Question	Answer	Marks	Guidance
1 a	amino acids (1)	1	**allow** C, H, O, N.
b	denatures protein (1) as quickly as possible (1)	2	**allow** denaturing enzymes rather than proteins **allow** so stops acting as a poison (1) **ignore** idea of sterilising wound
c	(poison) **gene** is switched off (in all but the spine cells) (1)	1	**allow** allele is switched off **allow** higher level answers e.g. transcription prevented
d	**any two from:** (no – no mark) idea that small individual risk/small number of incidents (1) no serious harm caused (1) idea that can wear footwear (1) fish may move to other beaches (so will not stop the problem) (1) increase awareness of the danger (1) go on beach but not in the water (1) possible adverse effect on tourism/economy/jobs (1) (yes – no mark) idea that stings may be dangerous to some people / some people may have allergy (1) idea of liability if danger known and people not warned (1) idea that if many of the stings happened on a small number of beaches, they should be closed (1)	2	**allow** easily treated
	Total	**6**	

Question	Answer	Marks	Guidance
2 a i	(lack of oxygen causes) fewer/no (aerobic) bacteria / fungi (1) (therefore) no/slow/less decay (1)	2	**allow** fewer/no decomposers / microorganisms **ignore** germs/viruses **ignore** fewer/no detritivores **allow** no/slow/less breakdown of dead material **allow for additional marking point**: less/no/slower respiration (by bacteria/fungi/decomposers) (1) **allow** reverse arguments
ii	(release) energy (1) to take in minerals/nutrients (1) by active transport / movement against a concentration gradient (1)	3	**ignore** absorb minerals from the air
b	higher concentration of salt (in roots) than sea water / ORA (1) (so can absorb water by) osmosis (1)	2	**allow** have lower concentration **of water** than sea water **allow** correct references to water potential references to concentration must be qualified
c i	different concentrations of salt (1)	1	**allow** idea of different water availability **allow** different levels of nutrients/minerals **allow** different niches / different abiotic factors / examples of different factors e.g. pH / light / temperature **allow** different environmental factors **allow** different conditions
ii	idea that only mangroves are adapted to / can survive / can grow in this environment (1)	1	**allow** mangroves outcompete other plants **allow** other plants not adapted / cannot survive / cannot grow (in mangrove forest)
	Total	**9**	

Question			Answer	Marks	Guidance
3	(a)		$6O_2 \rightarrow 6CO_2$	1	
	(b)		**Level 3 (5–6 marks)** RQ for both seeds calculated correctly. Compares calculated results to food type table and links pea seed with carbohydrate **and** peanut with a combination fat+protein. Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** RQ for both seeds calculated correctly. Compares calculated results to food type table and links pea seed with carbohydrate **or** peanut with a combination fat+protein. Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** RQ for both seeds calculated correctly **or** one correct RQ with a correct link to food source. Quality of written communication impedes communication of the science at this level. **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to C.** **Indicative scientific points at level 2 and 3 may include:** consider following point with reference to RQ RQ for carbohydrate = 1.0 so peas must be/use RQ for fat = 0.7 RQ for protein = 0.9 peanuts must be/use combination of protein and fat **Indicative scientific points at level 1 may include:** RQ for pea seed = 1.0 RQ for peanut seed = 0.80 (allow 0.798) **allow** pea is $\frac{0.6}{0.6}$ and peanut is $\frac{13.0}{16.3}$ for 1 mark • for 2 marks need to be clear which RQ is which but both RQs correct in the table will score 2 marks 1 RQ correct only will score 1 mark at L1 **Use the L1, L2, L3 annotations in Scoris. Do not use ticks.**

Question			Answer	Marks	Guidance
	(c)		enzyme activity would stop (1) because enzyme and substrate cannot bind / enzyme has lost its 3-D shape / active site destroyed / enzyme denatured / protein coagulates / irreversible change (1)	2	**allow** enzyme is inactive **not** enzyme killed
			Total	**9**	

Question			Answer	Marks	Guidance
4	(a)		$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O$ (2)	2	all correct (2) one mark formulae (1) case and subscripts must be correct one mark balancing (1) this mark is dependent on the first reactants and products must be on correct side of equation but can be in either order
	(b)		arteries carry blood at low pressure away from the heart ☐ arteries carry blood at high pressure away from the heart ✓ arteries carry blood at low pressure and have valves to prevent backflow ☐ arteries carry blood at high pressure back to the heart ☐ arteries join veins to capillaries ☐	1	any additional incorrect tick loses mark
	(c)	(	93.6% (1)	1	**allow** 94 or 93.62 or 93.617 **not** 94.0 (incorrect rounding)
		(ii)	(no) (no mark) 1. his heart ate puts him in the anaerobic threshold zone / he is not within the target heart rate zone / respiring anaerobically / he's in 85-100% max heart rate zone (1) 2. builds u lactic acid / builds up oxygen debt (1) 3. so cau s fatigue / cramp / pain (1)	3	if have not put 'no' can still award marking point 1 only **allow** builds up lactate lactic acid is toxic = 1
			Total	**7**	

Question	Answer	Marks	Guidance
5 a i	37.5 (^{o}C) (1)	1	**allow** answer in range 35-40 (^{o}C) **allow** single number, e.g. 37 (^{o}C) or range, e.g. 37-38 (^{o}C)
ii	(as temperature increases) time gets longer / rate gets slower (1) reaction stops / protein no longer broken down / AW (1) enzyme / pepsin denatures (at high temperatures) (1)	3	**allow** time increases **allow** any specific time greater than 6 **allow** time would be infinite / tube would not go colourless/ no reaction / the reaction won't work **ignore** it would not work if referring to enzyme only and not reaction **allow** description of denaturing in terms of changing shape of active site **ignore** protein is denatured
b i	The volume of carbon dioxide is less than the volume of oxygen / 2nd box (1)	1	more than one answer = 0 **allow** other unambiguous answers, e.g. X in box, underlining, circle
ii	**max three from** structural (1) e.g. collagen / keratin (1) hormones (1) e.g. insulin (1) carrier molecules (1) e.g. haemoglobin (1) enzymes / biological catalyst (1) e.g. amylase (1)	3	only award marks for examples if have already gained the function mark **ignore** pepsin **allow** antibodies (1) receptors (1) muscles / growth / repair (1)
	Total	**8**	