

系所組別： 太空天文與電漿科學研究所

考試科目： 科學英文

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**A. Reading Comprehension (50 points)**

The following are two paragraphs that are excerpted from Wikipedia. Please answer questions following each paragraph in *complete* sentences.

The Van Allen radiation belt is a torus of energetic charged particles (plasma) around Earth, which is held in place by Earth's magnetic field. It is believed that most of the particles that form the belts come from solar wind, and other particles by cosmic rays. It is named after its discoverer, James Van Allen, and is located in the inner region of the Earth's magnetosphere. It is split into two distinct belts, with energetic electrons forming the outer belt and a combination of protons and electrons forming the inner belts. In addition, the radiation belts contain lesser amounts of other nuclei, such as alpha particles. The belts pose a hazard to satellites, which must protect their sensitive components with adequate shielding if their orbit spends significant time in the radiation belts.

1. What is the Van Allen radiation belt?
2. What are the sources of charged particles in the radiation belt?
3. Describe the differences between the inner and outer belts?
4. Is the inner belt closer to Earth surface than the outer belt?

In physics and chemistry, plasma is a state of matter similar to gas in which a certain portion of the particles are ionized. Heating a gas may ionize its molecules or atoms (reduce or increase the number of electrons in them), thus turning it into a plasma, which contains charged particles: positive ions and negative electrons or ions. Ionization can be induced by other means, such as strong electromagnetic field applied with a laser or microwave generator, and is accompanied by the dissociation of molecular bonds, if present. The presence of a non-negligible number of charge carriers makes the plasma electrically conductive so that it responds strongly to electromagnetic fields. Plasma, therefore, has properties quite unlike those of solids, liquids, or gases and is considered a distinct state of matter. Like gas, plasma does not have a definite shape or a definite volume unless enclosed in a container; unlike gas, under the influence of a magnetic field, it may form structures such as filaments, beams and double layer. Some common plasmas are stars and neon signs. In the universe, plasma is the most common state of matter for ordinary matter, most of which is in the rarefied intergalactic plasma (particularly intracluster medium) and in stars.

5. What are plasmas?
6. Name the means used to ionize neutral particles?
7. Do plasmas respond to electric fields?
8. What is the most common matter in the universe?
9. Do plasmas have definite shape?
10. Is it possible to have negative ions in plasmas?

**B. Composition (50 points)**

Please write a short composition on one thing that you think is most important in life.