Earth Science Practice

Use this key to check answers and read the explanations.

1. What kind of rock forms when molten rock cools and solidifies?
   A. Igneous rock
   B. Sedimentary rock
   C. Metamorphic rock
   D. Loose sediment
   Correct answer: A. Igneous rock
   Igneous rock forms from a melt. The melt can cool underground as magma or at the surface as lava.

2. Which rock usually forms when sand grains are compacted and cemented together?
   A. Slate
   B. Basalt
   C. Sandstone
   D. Granite
   Correct answer: C. Sandstone
   Sandstone is a sedimentary rock made predominantly of sand-sized grains that have become bound together.

3. Existing rock forms new minerals under high heat and pressure while remaining solid. What process does this describe?
   A. Melting
   B. Metamorphism
   C. Deposition
   D. Erosion
   Correct answer: B. Metamorphism
   Metamorphism changes an existing rock in the solid state. Heat and pressure can change the minerals and the rock's texture.

4. Of Earth's four main layers, which is the outermost?
   A. Inner core
   B. Mantle
   C. Outer core
   D. Crust
   Correct answer: D. Crust
   The crust lies at the surface. Beneath it are the mantle, outer core, and inner core, in that order.

5. What does the term epicenter identify on an earthquake map?

A. The underground point where the earthquake starts
B. The point on Earth's surface directly above where the earthquake starts
C. The seismic station that records the largest waves
D. The point on the surface farthest from the source

Correct answer: B. The point on Earth's surface directly above where the earthquake starts
The underground starting point is called the hypocenter. The epicenter is the surface point directly above it.

6. Two bodies of molten rock have similar compositions. One cools slowly underground, and the other cools quickly at the surface. Which is expected to have larger mineral crystals?

A. The rock that cooled slowly underground
B. The rock that cooled quickly at the surface
C. Both always have identical crystal sizes because their compositions are similar
D. Neither forms crystals because both started molten

Correct answer: A. The rock that cooled slowly underground
Slow cooling leaves more time for mineral crystals to grow. Rapid cooling tends to produce smaller crystals or glass.

7. An undisturbed stack of sedimentary rock has sandstone at the bottom, limestone in the middle, and shale on top. Which layer was deposited first?

A. All three were deposited at the same time
B. The limestone
C. The shale
D. The sandstone

Correct answer: D. The sandstone
In an undisturbed sequence, younger beds accumulate on top of older ones. The lowest bed was laid down first.

8. A sedimentary rock consists mainly of rounded, gravel-sized pebbles cemented together. Which rock name fits that description?

A. Sandstone
B. Breccia
C. Conglomerate
D. Shale

Correct answer: C. Conglomerate
Conglomerate forms when rounded gravel-sized fragments become cemented together.

9. Which observation describes weathering by itself?

A. A rock splits into pieces that stay where it broke.
B. A stream carries loose pebbles downstream.
C. Wind carries sand away from a dry patch.
D. A stream drops sand on its bed as the water slows.

Correct answer: A. A rock splits into pieces that stay where it broke.
Weathering breaks down material in place. Transport moves sediment away, and deposition happens when transported sediment settles.

10. A seismic station can identify both the direct P wave and the direct S wave from one earthquake. Which wave arrives first, and why?

A. The S wave, because the station is at the surface
B. The S wave, because it travels faster
C. Both arrive together because they started together
D. The P wave, because it travels faster

Correct answer: D. The P wave, because it travels faster
P waves travel faster than S waves through solid rock, so the P wave appears earlier in the record.

11. A fictional outcrop has sandstone below shale in an undisturbed stack. A sheet of igneous rock called a dike cuts both beds. Erosion truncates the beds and the dike, and limestone lies on the eroded surface. What is the order of the four rock units from oldest to youngest?

A. Dike, sandstone, shale, limestone
B. Sandstone, dike, shale, limestone
C. Sandstone, shale, dike, limestone
D. Sandstone, shale, limestone, dike

Correct answer: C. Sandstone, shale, dike, limestone
The two original beds formed from bottom to top. The dike cuts both, so it is younger than both. Erosion cut off the dike before limestone accumulated on top.

12. Two fictional rock beds contain fossils of the same species, buried as each bed formed. The species was widespread and lived for only a short interval. Which conclusion is supported by those fossils?

A. Both beds have the same exact age in years.
B. The beds may represent roughly the same time interval.
C. Both beds must contain the same minerals.
D. The two fossil beds must have been next to each other when they formed.

Correct answer: B. The beds may represent roughly the same time interval.
A widespread species with a short time range can link beds from different places to about the same interval. An exact age in years would require different evidence.

13. Sand is the most common grain-size class in four fictional samples. A has 18 sand grains out of 24, B has 26 out of 40, C has 22 out of 25, and D has 25 out of 32. Which sample has the largest share of sand?

A. Sample D
B. Sample A
C. Sample B
D. Sample C

Correct answer: D. Sample C
Compare shares of each sample. A is 75%, B is 65%, C is 88%, and D is about 78%. C is the most concentrated in the sand size class.

14. Four fictional stations record the same earthquake. Each timer starts separately. The P and S times in seconds are A (41, 50), B (17, 30), C (54, 61), and D (28, 39). In a model where a longer S-minus-P gap means greater distance, which station is farthest?

A. Station B
B. Station A
C. Station C
D. Station D

Correct answer: A. Station B
Subtract the P time from the S time at each station. The gaps are 9, 13, 7, and 11 seconds for A through D. B has the longest gap.

15. A model labels Earth's four main layers A to D from the surface inward. In layer C, compressional P waves can travel but shear S waves cannot propagate as shear waves. Which label fits both the position and the wave behavior?

A. Liquid mantle
B. Solid outer core
C. Liquid outer core
D. Liquid inner core

Correct answer: C. Liquid outer core
Layer C is the third main layer down, below the crust and mantle. A liquid can carry compressional P waves, while shear S waves require shear rigidity. That pattern supports a liquid outer core.