Museum Visit Packet
Evolving Planet

Name:

Period:

Just a reminder:
Respond to these prompts completely and accurately. Your grade will be based on your ability to provide thoughtful, reflective answers. ***Accuracy of your responses is important if you wish to receive the full 1% from this option.*** *If can't find the information, or if an exhibit is "offline" – check out the museum's web site!*

KWL Chart: In terms of your knowledge of evolution, complete **K** and **W** *before* your visit, then **L** *afterwards*:

K	**W**	**L**
What I Know	What I Want to Learn	What I Have Learned

General Exhibit "Tips and Tricks:"

1. These are important "not to miss" displays along the way - they will always have a consistent appearance:

   - Evolution Kiosks - YELLOW - Explains the basics of evolution - always stop, watch these videos and read the related signage.
   - Mass Extinction Stations - RED - Draws attention to periods of time where life was threatened on a global scale, describes the event and offers possible explanations for the event - use these stations to fill out the chart below on this page.
   - DNA Evidence Displays - DOUBLE-HELIX symbol - found on smaller, circular displays. These displays indicate how DNA evidence supports our current theory of evolution.

2. When writing down information, try to do so in a spot where you will not block traffic (some areas are a bit narrow) or block someone else's view. Be considerate of other visitors.

3. Don't miss the "big picture" of the exhibit! Browse displays you're not asked about, look at the galleries (especially the dinosaurs - its just too cool to miss!) One favorite spot you might enjoy hanging out in is in the Cambrian section… watch the "aquarium-like display" - *insider tip* - it runs for about 5 min before it starts to repeat. Fascinating to watch how scientists and animators think these creatures may have moved & behaved. (based on fossil evidence and similarities to animals today!!)

4. The benches are a nice place to rest, reflect, and write. Also - take time to notice the murals, which were painted in the 1920's by Charles Knight. They depicted, with the best scientific knowledge of that time, what life may have looked like during different geologic periods of time. However, our thinking has changed in many ways based on new evidences - so in some important ways, the murals are now considered "inaccurate." Check out the signs on the benches - they highlight these differences from the 1920's to the present.

Record what you learn about the six Mass Extinction events in the chart below: ***(remember… in RED displays)***

Extinction Event	Era	Period	Millions of Years Ago	Percent of Life Lost	Main Cause
First Mass Extinction					
Second Mass Extinction					
Third Mass Extinction					
Fourth Mass Extinction					
Fifth Mass Extinction (hint…watch video!!)					
Sixth Mass Extinction					

SECTION 1: Introduction to *Evolving Planet*:

1. How is the term "Theory" defined at the beginning of the exhibit?

2. How old is the Earth?

SECTION 2: The Precambrian: Life Emerges

3. How much of Earth's history is represented by the Precambrian?

4. There are two main theories for the origin of life on Earth. Describe these theories and discuss the supporting evidence for both.

5. Find the interactive displays of prokaryotic and eukaryotic cells and work through their questions. How is it suggested that Eukaryotes originated?

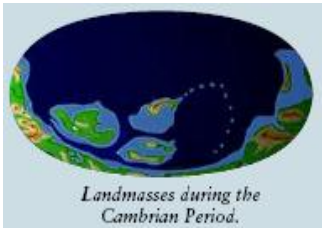
6. What is the difference between asexual and sexual reproduction, and why is sexual reproduction so important to the process of evolution?

7. Visit the "Natural Selection" evolution kiosk (yellow). Read the information and view the video.
   a. Briefly summarize the concept of Natural Selection:

   b. How is the concept of Genetic Diversity critical to the process of natural selection?

SECTION 3: The Cambrian and Ordovician: World of Water

8. Visit the "Fossilization" evolution kiosk (yellow). Read the information and view the video. What are fossils and how do they form? How do skeletons help us understand evolution?



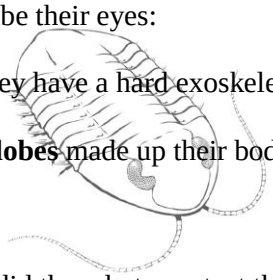
Landmasses during the Cambrian Period.

9. a. Where was the abundance of life in the Cambrian Period found?

   b. Was there any life on land at this time? If so - describe?

10. Explore the trilobite interactive stations at the center of exhibit:

   a. Describe their eyes:



   b. Did they have a hard exoskeleton?

   c. What **lobes** made up their body - and describe their function:

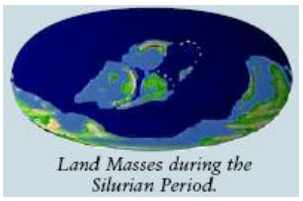
   d. What did they do to protect themselves?

11. Take time out to simply view the "aquarium" scene around you (about a 5 minute cycle). Now go learn about some of the creatures you see at the displays under the "aquarium" windows. Can you find *Anomalocaris* ? Describe what this creature was like… can you guess why it was named this?

12. What were the first vertebrates to appear, and when?

13. What is a mass extinction?

SECTION 4: The Silurian and Devonian: From Fins to Limbs



Land Masses during the Silurian Period.

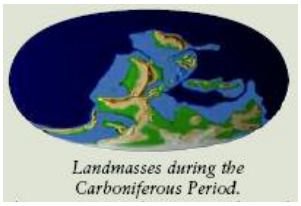
14. What major terrestrial biome appears by the end of the Devonian Period?

15. What advantage did jawed fish have over jawless fish?

16. Find the display case showing adaptations for a terrestrial existence. What evolutionary innovations helped vertebrates colonize land?

17. Looking at a map of the continents in the Silurian Period, can you locate the approximate position of North America, the United States, and Illinois? What was Illinois' climate like at this time?

SECTION 5: The Carboniferous: Age of Coal Forests



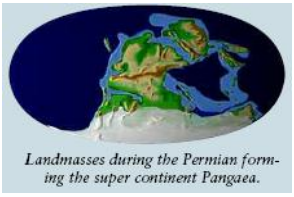
Landmasses during the Carboniferous Period.

18. The great coal forests of the Carboniferous Period were composed of plants (seed ferns, (giant horsetails, lycophytes) that are very different from trees alive in modern forests. Describe these ancient plants and how they are different from modern plants.

19. Observe the fossils and model on display for Illinois' State Fossil - The Tully Monster. Sketch, and write a few observations of this organism. Why is it so difficult for scientists to reconstruct what the creature was really like?
(hint…what information is not usually preserved by fossil formation?)

20. Find the video located at the Mass Extinction Station #3. (This will summarize much of what you have experienced so far.) What processes or forces are responsible for the formation of Pangea? How did this affect life?

SECTION 6: The Permian: Patchwork of Pangea



Landmasses during the Permian forming the super continent Pangaea.

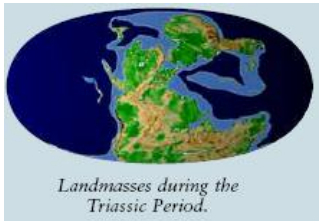
21. What is Pangea?

22. What is a tetrapod? Are humans tetrapods?

23. a. Draw and label the parts of the amniotic egg
(outer shell, embryo, chorion, yolk sac, allentois, and amnion):

b. Why was the evolution of this type of egg so important to the evolutionary success of early tetrapods?

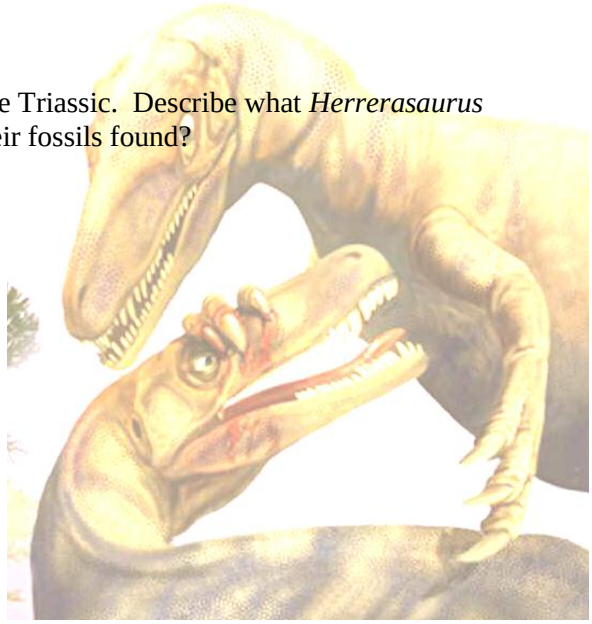
SECTION 7: The Triassic: Dawn of a New Era


Landmasses during the Triassic Period.

24. a. What are the synapsids?

b. Are humans synapsids? Provide a reason for your answer. (hint…see Cynodonts)

25. The first dinosaurs, represented here by *Herrerasaurus*, evolved in the Triassic. Describe what *Herrerasaurus* looked like. What did they eat? How big were they? Where are their fossils found?



26. What is a mammal? Are humans mammals?

27. Sketch and describe the early mammal known as *Morganucodon* :

28. During the Mesozoic, there were many different groups of mammals. What type of fossil evidence has been found that supports this statement?

29. Visit the "Phylogeny" evolution kiosk (yellow). Read the information and view the video. Answer these questions:
a. Describe the concept of Phylogeny:

b. Using the video as a model, expand this to humans. Name one feature that humans share with the following animals:

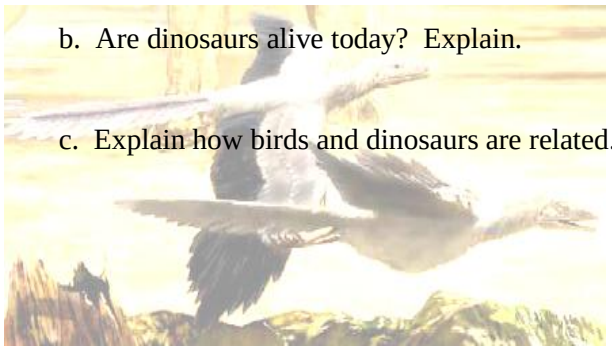
- Worms -
- Fishes -
- Lizards -
- Rabbits -

c. By looking at features shared by organisms, scientists can tell how closely related the organisms are. Which of the animal groups from the list in (b.) above are humans ***most closely*** related to? Which one are humans ***more distantly*** related to?

SECTION 8: The Jurassic and Cretaceous: Age of the Dinosaurs

Landmasses during the Jurassic Period.

30. a. What is a dinosaur?



b. Are dinosaurs alive today? Explain.

c. Explain how birds and dinosaurs are related.

31. a. What are angiosperms?

b. What is coevolution?

c. Visit the "Coevolution" evolution kiosk (yellow). Read the information and view the video. After watching the video, think of an example of ***modern*** animals and plants that have coevolved. For your example, explain the advantages that are gained by both organisms from their relationship?

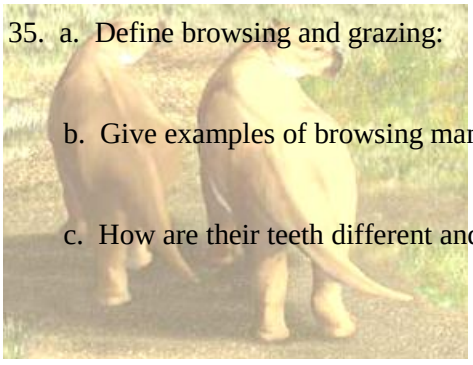
32. Did humans and dinosaurs live at the same time? When did each live?

33. While dinosaurs ruled the land, what animals lived in the oceans?

SECTION 9: The Tertiary: Age of the Mammals

Landmasses during the Tertiary Period.

34. *Be sure to watch the video about the 5th Mass Extinction and fill in your table!* What is the best evidence that supports a meteorite strike as the cause of this extinction?



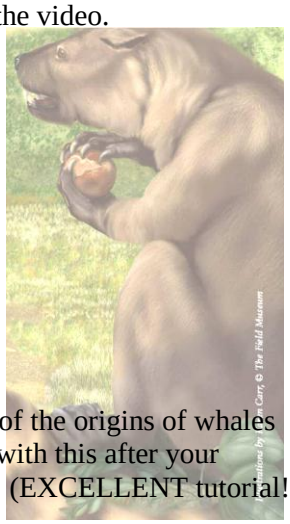
35. a. Define browsing and grazing:

b. Give examples of browsing mammals and grazing mammals.

c. How are their teeth different and why do these differences exist?

36. Find the DNA Evidence display (double-helix circle). What does DNA evidence tell us about the evolution of hoofed mammals?

37. Visit the "Convergent Evolution" evolution kiosk (yellow). Read the information and view the video. What is convergent evolution? Give several examples.



38. Locate the large display describing whale evolution. Describe the currently accepted theory of the origins of whales (mammals returning to the sea). What are the major evidences that support this theory? For help with this after your visit, you may wish to go to: http://www.indiana.edu/%7Eensiweb/lessons/whalekiosk.html (EXCELLENT tutorial!!)

39. Find the DNA Evidence display (double-helix circle). What does DNA evidence tell us about the whale's closest living relatives?

SECTION 10: The Hominids: Dawn of Humankind

Landmasses during the Late Tertiary Period.

40. In general, what are hominids?

41. What group gave rise to the hominids? How do we know?

42. Who is “Lucy” and where was she found? How is she related to us?

43. a. How did *Homo neanderthalensis* (“Neanderthals”) differ from modern humans? (Compare and contrast such features as body size, bone structure, facial features, cultural development, and tool use.)

b. What factor was an important influence on the evolution of the Neanderthals?

44. Find the DNA Evidence display (double-helix circle). Read the information and view the video.

a. What does Robert D. Martin have to say about fossil evidence and the relationship between Neanderthals and early modern humans?

b. What does DNA evidence have to say about whether or not Neanderthals and early modern humans are related?

45. Find the section “What makes a hominid?” For each of the following categories, summarize briefly how hominids are unique and why this may have proven advantageous for survival of the hominids:

a) tooth size

b) bipedalism

c) brain size

d) skull opening

e) pelvis shape

f) toes

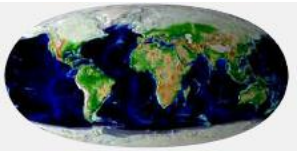
g) foot arch

8) femur

Lucy

46. Are humans evolving today? What evidence might suggest this?

SECTION 11: The Quaternary: Age of Ice



Landmasses during the Late Quaternary Period.

47. What are land bridges? Why are they important to the story of a changing Earth and evolution of new species?

48. What happened during the great faunal exchange that occurred between North and South America around 3.0 million years ago? Which animals migrated to North America? Which animals migrated to South America?

49. Visit the "Biogeography" evolution kiosk (yellow). Read the information and view the video.

    a. In general, how does changing geography affect organisms?

    b. Explain the process of "speciation" and the role that geography plays in that process.

50. a. What are ice ages?

    b. How many ice ages have there been on Earth?

51. Locate the ice age video monitor in this section. (you will see this monitor, with two red buttons, located next to the "glacial traces on the rocks" display) View each of the two videos and answer these questions:

    a. How does an ice age begin?

    b. Describe each of these factors, and explain how each affects ice development (the Milankowitch Cycles):

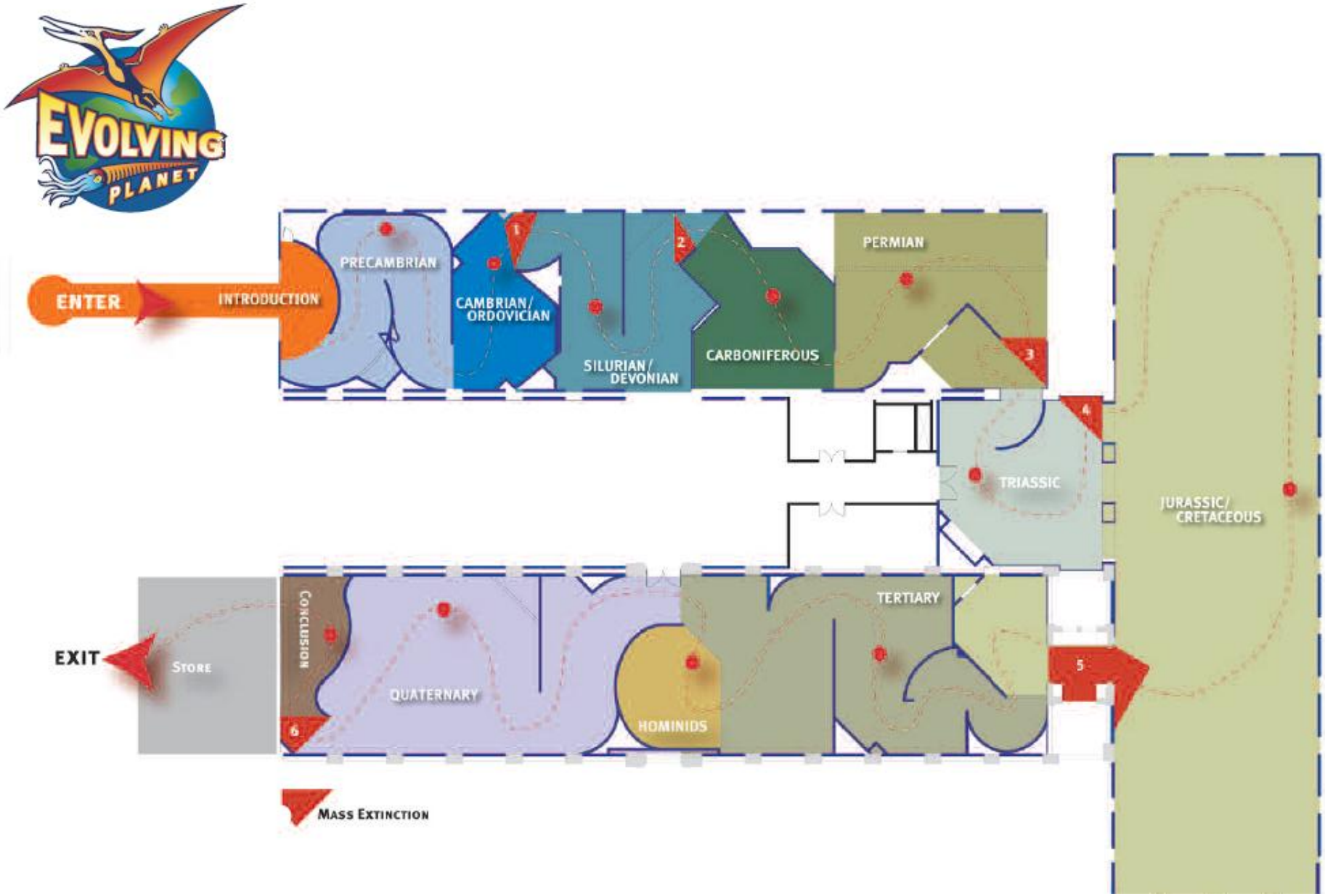
    - tilt of Earth:

    - wobble of the Earth (precession) :

    - Earth orbit:

52. What happened to the large ice age mammals or “mega fauna” during the Pleistocene ice age? Why?

53. What is the main cause of the sixth extinction? What can YOU do to slow it?


EVOLVING PLANET
ENTER
INTRODUCTION
PRECAMBRIAN
CAMBRIAN / ORDOVICIAN
SILURIAN / DEVONIAN
CARBONIFEROUS
PERMIAN
TRIASSIC
JURASSIC / CRETACEOUS
TERTIARY
HOMINIDS
QUATERNARY
CONCLUSION
STORE
EXIT
1
2
3
4
5
6
MASS EXTINCTION