

# Coin Cladogram

Adapted from American Museum of Natural History

Grades: 5-9

*Identify common features among a group of items and create a cladogram to learn how scientists use a method called cladistics to group animals and determine evolutionary relationships.*

## MATERIALS

- A penny, nickel, dime and quarter for each pair of students
- Coin Cladogram worksheet



## ENGAGE

Write lion, elephant, zebra, kangaroo, koala, buffalo, raccoon and alligator on the board. Ask students how the animals are related and what might be a good way of grouping them into sets and subsets.

Scientists use a method called cladistics to group animals and determine evolutionary relationships. They look for unique features, such as a hole in the hip socket, that the animals share. Animals with the same features are grouped together. A chart called a cladogram shows these relationships and can show how animals are linked to one another through a long and complex history of evolutionary changes.

Today students will practice using cladistics by examining the features of various coins.

## EXPLORE

- Working in pairs, students will examine the features of various coins to determine how they are related. Remind students that cladistics is used to determine relationships among organisms, and not necessarily objects. This exercise will introduce them to how cladistics works.
- Distribute the *Coin Cladogram* worksheet to students.

## EXPLAIN

- Ask students to explain how they arrived at their conclusions.
- Note any differences among the cladograms.
- The first feature (round) has been identified for students. Possible other features are: silver-colored, ribs on the edges, president's head, etc.
- What is important to note is that a coin at any node must have the features of all previous nodes.

## EXTEND and EVALUATE

- Distribute illustrations of six to eight prehistoric animals. Ask students to classify the animals according to features they identify. Have groups share their findings.

# COIN CLADOGRAM WORKSHEET

You and your partner will examine the features found in a penny, a dime, a nickel and a quarter and construct a cladogram of your own.

FEATURES	TYPE OF COIN			
	PENNY	NICKEL	DIME	QUARTER
A. Round				
B.				
C.				

- Before constructing a cladogram, scientists look for features in animals and note whether the feature is present or absent. You will do this for coins using the chart. Observe the coins. What feature do all the coins have in common? They are all round. Put a plus sign in the column under each coin for that feature.
- What other feature do most of the coins share? Identify this feature and write it in the column marked features. Put a plus sign if the coin has the feature. Put a minus sign if the coin does not have the feature.
- What other feature do most of the remaining coins share? Identify this feature and write it in the last space in the column marked features. Put a plus sign if the coin has the feature. Put a minus sign if the coin does not have the feature.
- Use the chart to complete the cladogram. The first node (branch in the tree) A is labeled Round. All the coins at this node and beyond share this feature. Label the other two nodes (letters B and C).
  - What coin is round, but does not share any more features with the other coins?  
Write the name of the coin in number 1.
  - What coin shares the first and second feature with the other coins, but no more?  
Write the name of the coin in number 2.
  - Which two coins share all the features you have identified?  
Write their names in numbers 3 and 4.
- Use the cladogram to answer these questions:
  - Which two coins are the most closely related?
  - Which coin is a distant relative of these two coins?
  - What feature(s) does the nickel share with the dime?

