Self-assessment questions for *An Introduction to Astrobiology*

Question 1

This question relates to Chapter 1.

(a) List some of the unique properties of carbon that enable it to play a vital role in supporting life. (*4 or 5 sentences*)

(b) Define chirality and discuss the links between chirality and life, taking into consideration the possible role played by the ultraviolet circularly polarized light (UVCPL) in star-forming regions. (*About 100 words*)

(c) Briefly comment on the key roles that minerals could have played in the origin of life. (*About 100 words*)

Question 2

This question relates mainly to Chapter 2.

(a) If the total power radiated by a planet is 1.19 10^{18} W then calculate the effective temperature (T_e) of the planet (in K) using Equation 1 (Eq. 1) below. Show your working and report your results in the correct units and to three significant figures.

$$T_e^4 \quad \frac{L}{4\,R^2\sigma} \qquad \text{(Eq. 1)}$$

Where:
L is the total power radiated in Watts (W),
$\pi = 3.14$
$R = 6.30 \quad 10^3$ km
$\sigma = 5.67 \times 10^{-8}$ W m^{-2} K^{-4} the Stefan-Boltzmann constant (see IA Appendix B2)
(Note: you met the concept of effective temperature, and this equation, in Box 2.1.)

(b) Outline three competing views for the origin of the Earth's water and cite appropriate examples that can help to distinguish between different options, taking into account any limitations or gaps in our current knowledge. (*About 250 words*)

(c) The level of solar luminosity was lower in the early Solar System than it is today. Outline the key aspects of plate tectonics on the early Earth which are believed to have played a crucial role in regulating the Earth's surface temperature and in bringing about the habitability of the planet. (*About 100 words*)