ENGLISH EXAMINATION Name:

LEVEL C 1

SECTION 1 READING (25 POINTS)

Read the following text and answer the questions.

Two Atomic Clocks

The nucleus of a radioactive atom disintegrates spontaneously and forms an atom of a different element while emitting radiation in the process. The original atom is called the parent isotope and its stable product is called the daughter or progeny isotope. For example, rubidium-87 decays by emitting an electron from its nucleus to form a stable daughter called strontium-87. Because the rate of nuclear decay is constant regardless of temperature and pressure conditions, radioactive decay provides a dependable way of keeping time. Radioactive isotopes alter from one type of atom to another at a fixed rate from the moment they are created anywhere in the universe. Since we can calculate the decay rate and also count the number of newly formed progeny atoms and the remaining parent atoms, we can use the ratio as a kind of dock to measure the age of minerals and other materials.

The rate at which a radioactive element decays is known as the half-life of the element. **This** is the time necessary for one-half of the original number of radioactive atoms in a sample to decay into a daughter product After two half-lives, the number of atoms remaining after the first half-life will have decayed by half again. Thus, the number of remaining parent atoms is reduced geometrically over time. With some elements, the half-life is very long. Rubidium-87, for example, has a half-life that has been estimated at nearly 48.8 billion years, much longer than the current estimated age of the universe. With other elements, this period can be as short as a few days or even minutes. If we know the half-life of a decaying element, it is possible to calculate the ratio of parent to stable progeny that will remain after any given period of time.

Geologists use a sensitive instrument called a mass spectrometer to detect tiny quantities of the isotopes of the parent and progeny atoms. By measuring the ratio of these, they can calculate the age of the rock in which the rubidium originally crystallized. Because the number of progeny is growing as the parent is decaying and this is occurring at a constant rate, after one-half life the ratio is one parent to one progeny. After two half-lives the ratio is 1 to 3.

Rubidium-87 has often been used to date rocks since it is a widespread element. Various elements including rubidium are incorporated into minerals as they crystallize from magma* or metamorphic rock. During this process the rubidium is separated from any strontium 4 progeny that existed before the rock formed and so we know that the measurable alteration from parent to progeny can be dated from this point. As the radioactive decay of rubidium-87 begins, new progeny atoms of strontium-87 start to accumulate in the rock. In the dating of rocks using these elements, it is important that the rock sample has not been altered subsequent to its formation by

other geologic processes or contamination of any kind. Rocks as old as 4.6 billion years can be dated with some degree of reliability using this method.
Another radioactive element useful for dating is carbon-14, which decays into nitrogen-14. **A** ___ With a half-life of 5,730 years, carbon-14 decays much more rapidly than rubidium-87 and so is useful for measuring the ages of objects from the recent historical and geologic past, such as fossils, bones, wood, and other organic materials. Whereas rubidium-87 is incorporated into rocks during the formation, carbon-14, which is an **essential** element of the cells of organisms, becomes incorporated into living tissues as organisms grow. **B** ___The ratio of carbon-14 to stable carbon isotopes in the organism is the same as it is in the atmosphere. **C**___ When a living organism dies, no more carbon dioxide is absorbed and so no new carbon isotopes are added. **D**___ The daughter nitrogen-14 isotope, existing in gaseous form, leaks out of the dead organism, and thus, we cannot use it to compare the ratio of original to daughter as is done with rubidium-87 and its daughter. However, as the amount of carbon-14 in the dead organism becomes less over time, we can compare the proportion of this isotope remaining with the proportion that is in the atmosphere and from this calculate the approximate number of years since the organism has died. Dating dead organic material by this method is moderately reliable in samples up to about 50,000 years old, but beyond that the accuracy becomes unreliable.
*__isotope__: one of the differing forms of an atomic element
*__magma__: material that is in liquid form and which cools on the Earth's surface to form rock

1. The word alter in the first paragraph is closest in meaning to
   a. adapt
   b. change
   c. revise
   d. vary

2. The rate of nuclear decay in rubidium-87
   a. is always the same
   b. changes over time
   c. depends on temperature
   d. depends on temperature and pressure

3. The word “ this ” in the second paragraph refers to
   a. element
   b. half-life
   c. rate
   d. time

4. The half-life of an element
   a. is a reliable way of measuring sample size.
   b. is a measure of decay rate in radioactive elements.
   c. is considered an unreliable way of calculating age.
   d. is approximately half the age of the atoms it contains.

5. What can be inferred about the reliability of using radioactive atoms to calculate ages of rock samples?
   a. The reliability increases over time.
   b. The reliability decreases with older samples.
   c. The reliability of the parent atom is greater than the progeny.
   d. The reliability of the progeny atom is greater than the parent.

6. According to the passage, from what point can we measure the ages of rocks?
   a. From the point at which rubidium-87 became part of the rock structure.
   b. From the point at which strontium-87 started to decay.
   c. From the point at which the rocks rubidium-87 and strontium-87 joined.
   d. From the point at which later contamination entered the rock samples.

7. The word “essential " in the passage is closest in meaning to
   a. redundant
   b. stable
   c. dependable
   d. vital
   e.
8. According to paragraph 5, what happens to an organism after it dies?
   a. It tends to deteriorate rapidly.
   b. The various carbon isotopes decay.
   c. The supply of carbon-14 is no longer replenished.
   d. The stable carbon isotopes deteriorate.

9. According to paragraph *5*, why can't scientists compare the ratio of carbon-14 carbon to nitrogen-14?
a. The amount of nitrogen-14 is not predictable.
b. The ratio of these two elements doesn’t change.
c. Nitrogen-14 has an unpredictable decay rate.
d. Carbon-14 tends to evaporate too quickly.

10. According to paragraph 5, the amount of carbon-14 in an organism
    a. replaces other carbon isotopes after an organism dies.
    b. tends to be the same as the other carbon isotopes.
    c. increases rapidly when an organism dies.
    d. deteriorates from the moment of death.

11. Look at the four gaps where the following sentence could be added to the passage. Where would the sentence best fit? Choose the letter that shows where the sentence should be added. _____
    Both the unstable carbon-14 and stable carbon isotopes are taken in from the carbon dioxide present in the atmosphere.

SECTION 2 WRITING (25 POINTS)

The following sentences are not concise. Rewrite them in a more concise way.

Example

- As far as I'm concerned, teenagers adopting more or less extreme forms of behavior that affront the adult population is a result of a necessity to become independent.
  Teenagers gain independence by adopting extreme forms of behavior that affront adults.

1. The first and the foremost thing to do if a person is not breathing and if the heart is not beating is to start resuscitation.

   _____
   _____

2. If a child must inhale the smoke from her mother's cigarettes for 12 years, it is likely to cause her harm during such a long period of time.

   _____
   _____

3. I try to make my first e-mail as clear as possible so that it will give the reader the impression that my e-mail is important for me and that I have put some thought into it.

   _____
   _____

4. As learning, so is research also a fundamentally collaborative effort in which people cooperate together.

   _____
   _____

5. In my opinion, for humankind the car has been a success, but for nature it has not been a success.

   _____
   _____

6. In my country, the birthrates are falling lower than ever before. As a result, we could face a severe lack of employees in the workforce when the baby boomers reach retirement age. Also, the employees will not be able to support such a large number of people who are retired.

   _____
   _____

7. My friend was getting some exercise by running along the side of the river when a pack of dogs was suddenly in front of him on the path.

   _____
   _____

8. My best hobby is the collection of stamps for which I have stamps from all over the world and from countries, like Rhodesia, that no longer have the same name.

   _____
   _____

SECTION 3 LISTENING (25 POINTS)

You will hear three different extracts. For questions 1-6, choose the answer (A or B) which fits best according to what you hear. There are two questions for each extract.

Extract 1

1. How did the speaker feel about the move?
   - **A** He didn't think downsizing would be achievable.
   - **B** He found the experience completely overwhelming.
2. How does he feel about his new flat?
   - **A** It can seem very enclosed and cramped.
   - **B** He enjoys spending time in it.

Extract 2

3. How did the speaker feel about her dream home?
   - **A** She was horrified by the size.
   - **B** It made her feel nervous at times.
4. What is the best thing about the house for the speaker?
   - **A** Being able to accommodate some heirlooms.
   - **B** Being able to get rid of some larger furniture.

Extract 3

5. What is the speaker's opinion about city centre living?
   - **A** He loves the range of amenities
   - **B** He can't wait to escape from it.
6. What does the speaker say about the proximity of other buildings?
   - **A** It gives him the sensation of feeling trapped.
   - **B** It doesn't spoil the other benefits of city life.

SECTION 4 SPEAKING (25 POINTS)

1. If you could donate a large amount of money for scientific or medical research, how would you want the money to be used? Describe one important area in need of more research. Explain how your money could make a difference in that field of research.

Preparation time: 15 seconds Response time: 45 seconds

2. Some research has indicated that pets are important for a person's mentai health. Do you agree or disagree? Explain your point of view, include details and examples to support your explanation.

Preparation time: 15 seconds Response time: 45 seconds

Answer Key

READING (25 points)

1. B
2. A
3. B
4. B
5. B
6. A
7. D
8. C
9. A
10. D
11. C

WRITING (25 points)

1. If a person is not breathing and if the heart is not beating, it is important to start resuscitation.
2. Inhalation of smoke from, a parent's cigarette over a long period may harm a child.
3. I try to give my reader a good impression by making my e-mails clear.
4. Learning and research are fundamentally cooperative efforts.
5. The car has been a success for people, but not for nature.
6. Because of low birthrates, in the future there may be too few employees to support the increasing number of retirees.
7. My friend was jogging along the riverside when a pack of dogs appeared in his path.
8. My stamp collection even includes stamps from countries that now have different names.

LISTENING (25 points)

1 A **2** B **3** C **4** A **5** B **6** B