


WJEC (Eduqas) Biology A-level
Topic 1.1: Importance of ATP
Questions by Topic - Mark
Scheme

1.

Question		Marking details	Marks available						
			AO1	AO2	AO3	Total	Maths	Prac	
1	(a)	 <p>Only one phosphate need be labelled. Pentagon shape with adenine and 3 phosphates coming off at correct points (1) Ignore shape of adenine Correct labels = ribose + adenine + phosphate (1) Accept adenosine if structures bracketed Reject pentose Reject base</p>	2			2			
	(b)	(i)	40.4 = 2 marks $\frac{38 \times 7.3}{888} \times 100 \%$ = 40 = 1 mark incorrect dp Correct substitution into equation = 1 mark		2		2	2	
		(ii)	Approx (twice/ four times) as efficient / (20/30)% more ECF from (i)			1	1		
	(c)	Any four (x1) from: 1. Both involve proton pumps/ protons are pumped(1) 2. (Driven/ powered) by (electron (energy)/ redox reactions of ETC)(1) 3. Creation of (electro chemical/ proton/ chemiosmotic) gradient (1) 4. (Diffusion/ flow) of (hydrogen ions/ protons)/ protons (travel down/ pass through) (stalked particle/ carrier protein)/ chemiosmosis(1) 5. (through/ use) ATP synthase (synthesising ATP) (1) Accept synthetase		4		4			
		Question 1 total	2	6	1	9	2	0	

2.

Question	Marking details	Marks Available
(a)	(i) phosphate / Pi / inorganic phosphate/ iP/ PO_4^{3-} ;	1
	(ii) W is outer (mitochondrial) membrane; Z is the (mitochondrial) matrix;	2
	(iii) most concentrated in part X;	1
	Question 5 Total	[4]

3.

Question	Marking details	Marks Available
(a)	inner membrane/crista;	1
(b)	ref to NADH/FADH; membrane impermeable to protons; pumped across membrane; to intermembrane space;	3 max
(c)	accepts electrons and protons; final acceptor of ETC; forms water; to maintain flow of electrons;	2 max
	Question 7 Total	[6]

4.	Question	Marking details	Marks Available
	(a)	<p><u>Similarities</u></p> <p>(Both contain) a 5 carbon sugar;</p> <p>Both have two phosphate groups;</p> <p>Both contain (two) nitrogenous bases/ adenine/ organic base;</p> <p>Dinucleotide;</p> <p>Accept adenosine for 1 mark if MP1 and 3 not awarded</p>	max 2
		<p><u>Differences</u></p> <p>FAD only contains one (ring form) sugar and NAD contains 2/</p> <p>One 5C sugar is in its linear form in FAD and both 5C sugars are in ring form in NAD/ NAD contains nicotinamide and FAD contains flavin/ FAD has a three ring base and NAD has one ring base;</p>	1
	(b)	(i) The bond between the {terminal/last two} phosphate groups on ATP;	1
		(ii) Does not involve the ETC/complex series of carriers and pumps;	Max 2
		Does not need stalked particles/ATP synthetase;	
		Does not need an electrochemical gradient/eq;	
		Does not require oxygen;	
		Accept 'Does not require mitochondria' as alternative to MPs 1, 2,3	

Question 6 Total

[6]

5.

Question	Marking details	Marks Available
5	<p>(a)</p> <p>(i) inner mitochondrial membrane / cristae;</p> <p>(ii) Hydrogen;</p> <p>(iii) Any 5 from: As electrons pass along the ETC energy released; used to pump protons; into inter membrane mitochondrial space; creates proton concentration gradient / electrochemical gradient / proton motive force; protons flow through / move down surface of stalked particles; provides energy for ATP synthetase / ATP synthase ; ADP + Pi to ATP; chemiosmosis;</p>	1 1 5
Question 5 Total		[7]

6.	Question		Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths *	Prac **
	(a)		From the intermembrane space into the matrix (1) Via (a stalked particle containing) ATP synthase (1)	2			2		
	(b)		Cannot produce enough/lower yield of ATP/ no ATP produced (1) For {flight/muscle contraction/active transport / transmission of nerve impulses/ no protein synthesis/ cell division} (1) NOT overheating/ denaturation of proteins		2		2		
	(c)		Any 4 (x1) from: A. Use of fat stores as an energy source causes weight loss (1) reference to muscle/ protein is neutral B. Increased metabolic rate to compensate for ATP underproduction (1) C. Lack of ATP causes tiredness/fatigue (1) D. Heat produced as a by-product so increases body temperature (1) E. More sweat production to lower body temperature (1)		1 1		4		
	(d)		Overheating/hyperthermia/organ failure			1	1		
			Question 6 total	2	4	3	9	0	0