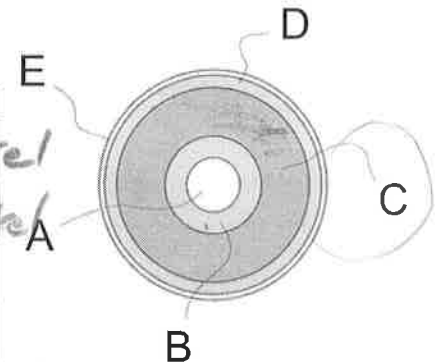


**Part 1: Properties of Mafic and Felsic Materials:**

1.	Mafic Material	Felsic Material
Provide an example of a rock of this type.	Basalt	Granite
Describe its density (more or less)	More Dense	Less Dense
Describe its viscosity (runniness) when it is molten.	Runny	Gooney
Where can this be found? List <u>two</u> different types of location for each.	Ocean Crust Mantle	Continental Crust Sediment
Describe its appearance (shade/color)	Dark	Light
Describe the effect of this type of lava/magma on the shape of a volcano.	Low, round "shield cone"	Steep "Composite cone"
Describe the effect of this type of lava/magma on the eruptions of a volcano.	Gentler	More Explosive

**Part II: Earth Layers and Internal Heat**

2. Letter	Name of Layer	Describe the material in this layer.
A	Inner Core	Solid Iron + Nickel
B	Outer Core	Liquid Iron + Nickel
C	Lower Mantle	Hot, Flowing Rock
D	Upper Mantle	Same
E	Crust (Lithosphere)	Rock (solid)



3. Why is the inside of the Earth hot? Provide **two** reasons.

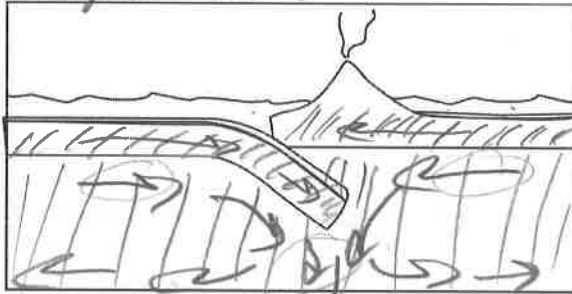
- Friction from dense material sinking to Earth's core during formation
- Pressure
- Radioactive Rocks
- Collisions during formation

**Part III: Plate Tectonics**

4. Add all of the following to each of the diagrams below.

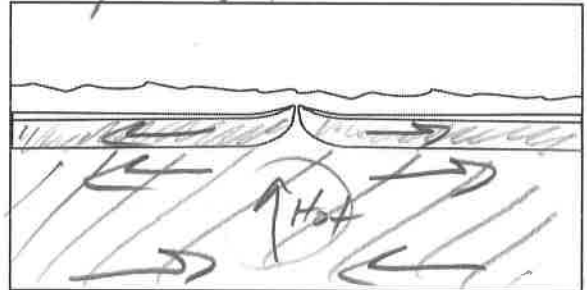
- ✓ a. Arrows showing the direction of plate movement
- b. Arrows showing circulation of the mantle and any other mantle currents
- c. The name of the tectonic feature
- d. Labels showing especially hot or cool parts of the mantle
- e. Correct shading of the plates, mantle, and sediment

O/O Conv.

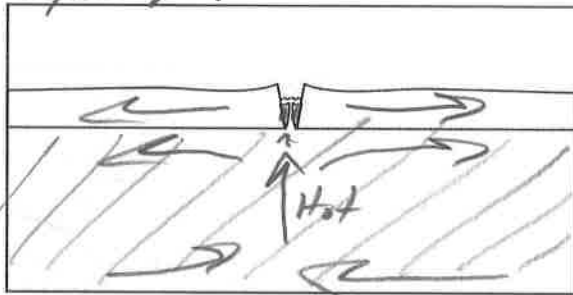


cool

O/O Div.



C/C Div



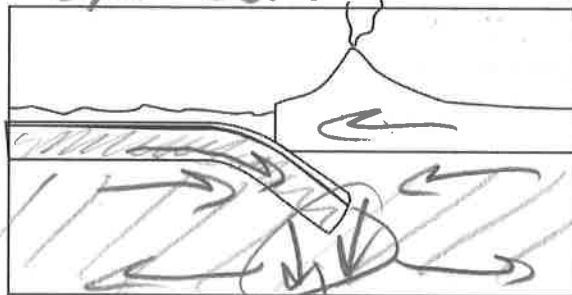
Hot

Ocean Hotspot



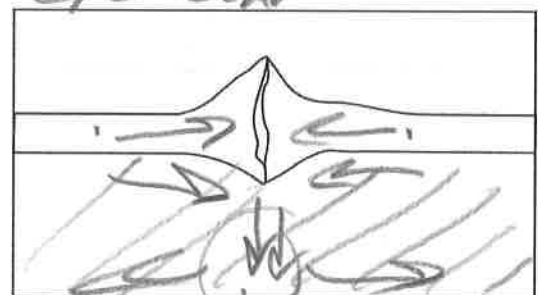
Hot

O/C Conv.



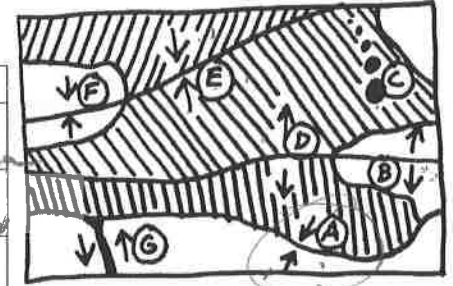
cold

C/C Conv.



cold

5. Use the map on the right to complete the table.



Letter	Name of Plate Feature	Where does this exist in the real world?
A	O/C Conv.	Andes Mtns, S. America
B	C/C Div	Africa (East) Rift Valley
C	Ocean Hotspot	Hawaii
D	O/O Div	Mid Atlantic Ridge
E	O/O Conv	Japan
F	C/C Conv	Himalayas (Mt Everest)
G	Transform	San Andreas Fault (California)

Read each of the descriptions below. Then choose all of the choices that apply.

Choices:

H. Ocean Hotspot

K. Ocean-Ocean Divergent

N. Transform

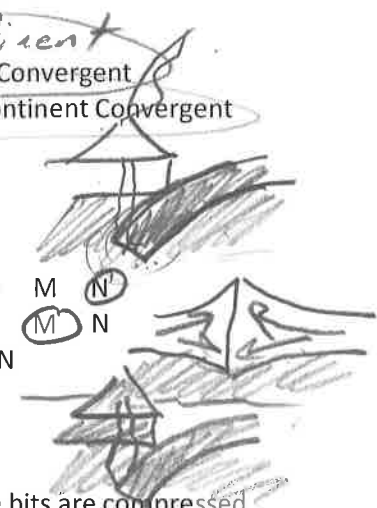
I. Ocean-Ocean Convergent

L. Continent-Continent Divergent

J. Ocean-Ocean Convergent

M. Continent-Continent Convergent

6. Where can shield cone volcanoes be found?  H  I  J  K  L  M  N
7. Where can deep-focus earthquakes be found?  H  I  J  K  L  M  N
8. Which location has nothing but shallow-focus earthquakes?  H  I  J  K  L  M  N
9. Where are there very tall mountains, but no volcanoes?  H  I  J  K  L  M  N
10. Where are steep, composite cone volcanoes found?  H  I  J  K  L  M  N
11. Where is there a rift valley?  H  I  J  K  L  M  N



**Part IV: The Rock Cycle**

12. Which rock type is created when rock is crushed to little bits and then those little bits are compressed together? A. Igneous B. Metamorphic  C. Sedimentary
13. Which rock type is created when rock is melted and then allowed to cool again, returning to solid form?  A. Igneous B. Metamorphic C. Sedimentary
14. Which rock type is created when existing rock is smashed or heated or both, but not entirely melted? A. Igneous  B. Metamorphic C. Sedimentary
15. Which type of rock can be dated using radiometric methods?  A. Igneous B. Metamorphic C. Sedimentary

Part V: Rock Dating

16. Three rules for relative dating:

- When one layer reaches higher than another, the one that reaches the highest...

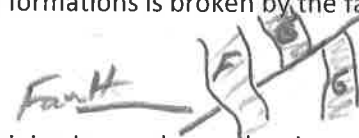
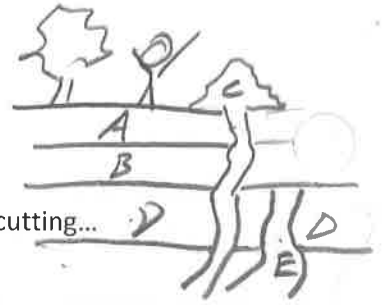
*is younger*

- When one rock formation cuts through another formation, the one that does the cutting...

*is younger*

- When two rock formations cross an earthquake fault, and one of the formations is broken by the fault but the other is not, the formation that is broken...

*is older*



17. Write the formula for determining the percentage of parent atoms remaining in a rock sample, given the numbers of parent atoms and daughter atoms that are currently in the rock sample.

$$\% \text{ Parents} = \frac{\# \text{ of Parents}}{\text{Total}}$$

18. A rock sample has 38 parent atoms and 58 daughter atoms. What percentage of those atoms are parent atoms?

$$\% \text{ Parents} = \left( \frac{38}{96} \right) \times 100\% = 39.6\% \approx 40\%$$

*(Handwritten annotations: '38' is circled, '96' is circled, 'Total' is written below '96', and '40%' is circled.)*

19. Complete the table below for a rock sample containing parent atoms with a half-life of 10,000 years.

Age of sample, in Half-Lives	Percentage of Parent Atoms Remaining in the rock	Age of rock Sample, in years
0 Half-lives	100 %	0
1 Half-Life	50 %	10,000 yrs
2 Half-lives	25 %	20,000 yrs
3 Half-lives	12.5 %	30,000 yrs
4 Half-lives	6.25 %	40,000 yrs

Organize the lettered rock samples from oldest to youngest. Then make a mark where the earthquake occurred in the sequence. Then use the graph on the back (or your own graph) to answer questions 20-26.

Oldest								Newest	
B	E	D	F	G	J	H	C	I	A

20. Of the following four layers, which is the youngest? D | C H

21. Of the following four layers, which is the oldest? G F E D

22. Sample I contains 20 U-238 parent atoms and 30 Pb-206 daughter atoms.

a. What percentage of those atoms are parent atoms?

20% 40% 60% 80%

b. Which of the following is closest to the age of Sample I?

0by 3by 6by 9by  
12by 15by

23. Sample C contains 60 U-238 parent atoms and 180 Pb-206 daughter atoms.

a. What percentage of those atoms are parent atoms?

25% 50% 75% 100%

b. Which of the following is closest to the age of Sample C?

0by 3by 6by 9by 12by 15by 18by

24. Sample D contains 40 U-238 parent atoms and 600 Pb-206 daughter atoms.

a. Approximately what percentage of those atoms are parent atoms?

6% 22% 48% 88% 94%

b. Which of the following is closest to the age of Sample D?

0by 3by 6by 9by 12by 15by 18by

25. Sample G contains 30 U-238 parent atoms and 272 Pb-206 daughter atoms.

a. Approximately what percentage of those atoms are parent atoms?

10% 20% 30% 40% 50% 60%

b. Which of the following is closest to the age of Sample G?

0by 3by 6by 9by 12by 15by 18by

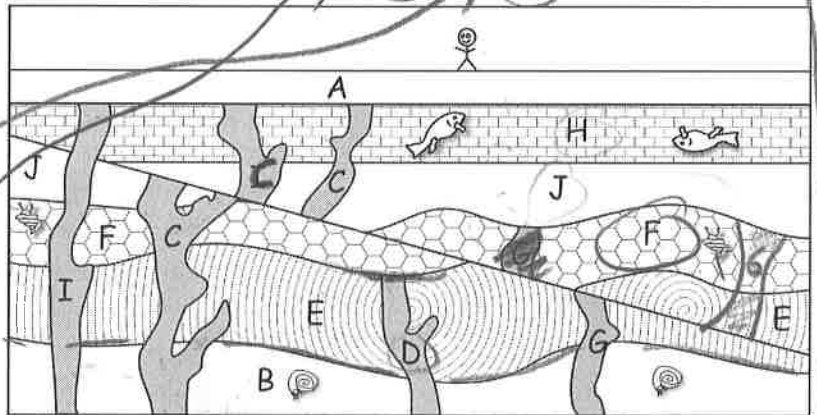
26. Which of the following is closest to the age of the fault created by the earthquake?

0-3by 3-6by 6-9by 9-12by  
12-15by 15-18by

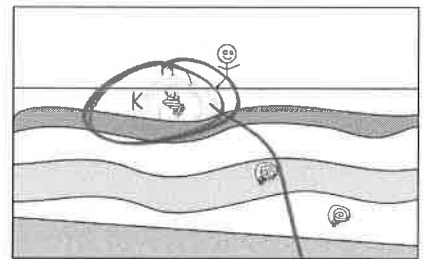
27. The diagram on the right shows rock samples from another location on Earth. Choose the most likely age range for layer K.

~~2-3by 3-4by 4-5by 5-6by~~

15-18by



Transfer to list at top of page



Between C and I (see top of page)

K has the same fossil as F, which is between D and G (see top of page)

$$\frac{20}{50} = 0.4$$

$$\frac{60}{240} = 0.25$$

$$\frac{40}{640} = 0.0625$$

$$\frac{30}{302} = 0.099$$

# Rock Dating Notes

Science

% U-238 Parent Atoms  
Versus  
Age of Rock

% U-238 Parent Atoms Remaining

