**Main Idea**

    Since the Earth is 4.6 billion years old and life originated around 3.5 billion years ago, scientists have been involved with classifying evolutionary relationships among organisms. Using timelines, students can determine the order in which certain events occurred. Due to the vast diversity of life that originated, common characteristics are used to group organisms into similar categories thus creating cladograms. Creating cladograms will allow students to understand how closely related organisms are to one another.

**Objectives**:

1. To list when major groups of creatures appeared and vanished during Earth’s lifetime.
2. To be able to describe the most important events in Earth’s history.
3. To understand how scientists find close relationships between organisms.
4. To be able to construct a cladogram
5. To understand that organisms can only be studied if we can group them into discrete categories.

**Students’ Skills & Materials**: textbooks, computers, PowerPoint, worksheets/handouts,

**Lesson**:

1. Entry card  - With a partner, compare the three-fold organizer that was to be completed for homework. Students should talk about their interpretation of the information that was presented in the paragraph. Based on their reading, students should be able to work together to construct a timeline the outlines the significant events that took place once the Earth originated.
2. The teacher should review the timeline that the groups created and make sure that everyone in class has the proper order of events. In addition, the instructor should talk through the timeline and see if students understand why certain events had to occur in such a specific order. Teacher or student lead?
3. After students have a grasp on the events that must have taken place, the teacher should emphasize the great diversity of life that was present long ago It is still present, you mean that the diversity have been increasing through out the earth lifeline? They should encourage students to think about the diversity that is found on Earth today.
4. Once the teacher points out the diversity, they should ask students, “Why is it important to acknowledge and study the diversity of life on Earth?” the teacher should give the students a couple minutes to write their answer in their notebook or talk with a partner. Good opportunity to call the attention to endangered species …
5. Once the students have had time to discuss, the teacher will introduce the concept of the Tree of Life. They should explain that studying the tree of life helps us to understand how everything is connected. By the end of this lesson, students should be aware that organisms can only be studied if they are grouped in discrete categories. What is the importance of the nodes in a cladogram?
6. The teacher will explain to the students that they are going to work in collaborative groups in order to classify several animals. As a group, students will have to decide how to fill in the handout provided that contains a table and organizer. Are these the same organizers as in lesson one?
7. Each student group will be assigned a different set of animal cards and asked to classify their specific group of cards. They should spread the cards out on the table and take a few minutes to compare and contrast the organisms. Students should be working together to recognize commonalities among the animals. As students are working, the teacher should be circulating between groups to ensure student understanding and make sure they understand the relationship between structure and function. GOOD!
8. Students should be completing the provided worksheet as they continue through the activity. Once all of their tables are filled out, they should then work on Venn diagrams to help demonstrate the relationships between organisms.
9. Exit card - As a group, students should write down an assessment of how well they worked together as a team. In addition, each student should write down two things they learned in class and one concept they still have a question on.

**Part II - Cladograms**

1. Entry card - Students will be given a sheet of paper that has a group of organisms pictured on it. The class will be instructed to make a table that will allow them to group the organisms into categories. The students will share their answers with the class and the teacher will lead into a discussion towards ideas such as shared ancestry.
2. The teacher will pass out the Cladogram worksheet and explain the purpose of the activity. Before starting the activity, the teacher will show a short video clip that explains the steps needed to follow in order to construct a cladogram. Students will complete the table of shared characteristics, and fill in the Venn diagram. Make sure to explain the significance of the nodes in a cladogram.
3. The teacher will explain that the animal with the most characteristics is placed in the middle circle. In each circle, students should write the name of the animal and its characteristics.
4. Once the table and Venn diagram are completed, the student will have to draw a cladogram that depicts the relationship between the animals. The teacher will allow students to work with a partner during this part of the activity so they can explain their reasoning and work together to come to a conclusion.
5. If students finish the problem, early they will be given another cladogram worksheet that will allow for further practice. The teacher should circulate among the groups and ask follow-up questions to check student understanding.
6. As an exit card, students will come up with their cladogram question and swap their card with another student in the class. The students should use the table of characteristics provided by their peer to make a Venn diagram and cladogram before leaving.
7. Homework: write a paragraph in the form of a narrative describing how to make a cladogram, what does it tell you, what does not tell you, and … Or you can ask the students to use the words: ancestry, nodes, Earth age, etc.

It is important that the students verbalize or write their ideas down.

**Part III Cooperative Cladogram Quiz**

1. The teacher will have created a series of characteristic cards that describe a specific phylum GOOD narrow it down to a specific Phylum. They will describe to the class that the students will be required to work as a whole in order to complete this activity.
2. The teacher will have already set up the backbone of the cladogram, yet the students will be given the entire stack of characteristic cards. On the back of the cards will be questions that the students will have to discuss in order to complete the activity. Example of the kind of questions?
3. The students will have to work together in order to create a class cladogram that organizes all of the characteristics/animals that are written on the cards.
4. The students can use the class period to complete the activity, but they will be accessed on their team effort, critical thinking, and problem solving skills.
5. Will they present the work to you or will you be involved through out the activity? A discussion will be good because you can go over important issues: when this happened, why did it happen (environmental pressures, adaptation), the significance of the nodes (modifications) also caution them that cladograms do not tell us about how long did it past between events.

**Assessment**

Participation in class and during group work

Thoroughness of filling out the handouts assigned in class

Completeness of the Cladogram n Class Activity

**Teacher’s Reflections**

Were all of the lesson objectives met?

Did students learn and apply the information in an appropriate manner?

**Notes to the Teacher**

Lesson will take place over two or more class periods