

Question		Answer	Marks	AO element	Guidance
	b	<p><i>No waxy cuticle</i> idea that water loss is not a problem / wax production wastes energy / AW ✓</p> <p><i>Stem tissue contains air spaces</i> buoyancy / (allows it to) float / increases gas exchange / more light near surface of water / AW ✓</p> <p><i>Thin, flexible stem</i> less support needed / plant is supported by water / can move more (in water) without breaking / AW ✓</p>	3	2.1	<p>ALLOW does not impede flow of materials through cell wall / shorter diffusion distance / easier gas exchange / faster gas exchange / gas exchange more efficient</p> <p>e.g. less likely to be damaged / not damaged by, water currents / aquatic animals</p>
2	a	i	2 max	2.1	<p>Assume 'they' or 'it' refers to naked mole rats ORA for other mammals</p> <p>IGNORE 'mammals are endotherms and mole rats are ectotherms'</p> <p>ALLOW 'most mammals are 37°C and naked mole rats are 30-32°C'</p> <p>e.g. 'they huddle together when temperature falls whilst mammals shiver' or ' they move to cooler parts when temperature rises whilst mammals sweat'</p> <p>IGNORE 'naked mole rats body temperature matches environmental temperature'</p> <p>IGNORE ref to no subcutaneous fat layer / no sweat glands ALLOW 'no hair so cannot trap heat'</p>

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a	ii	<p>positive feedback, is when an initial (biological) change is, increased further / exaggerated / AW ✓</p> <p>lower temperature reduces kinetic energy (of molecules) ✓</p> <p>enzyme activity, slowed / reduced ✓</p> <p>respiration rate / metabolism, slowed / reduced ✓</p> <p>less (metabolic / internal) heat generated ✓</p> <p>(so that body) temperature drops further ✓</p>	4 max	2.5	<p>e.g. 'it is when a change causes system to go further from, norm / optimum' 'it is when a decrease leads to a further decrease'</p> <p>ALLOW fewer successful collisions / fewer ESCs formed IGNORE enzymes stop working / no enzyme activity</p> <p>ALLOW the rate of reactions (in the body) is, reduced / slowed down IGNORE respiration stops</p> <p>ALLOW less heat, produced / created</p> <p><i>'change causes system to go further from, norm / optimum and so a decrease in temperature leads to further decrease' = mp1 and 6</i></p>
a	iii	<p>False True True False</p> <p>✓✓</p>	2	1.1	<p>ALLOW T and F for True and False ALLOW ticks and crosses for True and False (when unambiguous)</p> <p>All correct ✓✓ 2 or 3 correct ✓</p>
b	i	<p>no, action potentials / (electrical) impulses (in response to acid stimulus) ✓</p> <p>(along) sensory neurones / neurones to CNS ✓</p> <p>(because) no / few, <u>voltage gated</u> (sodium) channels open ✓</p> <p>less depolarisation (of receptor membrane) / fewer Na⁺ ions move in ✓</p>	2 max	3.1	<p>ALLOW fewer, action potentials / (electrical) impulses, generated ALLOW neurones to brain</p> <p>IGNORE fewer sodium ion channels opened</p> <p>DO NOT ALLOW no depolarisation / no Na⁺ ions move in</p>

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	b ii	converts, chemical / stimulus, to action potential / electrical energy / electrical impulse ✓	1	2.1	ALLOW kinetic energy / pressure / temperature / mechanical energy / H ⁺ ions as examples of stimuli (as question states a pain receptor) IGNORE 'sensory information' / 'pain'
	c i	positive correlation or the higher the body mass the, longer / higher, the lifespan ✓	1	2.2	ALLOW 'as body mass increases lifespan increases' DO NOT ALLOW 'increase in body mass causes them to live longer' IGNORE weight / size for mass
	c ii	lifespan is greater than expected for its mass / AW ✓	1	3.2	IGNORE weight / size for mass ALLOW 'longer / higher / bigger, than expected'
	d i	glycolysis / anaerobic respiration, can continue / AW ✓ because, conversion of glucose to TP is not needed / lactate inhibition is irrelevant / AW ✓ ATP is produced when TP is converted to pyruvate ✓	2 max	2.6	IGNORE lactate pathway ALLOW description of glycolysis e.g. 'enzymes needed to convert fructose to triose phosphate are not inhibited by lactate'
	d ii	low body temperature / slow metabolic rate ✓ less energy is spent on thermoregulation ✓	1 max	2.1	ALLOW low metabolic rate / fewer metabolic reactions ALLOW other plausible physiological adaptations e.g. more <u>creatine</u> phosphate stores / more able to buffer H ⁺ ions / more myoglobin / Hb has higher affinity for oxygen /

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					dissociation curve shifted to left / bradycardia / more erythrocytes
3	a	physiological ✓	1	2.1	ALLOW biochemical / physiology / biochemistry IGNORE biological / genetic /chemical
	b	enterokinase, is an enzyme / converts trypsinogen to trypsin / described ✓ calcium ion / Ca ²⁺ , is a cofactor (to trypsin)✓	2	3.1	mark as prose ALLOW enterokinase, modifies / activates / changes tertiary structure, of trypsinogen ALLOW calcium ion binding site formed by enterokinase ALLOW enterokinase is a catalyst ALLOW a description of a cofactor ALLOW calcium ion / Ca ²⁺ , is a <u>non-competitive</u> inhibitor DO NOT ALLOW Ca ²⁺ is a, prosthetic group / coenzyme