

Self-assessment questions for *An Introduction to the Solar System*

Question 1

This question about the conditions on the surface of Venus, relates mainly to Chapters 1–3.

A major space agency is planning a mission to Venus code-named ‘LN-Hi-water’, which will involve a robotic lander imaging the landing site, and also determining the pressure, temperature and meteorological conditions at the planet’s surface.

- (a) Outline the basic design requirements that will enable the lander’s sensitive instruments to survive long enough to send data back to the orbiting spacecraft. (4 or 5 sentences)
- (b) Describe the types of surface features and conditions that the lander’s cameras are likely to observe. (8–10 sentences)

Question 2

This question is about the internal heating and volcanism of terrestrial-like planetary bodies and relates mostly to Chapters 2 and 3.

- (a) Both the Earth and Io are volcanically active terrestrial-like bodies with broadly similar bulk (i.e. chondritic) compositions. In each case, identify the most common (i.e. volumetrically significant) lava products currently erupted on these two bodies. (2 or 3 sentences)
- (b) Describe what is meant by the term ‘primordial heat’, and briefly outline its causes in terms of energy conversion processes. (4 or 5 sentences)
- (c) Tidal and radiogenic heating are together responsible for the long-term internal heating of terrestrial-like bodies (e.g., Table 1). Briefly describe these processes, and outline how they might vary during the lifetime of such a body. (5 or 6 sentences)
- (d) Complete Table 1 by entering the appropriate rates of current global heating for each process on Io and Earth, and from these data indicate the relative importance of the main sources of ongoing internal heating that contribute to this volcanism. (Note: you will need to calculate the rate of heat production in watts (W) generated by tidal and radiogenic heating within the Earth using the data in Chapter 2 and Appendix A. Show your working where appropriate, and express your answer to 1 significant figure.)

Table 1 Current global heat production in Io and the Earth.

Body	Tidal heat production/W	Radiogenic heat production/W
Io		
Earth		