Name :_____

Student ID number : _____

Colour of Exam: _____

GEO1111 - 2017 -Midterm 1

Do not open this packet until instructed to do so.

Read the questions carefully.

Instructions:

- Write your name and student number **on this cover page.** DO IT NOW!!
- Write your name and student number **on your answer book**. DO IT NOW!!
- Write your name and student number **on your scantron card**. DO IT NOW!!

- This is a closed book exam; no books, notes, are allowed.
- University approved calculators are permitted.
- Multiple choice questions only have one correct answer.
- Mark your answers to the 20 multiple choice answers on the SCANTRON card.
- Write your answer to the short answer questions in the exam answer book.
- Do NOT write the answers on the question sheet
- Multiple choice questions are worth 2 marks each. (total 40)
- The 5 short answer questions are worth 5 marks each (total 25)
- The total mark for this midterm exam is 65.

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SECTION #1 MULTIPLE CHOICE. ANSWER ALL QUESTIONS ON THE SCANTRON CARD

1. Which of the following minerals is covalently bonded:
   a) Halite (NaCl)
   b) Galena (PbS)
   c) Pyrite (FeS_2)
   d) Diamond (C)

2. Graphite and Diamond are polymorophs and both are:
   a) ionically bonded
   b) compounds made of pure carbon
   c) metallically bonded
   d) high pressure minerals

3. Which of the following is <u>not</u> evidence for a large meteor impact
   a) shatter cones of rock
   b) volcanic eruptions
   c) tektites
   d) identified crater

4. Biostratigraphy is relative dating of rock strata by correlating using index fossils. What type of fossil makes a good index fossil:
   a) long life span throughout earth's history and a widespread distribution
   b) short life span throughout earth's history and a widespread distribution
   c) long life span throughout earth's history and a local distribution
   d) short life span throughout earth's history and a local distribution

5. Oil is not found in Precambrian rocks because:
   a) The rock are too young to have formed into petroleum products
   b) There was little / no life on earth during the Precambrian
   c) Organic matter produced in the rock it to complex chemically to process to oil.
   d) The complex Precambrian organisms form low grade petroleum products

6. What do Jovian and Terrestrial planets have in common?
a. They have similar densities
b. They both originate from the same solar nebula
c. They have similar sizes
d. They all have similar orbital radii

7. Which of the following ages is closest to the age of the solar system?

a) 2.55 Ga
b) 3.85 Ga
c) 13.25 Ga
d) 4.58 Ga

8. What takes up most of the volume in our solar system?

a) Iron
b) The Sun
c) Hydrogen
d) Empty Space

9. The model of nucleosynthesis states that heavier elements are formed:

a) Deep within planets under extreme heat and pressure
b) In the empty space between galaxies
c) Deep within stars from nuclear reactions
d) On the surface of stars from solar flares

10. What is the Solar Nebula Theory?

a) After a star forms, it releases gas and dust that spin out around it to form planets
b) The star and planets originate from a cloud of dust and gas that gravitationally collapses and begins to rotate
c) Heavy impacts scatter gas and dust from a planet, and the rubble forms a nebula
d) All of space is filled with gas and dust

11. At a plate transform fault boundary:

a. Plates slide by each other
b. Plates converge
c. Seafloor is created
d. A rift valley is formed

12. At a mid-oceanic ridge such as the pacific rise ridge

a. Basaltic volcanic rock is created
b. Oceanic crust is subducted
c. A deep trench is created
d. Volcanic rocks cool and sink into the crust

13. The age of all ocean sediments is less than 200 million years because:

a) The rate of sediment accumulation is very low
b) Very little sediment is washed into the ocean from the continents
c) Sediment is destroyed by high pressures in the deep sea
d) Older sediment is destroyed when it is subducted.

14. Magmatic rocks are:

a) Often composed of basalt
b) Formed at seafloor spreading centres
c) Contain high concentrations of Fe and Mg
d) All of a, b, and c are correct

15. The isotopes of all the elements known to science:

a) Are all composed of silicates
b) Are all stable and do not undergo radioactive decay
c) Were formed in planetary collisions
d) None of the above

16. Earth's magnetic field

a) Has north and south poles that have moved around or wandered
b) is produced by the rotating liquid outer core
c) Changed direction several times in the past 1 Ga
d) Statements a, b and c are all correct

17. A sample of rock has $5 * 10^5$ atoms of U-235 and $5 * 10^5$ atoms of Pb-207. U-235 has a radioactive half- life of 0.7 billion years and decays to Pb-207. The age of the rock is:

a) 0.7 billion years
b) 1.4 billion years
c) 0.35 billion years
d) Cannot be determined using this information

18. Which theory helps explain why there is a higher frequency of earth quakes around the ring of fire?

a) The theory of relativity
b) Newton's theory of gravity
c) The theory of plate tectonics
d) Dalton's atomic theory

19. The cryosphere includes:

a) water in the gulf of mexico
b) water in the ice sheets and glaciers
c) groundwater
d) water flowing in the Mississippi river

20. Which of the following is not a mineral?
a) quartz
b) ice
c) glass
d) pyroxene

21. What colour is the front page of your exam book
a. White
b. Pink
c. Blue
d. Yellow

SECTION #2. SHORT ANSWER QUESTIONS (5 Marks each)

THERE ARE 6 QUESTIONS. ANSWER ANY 5 OF THE 6 QUESTIONS.
YOUR ANSWERS SHOULD BE WRITTEN IN THE EXAM ANSWER BOOKLET.
MAKE SURE THAT YOUR NAME IS ON THE FRONT COVER OF THE BOOK.
Show your logic and write sentences not one word answers
MARK AN ‚X' THROUGH ANY QUESTION THAT YOU START AND DECIDE THAT YOU DO NOT WANT MARKED

1. The planet Earth (and everything else) is constantly moving through space and on its axis. List 5 effects of these planetary movements on the surface of the Earth?

Weather, slow rhythmic climatic variations, seasons, wind, meteor impacts, dust

2. The half-life of C^{14} is 5700 years. At time zero there are 10^6 atoms in a sample. How many atoms will there be in the sample after 28,500 years? How many half-lives of decay has C-14 undergone? Show your logic and or calculations. [$N(t)=N(t=0) * \exp(\lambda t)$; Remember t is negative going back in time.

28500/5700 = 5 half lives (2.5 points)
10^6 atoms/2^5 = 31250 atoms (2.5 points) - show how you performed these calculations

3. The radioactive half-life of ^{40}K is 1.3 billion years. The daughter product is ^{40}Ar. In a rock at t=0 there are 10^7 ^{40}K atoms per gram of sample. How old is the rock at time 't' if the sample

contains 7.5 x10^6 Ar^{40} atoms per gram of sample. Explain your logic and show any calculations. [Age= ln((P+D)/P)/ λ at time 't']

Answer: 2.6 Ga

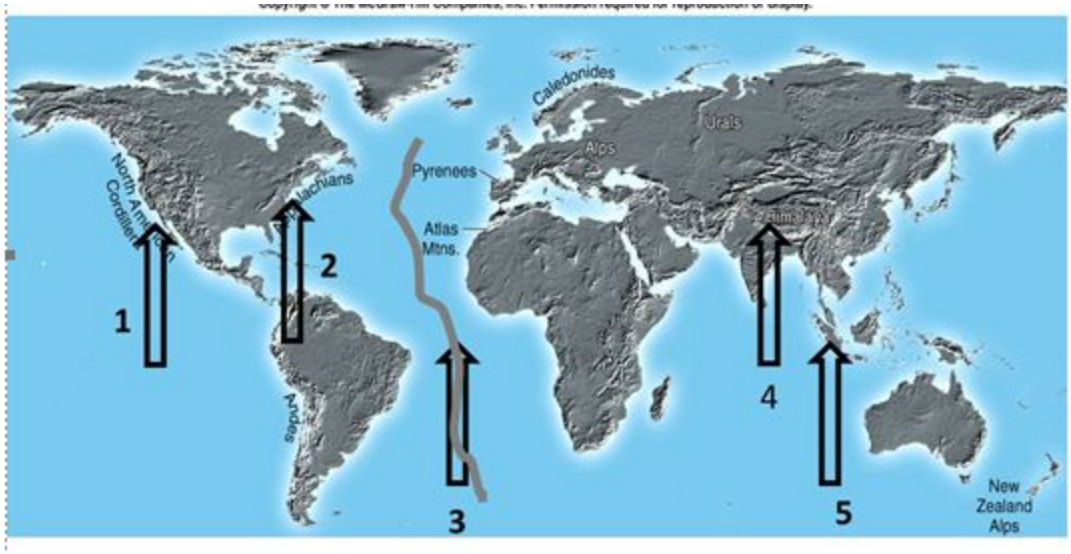
Intuitively: 7.5 x10^6 atoms of Ar^{40} (daughter) is equal to 75% of the total number of atoms.
Thus using the equation above with P = (10^7 - 7.5x10^6) and λ = ln2/t
two half lives would have passed to get 75%,
1.3Ga x 2 half lives = 2.6 Ga.

4. (a) Use a Cross section diagram to show the concept of Sea floor spreading and describe the key concepts in 3 or 4 sentences.

(b)List two specific geographic locations where spreading is occurring.

2 points for the X-section showing magma rising out of the ridge, spreading of the plates, etc.
2 points for brief explanation of the processes, mantle convection, creation of basaltic rock at the spreading center, slab-push, slab-pull… etc
1 point for 2 examples, mid Atlantic ridge, Pacific rise ridge (a few others)

5. Referring to the diagram below, list the <u>specific</u> plate tectonic geologic process that is occurring <u>TODAY</u> at the locations marked as 1, 2, 3, 4, 5.

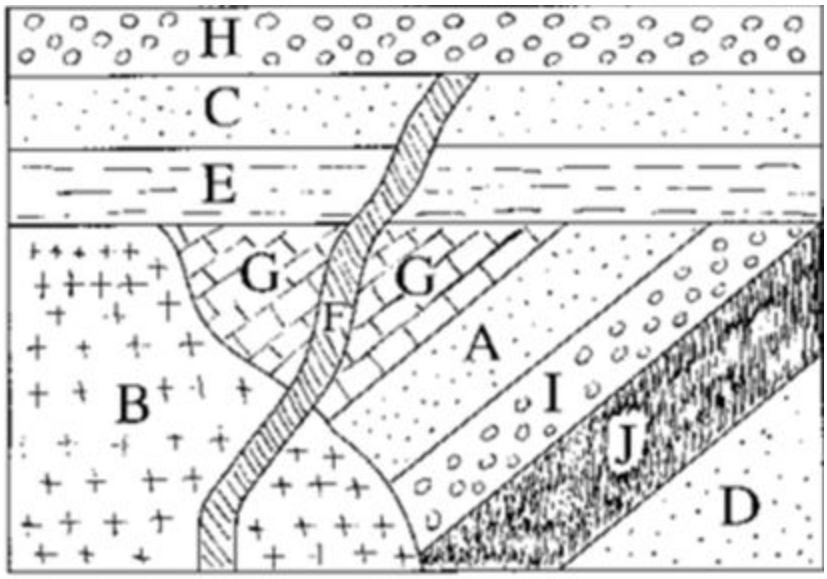


The key words are geologic process and today (NOT the name of the country)

1) ocean-continent convergence/subduction or continental arc or transform fault/boundary
2) Passive margin (EXTINCT ocean-continent collision)
3) Mid oceanic ridge or ocean-ocean divergence or sea floor spreading

4) Continental-continental convergence (no subduction)
5) Ocean-ocean convergence/subduction or volcanic island arc

6. List the order in the sequence in which A, B, C, D, E, F, G, H, I were formed. Sedimentary rocks are ACDEGHIJ and intrusive rocks are F and B. What principle describes the relationship between F and G?



DJIAGBECFH (4points)
Principle of Cross cutting (1 point) or explanation but no name (½) or Principle of Intrusions (½)