Level 2 Earth and Space Science: practice paper 2026

AS 91192 Demonstrate understanding of stars and planetary systems · Vertex Academy practice paper, not an NZQA paper

Attempt ALL the questions. Show ALL working. Write your answers on lined paper, or in the space under each question.

QUESTION ONE

(a) Sirius A, the brightest star in our night sky, and Proxima Centauri, the closest star to the Sun, are both main sequence stars.

- Sirius A: surface temperature 9940 K, 25 times as luminous as the Sun, 2.1 solar masses.
- Proxima Centauri: 3040 K, 0.0017 times as luminous as the Sun, 0.12 solar masses.

Describe the colour of each star, and use an HR diagram to describe where each one sits on it.

(b) Sirius A is about 15 000 times as luminous as Proxima Centauri.

Explain why Sirius A is so much more luminous. Include what luminosity means, and the role of each star's mass.

(c) From New Zealand, Sirius is the brightest star in the night sky, with an apparent magnitude of −1.5. Proxima Centauri is closer, 4.2 light years away compared with 8.6 for Sirius, but it cannot be seen without a telescope: its apparent magnitude is 11.1.
Their absolute magnitudes are 1.4 for Sirius A and 15.5 for Proxima Centauri.
Discuss why the closer star looks so much fainter. Include what apparent and absolute magnitude measure.

QUESTION TWO

(a) Describe how a star forms from a cloud of gas and dust, and describe when it becomes a main sequence star.

(b) The Sun is a main sequence star of 1 solar mass. In about 5 billion years it will run out of hydrogen in its core.
Explain how the Sun will change after its core runs out of hydrogen, and what will be left at the end.

(c) A main sequence star has 15 times the mass of the Sun.
Discuss how gravity and fusion control this star's life, from the main sequence to what is left after it dies.

QUESTION THREE

(a) Our solar system formed from a protoplanetary disc around the young Sun.
Describe what a protoplanetary disc is, and describe how planets formed in it.

(b) The four inner planets, Mercury to Mars, are small and rocky. The four outer planets, Jupiter to Neptune, are large and made mostly of gas and ice.
Explain why the inner and outer planets are so different.

(c) Most large moons orbit in the same direction as their planet spins (prograde). Neptune's largest moon, Triton, orbits in the opposite direction (retrograde), on an orbit tilted steeply to Neptune's equator. Triton's make-up is similar to Pluto and other icy bodies of the Kuiper Belt.
Discuss which theory of moon formation best explains Triton: accretion, capture or collision. Use the evidence to support your answer and to rule out the other theories.

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