Take Test: Graded Quiz 1

Test Information

Description Worth 5% of course grade.

Instructions

This quiz WILL take you a while, so don't delay. Many of the questions require thinking and some require you to look up information. Feel free to use your notes, the internet and any books that you like.

Once you start, make sure you ***Save*** your answers. However, do not click on ***Finish*** until you are ready to hand in your work. If you do that, the quiz will be submitted.

You can have 2 attempts at this quiz as long as you complete both attempts before the closing date and time (11pm). Your highest score will count toward your Overall Course Grade. **Save** as you go, but don't **Submit** until you are sure you are done. When you begin 'Attempt 2' you won't see your previous answers from 'Attempt 1'. You will need to re-enter your answer for each question.

If a question could have more than one correct answer, it will say that (otherwise, assume only one answer needed).

Note that for questions that may have multiple correct answers, you will be penalized for the wrong answer. So it is wise not to guess...

Good luck! Don't forget to click "Submit" once you are done!

Multiple Attempts This test allows 2 attempts. This is attempt number 1.

Force Completion This test can be saved and resumed later.

Question Completion Status:

Save All Answers | Close Window | Save and Submit

QUESTION 1 1 points Saved

In our Solar System, the proportion of metals in a planet or moon increases the closer that body is to the Sun. That is because:

1. the gas/dust disk from which the bodies in the solar system formed had a compositional gradient away from the Sun in order to conserve angular momentum. The amount of metals decreased away from the Sun.

- (•) 2. many metals and metal compounds could condense at the high temperatures quite close to the Sun; other materials could not.
- ( ) 3. many metals and metal compounds can only condense at the high temperatures close to the Sun, they could not condense as easily further from the Sun.
- ( ) 4. gravity caused more collisions closer to the Sun, resulting in high accretion rates.
- ( ) 5. all of the above

QUESTION 2

2 points Saved

A significant part of our bodies, our planet, and the universe is made up of atoms. [A cosmologist may want to get into a discussion about dark matter and subatomic particles here, but lets just stay with atoms].
Which of the following statements about atoms are true (several are correct):

- [x] a. Hydrogen (H) and Helium (He) are by far the most common atoms in the universe.
- [x] b. Young stars are almost entirely made up of hydrogen and helium atoms.
- [ ] c. With the exception of the hydrogen, pretty much all of the atoms in your computer, mp3 player, shoes, toothpaste, underwear, and the food you ate today were formed within our Sun.
- [x] d. Stars can produce atoms as large as iron (Fe) by their normal fusion processes. (Iron has 26 protons and usually about 30 neutrons). Larger atoms require more energy to form than a normal star posesses.
- [ ] e. Stars can produce all the larger atoms by their normal fusion processes. For example, Uranium (which has 92 protons and around 136 neutrons)

QUESTION 3

1.5 points Saved

Several of these are true. Which ones? (penalty for wrong answers).
The tails that stream out from comet nuclei:

- [x] a. are the dust and gas freed from the frozen comet nucleus by sublimation
- [ ] b. would never contain water vapour.
- [x] c. actually has two components, a dust tail and an ion tail.

- [x] d. point away from the Sun, essentially blown by the solar wind.
- [ ] e. always streams out behind the comet.
- [ ] f. Is present no matter where the comet is in it's orbit around the Sun.

QUESTION 4

1 points Saved

Why is the process by which the Earth (and many other of the larger bodies in the solar system) became layered called the "iron catastrophe"?

- ( ) a. Iron and iron compounds make up an extremely small proportion of the Earth. But when they melted their motion triggered a catastrophic, complete melting of the Earth.
- (•) b. Temperature rose to the point where iron compounds melted. The molten iron sank, generating more heat. That caused the catastrophic, complete melting of the Earth.
- ( ) c. The formation of the Moon claimed most of the Earth's iron compounds, leaving the depleted Earth in an iron catastrophe.
- ( ) d. Iron melted preferentially due to its conductive properties. Melting released heat-producing radioactive elements that subsequently caused a catastrophic, complete melting of the Earth.

QUESTION 5

1 points Saved

Which is **FALSE**? The iron catastrophe of the Earth resulted in _____ .

- ( ) a. a concentrically layered planet, with the layers ordered by compound density
- ( ) b. an early atmosphere was created due to release of volatile gases from the melting.
- (•) c. the Earth's lower mantle and core being enriched with radioactive atoms.
- ( ) d. the Moon's compositional differences from the Earth.
- ( ) e. the planet cooling more quickly because the radioactive atoms were concentrated in the Earth's crust.

QUESTION 6

2 points Saved

Having just won another Nobel prize, you decide to change fields and go into astronomy. Operating on a hunch, you discover yet another dwarf planet in an orbit just a bit further out than Pluto. Knowing what you do about the theories of condensation and accretion for the formation of our solar system, would you expect it to have:

- (•) a. a very small metallic core compared to the size of the dwarf planet
- ( ) b. a metallic core about the same proportion as the Earth's core to the entire Earth (the core's radius is about 1/2 the Earth's radius).
- ( ) c. an extremely large metallic core (comprising most of the interior of the dwarf planet)
- ( ) d. no metallic core

QUESTION 7

2.5 points Saved

The time it took our solar system to form appears to be astoundingly short. We have age dates for the oldest rocks on Earth, rocks from the Moon, and asteroids that have fallen to Earth as meteorites. Those dates give some bounds on when those rocks were last molten. To come up with dates beyond that, we have to rely on the physics behind models of the formation process. Match

the dates with the events below.

Depending on where you look, you may find slightly different numbers. Just choose the best answers - consider the sequence.

Dates can only be used once...

C.	~0 years ago
F.	~200 Ma (million years ago)
G.	~3.2 Ga (billion years ago)
I.	~4.022 Ga (billion years ago)
D.	~4.44 Ga (billion years ago)
J.	~4.56 Ga (billion years ago)
B.	~4.51 Ga (billion years ago)
H.	~4.7 Ga (billion years ago)
A.	~4.98 Ga (billion years ago)
E.	~4.999 Ga (billion years ago)
K.	~5 Ga (billion years ago)

A. Our young sun goes into T-Tauri phase, blowing most gas from solar system

B. Approximate age for Moon formation

C. Youngest known rocks from Earth (most recent magmatism)

D. Oldest known rocks from Moon

E. Nebula has collapsed into a spinning, flattened disk

F. Oldest oceanic crust on Earth

G. Youngest known rocks from Moon (most recent magmatism)

H. Planetary system pretty much formed

I. Oldest known rocks (rocks not mineral grains) from Earth

J. Age of majority of meteorites (asteroid fragments)

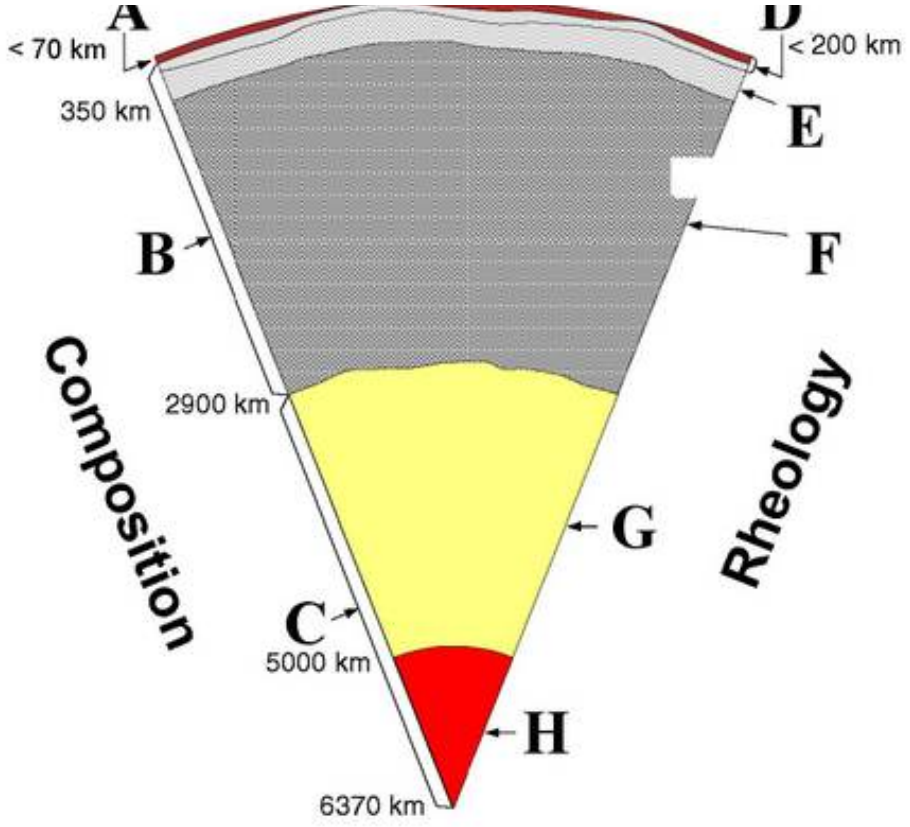
K. Nebula begins to collapse and rotate

QUESTION 8

1 points Saved

The basic layered structure of the Earth (and other planets) can be described or defined in different ways. It can be described in terms of the general **composition** of the layers (chemically different materials). Or, it be described in terms of the **rheology** of the layers (how the materials deform under pressure). Each method is useful.

This question is to ensure you know the different layers as we'll be using them throughout the course.



E. A
H. B
C. C
A. D
B. E
D. F
G. G
F. H

A. lithosphere
B. asthenosphere
C. core
D. lower mantle
E. crust
F. inner core
G. outer core
H. mantle

QUESTION 9

2 points Saved

The Earth is a layered planet. The composition of the different layers can be divided in general terms into types of rock (ultramafic, mafic, intermediate, felsic) and metal (primarily iron and nickel). Match the layer names on the left with the correct compositional term on the right. You can use some of the terms several times if you need to.

D. oceanic crust
C. continental crust
B. mantle
A. core

A. metal (mostly iron and nickel)
B. ultramafic rock
C. mafic, intermediate, and felsic rock (and some ultramafic)
D. mafic rock (and some ultramafic)

QUESTION 10

1 points Saved

Match the rock types on the left to the descriptions of how they form on the right.

B. igneous
C. metamorphic
A. sedimentary

A. precipitation of minerals or lithification (rock formation) of sediments
B. crystallization of molten rock
C. solid state changes due to changes in temperature and/or pressure

QUESTION 11

1 points Saved

Which one of the following is **FALSE**?
An intrusive rock:

- (•) a. can be sedimentary
- ( ) b. can be felsic
- ( ) c. can be igneous
- ( ) d. can be mafic
- ( ) e. solidifies beneath the Earth's surface

QUESTION 12

1 points Saved

If you were looking for a sedimentary rock here near Vancouver, a very good place to look would be _____.

- (•) a. several hundred metres beneath (down) Delta (or Richmond or Surrey or in similar places in the lower mainland)
- ( ) b. on top of Mt. Baker or Mt. Garibaldi (volcanoes close to Vancouver)
- ( ) c. next to the pier down at Jericho beach (near UBC, Vancouver on English Bay)
- ( ) d. at the bottom of the Fraser River (running through the Fraser Valley and exiting into Georgia Strait through Vancouver/Richmond/Surrey)
- ( ) e. All of the answers are correct.

QUESTION 13

1 points Saved

You have read about the general characteristics and components of the Earth's crust (continental and oceanic) and how different rock types are formed. Which of the following rock types is by far the **least** abundant in the Earth's crust?

- ( ) a. Igneous, sedimentary, and metamorphic are all equally abundant
- ( ) b. Metamorphic
- (•) c. Sedimentary
- ( ) d. Igneous

QUESTION 14

1 points Saved

Many things control the speed that P and S waves travel within the Earth.
In general, wave speeds gradually increase as they travel deeper in the Earth but in some places there are abrupt increases or decreases in wave speed.
Which of the following would likely cause an abrupt change in wave speed (there may be more than one right answer)?

- [x] a. a change from liquid to solid (or vice versa)
- [x] b. a change in crystal structure (mineral phase)
- [x] c. a change in composition (e.g., from sandstone to granite, or from crust to mantle or from mantle to core)
- [ ] d. an increase in pressure with depth

QUESTION 15

1 points Saved

Information obtained from seismic waves show that there is a 'transition zone' in the mantle with a major transition at roughly 410 km depth, and another major transition (at the base of the 'transition zone') at roughly 660 km depth. The depth to these varies slightly, but they are present all around the planet.

Both of these transitions are thought to represent _____. (one answer)

- ( ) a. Concentrations of lots and lots of diamonds
- (•) b. metamorphic changes in the mantle rocks as pressure increases
- ( ) c. Changes of rock composition as the amount of iron and nickel increases
- ( ) d. Sharp temperature changes (thermal boundaries) due to convective processes
- ( ) e. Rheological change at the top and bottom of the fluid asthenosphere.

QUESTION 16

1 points Saved

You are swimming underwater and hear a strange, curious, 'clack-clack-clack' noise. What could it be?
You turn around and, oh dear, there is an extremely large Great White Shark chomping its jaws as it closes in on you.
The first question that pops into your mind is, 'Hm, what type of waves are my ears detecting?'*(one answer)*

- ( ) a. surface waves
- ( ) b. gravity waves
- (•) c. P-waves
- ( ) d. S-waves
- ( ) e. Love waves

QUESTION 17

1 points Saved

The speed that P and S waves travel through rock _____.

[More than one answer may be correct. And, even worse, one of them is a trick... Penalty for incorrect answers except for the tricky one.]

- [x] a. decreases in partially molten rock
- [x] b. generally increases as the waves move deeper into the Earth
- [x] c. depends on the composition of the rock
- [ ] d. decreases as the stiffness of the rock increases
- [ ] e. increases with the density of the rock

QUESTION 18

1 points Saved

An example of *convection* dominating the transfer of heat is when you pour a hot cup of tea and _____.

- ( ) a. your hand gets warm as you hold your hand bon the side (but not touching) the cup
- (•) b. your hand gets warm as you hold your hand above (but not touching) the cup
- ( ) c. your hand gets warm as you hold the cup
- ( ) d. your hand gets warm as you spill the tea
- ( ) e. the tea cools faster as you blow across the top of the cup

Click Save and Submit to save and submit. Click Save All Answers to save all answers.

Save All Answers | Close Window | Save and Submit