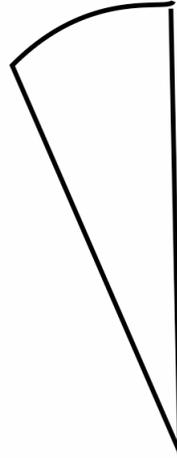


202 Sample midterm questions

1) On the "pie diagram", indicate the positions of the major regions and boundaries within the Earth (give positions of boundaries in km). For each region, describe very briefly its physical state and major chemical components.

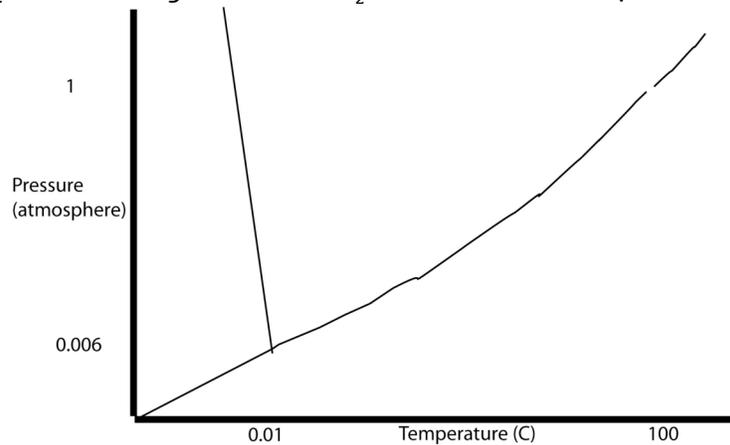


2) Give the appropriate name for each of the rock samples at the front of the class. List two minerals that are abundant in each. Give their average densities and explain where they might be found.

3) Give an approximate value (with units) for

- a) the radius of the earth
- b) the radius of the earth's core
- c) age of oldest rock found to date
- d) mean density of the earth
- e) mean density of the core
- f) P and S velocities in the crust
- g) P and S velocities in the upper mantle
- h) age of the earth as a planet

4) On the phase diagram for H₂O shown below, label all fields.



Explain, using the diagram:

- a) How the weight of a car can melt ice.
- b) Why water boils at lower temperatures in the mountains.
- c) How on Mars, where $P < 0.006$ bars, can H₂O ice melt at the poles during the summer, but no water can be found.

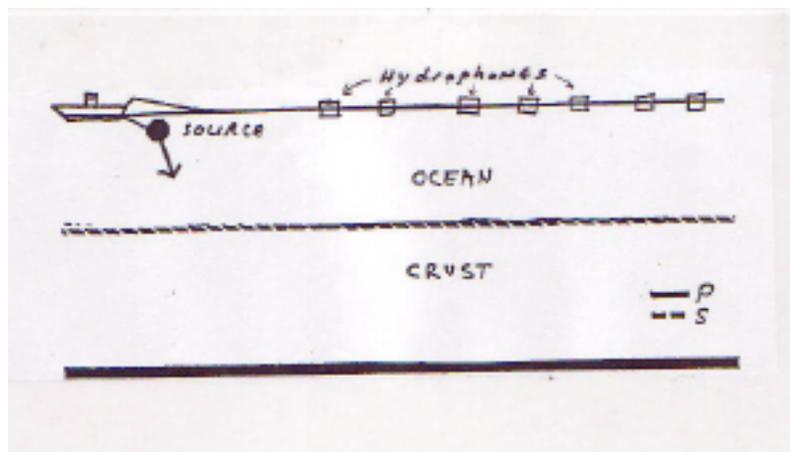
5) a) State the law of gravitational force between two bodies, and define the terms.

b) Show why objects of different masses fall at the same speed.

6 a) State Snell's law, and define the terms.

b) Use Snell's law to analyze a marine seismic experiment shown below, in which a seismic source towed behind a ship generates waves in the water, which are used to find the properties of the crust.

For the downgoing wave shown, sketch ray paths from the source to the string of hydrophones towed behind the ship for waves reflected at the bottom of the water and in layer within the crust. Assume that the velocity in the water is 1.5 km/sec and the crust has P wave velocity 5 km/sec and S wave velocity 3 km/sec. Mark P waves with a solid line and S waves with a dashed line.



7) Define the term "isotope." Explain using a sketch how the ratios of different isotopes of the same element in a sample are measured.