Name: _____ Date: _____ Period: _____

**Lab -How do Fossils Show Change?**

Most organisms live, die, and decompose. They leave no traces of having lived. Under certain conditions, an organism's remains or tracks may be preserved as a fossil. Fossils give clues about how an organism looked and where it lived. They are often used by scientists as evidence of change.

A fossil is any remains of a once-living thing. Fossils may be only the outline of some plant, animal, or other organism that is preserved in rock. Sometimes, entire skeletons of animals that lived millions of years ago are found.

**Research Questions:**

A. How are ancient horses and present day horses similar?
B. How have horses changed over time to become adapted to their environment?

**Prediction:** Make a prediction about what changes have occurred to adapt horses to their current environment.

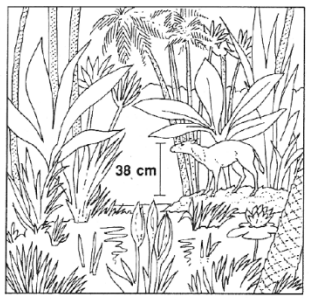
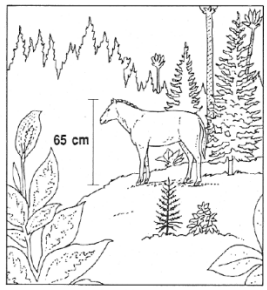
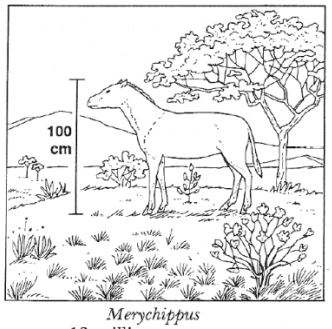
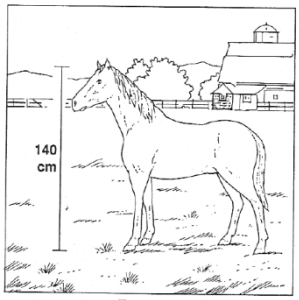
1. I predict that over time horses have changed to become better adapted to this environment:
   _____

**Materials:** Metric ruler, Colors: Red, Blue, Green and Yellow

**Procedure**: Part A – Change in Size with Time:

2. Examine the pictures in Table 1 and use them to fill in the data below.

**TABLE 1. EVOLUTION OF THE HORSE**

|  *Hyracotherium* 55 million years ago |  *Miohippus* 30 million years ago |  *Merychippus* 13 million years ago |  *Equus* Today |
|---|---|---|---|
| Size: | Size: | Size: | Size: |
| Environment: | Environment: | Environment: | Environment: |

3. Based on the data above what has changed about horses over time?
   _____
4. How has the environment changed over time? _____
   _____
5. How have horses adapted to their environments? _____
   _____

**Part B – Changes in Bone Structures with Time -** The changes in horses over the last 55 million years have been shown by studies of large number of fossils. The earliest kind of horse was small and had teeth that were adapted to browsing on young shoots of trees and shrubs. The present-day horse is much larger and has larger teeth that are adapted to grazing on the tough leaves of grasses. Early horses were adapted to living in wooded, swampy areas where more toes were an advantage. The single-hoofed toes of the present day horse allow it to travel fast in the plains.

6. Examine the diagrams below of fossils of the front foot bones and the teeth of horses. The foot bones at the upper right of each diagram indicate the relative bone sizes of each kind of horse. Be sure you measure the inset diagram of the foot. Use the color guide below to correctly color the bones before you analyze them further.

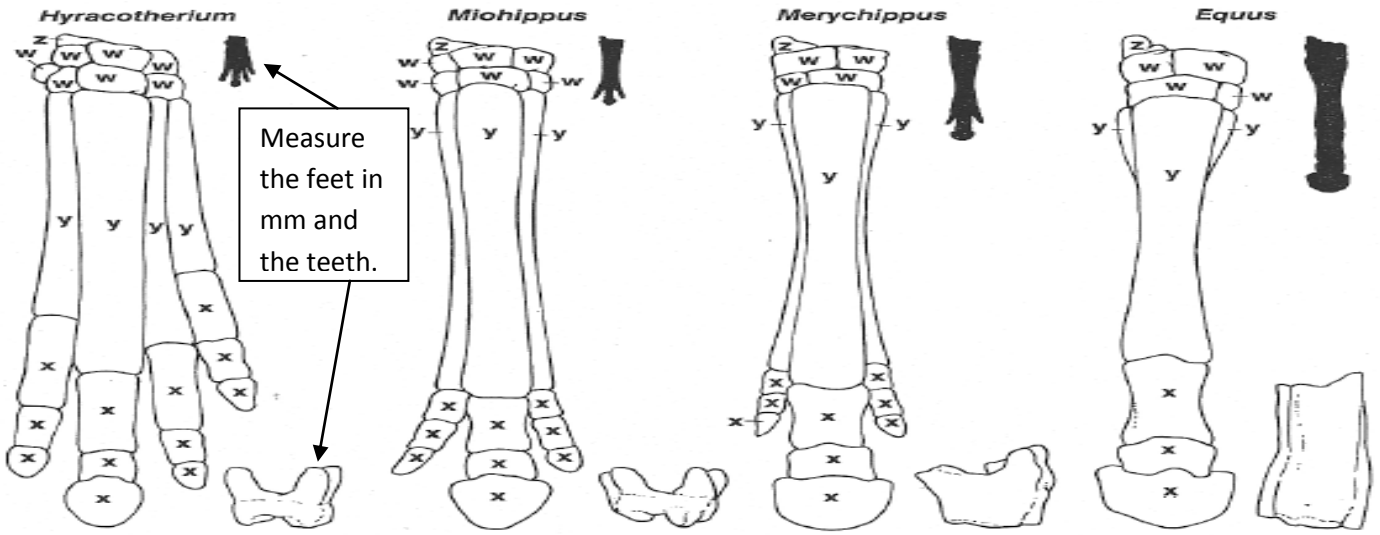



FIGURE 2. Forefoot bones and teeth of horses

| COLOR GUIDE | BONES | LETTER | Horse species | # of toes | # toe bones | # foot bones | # ankle bones | # heel bones | Total # foot bones | Length of foot (mm) | Tooth Height (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| RED | TOE | X | Hyracotherium | | | | | | | | |
| BLUE | FOOT | Y | Miohippus | | | | | | | | |
| GREEN | ANKLE | W | Merychippus | | | | | | | | |
| YELLOW | HEEL | Z | Equus | | | | | | | | |

7. What changes occurred in the surroundings of the horses from *Hyracotherium* to *Equus*?
   _____
8. What change occurred in the shape of the horse form *Hyracotherium* to *Equus*?
   _____
9. What changes occurred in the size of the horse from *Hyracotherium* to *Equus*?
   _____
10. As the surroundings changed, what happened to the teeth of the horse?
    _____
11. Describe the overall changes in foot length, number of toes, and size of toes in the horse over time. _____
12. Fossils give clues about how an organism looked and where it _____. They are often used by scientists as evidence of _____.
13. A fossil is any _____ of a once-living thing, like an outline in a rock or skeleton.
14. The changes in horses over the last _____ _____ years have been shown by studies of large number of fossils.
15. The teeth of the horse have _____ to grazing on the tough leaves of grasses.