

Skills Worksheet

# Directed Reading

## Section: Determining Relative Age

1. How old is Earth estimated to be?

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2. Who originated the idea that Earth is billions of years old?

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3. On what did the 18th-century Scottish physician and farmer base his conclusions?

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### UNIFORMITARIANISM

4. What did James Hutton conclude?

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5. What is the principle of uniformitarianism?

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6. In what way is the principle of uniformitarianism important to the science of geology?

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7. How did later geologists refine Hutton's ideas?

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8. Before Hutton, what two things did people believe about the age and geology of Earth?

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9. What question did Hutton's principle of uniformitarianism raise?

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Directed Reading *continued*

10. What did Hutton observe about the forces that changed the land on his farm?

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11. How did Hutton's observations and conclusions influence other scientists?

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12. What is one way to learn about Earth's past?

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**RELATIVE AGE**

\_\_\_\_\_ 13. Layers of rock are called

- a. strata.
- b. data.
- c. errata.
- d. pages.

\_\_\_\_\_ 14. The order of rock layers reveals

- a. the type of rock in the layers.
- b. the relative age for each layer.
- c. the exact years in which each layer formed.
- d. periods of volcanic activity.

\_\_\_\_\_ 15. Relative age indicates

- a. the true age of the rock layers.
- b. that all rock was formed at the same time.
- c. the amount of erosion in a rock layer.
- d. that one rock layer is older or younger than another layer.

\_\_\_\_\_ 16. Although various types of rock form layers, what type of rock is commonly used by scientists to determine the relative ages of rocks?

- a. igneous rock
- b. metamorphic rock
- c. sedimentary rock
- d. superheated rock

Directed Reading *continued***LAW OF SUPERPOSITION**

- \_\_\_\_\_ 17. Sedimentary rocks form when
- lava flows from volcanoes at different periods of volcanic activity.
  - new sediments are deposited on top of old layers of sediment.
  - magma is injected into older rock from Earth's core and then cools.
  - rivers erode igneous rocks and wind forms the edges into layered shapes.
- \_\_\_\_\_ 18. Layers of compressed and cemented sediments are called
- beds.
  - leaves.
  - shelves.
  - sheets.
- \_\_\_\_\_ 19. What is a bedding plane?
- single sediment bed
  - dark-colored layer of sediment
  - light-colored layer of sediment
  - boundary between two rock beds
- \_\_\_\_\_ 20. The law of superposition helps scientists determine the
- relative age of a layer of sedimentary rock.
  - true age of a layer of sedimentary rock.
  - composition of a layer of sedimentary rock.
  - rate at which a layer of sedimentary rock will erode.

**PRINCIPLE OF ORIGINAL HORIZONTALITY**

- \_\_\_\_\_ 21. In what kinds of layers does sedimentary rock generally form?
- vertical
  - horizontal
  - circular pools
  - rippled curves
- \_\_\_\_\_ 22. What can scientists assume when sedimentary rock layers are not horizontal?
- The rock layers have been tilted or deformed.
  - The rock layers are not actually sedimentary.
  - The rock layers have been eroded.
  - The law of superposition is incorrect.

Directed Reading *continued*

- \_\_\_\_\_ 23. What causes sedimentary rock layers to be tilted or deformed?
- a. erosion by water
  - b. lava flows from volcanoes
  - c. movements of Earth's crust
  - d. the weight of new layers of sediment

- \_\_\_\_\_ 24. When sedimentary rock is tilted or deformed, scientists know that crustal movements occurred
- a. while lava was flowing.
  - b. before the rock layers were formed.
  - c. while the rock layers were forming.
  - d. after the rock layers had formed.

25. In what cases is it difficult to apply the law of superposition?

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26. When sedimentary rock layers have been tilted or deformed, what must scientists do before they can apply the law of superposition?

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27. What is graded bedding?

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28. What can scientists assume if larger particles are in the top of a layer of sedimentary rock?

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29. When sandy sediments form beds at an angle to the bedding plane, what are the sedimentary layers called?

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30. Why do the layers in cross-beds appear to be curved at the bottom and cut off at the top?

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Directed Reading *continued*

31. Why do scientists study the shapes of cross-beds?

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32. What are ripple marks, and how are they formed?

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33. What can scientists assume if ripple marks in sedimentary rock point up?

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34. How do scientists use ripple marks to determine the relative ages of rocks?

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**UNCONFORMITIES**

- \_\_\_\_\_ 35. How are buried rock layers exposed to erosion?
- a. They are lifted up by changes in weather.
  - b. They expand when Earth's climate warms.
  - c. They are lifted up by movements of Earth's crust.
  - d. Buried layers are never exposed to erosion.

- \_\_\_\_\_ 36. An unconformity shows that
- a. erosion occurs all the time.
  - b. deposition stopped for a period of time or rock may have been removed by erosion before deposition resumed.
  - c. an area was underwater.
  - d. volcanic action increased at one time.

Directed Reading *continued*

- \_\_\_\_\_ 37. Which of the following is NOT a type of unconformity?
- discontinuity
  - disconformity
  - nonconformity
  - angular unconformity
- \_\_\_\_\_ 38. According to the law of superposition, what is the age relationship of rocks on either side of an unconformity?
- All rocks beneath an unconformity are younger than the rocks above it.
  - All rocks at the boundary of an unconformity are the same age.
  - All rocks beneath an unconformity are older than the rocks above it.
  - The age relationship between rocks at an unconformity cannot be determined.
- \_\_\_\_\_ 39. How does a nonconformity form?
- Unstratified igneous or metamorphic rock is folded, tilted, then eroded.
  - Unstratified igneous or metamorphic rock is uplifted, eroded, and is then covered by new igneous or metamorphic rock.
  - Stratified rock is buried beneath unstratified igneous or metamorphic rock when a volcano erupts.
  - Unstratified igneous or metamorphic rock is uplifted, eroded, and then sediments are deposited on the eroded surface.

**In the space provided, write the letter of the description that best matches the term or phrase**

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|--------------------------------|---|
| _____ 40. unconformity         | a. accumulation of sediments  |
| _____ 41. deposition           | b. the boundary between older layers of sedimentary rock and overlying younger layers     |
| _____ 42. angular unconformity | c. break in the geologic record showing that deposition stopped for a long period of time |
| _____ 43. erosion              | d. natural force that can cause breaks in the geologic record                             |
| _____ 44. nonconformity        | e. boundary between stratified rock on top of unstratified rock                           |
| _____ 45. disconformity        | f. the boundary between a set of tilted layers and a set of horizontal layers             |

**Directed Reading *continued***

46. What can happen when rock layers have been disturbed by faults or intrusions?

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47. What is a fault?

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48. Explain how an intrusion forms.

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49. What law do scientists apply to determine relative ages of rock when they find faults or intrusions?

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50. Explain the law of crosscutting relationships.

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51. What is the relative age of a fault or igneous intrusion that cuts through an unconformity?

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