

117 Ways to Pass the Earth Science Midterm Exam!

Prologue

1. The #1 Tested Item EVERY Year is reading graphs and charts (3 questions per year) Know it!
2. Inferences are conclusions or predictions based on observations
3. Instruments extend our senses to make observations
4. Know Scientific Notation. - 345,876 --> 3.45×10^5
5. Use Percent Error Formula on Front of ESRT's and the Rate of Change Formula
6. Cyclic Relationships repeat and are predictable (ex Moon Phases, Tides, Seasons)
- 7. Practice Reading Graphs and Charts \swarrow direct Δ indirect \searrow
8. As Temperature Increases, Density Decreases
- 9. As Temperature Increases, Volume Increases
10. As Pressure Increases, Density Increases
11. The same objects have the same density NO MATTER WHAT SIZE
12. Water is most dense at 4°C in the liquid form
13. Everything else is most dense in the solid form
14. For objects with densities less than 1, the lower it is the higher it floats
15. The higher the density over 1, the faster it sinks
16. Use the Density Formula in the ESRT's
17. As population increases, pollution increases, water quality decreases
18. Earth Science consists of Astronomy, Meteorology, and Geology



% Dev.
Density
MASS
VOL.

Planet Earth

19. The true shape of the earth is an oblate spheroid
- 20. Bulging Equator, Flattened at the poles
21. Look like a perfect sphere from space, only SLIGHTLY oblate
22. The altitude of Polaris equals your latitude—Pittsford's latitude is 43° North
23. Always, Always look North to see Polaris, hence North star
24. Polaris is only special because it is in line with the earth axis of rotation
25. Lithosphere is the solid land part of the earth
- ↖ 26. Hydrosphere is the liquid water part of the earth
- ↖ 27. Atmosphere is the gas portion, broken down into 4 layers
- 28. Use the ESRT chart for questions on Atmospheric properties p11 and p14
29. Latitude lines run horizontal across like the Equator, labels are degrees North or South
30. Longitude lines run up and down, labels are East and West of the Prime Meridian
31. Astrolab is used to measure the altitude of a star above the horizon
32. Pointer stars in the big dipper point to Polaris
- 33. Time zones are separated by 15° degrees of longitude based on Earth's Rate of Rotation
34. Going to the west (California) time gets earlier, going east it gets later (London)
35. Isoline is a line connecting points of equal value (Isobars - pressure, Isotherm - temperature)
36. Contour lines connect points of equal elevation above sea level
37. Contour Interval - amount between adjacent contour lines, Ocean is sea level 0'
- ↖ 38. Study your ESRT.
- ↖ 39. Lines close together --> steep gradient, water goes downhill and opposite bends in contour lines
- ↖ 40. Use Gradient Formula in ESRT, use contour interval to determine highest elevation of hills
- ↖ 41. Do a practice Profile, which is a side view of a topographic cross section, draw Isolines too!

Rocks, Minerals, and Natural Resources

42. Minerals are solid, naturally occurring, inorganic (not living) substances.
43. There are over 2000 known minerals but only 12 are commonly found
44. Most rocks are made from a few of those 12 minerals I just mentioned
45. Oxygen and Silicon are the two most abundant which form a pyramid shape. Tetrahedron
46. Almost all rocks contain minerals
47. Mineral properties hardness, cleavage, & crystal shape -based on the internal arrangement of atoms
48. Color is not a good way to ID a mineral b/c some minerals come in lots of colors like quartz

- 49. Streak is the powdered form of a mineral, as found by using a streak plate
50. Cleavage is flat sides on a mineral, minerals break along planes of weak bonding
51. The origin of the rock determines if it is a SED rock, IGN rock or MET rock
52. Use the Rock Cycle Chart in the ESRT to see how each of the 3 rock types form
53. Texture or crystal size in Igneous rocks is determined based on rate of cooling
54. Fast cooling --> glassy or fine texture where slow cooling --> coarse crystals (big)
55. USE ESRT Charts for all rocks, if you don't understand them, you better ask somebody!
56. Clastic Sedimentary rocks are classified based on grain size (shale vs. sandstone)
57. Sedimentary Rocks form 3 ways, Compaction & Cement, Organically, Chemically
58. Chemically formed Sed rocks form from evaporating seawater, leaves behind evaporates
59. Sedimentary Rocks are the only ones with fossils in them
60. Key words for Metamorphic rocks are; foliation, re-crystallize, distorted structure, INC density
61. Nonrenewable resources include fossil fuels (coal, petroleum, natural gas) and metals

Plate Tectonics and Earthquakes

62. Earthquake is the sudden movement along a fault, usually happens at plate boundaries
63. P waves are fastest waves, can go through anything, they go faster through more dense layers
64. S waves are slowest, move in S motion, cannot go through liquids (outer core)
65. We infer the outer core is liquid and the inner core is solid based on seismic data
66. One seismic station can determine the distance to the epicenter -longer time lag = further away
67. A minimum of 3 are needed to determine the epicenter location (Big circles = far distance)
68. USE ESRT to determine travel times and earthquake origin times (one question per year)
69. Ocean Crust - High Density (in ESRT), Young Age, Thin, made of Basalt. Continental Crust
Low Density, Old Age, Thick (think Mt. Everest) made of Granite
71. The core of the earth is thought to be Iron and Nickel based on Meteorite data
72. Most Earthquakes and Volcanoes are found together along Plate Tectonic Boundaries *prep!*
73. Tsunamis (tidal wave) caused by underwater earthquake, better run fast!
74. Proof of Continental Drift - Continents fit together, fossils/rocks/mtns. all match up along coasts
75. Divergent Boundary (Ridge, Spreading Center) where magma come up through the sea floor, new ocean floor is created at mid ocean ridges. Age of rock increases with distance from the ridge
76. Convergent Boundary (Subduction zone) where two plates collide, the more dense plate will go beneath the continental plate. Two continents collide = Mt. Everest (Himalayas)
77. Transform Boundary - Plates slide past each other - San Andreas Fault
78. Plates move due to Convection Currents in the Mantle
79. Hot spot - mantle plume through the middle of a plate, like Hawaii or Iceland
80. Use Plate Tectonic Map in the ESRT - Know Examples of Boundaries (one every year)

Weathering, Erosion, Deposition, and Landscapes

81. Physical Weathering - breaking down of a rock into smaller pieces
82. Best example of Physical Weathering is frost action (climate = temperature changes and wet)
83. Collisions of rock particles carried by a stream is called abrasion
84. Chemical Weathering - changes the chemical composition of the rock, best example is rust
85. Climate for chemical weathering is Warm and Wet (Humid)
- 86. Soil - mixture of weathered rock and organic remains that covers bedrock
87. As organic material increases (bugs) soil thickness increases, Organics are on top layer of soil
88. Running water is the #1 form of erosion on earth (erosion is the moving of sediments)
89. The velocity of a stream -?- as the slope -?-. As the (amt of water) discharge inc, velocity inc
90. Water flows fastest in the center of a river also on the outside parts of curves
91. Rocks become smaller and rounder in a stream due to abrasion (in V-shape valleys)
92. Smallest particles (clay) carried by solution and suspension
93. Glaciers carve U-shaped valley's, deposit Unsorted sediments, scratch rocks, leave numerous lakes, deposit erratics (large boulders), glaciers advance from the north, formed Long Island, left sand and gravel, flows like a river, need cold global temps *fill, moraine*
94. Gravity is the force responsible for the agents of erosion

*Rock
Striations*

95. Deposition -an agent of erosion slows down and can no longer transport sediments

96. As roundness -?-, rate of Dep -?-, as density -?-, rate of Dep -?-, as size -?-, rate of Dep -?-

97. Large particles have a high settling rate but a low settling time

98. Know your vertical and horizontal sorting!

99. Longshore drift moves sand along the beach in the direction of the ocean current

→ 100. Use the Stream Velocity vs Particle Size graph in ESRT

100 Jetties prevent sand from moving along the beach

101 A landscape is determined by the climate, bedrock, and geologic structures

102 Mountains have high relief, igneous or metamorphic rock, built along plate boundaries

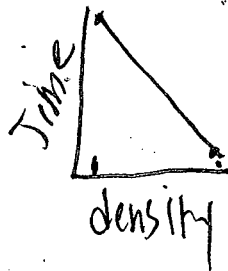
→ 103 Plateau's are medium elevation horizontal sedimentary rock, with river carved V-Shaped valleys

104 Plains are flat, low relief, sedimentary rock, and have meandering streams

105 Arid Climates-dry, steep slopes, -?- erosion; Humid climates rounded hills, wet, -?-erosion

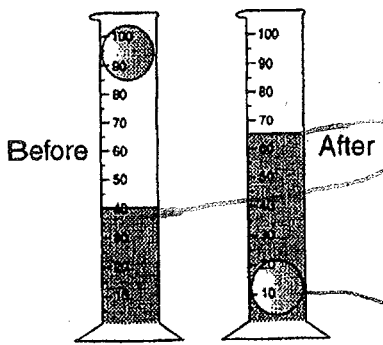
106 Use Landscape Region and NYS Map in ESRT (1-2 Questions per year on this skill)

107 Radial pattern rivers for Mtns., Random pattern for plains, plateaus rivers flow in valleys

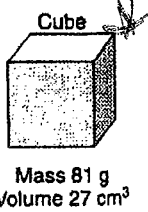


Surface
area
more
weathers
faster

The following four samples are composed of the same material. The only difference is the size and the shape of each of the samples. Use the following pictures to answer questions 1-6.



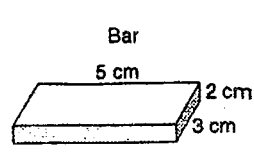
65
40
25



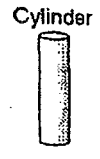
Mass 81 g
Volume 27 cm³



Mass 75 g
Volume ?

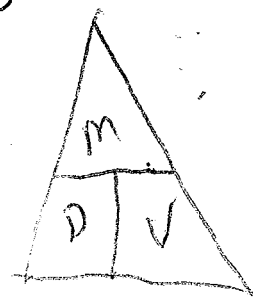


Mass 90 g
Volume ?



Mass 60 g
Volume 20 cm³

SHOW WORK HERE

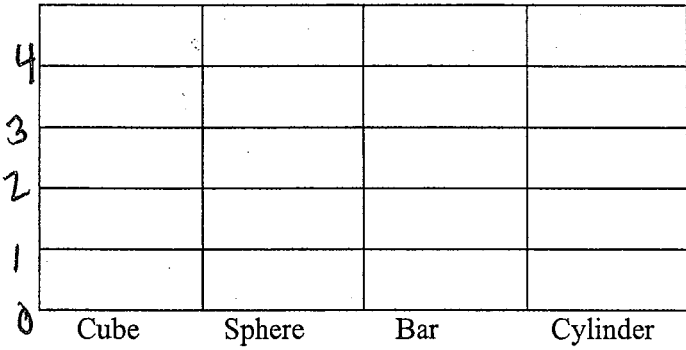


$m = d \times V$
 $V = \frac{m}{d}$
 75%

1. What is the volume of the sphere? 25
2. What is the density of the cube? 3
3. What is the volume of the bar? 30
4. A second student measured the volume of the bar to be 35 cm³, what is her percent error? 75%
5. What is the density of the bar? 3 g/cm³
6. Make a bar graph to show the densities of the four samples

$\frac{90}{30}$

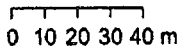
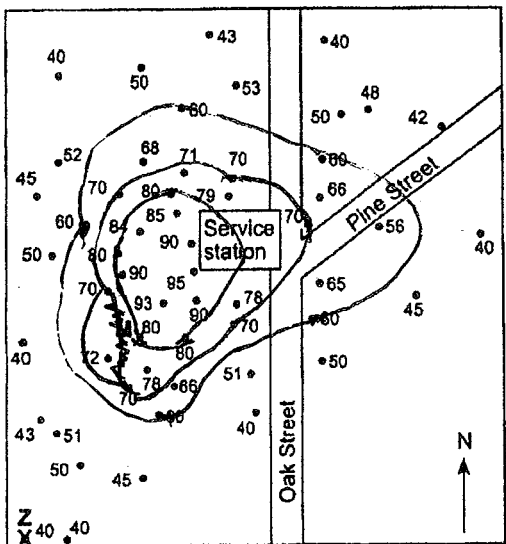
Density (g/cm³)



$\frac{35-20}{20}$

Use the following picture to answer questions 7-10.

Area Map



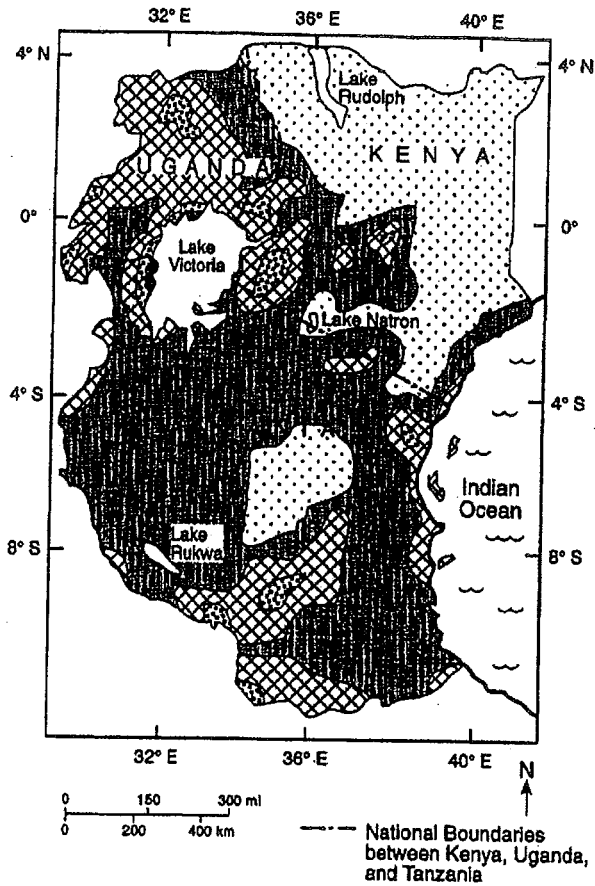
Key
• Well

7. Connect isolines for 60 ppm, 70 ppm and 80 ppm.
8. If this were a gasoline leak, what corner of the service station is the tank located? SW
9. What type of soil would the gasoline infiltrate the quickest in? Sandy topsoil
10. Determine the gradient from M to Z.

Equation $\frac{80-40}{70} = \frac{40}{70} = 57\%$

Substitute and answer

$\% \text{ DW} = \frac{0-9}{a} \times 100\%$

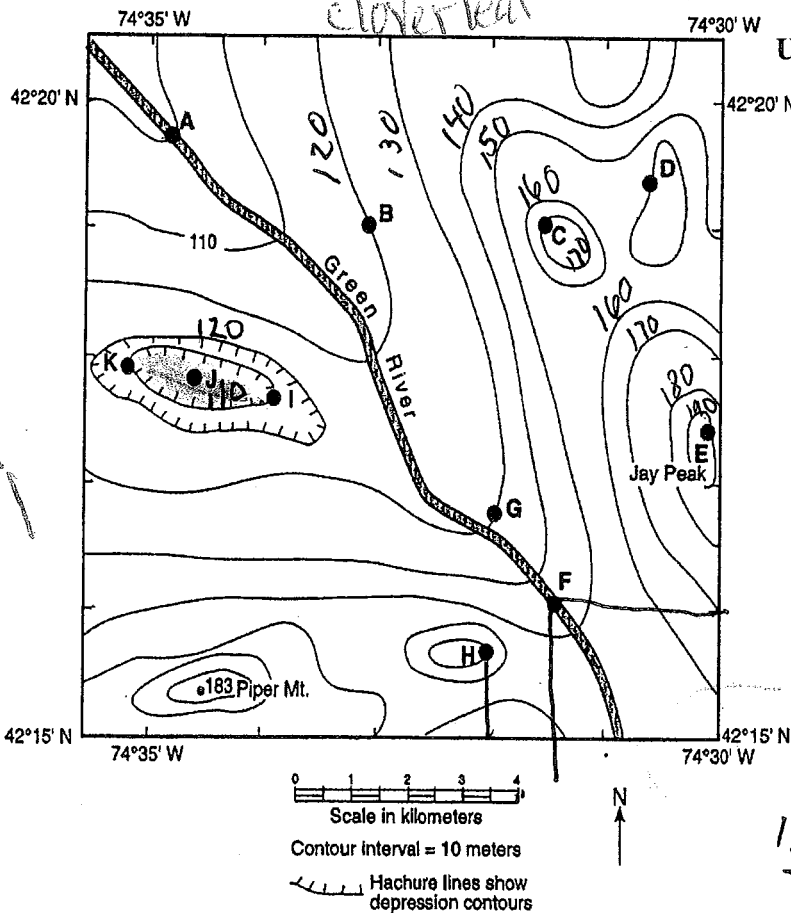


Use the map to the left to answer questions 11-13.

- Use the latitude and longitude to determine what continent the map is from? Africa
- What is the approximate latitude and longitude of Lake Natron? 3°S 36°E
- What is the approximate distance between Lake Natron and Lake Rukwa?

Miles 450
 Km 800

*lat 1st
 long 2nd
 compass*



Use the map to the left to answer questions 14-21.

- What is the elevation of C? 170
- Highest elevation of Jay Peak is 199
- Possible elevation of J? 101
- Approximate latitude of point F. 42°16'N
- Approximate longitude of point H. 74°32'W
- Latitude and longitude of point K. 42°18'N 74°35'W
- What other point has the same elevation as point C? H
- Determine the gradient from point A to point G. Show all work including the formula.

*109
 101*

$$\frac{130 - 100}{10} = \frac{30}{10} = 3 \text{ m/km}$$

22. Fill in the following sedimentary rock chart using the following words:
 Rock Salt Conglomerate Limestone Sandstone

TABLE OF COMMON SEDIMENTARY ROCKS

	NAME	PARTICLE SIZE
ROCKS FORMED FROM FRAGMENTAL MATERIAL	SANDSTONE	COARSE (particles easily visible)
	Sandstone	MEDIUM (separate particles visible)
	SHALE	FINE (separate particles not visible)
	NAME	MINERAL COMPOSITION
ROCKS FORMED FROM CHEMICAL PRECIPITATES	Limestone	CALCITE (separate particles not visible)
	CHERT	QUARTZ (separate particles not visible)
	Rock Salt	SALT (halite; may have large crystals)

conglomerate

23. Use the following chart to name the specific rock.

	Coarse Grained		Fine Grained	
	Rock A	Rock B	Rock C	Rock D
Mineral	Percent of Rock	Percent of Rock	Percent of Rock	Percent of Rock
Quartz	40	0	0	0
Pyroxene	0	25	0	70
Plagioclase feldspar	20	0	60	10
Potassium feldspar	20	0	0	0
Biotite	10	0	17	0
Hornblende	10	0	23	3
Olivine	0	75	0	17

- a. Rock A could be granite
- b. Rock B could be gabbaro
- c. Rock C could be Rhyolite
- d. Rock D could be basalt

pegmatite
peridot
quartz
coral
soria

24. Fill in the chart using the following words: *Some words may be used twice.*

Intrusive Extrusive Basalt Gabbro Pyroxene and Feldspar Quartz and Feldspar

Table II: Igneous Rocks

Rock	Description	Minerals in Rock	Method of Formation
Granite	Light colored, gray to pink	T	Intrusive
Pumice	Light gray	Feldspar and quartz	Ex
gabbaro	Dark colored, gray to black, coarse grained	Feldspar and pyroxene	Intrusive
basalt	Dark colored, fine grained		Extrusive
Obsidian (volcanic glass)	Dark colored	Feldspar and quartz	Ex

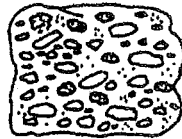
Use the following pictures to answer questions 25-31.



BASALT



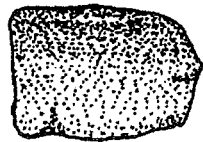
GNEISS



CONGLOMERATE



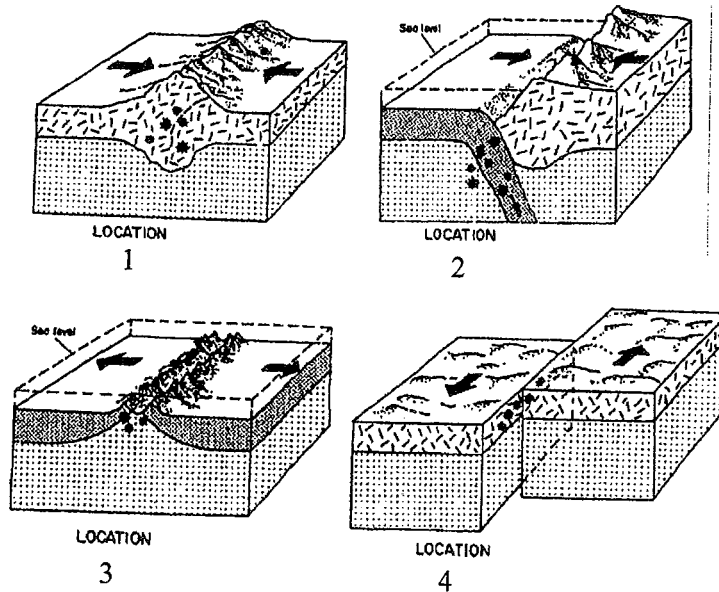
GRANITE



SANDSTONE

25. Which sample has the largest range in particle size? conglomerate
26. Which sample shows banding? gneiss
27. Which sample formed from MAFIC lava? basalt
28. Which sample formed from FELSIC magma? granite
29. What is the range of particle size in a sample of sandstone? .006-.2
30. In which two samples will there ~~never~~ be fossils? sandstone and congl.
31. Which samples could contain fossils? Never gneiss and granite

Use the following plate boundaries to answer questions 32-36.



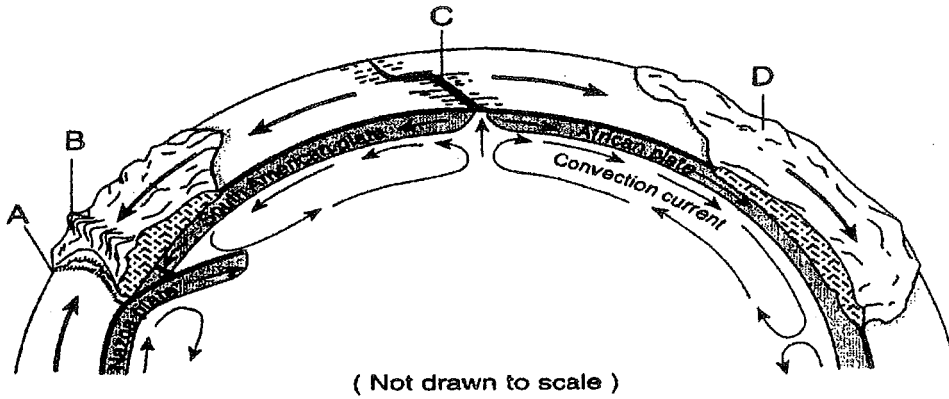
*oceanic
cont.*

32. Specifically name a boundary that location 3 could be. div.
33. Specifically name a boundary that location 4 could be. transform
34. Specifically name a boundary that location 2 could be. convergent
35. On location 3 label the youngest bedrock.
36. How does oceanic crust compare to continental crust in thickness, age and composition.

↓ *thin*
more dense

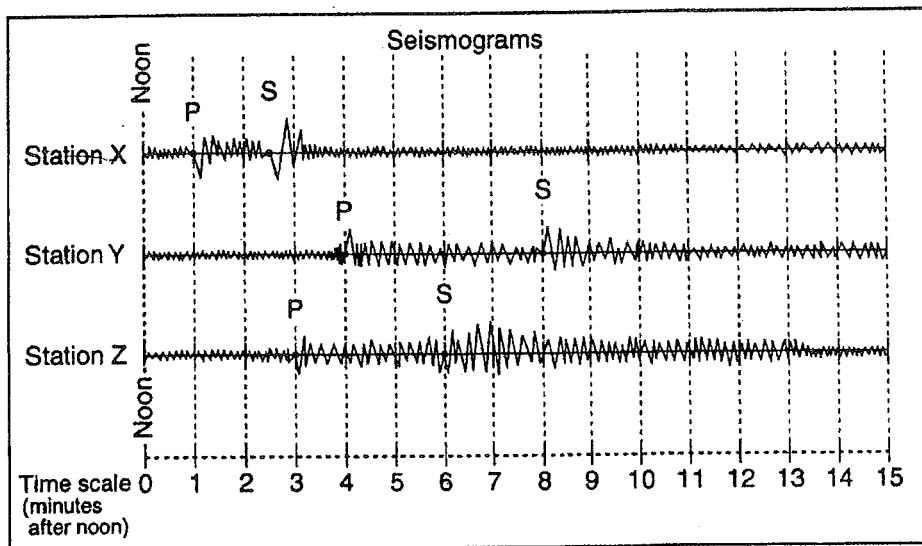
↓ *thick*
less dense

Use the following picture to answer questions 37-40.



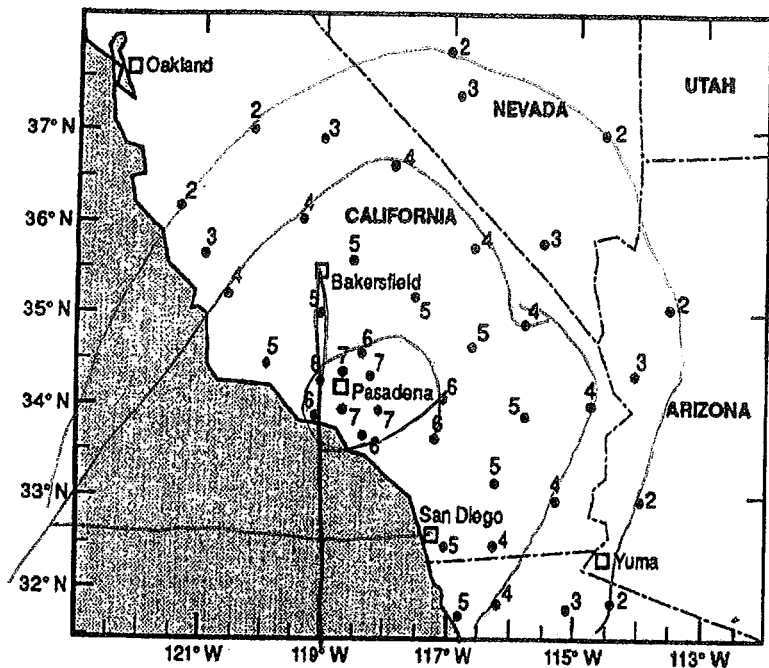
37. Which letter represents the youngest ocean floor? C
38. What is located at position A? trench
39. What is located at position B? MTS.
40. What causes the plates to move? Convection cells

Use the following seismographs to answer questions 41-45.



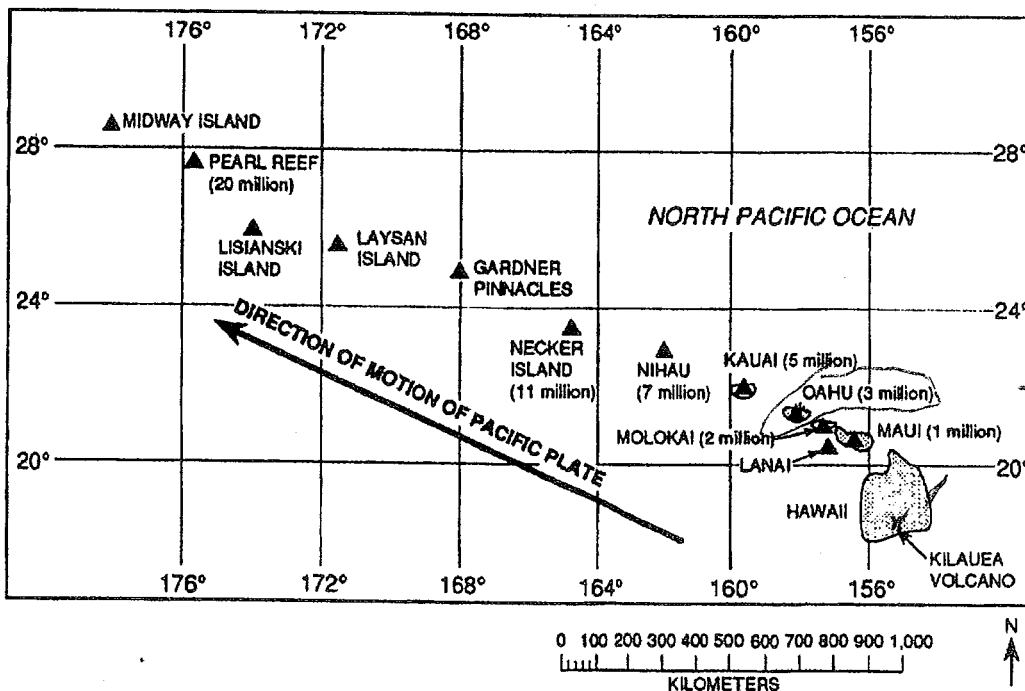
41. Which station is closest to the epicenter? X
42. Which station is the farthest from the epicenter? Y Explain.
43. Exactly what time did the P-wave arrive at station Z? 3
44. Exactly what time did the S-wave arrive at station Z? 6
45. Determine the distance between station Z and the epicenter. 3min 1800

Use the map to the left to answer questions 46-50.



46. Connect the isoseismal lines for 3, 5 and 7.
47. Longitude of Bakersfield is 119°W
48. Latitude of San Diego is 32°30'N
49. Where is the epicenter of this earthquake located? Pasadena
50. How did you know this?

Use the map of Hawaii to answer questions 51-52.



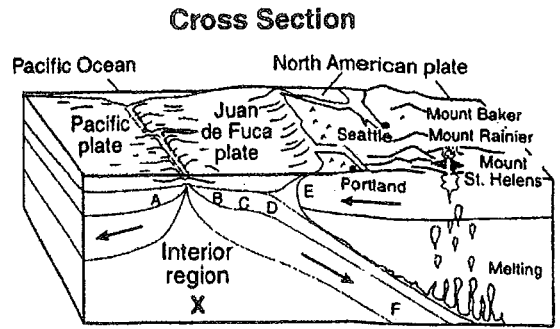
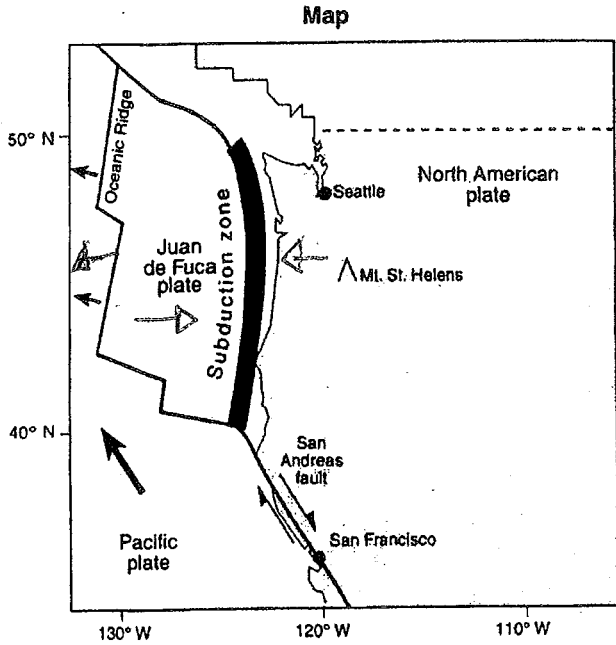
51. What is the latitude and longitude of Kauai? 22°N 159°W

52. Determine the rate of crustal movement between Oahu and Kilauea. Show all work including formula. *The answer will be in km/millions of years.*

450
3 million
~~1500~~

150 Kilometers
mi. year

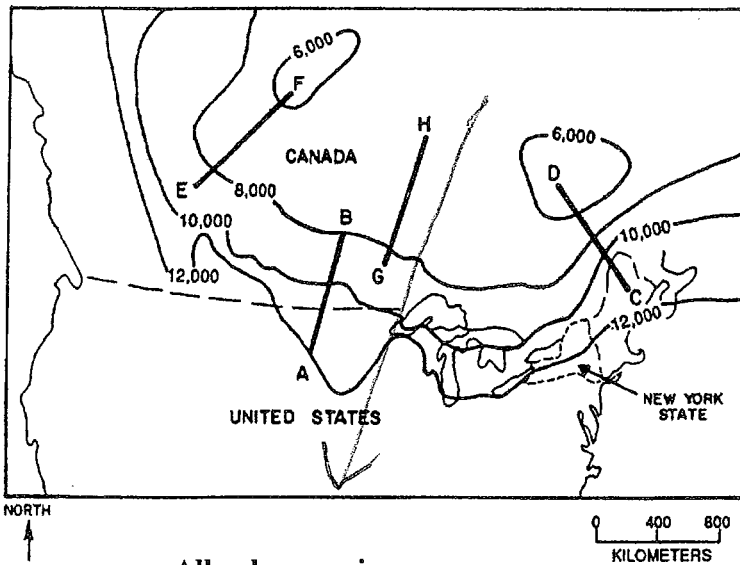
Use the maps to answer questions 53-54.



53. On the diagram to the left, draw an arrow on the Juan de Fuca plate to show its movement.

54. Explain why San Francisco is so susceptible to earthquakes.

Use the following map to answer questions 55-57.



All values are in years

54. Approximately how many years ago was most of New York State covered with glacial ice? 11,000 - 12,000

55. What is the general direction of ice movement? _____

56. Describe what the soil and the bedrock would look like after a glacier passes over the area.

unsorted moraine - unsorted

57. Calculate the rate of change from point A to B? Answer will be km/year

Formula:

Substitute:

Answer: