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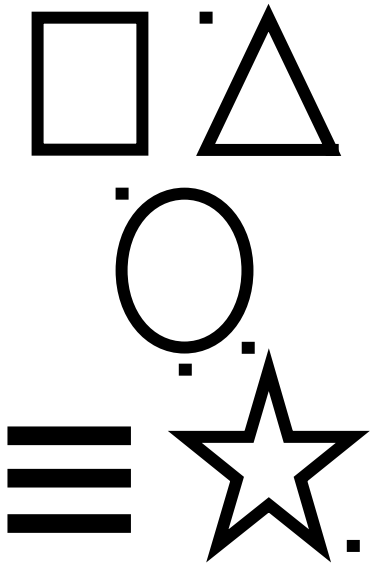

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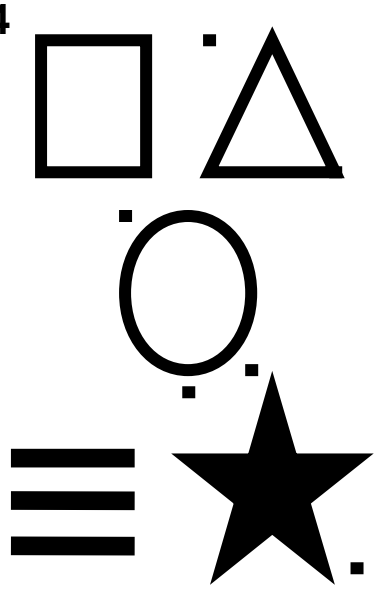

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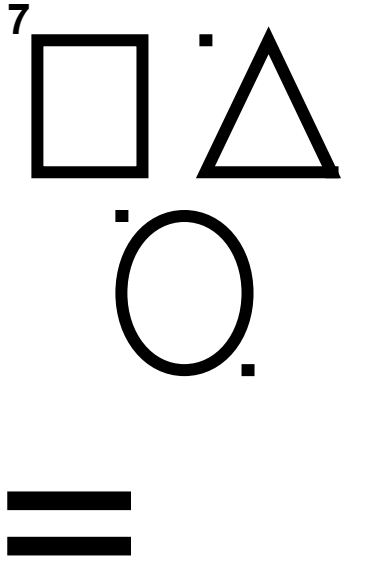

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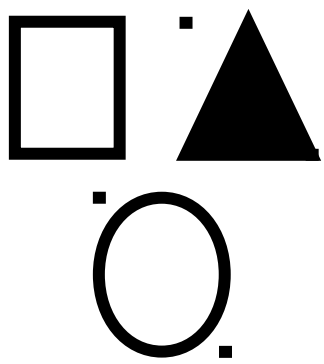

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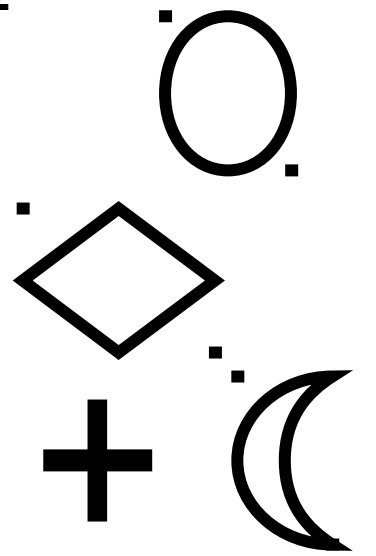

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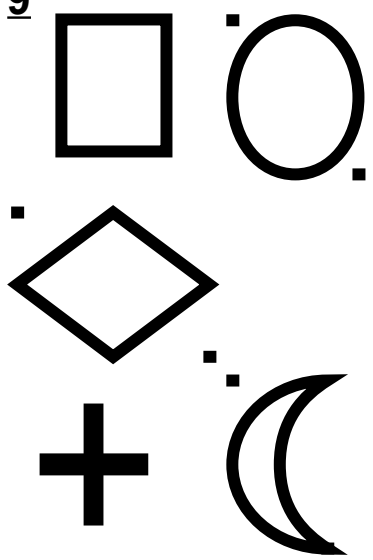

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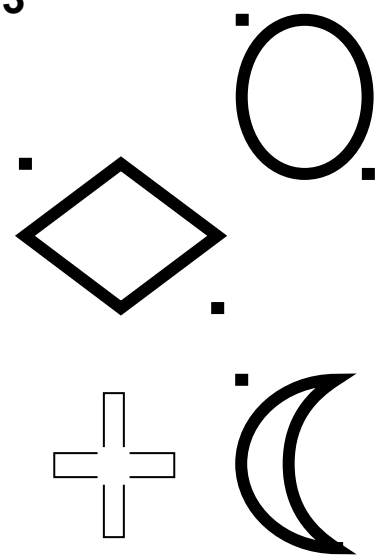

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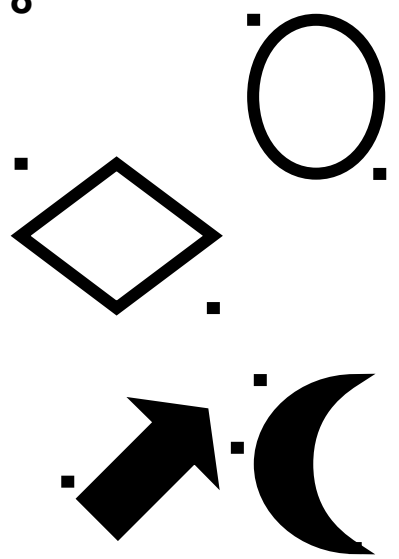

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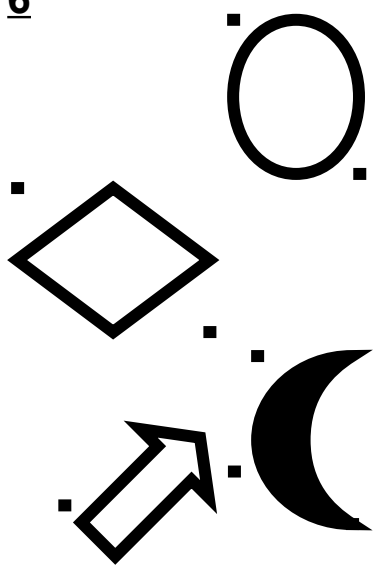


THE GREAT CLADE RACE

Overview: in this activity you will be introduced to the cladistic method using the analogy of a cross-country race through a forest. With the data that you will be provided with, you will reconstruct the racecourse followed by each racer.

Materials: eight cards, white paper, pencils, eraser, markers, charting paper. Color pencils or pens are optional.

Data: the symbols on the cards. Each racer (numbered 1 to 8) carried one card, which worked as a kind of "racing passport".

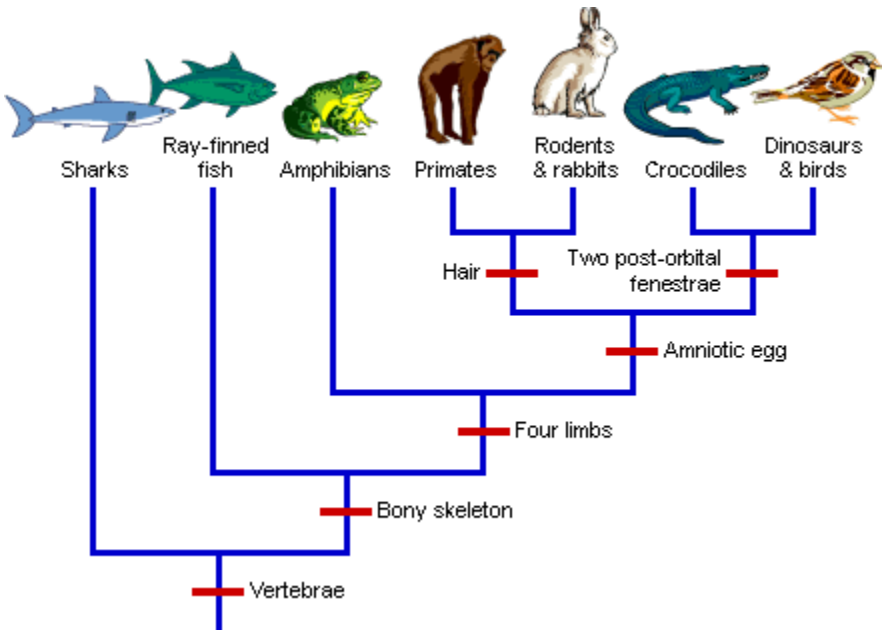
Directions:

1) With members of your group organize the cards into distinct groups organize the cards into distinct groups using any criteria you wish. You can make as few or as many groups as you want, but each card must be put into exactly one group.

2) Discuss as a group and prepare to defend your classification scheme as being demonstrably superior to the alternatives.

3) Imagine a race through the woods. All participants in the race start at the same starting line at one end of the woods. As the race continues the path through the woods repeatedly splits, and runners are free to take either fork. Each series of forks leads to a separate finish line at the other end of the forest. As the runners make their way through the woods, each carries a card that he/she must have stamped at check-in stations along the way (including at the finish line) The cards that you have been working with are the cards carried by eight runners in this imaginary race.

Example of a "race course" including 7 different animals.



4) Your challenge is to draw a map of the race course, complete with check-in stations.

While doing so, you need to follow a few simple rules:

a) All runners must complete the race. They cannot stop part of the way down a path.

b) When the path branches, it only branches into two new paths, never three or more

c) Once two paths have branched off from one another, they can never reunite.

d) Check stations are located along straight-aways between branching points.

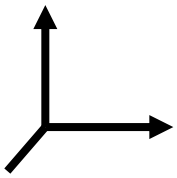
e) The accepted map from all possible ones will be the shortest (e.g. with the lowest number of checking-points.

5) Draw your final map of the racecourse on charting paper. One member of the group will explain the map to the class. (See example on previous page)

---Put a hash-mark across the trail where each station is located.

---Draw the corresponding symbol. Note: a diamond is not a star, a diamond is not a square!

MULTIPLE
FINISH LINES



START

6) After reviewing and comparing your map with those from other groups, you can re-evaluate the initial sorting of the cards and adjust the map.

Think: If two runners share one or more symbols on their cards, what does this mean in terms of the racecourse?

7) If time permits your teacher will give you the card of an additional racer. Put the new card on the map.

Think: What is the only way for you to include this ninth card on the map? How does the new map look like with the least number of checking points?

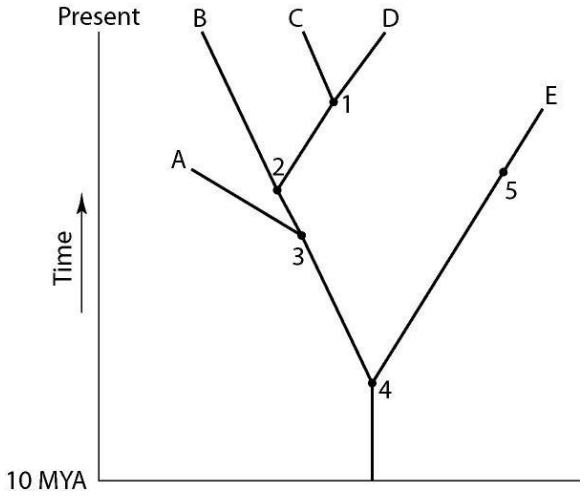
GUIDING QUESTIONS FOR THE INTERPRETATION OF THE ANALOGY BETWEEN THE RACE AND CLADISTIC ANALYSIS

1. What would the map represent?

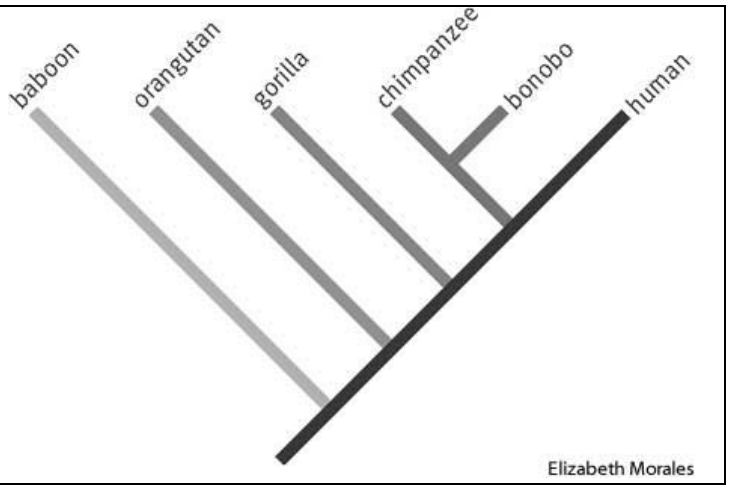
2. What do the nodes represent?

3. If two organisms share many characteristics (stamps on their passport) are they closely related or distantly related?

4. in the cladogram to the right, how would you describe species A & E?



5. Using the cladogram to the right, identify the two most closely related organisms. Justify your answer.



6. The best map is the one with the least number of check points. What is the name of this rule applying to the cladistic method?