Assessment schedule: practice paper 2026

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

QUESTION ONE

Part	Evidence	Achievement (u)	Merit (r)	Excellence (t)
(a)	colour depends on surface temperature Sirius A 9940 K Proxima Centauri 3040 K HR diagram: hot on the left, luminous at the top Sirius A upper left, Proxima lower right	Describes Sirius A as blue-white (or white) and Proxima as red, linked to temperature. Describes Sirius A as upper left and Proxima as lower right on the HR diagram. Describes both as main sequence stars fusing hydrogen.		
(b)	luminosity: total energy given out per second Sirius A 2.1 solar masses, Proxima 0.12 more mass, stronger gravity faster hydrogen fusion hotter, larger surface gives out more energy	Describes luminosity as the energy given out per second (or brightness at the source). Describes Sirius A as more massive. Describes Sirius A as hotter.	Explains that greater mass gives stronger gravity, a hotter denser core and faster fusion, so more energy is released, OR explains that a hotter, larger surface gives out more energy.	
(c)	apparent magnitude: how bright it looks from Earth absolute magnitude: how bright at 10 parsecs smaller number is brighter absolute 1.4 against 15.5 Proxima about half as far luminosity outweighs distance	Describes apparent magnitude as brightness seen from Earth. Describes absolute magnitude as brightness at a standard distance. Describes a smaller magnitude as brighter.	Explains that Sirius A's smaller absolute magnitude shows it is much more luminous, OR explains that being closer makes a star look brighter.	Discusses why Proxima looks fainter although it is closer, weighing luminosity (linked to mass) against distance, using both magnitudes.

QUESTION TWO

Part	Evidence	Achievement (u)	Merit (r)	Excellence (t)
(a)	nebula: cold cloud of hydrogen gas and dust gravity collapses it protostar contracts and heats core about 10 million K fusion pushes out, gravity pulls in	Describes gravity collapsing a nebula. Describes the protostar heating as it contracts. Describes hydrogen fusion starting in the core. Describes the balance of fusion and gravity on the main sequence.		
(b)	core hydrogen runs out gravity contracts and heats the core shell fusion swells the outer layers core fuses helium into carbon not enough mass for heavier elements core left as a white dwarf	Describes the Sun becoming a red giant. Describes the outer layers forming a planetary nebula. Describes a white dwarf as what is left.	Explains that the core contracts and heats when fusion stops, causing the outer layers to expand, OR explains that the Sun lacks the mass to fuse heavier elements, so it ends as a white dwarf.	
(c)	main sequence: gravity in, fusion energy out 15 solar masses: strong gravity, hot dense core core hydrogen gone outer layers swell iron fusion takes in energy rebound blasts the outer layers core under about 3 solar masses: neutron star	Describes the balance of gravity and fusion on the main sequence. Describes a red supergiant stage. Describes a supernova. Describes a neutron star or black hole as the end point.	Explains why a massive star has a short life (strong gravity, hot core, fast fusion), OR explains why iron fusion leads to core collapse, OR explains how core mass decides between a neutron star and a black hole.	Discusses the whole life of the star in terms of gravity against fusion energy, linking mass to its lifetime, the collapse and supernova, and the remnant.

QUESTION THREE

Part	Evidence	Achievement (u)	Merit (r)	Excellence (t)

(a)	protoplanetary disc: flat spinning disc of gas and dust round a young star dust grains collide and stick planetesimals form the largest grow into planets	Describes a protoplanetary disc as a disc of gas and dust around a young star. Describes particles colliding and sticking (accretion). Describes gravity pulling in more material to form planets.		
(b)	disc hot near the Sun, cold far away near the Sun: only rock and metal solid beyond the frost line: ices freeze too large cores, strong gravity	Describes the disc as hotter near the Sun. Describes the inner planets forming from rock and metal. Describes ice forming further out. Describes the outer planets gathering gas.	Explains that only rock and metal were solid near the Sun, so the inner planets stayed small, OR explains that ice beyond the frost line built large cores whose gravity captured gas.	
(c)	accretion: forms from the planet's disc collision: forms from impact debris disc capture: caught from elsewhere Triton: retrograde and steeply tilted make-up like Pluto and Kuiper Belt objects best explained by capture	Describes one moon formation theory correctly. Describes Triton's orbit as retrograde. Describes Triton as similar to Kuiper Belt objects.	Explains why a retrograde orbit suggests capture, OR explains why accretion or collision would give a prograde orbit.	Discusses which theory fits Triton, using both its orbit and its make-up to support capture AND to rule out accretion and collision.

Judgement for each question

N0	N1	N2	A3	A4	M5	M6	E7	E8
No response, or nothing relevant.	One Achievement point, partly described.	Two Achievement points.	Three Achievement points.	Four Achievement points.	One Merit point.	Two Merit points.	One Excellence point, with a minor error or omission.	One Excellence point, complete.

Grade score out of 24 (each question's grade: N0 = 0 to E8 = 8): Not Achieved 0 to 6, Achieved 7 to 12, Merit 13 to 18, Excellence 19 to 24 (the 2025 exam's cut scores).