

PART I
Total Value: 60%

Instructions: Shade the letter of the correct answer on the computer scorable answer sheet provided.

1. What is a proposed explanation that requires testing to determine its validity?
 - (A) hypothesis
 - (B) law
 - (C) paradigm
 - (D) theory

2. Which branch of science studies the atmosphere and atmospheric phenomena?
 - (A) hydrology
 - (B) meteorology
 - (C) seismology
 - (D) volcanology

3. Who provided information that allowed the heliocentric model to replace the geocentric model?
 - (A) Anaxagoras
 - (B) Aristotle
 - (C) Copernicus
 - (D) Ptolemy

4. What geologic principle suggests the top layer of a sedimentary sequence is the youngest?
 - (A) cross-cutting relationships
 - (B) original horizontality
 - (C) superposition
 - (D) unconformities

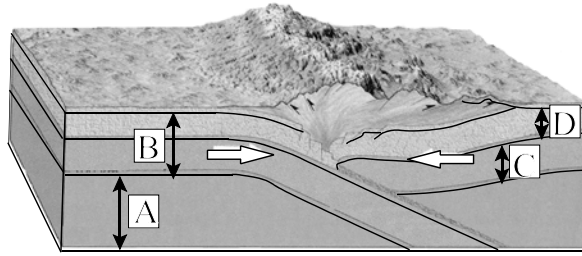
5. Which refers to annual sedimentary deposits in a glacial lake where seasonal changes occur?
 - (A) growth rings
 - (B) nonconformities
 - (C) turbidity currents
 - (D) varves

6. The age of a rock was found to be 2.1 billion years old using uranium-235 dating (half life 0.7 billion years). What was the original amount of parent material in the rock if there are now 20 g remaining?
 - (A) 2.5 g
 - (B) 40 g
 - (C) 60 g
 - (D) 160 g

7. How does the density of Earth's crust compare to the density of the mantle and outer core?
 - (A) greater than mantle, greater than outer core
 - (B) greater than mantle, less than outer core
 - (C) less than mantle, greater than outer core
 - (D) less than mantle, less than outer core

8. Which reservoir contains the greatest percentage of water on Earth?
- (A) atmosphere
 - (B) glaciers
 - (C) groundwater
 - (D) oceans
9. Which best describes the outer core of Earth?
- (A) liquid
 - (B) plastic
 - (C) rigid
 - (D) solid
10. Which refers to the upper limit of ground water?
- (A) cone of depression
 - (B) water table
 - (C) zone of aeration
 - (D) zone of saturation
11. Which is characteristic of a good aquifer?
- (A) non porous and impermeable
 - (B) non porous and permeable
 - (C) porous and impermeable
 - (D) porous and permeable
12. Which condition is needed for a surface well to produce a continuous supply of water throughout the year?
- (A) It has to reach above the zone of aeration.
 - (B) It has to reach above the zone of saturation.
 - (C) It must pass below impermeable, solid bedrock.
 - (D) It must pass below the lowest level of the water table.
13. Which was the major cause of Earth's atmosphere changing from its original composition?
- (A) chemosynthesis
 - (B) evaporation
 - (C) melting
 - (D) photosynthesis
14. Which layers of the atmosphere decrease in air temperature with increasing altitude?
- (A) mesosphere and stratosphere
 - (B) mesosphere and troposphere
 - (C) thermosphere and stratosphere
 - (D) thermosphere and troposphere
15. Which are characteristics of life?
- (A) growth, crystallization, and absorption
 - (B) growth, metabolism, and reproduction
 - (C) metabolism, crystallization, and absorption
 - (D) metabolism, crystallization, and reproduction

16. Which layer best indicates the lithosphere?



- (A) A
- (B) B
- (C) C
- (D) D

17. Which is a negatively charged particle in an atom?

- (A) electron
- (B) neutron
- (C) nucleus
- (D) proton

18. Which elements make up the largest percentage of Earth's crust?

- (A) aluminum and iron
- (B) iron and calcium
- (C) oxygen and silicon
- (D) silicon and aluminum

19. Which is a mineral?

- (A) basalt
- (B) coal
- (C) granite
- (D) gypsum

20. Which formula is matched to the correct mineral group?

- (A) Fe_2O_3 - oxide
- (B) FeS_2 - sulfate
- (C) Fe_2SiO_4 - carbonate
- (D) FeSO_4 - sulfide

21. Which property is best to distinguish between halite and calcite?

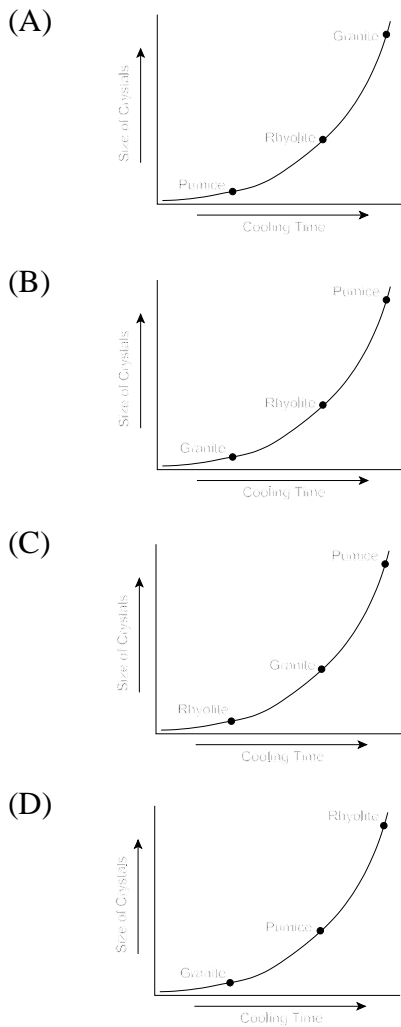
- (A) cleavage
- (B) colour
- (C) lustre
- (D) streak

22. Which refers to the colour of a mineral in its powdered form?

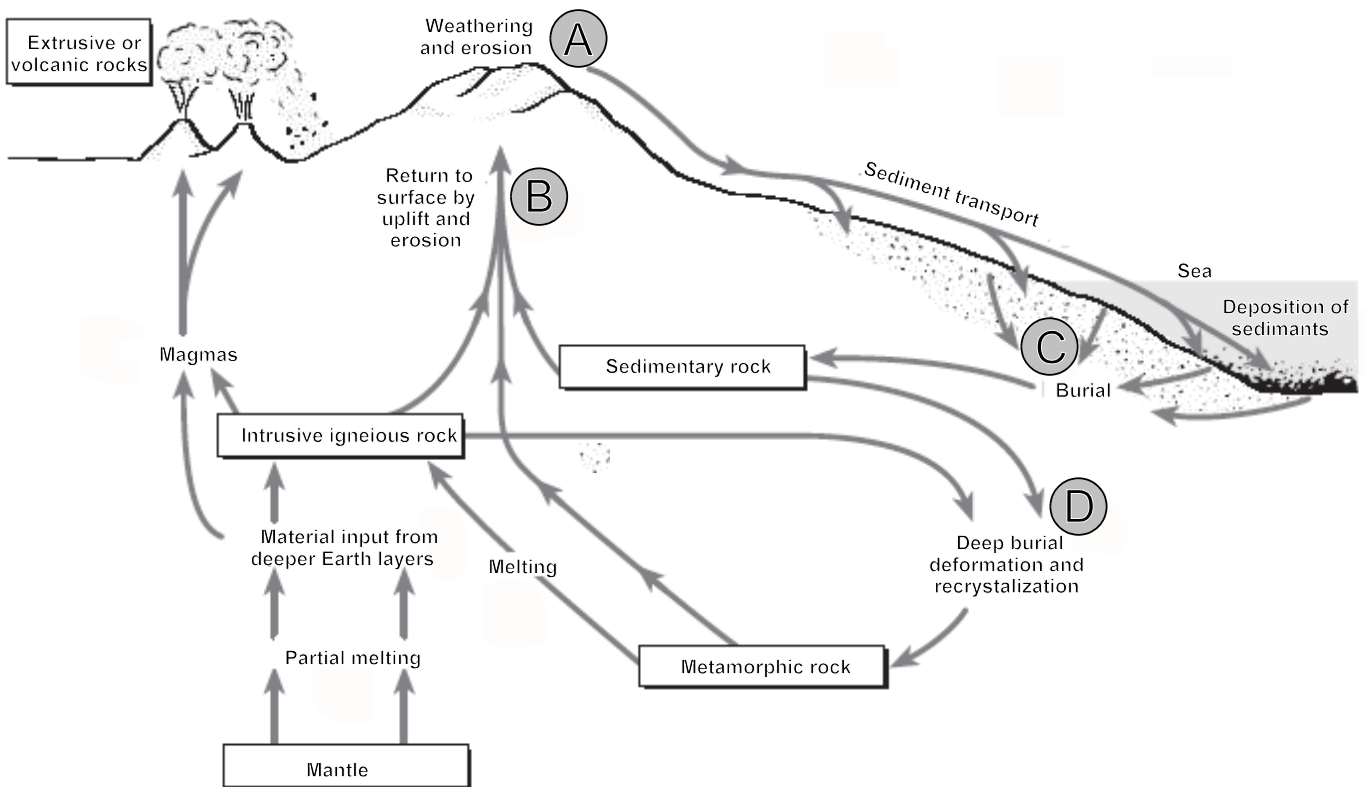
- (A) cleavage
- (B) hardness
- (C) specific gravity
- (D) streak

23. What is the chemical symbol for potassium?
- (A) Ar
 - (B) K
 - (C) P
 - (D) Po
24. Which compares the weight of a mineral to the weight of an equal volume of water?
- (A) crystal form
 - (B) fluorescence
 - (C) hardness
 - (D) specific gravity
25. Which mineral would be considered hardest according to Mohs hardness scale?
- (A) calcite
 - (B) fluorite
 - (C) gypsum
 - (D) quartz
26. Which rock type forms after granite melts and then solidifies?
- (A) clastic
 - (B) igneous
 - (C) metamorphic
 - (D) organic
27. Which two rocks have the most similar mineral composition?
- (A) granite and gabbro
 - (B) limestone and basalt
 - (C) marble and rhyolite
 - (D) quartzite and sandstone
28. Which is a chemical sedimentary rock?
- (A) conglomerate
 - (B) limestone
 - (C) sandstone
 - (D) shale
29. What information do glacial striations provide to geologists?
- (A) direction of glacial movement
 - (B) exact date of glaciation
 - (C) speed of the glacier
 - (D) thickness of the ice sheet
30. Which moraine indicates the furthest advance of a glacier?
- (A) lateral
 - (B) medial
 - (C) recessional
 - (D) terminal

31. Which graph below correctly shows the relative positions of granite, rhyolite, and pumice based on the cooling time of magma and the size of crystals produced?

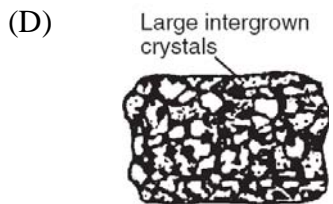
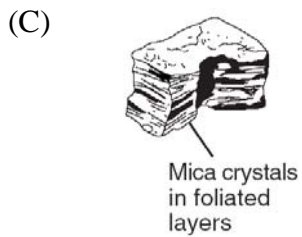
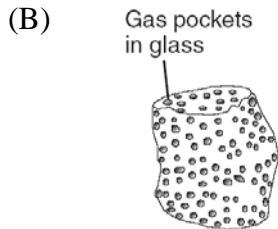
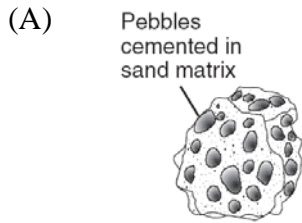


32. Which letter in the diagram below indicates where lithification is occurring?

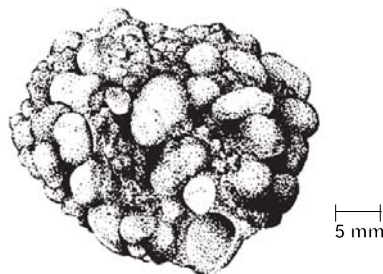


- (A) A
- (B) B
- (C) C
- (D) D

33. Which sample most probably formed directly from lava cooling quickly at Earth's surface?

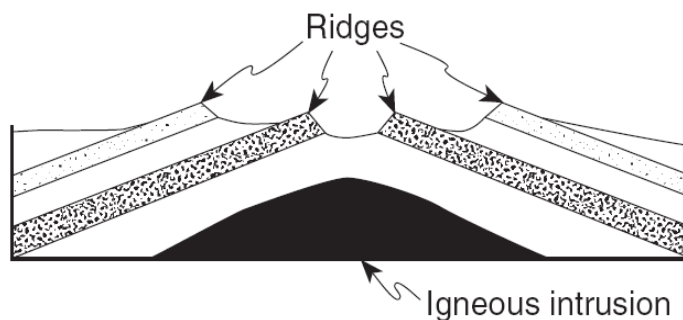


34. Which agent of erosion shaped the particles that formed the rock below?



- (A) glacial ice
- (B) mass movement
- (C) running water
- (D) wind

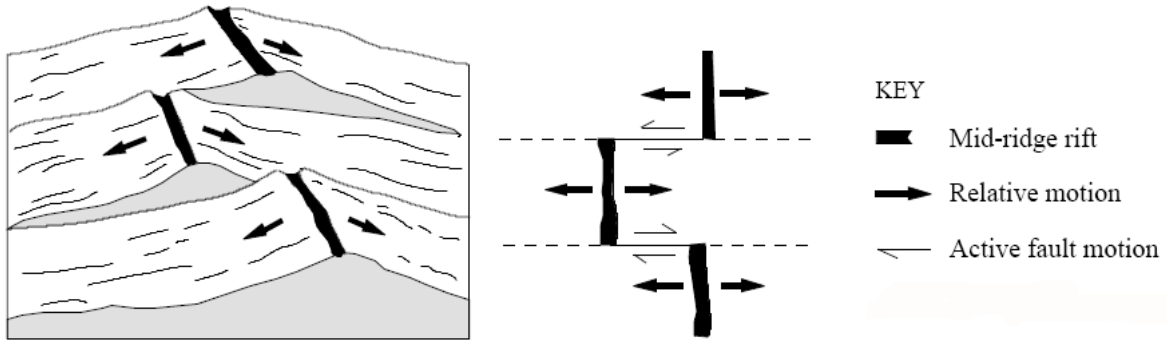
35. Which best describes the cause of the ridges below?



- (A) More deposition occurred at the ridge sites after uplift.
- (B) Some rock layers were more resistant to weathering and erosion.
- (C) The igneous intrusion flowed over the surface.
- (D) The rock layers were evenly weathered.

36. Which results from the metamorphism of limestone?
- (A) gabbro
 - (B) gneiss
 - (C) marble
 - (D) schist
37. Which metamorphic rock forms under the lowest temperature and pressure conditions?
- (A) gneiss
 - (B) phyllite
 - (C) schist
 - (D) slate
38. Which most likely causes convection currents in the mantle?
- (A) cooling effects of sea water
 - (B) density of continental rocks
 - (C) friction between plates
 - (D) temperature differences
39. Why is all oceanic crust younger than 200 million years?
- (A) It is constantly being created at mid-ocean ridges.
 - (B) Older oceanic crust has been subducted beneath oceanic trenches.
 - (C) Plate tectonics did not commence until the early Jurassic.
 - (D) Some oceanic crust has been uplifted into mountain ranges.
40. Where does a folded mountain range form?
- (A) continental-continental plate collisions
 - (B) divergent plate boundaries
 - (C) oceanic-oceanic plate collisions
 - (D) volcanic island arcs
41. How were the Hawaiian Islands formed?
- (A) continental intraplate volcanism
 - (B) divergence of two continental plates
 - (C) divergence of two oceanic plates
 - (D) oceanic intraplate volcanism
42. Which plate boundary has crust neither created nor destroyed?
- (A) convergent
 - (B) divergent
 - (C) subducting
 - (D) transform
43. Which part of a stream's load is carried along the bottom of a stream?
- (A) bed
 - (B) dissolved
 - (C) invisible
 - (D) suspended

44. Which type of faults are shown in the diagram below?



- (A) normal
- (B) reverse
- (C) thrust
- (D) transform

45. Which type of fault occurs in a compressional environment?

- (A) normal
- (B) reverse
- (C) strike-slip
- (D) transform

46. Which scientist developed the theory of Continental Drift?

- (A) Alfred Wegener
- (B) Arthur Holmes
- (C) James Hutton
- (D) Tuzo Wilson

47. Which accounts for the sudden release of a large amount of energy during an earthquake?

- (A) crustal folding
- (B) elastic rebound
- (C) fault creep
- (D) seismic waves

48. What are the differences in the arrival times of P and S waves at a seismograph station used to determine?

- (A) amount of damage
- (B) distance from the epicenter
- (C) intensity of energy released
- (D) when the next earthquake occurs

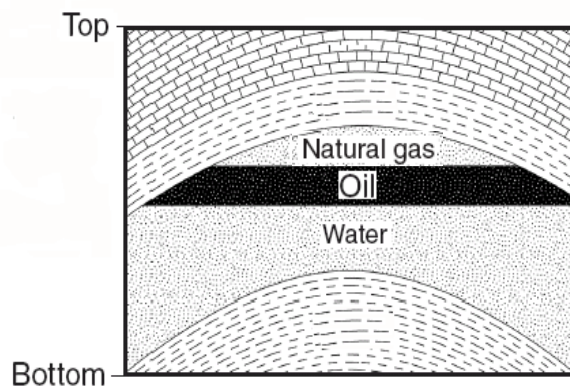
49. Which is an example of a trace fossil?

- (A) carbon outlines of plant fossils
- (B) insects preserved in amber
- (C) mineral replacement in ancient trees
- (D) trilobite tracks and trails

50. Which geological time frame is known as the “age of mammals”?

- (A) Cenozoic
- (B) Mesozoic
- (C) Paleozoic
- (D) Precambrian

51. In the diagram, below oil and water are trapped within the top of the sandstone and do not move upward through the shale. Which property of shale accounts for this?



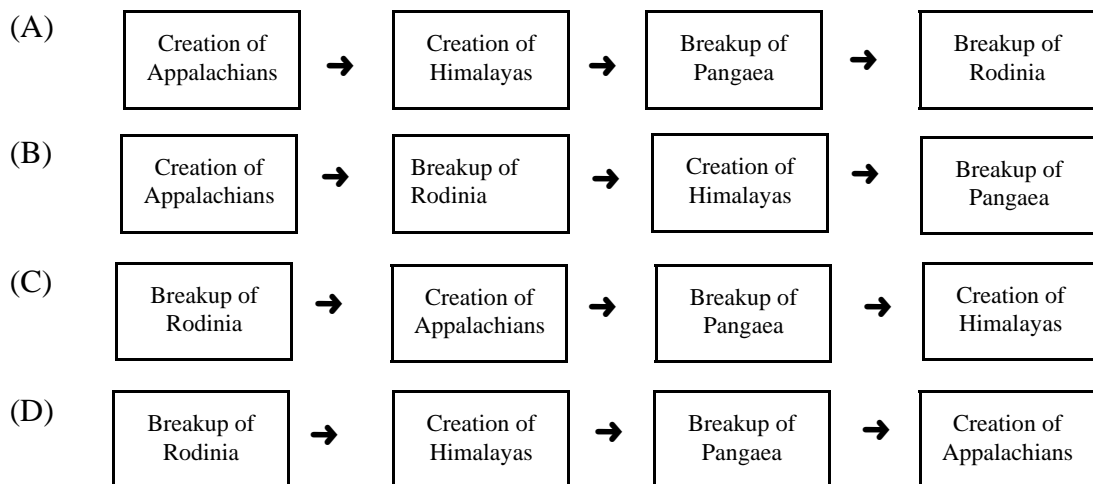
- (A) larger particles
 (B) larger pore spaces
 (C) less foliation
 (D) lower permeability
52. A coral fossil most likely indicates which type of environment?
- (A) deep ocean
 (B) dessert
 (C) forest
 (D) marine shelf
53. Why is radiometric dating more precise than superposition when determining a rocks age?
- (A) Radioactive decay occurs at a constant rate.
 (B) Some sedimentary layers may be very large.
 (C) The amount of material can be measured relatively.
 (D) The rate that wind redistributes sediments is constant.
54. Which type of coal is correctly matched with its rock type?

Coal	Rock type
(A) anthracite	igneous
(B) anthracite	sedimentary
(C) bituminous	igneous
(D) bituminous	sedimentary

55. Which process is correctly matched with the atmospheric change it causes?

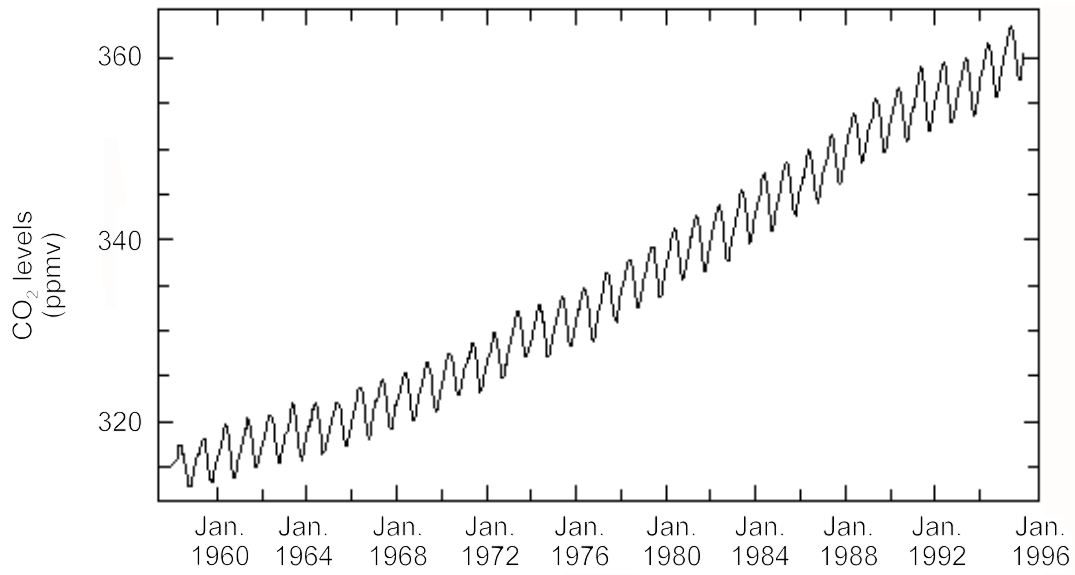
Process	Atmospheric change
(A) photosynthesis	increases nitrogen
(B) photosynthesis	decreases oxygen
(C) respiration	increases nitrogen
(D) respiration	decreases oxygen

56. Which area on the island of Newfoundland is thought to have been a part of present day Africa?
- (A) central
(B) eastern
(C) northern
(D) western
57. Which best supports the concept of sea floor spreading?
- (A) new rocks form closest to the oceanic ridge
(B) new rocks form furthest from the oceanic ridge
(C) old rocks are destroyed closest to a transform fault
(D) old rocks are destroyed furthest from a transform fault
58. Which rock would most likely contain fossils?
- (A) granite
(B) quartzite
(C) schist
(D) shale
59. Which term supports the idea that mass extinctions will continue to occur in the future?
- (A) catastrophism
(B) correlation
(C) superposition
(D) uniformitarianism
60. Which is the correct order of events in Earth's history?



Value

2% 62.(b) Refer to the graph below to answer questions (i) and (ii).



(i) Describe short term changes in CO₂ levels within a single year.

(ii) Describe long term changes in CO₂ levels over the thirty year period.

2% (c) Describe how Earth's interior separated into its layers.

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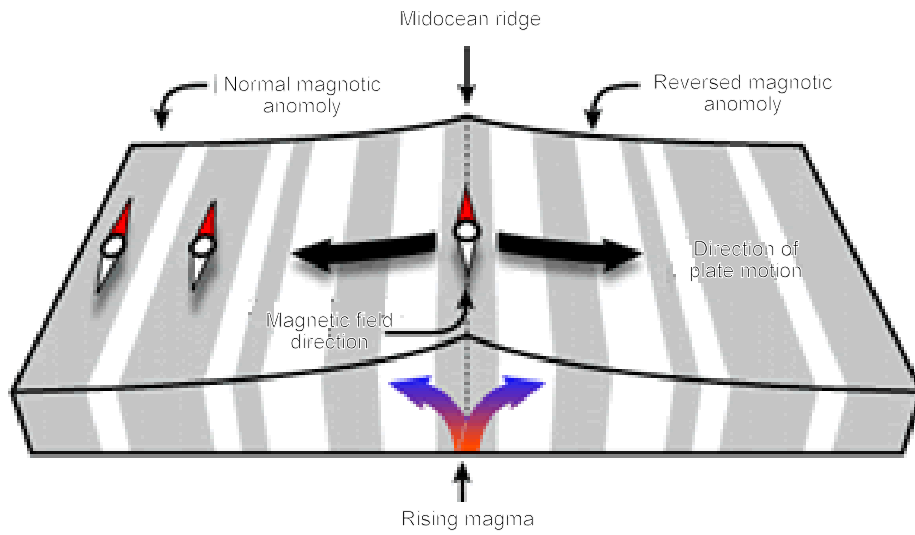
2% 63.(g) Use an example to show how the texture seen in a metamorphic rock is different than the rocks they formed from?

2% (h) Draw a typical shield volcano and describe the properties of the lava that produces this type of volcanic cone.

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63.(i) How do the magnetic stripes on the ocean floor below support seafloor spreading?



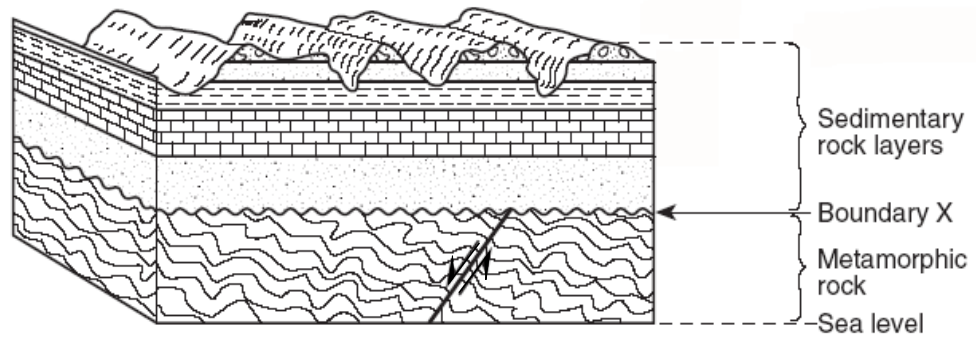
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(j) Describe the process involved in the formation of an economic mineral deposit associated with a large igneous intrusion.

Value

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63.(m) Describe two stages which resulted in the formation of boundary “X” in the diagram below.



2%

64. If the organism below gets buried after it dies, describe the most common method by which fossilization would occur.