GEOL 04/25/16 Last Lecture

Basic understanding of scientific method

Principle processes involved in earth evolution

Fundamental concepts of:

Plate tectonics

Rock cycle

Geologic Time

Appreciation of impact of Earth science on society in a daily basis

Lots of i-clicker questions today.

Scientific Method

Observations / Experiments / Chance -> Hypothesis -> Theory -> Scientific Model

Plate Tectonics

Convergent( -> | <- ), Divergent(<- | ->), Transform plate boundaries ( ^\ | /down)

Variables of State

All matter exists as either

Solid

Liquid

Gas

Temperature – increases with depth

Pressure – increases with depth

Composition – combination of elements

The Rock Cycle

Igneous, Sedimentary, Metamorphic

Igneous – formed from magma, intrusive vs extrusive

Sedimentary – only formed on earth’s surface

Metamorphic – rocks that are recrystallized while still in solid state

First Quarter Material

Scientific Method

Plate Tectonics

Minerals and Rocks

Earth System

Etc

New lithosphere is created \_\_\_\_\_\_\_ (C)

A In deep sea trenches

B In subduction zones

C At mid ocean ridges

D Along transform faults

Isotopes of an element have did numbers of \_\_\_\_\_\_\_ (C)

A Protons

B electonrs

C neutrons

D all of the above

The main difference between intrusive and extrusive igneous rocks is\_\_\_\_\_\_\_ (B)

A silica compositon

B where they solidify

C viscosity

D all of the above

Most common rock forming minerals are\_\_\_\_\_\_\_ (C)

A carbonates

B oxides

C silicates

D sulfides

What type of sediments are accumulations of **solid fragments** produced by weathering\_\_\_\_\_\_\_ (B)

A biochemical sediments

B clastic sediements

C chemical sediements

D all of the above

2nd quarter material

Metamorphic rocks and processes

Mountain building

Deformation – faults and folds

Geologic time – parent daughter isotopes

History of planets and continents

Geobiology

Volcanoes and volcanism

WKhat is an orogeny?\_\_\_\_\_\_\_ (B)

A A broad exposure of deformed metamorphic and igneous rocks

B a general term for mountain building processes

C a special type of reverse fault

D a theory that explains the uplift of the continents after large ice sheets melt

The principle of superposition states that\_\_\_\_\_\_\_ (D)

A A fault is younger than the rock it cuts

B sediements are deposited as essentialy horizontal layers

C the present is the key to the past

D undisturbed sedimentary layers get progressively younger from bottom to top

The absolute age of a geologic event in the rock record is\_\_\_\_\_\_\_ (A)

A # of years that have elapbsed btwen event and present day

B amount of time that has elapsed between event and start of earth history

C # ofyears that have elapsed btwn event and start of human civilization

D amt of time that has elapsed btwn event and another similar event

Based on the fossil record, current diversity of life on earth represents less than 0.1% of total # of speices which have existed here in geologic past. A

A True

B False

3rd quarter

Earthquakes

Earth’s interior

Climate system

etc

Which of the following makes up the bulk of the earth\_\_\_\_\_\_\_ (C)

A crust

B inner core

C mantle

D outer core

Which layer in the earth does not transmit S waves\_\_\_\_\_\_\_ (D)

A crust

B inner core

C mantle

D outer core

Milankovitch cycles are depended on Earth’s\_\_\_\_\_\_\_ (D)

A orbital eccentricity

B precession

C angle of tilt on the rotation axis

D all of the above

4th quarter

Hydrologic cycle

Groundwater – hydrologic cycle, water stored in ground, primary source of water we use

Streams and floods – surface water, floods are single largest factor in loss of life on earth

Deserts – less than 1 inch of water = desert, no bearing on temperature (1/5 of land surface)

Coasts and oceans – 75% of us populate lives within km of coastline tides, waves, currents

Earth and society / energy resources

The process by which surface water becomes groundwater is called\_\_\_\_\_\_\_ (C)

A Discharge

B Evaporatoin

C Infiltration

D Transpiration

Suspended load includes all material includes\_\_\_\_\_\_\_ (B)

A rolling along bottom of stream

B temporarily or perm. Suspended in flow

C deposited on the bottom of stream

D rolling along bottom and suspended in the flow

Which of the following particles is most easily eroded from the bed of a stream\_\_\_\_\_\_\_ (D)

A boulders

B cohesive clay

C pebbles

D sand

10 year flood question

Layers that transmite groundwater are called\_\_\_\_\_\_\_ (C)

A unsaturated zones

B influent streams

C aquifers

D aquicludes

How deep is the deepest part of the ocean\_\_\_\_\_\_\_ (B)

A About 1 km deep

B 10 km deep

C 3 km deep

D 30 km deep

Skipped a few iclicker questions

### Ripped from Online Exam: Question 1

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Which of the following sequences describes the metamorphic changes in a shale with increasing metamorphic grade? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | slate → schist → gneiss | |  |  |  |

* **Question 2**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | What is an orogeny? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | a general term for mountain-building processes | |  |  |  |

* **Question 3**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | According to the principle of uniformitarianism, \_\_\_\_\_\_\_\_ . |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | geologic processes we observe today have operated in the past | |  |  |  |

* **Question 4**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | The principle of superposition states that \_\_\_\_\_\_\_\_\_\_. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | undisturbed sedimentary layers get progressively younger from bottom to top | |  |  |  |

* **Question 5**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | The main difference between intrusive and extrusive igneous rocks is \_\_\_\_\_\_\_. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | where they solidify | |  |  |  |

* **Question 6**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | The parent rock of quartzite is \_\_\_\_\_\_\_. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | sandstone | |  |  |  |

* **Question 7**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | The presence of water will \_\_\_\_\_\_\_\_ the melting temperature of a rock. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | decrease | |  |  |  |

* **Question 8**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Which region in the Earth consists primarily of solid iron? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | region A | |  |  |  |

* **Question 9**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Strains are the forces that act on geologic materials, and stresses are the deformation they produce. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | False | |  |  |  |

* **Question 10**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Continental crust is \_\_\_\_\_\_\_\_ oceanic crust. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | less dense than | |  |  |  |

* **Question 11**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | The average time between large earthquake events along a fault is known as the \_\_\_\_\_\_ interval. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | recurrence | |  |  |  |

* **Question 12**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | When did the Big Bang take place? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | approximately 13.7 billion years ago | |  |  |  |

* **Question 13**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Which of the following can change the rate of radioactive decay? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | none of the above | |  |  |  |

* **Question 14**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | The amount of ground displacement in an earthquake is called the \_\_\_\_\_\_. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | slip | |  |  |  |

* **Question 15**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | What is the most common type of bonding in minerals? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | ionic bonding | |  |  |  |

* **Question 16**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Organisms that gain energy from feeding directly or indirectly on “producers” are referred to as \_\_\_\_\_\_\_\_\_\_\_. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | heterotrophs | |  |  |  |

* **Question 17**

3 out of 3 points

|  |  |  |  |  |
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|  |  | | | |
| Correct | Modern geology has enabled scientists to predict when an earthquake will occur. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | False | |  |  |  |

* **Question 18**

3 out of 3 points

|  |  |  |  |  |
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|  |  | | | |
| Correct | The four inner planets are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | small, rocky, and relatively lacking in volatile elements. | |  |  |  |

* **Question 19**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | On a map of the seafloor, the boundaries between normally magnetized oceanic crust and reversely magnetized oceanic crust are called \_\_\_\_\_\_\_\_\_\_. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | isochrons | |  |  |  |

* **Question 20**

3 out of 3 points

|  |  |  |  |  |
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|  |  | | | |
| Correct | In which region of the Earth is conduction the dominant heat transfer mechanism? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | region D | |  |  |  |

* **Question 21**

0 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Incorrect | In which of the following regions would you expect to find the thickest sequence of sedimentary rocks? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | on continental platforms | |  |  |  |

* **Question 22**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | The greenhouse effect is caused by \_\_\_\_\_\_\_\_\_\_. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | carbon dioxide and water vapor that trap heat radiating from the Earth's surface | |  |  |  |

* **Question 23**

3 out of 3 points

|  |  |  |  |  |
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|  |  | | | |
| Correct | Isotopes of an element have different numbers of \_\_\_\_\_\_\_\_\_\_. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | neutrons | |  |  |  |

* **Question 24**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | How old is the Earth? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | approximately 4.5 billion years old | |  |  |  |

* **Question 25**

3 out of 3 points

|  |  |  |  |  |
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|  |  | | | |
| Correct | The faster a magma cools, the larger the crystals it will contain once it becomes a rock. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | False | |  |  |  |

* **Question 26**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | New lithosphere is created \_\_\_\_\_\_\_\_\_\_\_\_. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | at mid-ocean ridges | |  |  |  |

* **Question 27**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | The absolute age of a geologic event in the rock record is \_\_\_\_\_\_\_\_\_\_. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | the number of years that has elapsed between the event and the present day | |  |  |  |

* **Question 28**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Ecosystems are composed of \_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_ that function in a balanced manner. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | organisms, geologic components | |  |  |  |

* **Question 29**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Burial of sediments results in \_\_\_\_\_\_\_\_\_\_. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | increasing pressure and increasing temperature | |  |  |  |

* **Question 30**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Which of the following concepts was developed earliest? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | continental drift | |  |  |  |

* **Question 31**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Which mineral is commonly used to determine a metamorphic P-T path? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | garnet | |  |  |  |

* **Question 32**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Which region in the Earth is molten? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | region B | |  |  |  |

* **Question 33**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Minerals that form through covalent bonding of elements typically dissolve easily in water. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | False | |  |  |  |

* **Question 34**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | What drives plate tectonics? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | mantle convection | |  |  |  |

* **Question 35**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Which of the following types of tectonic forces causes faulting? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | all of the above | |  |  |  |

* **Question 36**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Which of the following statements is true? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | Cementation and compaction both decrease porosity. | |  |  |  |

* **Question 37**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Which of the following rocks represents the lowest metamorphic grade? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | slate | |  |  |  |

* **Question 38**

0 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Incorrect | If a magma undergoes fractional crystallization, the remaining magma will be \_\_\_\_\_\_. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | more mafic  more felsic is the correct answer | |  |  |  |

* **Question 39**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | The three domains of life are \_\_\_\_\_\_\_\_\_\_\_. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | eukarya, bacteria, archaea | |  |  |  |

* **Question 40**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Abrasion of sediment particles results in which of the following? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | They become smaller and more rounded. | |  |  |  |

* **Question 41**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Reverse faults form in response to \_\_\_\_\_\_ forces. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | compressive | |  |  |  |

* **Question 42**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Where are the oldest rocks in North America located? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | in the Canadian Shield | |  |  |  |

* **Question 43**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | When tensional forces act on a fault plane they produce \_\_\_\_\_\_\_\_\_. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | normal faults | |  |  |  |

* **Question 44**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | The mineral property “cleavage” refers to \_\_\_\_\_\_\_\_\_\_. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | the splitting of a mineral along planar surfaces | |  |  |  |

* **Question 45**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | The Milankovitch cycles are dependent on the Earth's \_\_\_\_\_\_\_\_. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | all of the above | |  |  |  |

* **Question 46**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Which of the following processes removes carbon from the atmosphere? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | photosynthesis | |  |  |  |

* **Question 47**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | What are the “plates” of plate tectonics made up of? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | lithosphere | |  |  |  |

* **Question 48**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Volcanic processes transport gases and aerosols from the \_\_\_\_\_\_\_ to the \_\_\_\_\_\_\_\_. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | lithosphere; atmosphere | |  |  |  |

* **Question 49**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | The Earth should be considered a closed system, both with respect to matter and energy. |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | False | |  |  |  |

* **Question 50**

3 out of 3 points

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | |
| Correct | Which of the following igneous rocks crystallizes on the Earth's surface? |  |  |  |
| |  |  | | --- | --- | | Selected Answer: | basalt | |  |  |  |