**Fossil Expedition: Day 1**

**Introduction:**
Over hundreds of years, **paleontologists** have discovered millions of fossils all over the world, which they have used as evidence for various biological and geological processes including evolution and plate tectonics. Today, you will go on fossil expeditions on three continents to see what fossils you can unearth in canyons in each place. Canyons are ideal places to look because millions of years of erosion have exposed deep, ancient layers of rock – perfect for fossil finding!

**Groups:**

|  |  |  |
| --- | --- | --- |
| **South America** | **North America** | **Africa** |
| Caleb | Valen | Cesar |
| Trevon | Haizlee | Haley B. |
| Samuel | Chloe | Stephen |
| Haley L. | Kameron | JT |
|  | Ayana |  |

**Instructions**:

1. **Gather** your group together and **decide on roles** for each person. You should have:
	1. 2 searchers who are looking for new fossils
	2. 1 measurer who measures how high up the canyon the fossil was found
	3. 1 recorder who writes down where each fossil was found, its name, and how high up in the canyon it was found
2. **Search** for fossils in your canyon until you have found at least 15 fossils in your area.
3. **Record** all of your findings on the data sheet on the back of this sheet.

If you have time left over**, begin discussing** the following questions:

* 1. What patterns do you notice in the types of fossils you are finding and how deep you found them in the canyon?
	2. What fossil is most interesting to you and why?
	3. What hypothesis can you make about where you might find mammals in the canyon?

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| **Fossil Name** | **Description of where it was found** | **Height above floor (inches)** |
| 1) |  |  |
| 2) |  |  |
| 3) |  |  |
| 4) |  |  |
| 5) |  |  |
| 6) |  |  |
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| 17) |  |  |
| 18) |  |  |

**Fossil Expedition: Day 2**

**Introduction:**After discovering some amazing fossils in the canyons around the world, your group will now analyze your findings in the laboratory by looking up important information about each of your fossils like their estimated age, the habitat of the organism, and what type of fossil it is. You will use this information to develop hypotheses and theories about the history of the canyon you have explored.

**Instructions**:
You and your group will now fill out the data table below for each of the fossils you discovered. It may be helpful to split up the fossils between group members so that your group can gather information on each one. There will not be time to do all of them as a group in class, so your best option is to divide the work.

|  |  |  |  |
| --- | --- | --- | --- |
| **Fossil Name** | **Estimated age / Geological Era**  | **Habitat of the organism** | **Type of fossil (cast, mold, carbon film, amber, etc)** |
| 1) |  |  |  |
| 2) |  |  |  |
| 3) |  |  |  |
| 4) |  |  |  |
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| 18) |  |  |  |

**Fossil Expedition: Analysis & Sharing**

Now that you know a little more about the fossils you discovered, it’s time to analyze the information you’ve collected. Scientists often create ***theories*** to explain and predict natural processes based on research they or other scientists have done. Because most organisms found by paleontologists are extinct, we can only guess about their behavior, appearance, and habitats. We use evidence from fossils, geology, and living organisms to make our best guess about the fossilized organisms we have discovered. Now, it’s your turn to use the evidence you’ve collected to create some theories about the organisms you found by answering the questions below:

1. Based on your fossil discoveries and their preferred habitats, how do you think the environment in your area changed over time? Describe how you think the environment looked during each geological era (Precambrian, Paleozoic, Mesozoic, and Cenozoic) and what fossils support your theory.

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| --- | --- | --- |
| **Era** | **What did the environment look like?** | **Why? List two pieces of evidence to support your theory.** |
| **Precambrian** |  | 1)2) |
| **Paleozoic** |  | 1)2) |
| **Mesozoic** |  | 1)2) |
| **Cenozoic** |  | 1)2) |

1. Use your fossil findings to create a theory about when different plants and animals might have evolved and what types of organisms dominated the Earth during each era.

|  |  |  |
| --- | --- | --- |
| **Type of organism** | **When did they exist? (provide a range of time)** | **What geological era did they dominate?** |
| Mammals |  |  |
| Reptiles |  |  |
| Birds |  |  |
| Fish |  |  |
| Bacteria |  |  |
| Trees |  |  |
| Insects |  |  |

1. Choose three fossils that your group discovered and make a theory about their migration pattern and geographical range. Talk to other groups about whether they found that same fossil in their canyon and how high it was, then compare their findings with the depth of your own fossil to create your theory.

**Example**: My group found a trilobite 12 inches above the canyon floor in South America. The North American group found the same fossil twice at 15 and 18 inches above the canyon floor. None were found in Africa. So, we think that the trilobite first evolved in an ancient ocean in South America 300 million years ago and migrated to an ancient North American ocean 250 million years ago, where it lived for at least 50 million years. This probably also means that those two bodies of water were connected because we don’t think trilobites could migrate over land as sea creatures.

**Fossil 1**:

**Fossil 2:**

**Fossil 3:**

1. Graph the age of your fossils vs. their height above the canyon floor. Label your y-axis “Height (inches)” and your x-axis “Age (millions of years).” Once you have created your graph, answer the following questions.

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* 1. What does this graph predict about how a fossil’s age relates to its height in the canyon?
	2. If I were looking for a 60 million year old organism, what height should I look in the canyon?
	3. If I were looking 45 inches up in the canyon, what type of fossils might I expect to find? What geological era does this height represent?