\_\_\_\_ the same way the larvae could match the color of the twigs. Others thought the chemicals in the \_\_\_\_\_\_\_\_\_\_\_\_ darkened the moths. (1)

Finally it was found that the color was \_\_\_\_\_\_\_\_\_\_\_. Moths passed their color to the next generation. Eggs from light moths developed into light moths and dark moth eggs turned to dark adults. The dark color was caused by a \_\_\_\_\_\_\_\_\_\_\_ in the DNA of a single moth, and the mutated gene had been passed to all its offspring. (1)

This explained why the moths were \_\_\_\_\_\_\_\_, but not why the dark moths were taking over. Did the dark moths have an \_\_\_\_\_\_\_\_\_\_\_\_ in the dark forests? If so, the \_\_\_\_\_\_\_\_\_\_\_\_\_in the moths was a result of \_\_\_\_\_\_\_\_\_\_\_\_ selection. (2)

**Natural Selection**

Natural selection was proposed by \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ to explain how new species \_\_\_\_\_\_\_\_\_\_. All types of living things have small differences between the individuals in the species. If one of those differences allows the individual to live \_\_\_\_\_\_\_\_\_\_\_, they will likely have more offspring. As that trait is passed on, the population starts to look more like the successful individual. Over time, the species \_\_\_\_\_\_\_\_\_. (2.5)

Who was J. W. Tutt? What did he suggest and recognize?(1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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All living things respond to natural selection. Over 100 other species of moth were observed to darken over time in polluted forests. Scientists call this effect *\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*. Natural selection is still at work in the peppered moth. In the last 50 years, most industrial countries have significantly reduced their pollution. As predicted by the \_\_\_\_\_\_\_\_\_, the number of dark moths are \_\_\_\_\_\_\_\_\_\_\_\_\_ as the forests become cleaner. (2)

**Part III Directions:** Click on the **Dr. Kettlewell** Tab to fill in the blank and answer the questions below.

**Dr. Kettlewell**

Who is Dr. Kettlewell and what is his role in the evolution of peppered moths?(1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Hypothesis**

What did Dr. Kettlewell hypothesize?(.5) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Observation**

What did Dr. Kettlewell observe?(.5) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Experiment/Conclusions (3)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Dr. Kettlewell’s Experiments** | **How his experiment was conducted** | **His Findings** | **His Conclusion** |
| Bird predation on the moths |  |  |  |
| The idea that dark moths live longer in dark forests |  |  |  |

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Ms. Murphy approval (.5)**

**Part IV Directions:** Click on **How to Play** tab and read the directions; this will instruct you how to play the game in the next section.

**Part V Directions:** Click on **Play Game** Tab and play the game to watch natural selection in action! Play one game in the light forest and one game in the dark forest.

When your simulation in complete, fill in the blanks below:

**In the light forest:** You ate a total of \_\_\_\_\_\_ moths. Your forest started with 50% light moths and 50% dark moths in a light forest. There are now \_\_\_\_\_\_\_\_\_\_\_\_ light moths and \_\_\_\_\_\_\_\_\_\_\_\_\_ dark moths. (1.5)

Because you could see the \_\_\_\_\_\_\_ moths more easily, you ate more \_\_\_\_\_\_\_ moths than \_\_\_\_\_\_\_\_ moths. (1.5)

**In the dark forest:** You ate a total of \_\_\_\_\_\_ moths. Your forest started with 50% light moths and 50% dark moths in a light forest. There are now \_\_\_\_\_\_\_\_\_\_\_\_ light moths and \_\_\_\_\_\_\_\_\_\_\_\_\_ dark moths. (1.5)

Because you could see the \_\_\_\_\_\_\_ moths more easily, you ate more \_\_\_\_\_\_\_ moths than \_\_\_\_\_\_\_\_ moths. (1.5)

**Station #5: Brain Pop: Extinction Explained (20)**

**Unit Essential Question:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(1)

**Focus Question:** What are the causes of mass extinction?

**Task:** As a group, first you will watch a BrainPop video and answer some questions. You will also read an informational article and answer some questions. Please complete each part of this activity as it appears in sequential order.

**Part I BrainPop:** Follow the procedure below; do not skip steps.

1. Get the Chromebook you are assigned.

2. Login and go to [www.brainpop.com](http://www.brainpop.com).

3. Login to the Brainpop site; the username is stout1, the password is falcon.

4. Type “extinction” into the search bar and select the video titled “extinction”.

5. Watch the video.

6. Take the quiz and record your score (1):

7. After watching the video and taking the quiz, click on the Related Reading and notice that you have five tabs you can click on and read an article (famous faces, mother nature, theory, quirky stuff, or comic). Choose the tab you find most interesting.

8. Which tab did you choose? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(1)

9. Read the article/view the information on your chosen tab.

10. Summarize your chosen tab; what was it about? Why was it interesting? What did you like best about it? (This response should be at least five sentences long) \*\* Any additional articles will be counted as extra credit\*\* (8)

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**Part 4:** Go back to the screen with the video. Click on the tap that says “Activities” select one activity to complete activity, graphic organizer or vocab. Copy and complete the assignment below. \*\* Any Extra Activities will be counted as extra credit\*\* (8)

**Part 3:** Check in the following items with Ms. Murphy. You must get her signature to receive credit. (Have everything open at one time)

1. Show Ms. Murphy your student connect, write down any missing or incomplete assignments you have.(1)

2. Work on station work or missing assignments. Then select something from the “What to do when you’re done list”

**Purple Station #6: Geological Dig (30)**

**Unit Essential Question:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(1)

**Focus Question:** How do scientists use the fossil record and rock strata to establish a geologic timeline?

**Task:** You will “dig” through sediment to locate and identify various rocks, mineral, and fossils. Minerals, rocks, and various fossils can be found throughout the world in the Earth's crust but usually in such small amounts that they not worth extracting. Only with the help of certain geological processes are these items brought to the Earth’s surface; some are easier to locate than others.

**Part I Directions:** Use a dictionary or a textbook to answer the following questions.

1. What is a rock?(1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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2. What is a mineral?(1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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3. What is a fossil? P. 402(1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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4. Look up *mold* and *cast*. What is the difference between a mold and a cast? Text p. 365(1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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5. What is another kind of fossil? Use the Text (1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Part II Directions:** Follow step-by-step directions as they are listed below.

A. Find the laminated *Identification Chart* in the tub; read through the items you will be searching for.

B. Use the descriptions below to locate and identify the minerals, rocks, and fossils listed on the chart. The numbered description below corresponds with the numbers on the chart. When you believe you have found the item described, place it on the chart. Next to the descriptions below, determine if each item is a rock, a mineral, or a fossil; write your choice on the line. Check each item off as you locate it; let the teacher know when you think you are done. (15)

\_\_\_\_\_1. Tuerqenite: Has been use to make jewelry since the 1970’s. Actually a form of howlite, it is dyed blue to look like turquoise. You can tell the difference between real turquois and turquneite, because dye does not go very deep into the dyed howlite stone: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_2. Amethyst: Purple polished gem: it is the most popular kind of quartz and comes in many shades of purple. Also known as “Jewel of the gods,” it has been used for jewelry and decoration since ancient times. Amethyst is a very common mineral that is found worldwide. It comes in many shapes and forms \_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_3. Amazonite : Is a kind of feldspar that most often is bright green, but also may be purple, gray, or multi-colored. Also known as “Amazon stone”, it looks like the lush green color of the rainforests in the Amazon River region of South America. Amazonite is often used for beads and carvings : \_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_4. Shark’s Tooth (Carcharias): Small pointy tooth; smooth to rough edges: Is also known as a sand tiger and has been around for 50-60 million years, since the Paleocene Period. They are very fierce looking and are related to the great white sharks. Their teeth are long and smooth with small secondary cusplets. Shark teeth are the most common type of fossils. The average share has 5 rows of teeth in each jaw and will lose 35,000 teeth per year. There are three basic shapes of shark teeth that vary according to their diet: crushing (short and round), grasping (long and pointy), and cutting (triangular with serrated edges). Most shark teeth fossils are from the Cenozoic Period (65 mya to present day) \_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_5. Obsidian: Black, glass-like, igneous: \_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_6. Arrowheads: were made of various types of stones like obsidian, slate and chert. The oldest ones are found in South Africa and are around 64,000 years old. The Neanderthals who first used them were probably “ambush hunters” who needed to get closer to their prey. Arrowheads are attached to arrow shafts and shot from a bow. Similar types of arrowheads may be attached to a spear and thrown : \_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_7. Agate: Multicolored, sometimes banded, and polished: It is a kind of quartz that may have striped patterns of varying colors including pink. The strips are made when minerals seep into water-filled holes in igneous rocks. Botswana agate, in shapes of brown and gray, comes from Africa. Turritella agate contains visible snail fossils and is found in the Green River Formation in Wyoming. Carnelian agate comes in red, orange, and amber. Moss agate is white with green inclusions that look like moss. Agate is very porous and often dyed and cut into slices, so it has a wide range of natural and man-made colors and patterns. Agate was first used to make jewelry over 20,000 years ago. \_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_8. Hematite: Reddish color, comes off on your hands: \_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_9. Feldspar: Pink, shiny cleavages: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_10. Pyrite: Gold, brassy look; referred to as “Fool’s Gold”: is a mineral with a bright metal-like shine. It is found in small quantities worldwide. Pyrite is polished and used as mirrors in ancient Native American cultures. \_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_11. Scoria: Red or black, full of hole, igneous: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_12. Aventurine: A form of quartz that is most often green but can also be blue, yellow, orange, red, brown or gray. Small pieces of mica make it sparkle. Most green aventurine comes from India, South Africa and Brazil. Aventurine is often carved into beads and figurines : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_13. Red Sandstone: Red; sedimentary; sand grains appear cemented together: \_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_14. Coal: Jet black, soft and brittle: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_15. Dinosaur Remains: Looks like a piece of dried meat: \_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_16. Quartz: Very hard; white to pink in color: It is one of the most common minerals on Earth. It comes in many different colors clear, pink, smoky, purple, and yellow. Rose quartz gets its pink color from small amounts of titanium, iron and manganese. Large deposits have often been found in Brazil, India, USA, Madagascar, Mozambique, and South Africa. Quartz comes in many forms such as crystals, clusters, and points, and is very popular for jewelry. It is also used in electronics, watches, computer chips and telecommunications.\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_17. Cephalopod: Has a coiled shell: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_18. Brachiopod: Has a small ribbed shell: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_19. Conglomerate: Pebbles cemented together; sedimentary: \_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_20. Gneiss: Black and white speckled; metamorphic: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_21. Rock Crystal: Polished, clear quartz: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_22. Pumice: Very light; floats on water; igneous: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_23. Stem Coral: Appears “holey”’ looks like a plant stem: \_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_24. Horn Coral: Looks like a slender “holey’ finger: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_25. Shale: Grayish-black; fine-grained; clay-like, metamorphic: \_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_26. Calcite: White, rhombic; cleavage-breaks: One of the most common minerals on earth comes in many different shapes and colors. It is sometimes fund in caves and stalactites and stalagmites. Iceland spar, a see-through type of calcite, is used in the optical trade. Objects appear as double images when viewed through a clear piece of calcite.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_27. Gypsum: White; soft-looking, used to make plaster of paris: Gypsum that has been crystalized into rosette patterns is called “Gypsum Rosette” or “Desert Rose”. Sand is often trapped within the crystal, as they are formed in desert areas. Gypsum Rosette forms very quickly compared to other minerals, taking only tens to hundreds of years to form. Gypsum, in other forms, is widely used as fertilizers, blackboard chalk, and plaster. \_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_28. Fluorite: Green, shiny; large in size: \_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_29. Mica Schist: Glittering ‘flakes” cemented together; metamorphic: \_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_30. Branch Coral: Appears “holey”’ looks like a branch: \_\_\_\_\_\_\_\_\_\_\_\_\_

Call the teacher over to check your placement of each rock, mineral, and fossil(2)

\_\_\_\_\_ Attempt #1 \_\_\_\_\_ Attempt #2

**\_\_\_\_\_ Teacher check-in; put the rocks, minerals, and fossils back in the pan of sediment and return it.**

**Part III Directions:** Use knowledge gained from this activity to answer the follow-up questions below. Answer using complete sentences with a restate.

1. Look at the shark tooth and read the description. Sharks teeth are shaped based on the sharks diet, what kind of shark tooth do you think you found? (1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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2. Look at the Agate and read the description. Where do you think your Agate that you found could be from?(1)

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3. What did Native Americans use Pyrite for? (1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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4. Which Rock is your favorite and why ? (1)\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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5. Why are some minerals valuable? Include an example (2) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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6. Which sample is known as the “Jewel of the Gods”(1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_