

Study Guide for 1st Midterm

The first midterm will consist of 22 - 25 short-answer, matching, and multiple-choice questions which will cover the course up through geologic time. About four to seven of these questions will be on slides I will show. As I am more interested in your *understanding* of concepts and basic principles than in rote memorization, questions will typically ask you to choose an example that illustrates a principle or idea, to associate ideas (or identify ones which are not associated), or to offer an explanation or interpretation of some observed phenomenon. Some questions may depend on common-sense reasoning as much as geological knowledge.

Because there is a certain basic vocabulary used in geology, there *are* terms you will simply have to know or memorize. You will not usually be asked to define the term, but the term may well be used in a question. For example, if I were to ask a question about what size crystals you would expect to find in a dike, if you didn't know what a dike was, you wouldn't be able to answer the question. However, if you know what a dike is, and understand the effect of rate of cooling on crystal size, then the answer is just a common-sense deduction. **I have listed below the vocabulary I expect you to be familiar with; in the test I will not introduce or ask you about other technical terms.**

The questions below are designed to guide your study: to indicate the sorts of things and idea-associations I would like you to understand. All questions on the test will be related in some fashion to the study topics or listed terminology. There may, however, be a series of questions in which you are asked to interpret a geologic cross-section. This will require both common-sense deduction and integration of your knowledge of what rock types mean (in terms of type of rock, origin, or depositional environment.)

MINERALS

1. Know and understand the following terms:

atoms	crystal	cleavage
ion	crystalline	silica tetrahedron
isotope	glass	

2. Mineral names: You should be familiar with what sort of rock each of these minerals is likely to occur in, and have a general idea of what sort of elements (e.g., iron, calcium, sodium, magnesium, potassium, or what?) are in them.

quartz	amphibole	calcite
orthoclase feldspar	pyroxene	pyrite
plagioclase feldspar	olivine	hematite
biotite		

3. How does a crystalline substance differ from a glass? What sorts of properties might we use to distinguish one from the other?

ROCKS

1. Know and understand the following terms:

igneous	crystalline texture
sedimentary	clastic texture
metamorphic	foliated texture

2. Rock names: you should have a general idea of the *typical texture, origin, occurrence, and typical minerals* in the following rocks:

granite	well-sorted sandstone	slate
rhyolite	poorly-sorted sandstone	schist
obsidian	conglomerate	gneiss
pumice	mudstone	marble
gabbro	shale	serpentinite
basalt	greywacke sandstone	greenstone
andesite	limestone	quartzite
diorite	chert	
peridotite		

IGNEOUS ROCKS

1. Know and understand the following terms:

magma	aphanitic texture
plutonic (intrusive)	vesicular texture
volcanic (extrusive)	pyroclastic texture or rock
cinder cone	ignimbrite or welded tuff (glowing-ash deposit)
shield volcano	caldera
composite volcano (stratovolcano)	dike
plateau (fissure) basalt	sill
pillow basalt	volcanic neck
crystalline granular (phaneritic) texture	plug
porphyritic texture	batholith

2. What does texture and crystal size in an igneous rock tell us about the rock's cooling history?
3. What rock types tend to be associated with the different types of volcanos? Which types usually have relatively violent eruptions, and which are relatively quiet ones? Which magmas are viscous, which fluid? How would this affect the nature of the resulting rocks?
4. Where and how do we think basalt magmas originate? Why? How might granite magmas originate? Andesites?
5. How does the distribution of mid-oceanic rises, trenches, and volcanic arcs fit together in our big picture of sea-floor spreading? (What do we think is going on?)
6. Where are fold-mountain belts and volcanic arcs located? Why? How do we think they are formed?
7. How does our plate-tectonic model explain the origin of andesites and granite?

SEDIMENTARY ROCKS

1. Know and understand the following terms:

rounding	cross-bedding	alluvial fan
sorting	graded bedding	delta
stratification	unconformity	continental shelf
compaction	turbidity current	superposition
cementation	formation	facies

2. What is sorting? What can it tell us about the environment of deposition of the rock?
3. How do pebbles and grains in sedimentary rocks become rounded? What does roundness or lack thereof tell us about the transport history of the grains?
4. How do soft sediments become hard sedimentary rocks?
5. How do sedimentary rocks reflect the nature of the source rocks from which the sediment was derived?
6. What sort of sediment would probably be deposited in each of the following environments? Specifically, what characteristics would each have that would allow you to determine the environment of deposition if you later saw it in a rock? Consider sorting, rounding, particle size, and sedimentary structures as well as rock type.
- beach
 - river bed
 - alluvial fan
 - sand dune
 - delta of big river
 - lake
 - dry lake (playa)
 - continental shelf
 - base of continental slope
 - deep sea
 - landslide
 - glacier
7. What conditions of weathering and transport, and what sort of environments of deposition are suggested by:
- well-sorted quartz sandstone
 - poorly-sorted feldspar-rich sandstone
 - conglomerate with occasional sand and clay lenses in it
 - very well-sorted, well-rounded conglomerate
 - very poorly-sorted angular conglomerate (breccia) with lots of clay in it
 - mudstone
 - very well-laminated (finely stratified) shale

METAMORPHIC ROCKS

1. Know the *texture* (coarse-grained or fine-grained, foliated or non-foliated), *probable origin* (what parent rock, what pressure and temperature conditions), and the *most important minerals* in each of the following metamorphic rocks:

slate	marble	greenstone
schist	quartzite	serpentinite
gneiss		

2. What is metamorphism, i.e., what is a metamorphic rock?
3. Know the processes by which rocks are metamorphosed (heat, pressure, shearing, water plus ions)
4. What changes in the texture (appearance) of a rock occur as a result of metamorphism? How would these reflect the process(es) by which the rock was metamorphosed? (That is, what could we look for in the rock to tell us whether it was high or low pressure, high or low temperature, shearing, or ion-rich water which caused the metamorphism.)
5. What is the difference between *contact metamorphism* and *regional metamorphism*? Where would you be likely to find each?
6. What is *foliation*? How and why does it form? What does it tell us?
7. How is metamorphism related to plate tectonics?
8. What is a *melange*? How do we think melanges are formed?

GEOLOGIC TIME AND RADIOMETRIC DATING

1. Know and understand the following terms:

formation	geologic period	parent element
unconformity	relative age	daughter product
correlation	absolute age	potassium-argon dating
fossil	half-life	radiocarbon dating

2. How does radiometric dating work? (What is the idea behind it? What do we measure in the rock?)
3. What sorts of things cause errors in radiometric dating? What sorts of things might make a rock date older or younger than it really is?
4. Know the *periods* of the geologic time scale in order from oldest to youngest. Know approximately (in millions of years) the boundaries of the Precambrian, Paleozoic, Mesozoic, and Cenozoic eras.
5. How can we *correlate* rock units; i.e., what methods do we use, and under what circumstances are they appropriate?

PLATE TECTONICS

Know and understand the following terms:

density

isostasy

lithospheric plate

divergent boundary

convergent boundary

transform boundary

subduction zone (trench)

mid-oceanic ridge (rise)

fold–mountain (orogenic) belt

convection

plume ("hot spot")

1. How does the distribution of mid–oceanic rises, trenches, and volcanic arcs fit together in the picture of sea–floor spreading? (What do we think is going on?)
2. Where are fold–mountain belts and volcanic arcs located? Why? (How do we think they are formed?)
3. How does our plate tectonic model explain the origin of basalts, andesites, and granites?
4. Why are continents high and ocean floors low?