Station 1

1. Indicate the method of preservation for each specimen. Choose from the following list:

    internal mold   *external mold*   actual remains

    carbonization   *mineral replacement*   *petrification*   *cast*

    trace fossil   *pseudofossil*   *impression*

2. Why are some organisms more likely to become fossils than others?

3. Give two other factors that lead to the preservation of fossils

Station 2:

4. Name the <u>class</u> or <u>common name</u> of this specimen.

5. What kind of rock is it preserved in?
   a. limestone   **b.** sandstone   **c.** shale   **d.** coal

6. What can you say about the environment of deposition?
   a. deep, quiet water
   b. shallow water, high energy environment
   c. muddy intertidal zone
   d. floodplain environment

7. The various species of this type of organism make excellent index fossils for fine divisions during which geologic era?
   a. Cenozoic
   b. Mesozoic
   c. Paleozoic
   d. Proterozoic

8. Why do these make such good index fossils?
   a. They are found over a wide area and the species existed for a short period of time
   b. They are found only in one kind of rock
   c. They lived everywhere and they existed for a long time
   d. They give us a lot of information about their mode of life

Station 3:

9. Identify this fossil

10. The fine layers of this fossil were formed by
    a. seasonal growth of a woody plant
    b. response to temperature variations in the climate
    c. burrowing animals
    d. cyanobacteria trapping fine sediment

11. Some of these are the only type of fossil from which geologic time?
    a. the Archean
    b. the upper Precambrian
    c. the Spencer Interglacial
    d. Hadean

12. Why did the numbers of these organisms decrease dramatically toward the end of that time?
    a. grazers evolved that preyed on them
    b. the environment they lived in began to disappear from Earth
    c. they could not adapt to changing environmental conditions
    d. they died, along with many other types of organisms, during a mass extinction

13. * These organisms (and others like them) contributed to a major change in the earth's environment. What change did they help create?
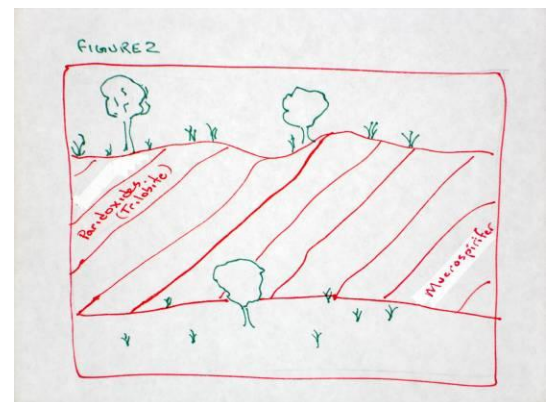
Station 4:

FIGURE 1

(88±7 my)

63±5 my
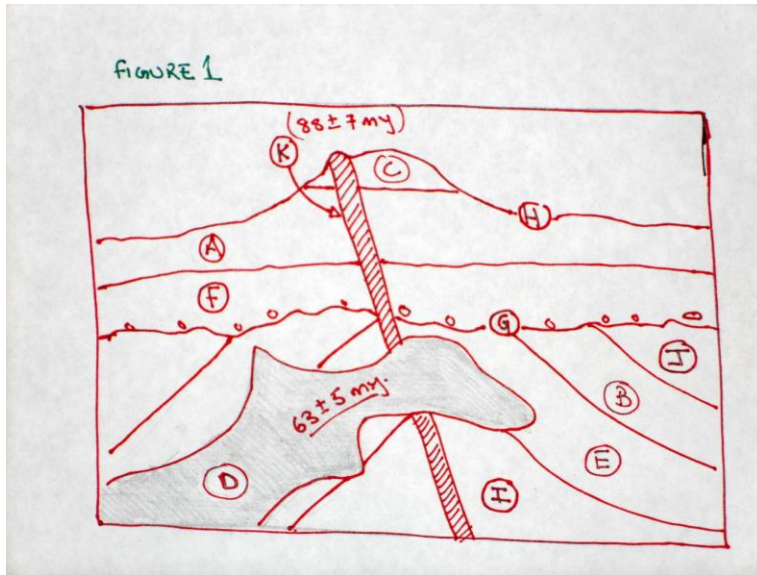
14. What is the relative age of rock layer A:

    a. it's older than 63 m.y. and younger than 88 my
    b. it's older than rock layer C and younger than 63 m.y.
    c. it's younger than layer F and older than C
    d. it's younger than 63 m.y.

15. Which is the order of events represented in this geologic cross section (figure 1) in

order from oldest to youngest?

    a. I E B J K G F A C D H
    b. I E B J D G L F A C H
    c. I E B J G F A C K D H
    d. K D I E B J G F A C H

16. You are studying the rocks exposed in a huge

cliff (figure 2). The upper rock layers have

fossils of the trilobite *Paradoxides*.   The

lower layers have fossils of *Mucrospirifer*.

What can you infer from these layers?

FIGURE 2

    a. *Mucrospirifer* is younger than
        Paradoxides
    b. this rock outcrop records a gradual
        shallowing of the sea
    c. the rock layers have been overturned by folding
    d. The environment of deposition remained the same for a long period of time

Station 5:

Match the description to the geologic time division. Write the letter of the description on the appropriate blank on your answer sheet.

DO NOT MARK THIS PAGE

Time division	Description
17. Permian period	**A.** First fossil evidence of blue-green algae
18. Silurian period	**B.** First dinosaurs appeared
19. Carboniferous period	**C.** First vascular plants appear on land
20. Mesozoic Era	**D.** Megafauna, neandertals, and the last ice age
21. Cenozoic Era	**E.** Ediacaran fauna
22. Devonian Period	**F.** Explosion of life occurs
23. Quaternary Period	**G.** Age of man
24. Jurassic Period	**H.** Archaeopteryx first appeared
25. Triassic Period	**I.** Ended with the K-T extinction
26. Paleozoic Era	**J.** Ended with the largest mass extinction event
27. Cambrian Period	**K.** Age of amphibians
28. Proterozoic Eon	**L.** Age of mammals
29. Pleistocene Epoch	**M.** Age of fishes
30. Archean Eon	**N.** Widespread coal swamps

Station 6

30. Give the genus of specimen A

31. Give the genus of specimen B

32. Of specimens A, B, and C, which two are most closely related?

33. By what reason are they more closely related?
    a. they were both squid-like organisms, while the other was snail-like
    b. they made their shells out of aragonite, while the other made calcite
    c. they were both nautiloid, while the other was ammonoid
    d. they were both ammonoid, while the other was nautiloid

34. In what way is the organism represented by specimen D different from other fossil cephalopods?
    a. they were free swimmers instead of benthic scavengers
    b. they had tentacles rather than pseudopods
    c. they had internal supports instead of external shells
    d. they made their shells out of chitin rather than carbonate

35. * What is the term for the white material on one side of specimen A?

Station 7:

36. Identify the genus of specimen A

37. Although it has a different name, specimen B is thought to be the same species as specimen A. What is the name of specimen B?

38. It is related to which modern organisms?
    a. horsetails
    b. club mosses
    c. lizards and snakes
    d. giant sequoia trees

39. How do the ancient species compare to the modern organism?
    a. they were much bigger
    b. they were much smaller
    c. they were found in much drier climates
    d. they reproduced by spores

Station 8

40. Identify the <u>class</u> of specimen A.

41. This class of organisms have a special mouth structure called a
    a. siphuncle
    b. mandible
    c. gastrolith
    d. radula

42. Identify the genus of specimen B

43. In what way are A and B similar?
    a. they are both types of snails
    b. they are both mollusks
    c. they are both filter feeders
    d. all of the above

44. Specimen C: What is the meaning of the hole in one of the valves?
    a. it is the anal pore
    b. it's for the pedicle
    c. the hole left by predation by another organism
    d. it's for the siphon

Station 9

A mastodon tooth

A mammoth tooth

45. Study the pictures of the mastodon and mammoth teeth. The teeth hint at a key difference between these two mammals. What is it?
    a. the mastodons were much smaller than mammoths
    b. mastodons were grazers, while mammoths were browsers
    c. mastodons were browsers, while mammoths were grazers
    d. mastodons and mammoths represent an example of convergent evolution from very different ancestors

46. Mammoths had relatively small ears. What is the most likely reason for this?
    a. their large trunks could make a loud bellow, which was easy to hear
    b. one function of large ears is to regulate temperature, and this wasn't necessary for creatures that lived in fairly cold climates
    c. large ears would have been easily damaged when sparring with other mammoths with large tusks
    d. the ears were vestigial; mammoths were deaf

47. Which of the following was a major factor in the extinction of these animals?
    a. sharp cooling of the climate
    b. part of mass extinctions because of asteroid impact
    c. competition for resources with other animals
    d. predation by smaller mammals

48. * What is one way scientists might be able to use new technologies to learn MUCH more about mammoths?

Station 10

49. Identify the genus of the three models A, B, and C

50. Two of these dinosaurs are closely related. Which one doesn't belong? Why?

51. Identify model D

52. What basic structural difference distinguishes this reptile from A, B, and C?

53. Imagine that you are reading a story in which a fearsome *Tyrannosaurus* is stalking a large but gentle *Plateosaurus* as it browses on the foliage of trees. What inaccuracy in this story would cause you to throw down the book in disbelief?

    a. they lived in totally different environments
    b. they lived at different times
    c. the *Plateosaurus* was simply too big for even the *T-rex*
    d. the *Plateosaurus* was not a browser

Station 11

54. You have 4 specimens. Which one doesn't belong?

55. The group of 3 is from which phylum?

56. The oddball is from which phylum?

57. Specimen A represents only one part of the organism. What growth form did it actually share with specimen D?

58. These organisms were all benthic, sessile, and colonial. What does this tell us about their mode of life?
    a. they lived in groups, attached to the bottom of the ocean
    b. they lived in symbiosis with other organisms as they foraged on the sea floor
    c. they lived in groups near the shore in clear, warm water
    d. rafts of these organisms floated freely in deep water

Station 12

59. These fossils all belong to which phylum?

60. To which class does specimen A belong?

61. Give the class and genus of B

62. Look at specimen C. Although they are animals, modern species of these organisms are called _____

63. * What is specimen D?

Station 13

Radiometric dating:

64. What is a half-life?
    a. half of the time it takes a parent radioactive element to decay
    b. the midpoint in the life of an organism
    c. the midpoint in the duration of a species
    d. the time it takes for half of the original quantity of daughter atoms to decay
    e. the time it takes for half of the original quantity of radioactive atoms to decay

65. Which type of rock is best for radiometric dating?
    a. chalk
    b. granite
    c. schist
    d. coal
    e. black shale

*Use the worksheet on your answer form to help you
answer the following questions.*

The (fictitious) radioisotope ^{123}X decays to ^{123}Y with a half-life of 100 million years.

A shale bed containing a fossil was cross-cut by an igneous dike, which was found to contain a $^{123}X/^{123}Y$ ratio of 1/3 .

(Assume that the dike contained no ^{123}Y when it originally formed.)

66. How many half-lives have passed?

67. What is the age of the dike?

68. What can be said of the age of the mystery fossil?

69. *Why is ^{14}C a poor choice for dating most geologic samples?

Station 14

70. Identify the genus of sample A.

71. The transverse internal partitions present in this specimen help in its identification. What are these partitions called?

72. Identify the genus of sample B.

73. Identify specimen C.

74. What are the partitions within the theca of this sample called?

75. The name of the phylum to which these organisms belong refers to a distinguishing characteristic that they all possess. What is that characteristic?
    a. they all capture prey with venomous cells
    b. they all are small, colonial organisms
    c. they have both sessile and medusa forms
    d. they are filter feeders

76. Give three inferences about the paleoenvironment where these fossils lived.
    e. marine, turbid, shallow
    f. marine, shallow, clear
    g. marine, abyssal, warm
    h. lacustrine, warm, turbid

Station 15

* Speed ID: Identify samples A - J