

# 2010 North Carolina Olympiad

## Fossils – Division C

PRINT FULL SCHOOL NAME: \_\_\_\_\_

TEAM NUMBER: \_\_\_\_\_

PRINT STUDENT 1's NAME HERE: \_\_\_\_\_

What is Student 1's race? Check the box of one or more races to indicate what this person considers himself/herself to be.

- White  Black  American Indian/Alaskan Native  
 Spanish/Hispanic/Latino  Asian Indian  Chinese  
 Filipina  Japanese  Korean  
 Vietnamese  Native Hawaiian  Samoan  
 Pacific Islander  Other Asian

What is Student 1's gender?  Male  Female

What is Student 1's grade-level?  6<sup>th</sup>  7<sup>th</sup>  8<sup>th</sup>  9<sup>th</sup>  10<sup>th</sup>  11<sup>th</sup>  12<sup>th</sup>

PRINT STUDENT 2's NAME HERE: \_\_\_\_\_

What is Student 2's race? Check the box of one or more races to indicate what this person considers himself/herself to be.

- White  Black  American Indian/Alaskan Native  
 Spanish/Hispanic/Latino  Asian Indian  Chinese  
 Filipina  Japanese  Korean  
 Vietnamese  Native Hawaiian  Samoan  
 Pacific Islander  Other Asian

What is Student 2's gender?  Male  Female

What is Student 2's grade-level?  6<sup>th</sup>  7<sup>th</sup>  8<sup>th</sup>  9<sup>th</sup>  10<sup>th</sup>  11<sup>th</sup>  12<sup>th</sup>

**Do not open this booklet until so instructed**

This exam consists of groups of 4 questions, each group associated with one of 25 “stations” containing specimens, photographs, etc. The specimens (or pictures) in each tray are labeled W, X, Y, or Z. Each question will have only one correct answer from the following types of responses:

- a specimen/picture label (W, X, Y, or Z).
- T or F (for true/false).
- your choice from a list of possible answers labeled A, B, C, etc.

Simply print the capital letter corresponding to your choice of answer on the blank line provided.

**If we have to guess your answer because of the uncertainty of your handwriting, we will count it wrong.**

You will have 1<sup>3</sup>/<sub>4</sub> minutes at each station and you will not be able to return to a station. You may continue work on a question, however. When time is called you should immediately and quietly move to the next station. Remember also that if you discuss a question too loudly with your teammate, you could give information to another team.

In the case of ties between teams, answers to questions beginning with Station 1 and continuing sequentially will be used to break the tie.

# Station 1:

Match the letter of each specimen with its name:

\_\_\_\_\_ Petrified wood fragment

\_\_\_\_\_ Mammoth tooth fragment

\_\_\_\_\_ Dugong (manatee) rib fragment

\_\_\_\_\_ Turtle Shell Fragment

---

# Station 2:

Match the letter of each fossil tooth with its “owner”:

\_\_\_\_\_ Dinosaur

\_\_\_\_\_ Cetacean

\_\_\_\_\_ Crocodile

\_\_\_\_\_ Fish

---

# Station 3:

Match the letter of each specimen of fossilized plant material with its type

\_\_\_\_\_ Gymnosperm

\_\_\_\_\_ Equisetales

\_\_\_\_\_ Pteridosperm

**True or False:**

\_\_\_\_\_ Fossils recognizably related to the modern *Ginkgo* date back to the Permian Period.

---

# Station 4:

Each specimen at this station belongs to the Class Cephalopoda. Match the letter of each specimen with its Subclass.

\_\_\_\_\_ Ammonoidea

\_\_\_\_\_ Coleoidea

\_\_\_\_\_ Nautiloidea

**True or False:**

\_\_\_\_\_ Of these Subclasses only Nautiloidea has living representatives.

---

# Station 5:

Each of the invertebrate remains at this station belongs to one of the Phyla below. Match the letter of each specimen with its Phylum.

\_\_\_\_\_ Cnidaria                      \_\_\_\_\_ Bryozoa

**True or False:**

\_\_\_\_\_ Both corals and bryozoa feed using a ring of ciliated tentacles called a lophophore.

\_\_\_\_\_ Solitary corals became extinct by the end of the Permian Period.

---

# Station 6:

Each of the remains at this station is a member of Phylum Mollusca. Match the letter of each specimen with its Class.

\_\_\_\_\_ Gastropoda                      \_\_\_\_\_ Bivalvia                      \_\_\_\_\_ Cephalopoda

**True or False:**

\_\_\_\_\_ Fossil mollusks have been found as far back as the Cambrian Period.

---

# Station 7:

Each of the specimens in this tray belong to the Phylum Echinodermata. Match each specimen to its Class:

\_\_\_\_\_ Stelleroidea                      \_\_\_\_\_ Echinoidea                      \_\_\_\_\_ Blastoidea                      \_\_\_\_\_ Crinoidea

---

# Station 8:

Match the letter of each tooth with its “owner”:

\_\_\_\_\_ *Equus*                      \_\_\_\_\_ *Mammuthus* (juvenile)                      \_\_\_\_\_ *Mammut* (juvenile)

**True or False:**

\_\_\_\_\_ *Hyracotherium* was probably a prey animal for *Smilodon*.

---

# Station 9:

Identify each specimen to its Class:

\_\_\_\_\_ Trilobita      \_\_\_\_\_ Maxillopoda      \_\_\_\_\_ Malacostraca      \_\_\_\_\_ Merostomata

---

# Station 10:

Identify the specimens at this station:

\_\_\_\_\_ Brachiopoda      \_\_\_\_\_ Bivalvia

**True or False:**

\_\_\_\_\_ The Permian-Triassic extinction event had little effect on brachiopods.

\_\_\_\_\_ Other animals have evolved the two-shell “armor” of brachiopods and bivalves.

---

# Station 11:

Match the letter of each vertebra with its “owner” below.

\_\_\_\_\_ Osteichthyan      \_\_\_\_\_ Cetacean      \_\_\_\_\_ Crocodilian      \_\_\_\_\_ Chondrichthyan

---

# Station 12:

Identify the various plant fossils here.

\_\_\_\_\_ Calamites      \_\_\_\_\_ Metasequoia      \_\_\_\_\_ Annularia

**True or False:**

\_\_\_\_\_ *Glossopteris* leaf fossils have been found across much of North America.

---

# Station 13:

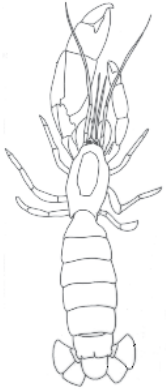
Identify the specimen best exemplifying the indicated type of fossilization:

\_\_\_\_\_ Internal mold      \_\_\_\_\_ Silicification      \_\_\_\_\_ External mold      \_\_\_\_\_ Permineralization

---

# Station 14:

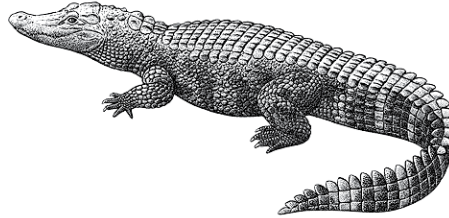
Match each of the animals pictured here with the letter of its most likely trace fossil in the tray.  
Note: the representations below are not to the same scale!



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_

---

# Station 15:

\_\_\_\_\_ Which habitat was the most likely for this specimen?

**A:** estuary    **B:** sandy beach    **C:** mountain stream    **D:** off-shore marine    **E:** dry land

**True or False:**

\_\_\_\_\_ Soft tissues of animals never fossilize.

\_\_\_\_\_ Fossils are rarely found in modern deserts.

\_\_\_\_\_ Fossils are never found in metamorphic rocks.

---

# Station 16:

Identify each of the fossil corals in this tray:

\_\_\_\_\_ *Favosites*    \_\_\_\_\_ *Hexagonaria*    \_\_\_\_\_ *Heliophyllum*    \_\_\_\_\_ *Septastrea*

---

# Station 17:

\_\_\_\_\_ Identify the trilobite specimen in this tray.

There have been several major extinction events in the past; the three most recent were at the end of the: **A:** Permian (~250 Ma), **B:** Triassic (~200 Ma), and **C:** Cretaceous (~65 Ma) (approximate times are millions of years ago). Indicate (by above letter) which extinction event is associated with the demise of each of these groups of animals:

\_\_\_\_\_ Conodonts    \_\_\_\_\_ Blastoids    \_\_\_\_\_ Eurypterids

---

# Station 18:

\_\_\_\_\_ Identify the stromatolite specimen in this tray.

## True or False:

\_\_\_\_\_ Stromatolites became extinct at the end of the Cretaceous Period.

\_\_\_\_\_ Stromatolites are a major constituent of the fossil record for about the first 3.5 billion years of life on earth.

\_\_\_\_\_ Developing techniques for distinguishing between biological and non-biological stromatolites is an active area of research in contemporary geology.

---

# Station 19:

Identify the three proboscidean genera pictured on these stamps:

\_\_\_\_\_ *Loxodonta*

\_\_\_\_\_ *Mammut*

\_\_\_\_\_ *Mammuthus*

\_\_\_\_\_ Which of these belong(s) to the Family Elephantidae?

**A:** None

**B:** X only

**C:** Y only

**D:** Z only

**E:** X & Y only

**F:** X & Z only

**G:** Y & Z only

**H:** X & Y & Z

---

# Station 20:

Identify the three dinosaurs pictured on these stamps:

\_\_\_\_\_ *Stegosaurus*

\_\_\_\_\_ *Allosaurus*

\_\_\_\_\_ *Parasaurolophus*

\_\_\_\_\_ In the diagram (lower right of picture) the group circled in red (Saurischia) is:

**A:** polyphyletic

**B:** paraphyletic

**C:** monophyletic

---

# Station 21:

The picture contains three artists' renderings (and the skeleton) of a famous dinosaur.

\_\_\_\_\_ What is it? **A:** *Deinodon* **B:** *Deinocheirus* **C:** *Deinonychus* **D:** *Deinosuchus*

## True or False:

\_\_\_\_\_ This animal lived during the Jurassic Period.

\_\_\_\_\_ It probably lived in a floodplain or swamplike habitat.

\_\_\_\_\_ It is considered to be a close relative of *Velociraptor*.

---

# Station 22:

Many remains of this large animal have been found in the United States; it was exhibited as a “sea serpent” in the middle of the 19<sup>th</sup> Century. Fill in the blanks in its (Linnaen) classification with the appropriate letter from the three possibilities listed to the right of each level.

Kingdom: Animalia

Phylum: Chordata

_____ Class	<b>A: Mammalia</b>	<b>B: Reptilia</b>	<b>C: Sauropsida</b>
_____ Order	<b>D: Squamata</b>	<b>E: Plesiosauria</b>	<b>F: Cetacea</b>
_____ Family:	<b>G: Elasmosauridae</b>	<b>H: Mosasauridae</b>	<b>I: Basilosauridae</b>
_____ Genus:	<b>J: <i>Tylosaurus</i></b>	<b>K: <i>Basilosaurus</i></b>	<b>L: <i>Elasmosaurus</i></b>

---

# Station 23:

There have been many significant discoveries and events in the history of paleontology. Associate each listed here with the most appropriate photograph in the tray.

_____ K-T Extinction	_____ Cuvier’s proof of extinction
_____ Burgess Shale	_____ The Bone Wars (Marsh vs Cope)

---

# Station 24:

Let’s say that a group A (of animals) is more successful than group B (symbolically  $A > B$ ) provided group A existed for a longer period of time than group B (but not necessarily simultaneously).

Rank the groups **W: Primates**, **X: Trilobites**, **Y: Dinosaurs**, and **Z: Brachiopods** from most successful to least successful.

Most \_\_\_\_\_ > \_\_\_\_\_ > \_\_\_\_\_ > Least \_\_\_\_\_

---

# Station 25:

Use the NC Geological Survey map found at this Station to decide if each of the following is **True or False**:

_____	If you travel west from Cape Lookout, the rock strata dip toward the west.
_____	The rocks exposed in Bladen County are the right age to contain mosasaur remains.
_____	Rocks exposed in Dare County are likely to have dinosaur remains.
_____	Beaufort County would be a better place to look for whale fossils than Franklin County.

---