

GEOLOGY 11
EXAM I STUDY QUESTIONS

What are the compositional layers of the earth? What are their compositions? Where (at what depth) are their boundaries? How do we know the answers to these questions?

What are the rheological layers of the earth? What are their rheologies? Where (at what depth) are their boundaries? How do they arise? (Why does one layer have a different rheology than another?) What are the compositions of the various rheological layers?

What is the "Moho"?

Why isn't the mantle molten?

What is the geothermal gradient? What is the source or sources of the earth's heat?

What does it mean to be a "rock"? What are the three main categories of rocks and what are their key characteristics?

What is a mineral? What is a silicate mineral? What are the fundamental structures of silicate minerals?

What is luster? What is cleavage? How is hardness of minerals measured?

What is the most abundant atom in the rocky part of the earth? What is the most abundant mineral in the crust? What are the minerals in the mantle?

What is the liquidus? What is the solidus? What are the states of rocks found at temperatures above and below each of these lines?

What is partial melting? What is fractional crystallization?

What are the three main types of rheology that rocks exhibit? Under what conditions would a rock have one kind of rheology versus another? What is the yield strength of a rock?

What is isostasy? Why do mountains have roots?

How and why does mantle convection occur? Why do plates subduct?

Name the periods of the Geologic Time Scale. When did life appear? How old is the earth and how do we know that? How is the time scale subdivided? When was the end of the Mesozoic?

What is an earthquake? What is elastic energy? How is elastic energy stored and released by rocks?

What is a P-wave?

What is the significance of the P-wave shadow zone? How does it arise? What is the significance of the S-wave shadow zone? How does it arise?

Why does the asthenosphere transmit seismic waves but does not generate earthquakes?
If the asthenosphere does not generate earthquakes, why are the deepest recorded quakes as deep as 700 km? What is a Wadati-Benioff zone?

What is a Richter magnitude for an earthquake?

What is the global distribution of earthquakes in time and space? What can we learn from patterns in this distribution?

How can we tell an earthquake from an underground explosion and, more importantly, how can we tell what kind of earth motion produced the earthquake?

What is "liquefaction"?

How are earthquake predictions made? What are the limitations of such predictions? What is the utility of such predictions?

What's in a magma?

Name and define three different types of intrusive igneous bodies.

Why do different magmas have different viscosities? Which have high viscosities? What are shield and strato-volcanoes and how do they differ? Why do some eruptions produce shield volcanoes and others strato-volcanoes? Why do some volcanoes explode? Which are more likely to and why?

What is the difference between continuous and discontinuous crystallization behavior in a cooling melt? What is the evolution of a plagioclase feldspar crystal and the surrounding melt during crystallization of a magma of any given composition? What is the evolution of mafic minerals in the same setting? What does this have to do with the origin of the diversity of naturally occurring igneous rocks?

How can you get a felsic melt from a mafic parent rock? How can you get a mafic rock from a felsic melt?

What is the difference in the solidus for a wet versus dry magma? Which is more likely to be dry, a mantle rock or a crustal rock? Why do some rocks melt on decompression and others when buried? What is "decompression melting", anyway?

Why are basalts and granites common, and gabbros and rhyolites rare?

What is the most abundant volcanism on earth?

Aren't you impressed with how much you know?