Assessment schedule: practice paper 2026

AS 91156 Demonstrate understanding of life processes at the cellular level · Vertex Academy practice paper, not an NZQA paper

QUESTION ONE

Part	Evidence	Achievement (u)	Merit (r)	Excellence (t)
(a)	active site has a specific shape enzyme-substrate complex forms activation energy lowered enzyme unchanged, reused	Describes the substrate binding to an active site of a specific shape. Describes the enzyme lowering the activation energy. Describes the enzyme as unchanged at the end.		
(b)	fresh kiwifruit: active actinidin digests gelatin cooking: high temperature breaks bonds in the enzyme active site changes shape gelatin not digested	Describes actinidin breaking down gelatin. Describes the enzyme as denatured by heat.	Explains that heat changes the shape of the active site so gelatin no longer fits, linked to why the jelly sets with cooked kiwifruit but not with fresh.	
(c)	10 to 50 °C: 12% to 60% optimum about 50 °C 60 to 70 °C: 38% to 5% denaturation permanent	Describes the activity increasing to an optimum and then decreasing. Describes denaturation at high temperature.	Explains the rise in activity below the optimum (more kinetic energy, more collisions), OR explains the fall above the optimum (active site changes shape).	Discusses both the rise and the fall, linking each to the data (more frequent collisions up to the optimum of about 50 °C; denaturation of the active site above it), and the permanence of denaturation.

QUESTION TWO

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

(a)	light-dependent: thylakoid membranes light-independent: stroma	Describes the light-dependent stage on the thylakoids, with water split and O_2 released. Describes ATP and NADPH being made. Describes the light-independent stage in the stroma, with CO_2 made into glucose.		
(b)	light intensity CO_2 concentration stages linked through ATP and NADPH factor in shortest supply limits the rate	Describes more light giving a faster rate. Describes more CO_2 giving a faster rate.	Explains how light affects the light-dependent stage AND how CO_2 affects the light-independent stage, linked through ATP and NADPH or the idea of a limiting factor.	
(c)	aerobic: needs O_2, cytoplasm and mitochondria anaerobic: no O_2, cytoplasm sprint: O_2 supply cannot meet ATP demand anaerobic makes ATP fast without O_2 low ATP yield, lactic acid builds up	Describes aerobic respiration needing oxygen and making CO_2 and water. Describes anaerobic respiration making lactic acid. Describes aerobic respiration giving much more ATP.	Explains why the muscles switch to anaerobic respiration (oxygen supply cannot meet ATP demand), OR explains the difference in ATP yield linked to where each happens.	Discusses both processes (location, oxygen, products and ATP yield) AND why anaerobic respiration increases late in the sprint, including its costs (low yield, lactic acid and fatigue).

QUESTION THREE

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

(a)	helicase unwinds, H bonds broken each strand a template complementary pairing: A-T, C-G DNA polymerase adds nucleotides one old + one new strand	Describes the strands separating and acting as templates. Describes complementary base pairing (A with T, C with G). Describes each new molecule as having one original and one new strand. Describes the strands as antiparallel.		
(b)	0 and 0.2 mol L^{-1}: higher water potential outside 0.4 and 0.6 mol L^{-1}: lower water potential outside zero change between +4% and −3%	Describes water entering the potato in dilute solutions and leaving in concentrated ones. Estimates about 0.3 mol L^{-1}.	Explains the gains and losses by osmosis using water potential (or concentration of water) on each side of the membrane, AND estimates about 0.3 mol L^{-1} as the point of no net movement.	
(c)	water: osmosis, higher to lower water potential nitrate: active transport against the gradient ATP from aerobic respiration waterlogged: air spaces full of water less ATP	Describes water entering by osmosis. Describes nitrate entering by active transport. Describes active transport needing energy (ATP).	Explains active transport of nitrate against its concentration gradient using ATP, OR explains that waterlogging reduces the oxygen available for respiration.	Discusses both processes AND links waterlogging to less oxygen, less aerobic respiration, less ATP and so less active transport of nitrate, contrasting this with osmosis.

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).