

## Evidence for Evolution Stations Lab

### STATION 1 –MOLECULAR INFORMATION

#### Part 1 - Comparing DNA Sequences

1. Each DNA sequence comes from a different species. Sort them in order from most to least similar to the living species. List the species letters below.

Human	ATGCATGCATGC
Chimp.	ATGCATGCATGC
Gorilla	ATGCATGCATGC
Mouse	ATGCATGCATGC
Ancestor	ATGCATGCACGC
Horse	ATGCATGCACGC

2. Explain how you determined this order. \_\_\_\_\_
3. What do the DNA sequences tell us about the ancestry of these species? \_\_\_\_\_

#### Part 2 - Analyzing Amino Acid Sequence Differences

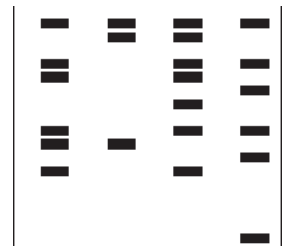
1. As organisms become less similar to humans (going from top to bottom), do the number of amino acid differences increase, decrease, or stay the same?

Organism	Number of amino acid differences from humans
Chimpanzee	0
Rhesus monkey	1
Rabbit	9
Cow	10
Pigeon	12
Bullfrog	20
Fruit fly	24
Wheat germ	37
Yeast	42

2. What species is most closely related to humans – the cow or the rabbit? Explain how you know based on the amino acid data. \_\_\_\_\_

#### Part 3 - Classification with DNA Fingerprinting

1. Based on the DNA fingerprints, which two species are most closely related? Explain your answer.



2. What do genetic similarities between two species suggest about their ancestry? \_\_\_\_\_

## STATION 2 – OBSERVING FOSSILS

### Part 1 – Ancient and Modern Horses

1. Observe fossils of horse ancestors and compare them to the modern horse species. Describe one way the bone structures have changed over time. \_\_\_\_\_  
\_\_\_\_\_
2. Do these fossils suggest species changing or staying the same over time? \_\_\_\_\_  
\_\_\_\_\_

### Part 2 – Whale Ancestors

1. Observe fossils of whale ancestors and compare them to the modern whale species. Describe how the bone structures change over time. \_\_\_\_\_  
\_\_\_\_\_
2. What do these fossils suggest about the ancestors of whales? What kinds of organisms did they descend from? Explain your answer. \_\_\_\_\_  
\_\_\_\_\_

### Part 3 – Missing Link

1. Observe the fossilized “specialized fins” of Tiktaalik. What seems special about this fossil that suggests it is the “missing link” between fish and 4-limbed land animals (tetrapods)? \_\_\_\_\_  
\_\_\_\_\_
2. Observe the fossilized “wings” of Archaeopteryx. What seems special about this fossil that suggests it is the “missing link” between dinosaurs and birds? \_\_\_\_\_  
\_\_\_\_\_
3. Explain the importance of fossils of “missing link” extinct species. Why do you think they are important for understanding how organisms change and are related. \_\_\_\_\_  
\_\_\_\_\_

## STATION 3 – FOSSIL DATING PhET SIMULATION

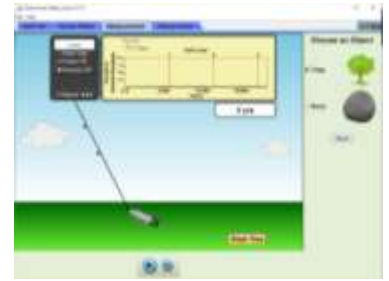
### Part 1 – “Measurement” Tab

1. Click “Plant.” After the tree dies, how does the amount of radioactive energy in the tree change over time?

\_\_\_\_\_

2. Choose “Rock” and “Uranium-238.” Click “Erupt Volcano.” After its initial formation, how does the amount of radioactive energy in the rock change over time? \_\_\_\_\_

3. Fill in the blanks: As a fossil or rock becomes older, its radioactive energy will \_\_\_\_\_.  
Newer fossils have \_\_\_\_\_ radioactivity than ancient fossils.



### Part 2 – “Dating Game” Tab

1. Without using radioactivity, how can you tell that the wooden cup is newer than the fish fossils? \_\_\_\_\_

\_\_\_\_\_

2. Put the following fossils in order of age, from newest to oldest:  
bone, dinosaur skull, fish bones. Explain how you determined the correct order.

a. Order: \_\_\_\_\_

b. Explanation: \_\_\_\_\_

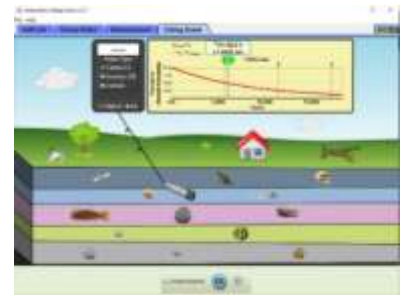
3. How does the amount of radioactive energy change as you measure deeper layers of rock?

\_\_\_\_\_

4. Put the following fossils in order of age, from youngest to oldest: rock 3, rock 4, rock 5. Explain how you determined the correct order.

a. Order: \_\_\_\_\_

b. Explanation: \_\_\_\_\_



### Summarize

“Absolute dating” tells the actual age (in years) of a fossil. “Relative dating” tells whether a fossil is older or younger than another.

a. Measuring a fossil’s radioactivity is a form of \_\_\_\_\_ dating.

b. Observing which layer a fossil is in is a form of \_\_\_\_\_ dating.

## STATION 4 – EMBRYOLOGY

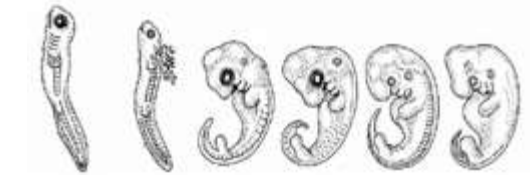
### Part 1 – Embryology

1. Based **only** on the earliest embryos, can you confidently identify which embryo is human? Why or why not?



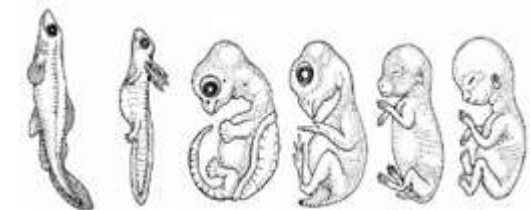
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2. Based on the second set of embryo forms, are there any embryos you can tell are definitely NOT human? Which ones, and why? \_\_\_\_\_



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3. Based on the third set of embryo forms, which do you think is human? \_\_\_\_\_



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4. Taken as a whole, which species is most closely related to humans? How can you tell based on your observations? \_\_\_\_\_

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5. Taken as a whole, how does this information indicate that all these species descended from one common ancestor? \_\_\_\_\_

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## STATION 5 – COMPARATIVE ANATOMY

### Part 1 – Pelvic bones

1. The only function of the pelvic bone is to allow hind limbs (legs) to swing back and forth for walking or running. Do they likely have a function in whales, dolphins, or snakes? If so, what is the function?



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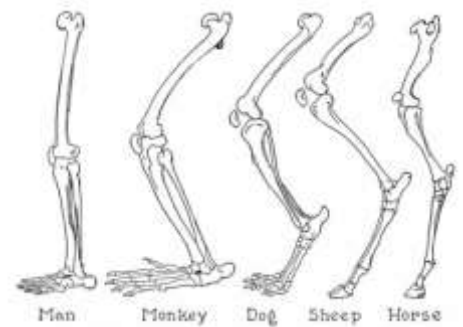
2. What does the presence of pelvis bones in these organisms suggest about their ancestors?

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### Part 2 – Vertebrate limbs

1. What similarities do you see among the different species' limb bone structures?



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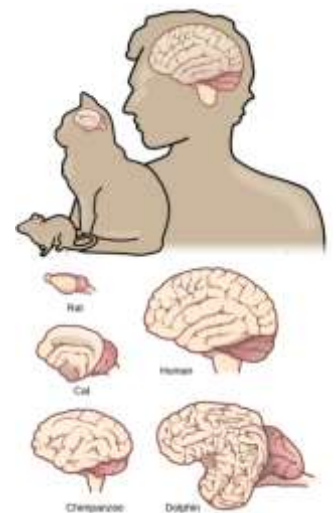
2. Why do these similarities support the theory that these different species share a common ancestor?

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### Part 3 – Vertebrate Brains

1. What similarities do you see among the different species' brain structure?



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2. Which two brains look the most similar? Why might this be the case?

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