Question Number	Answer	Mark
1(a)	molecule R - ATP / adenosine triphosphate ; molecule S - ADP / adenosine diphosphate ;	**(2)**

Question Number	Answer	Mark
1(b)(i)	1. carbon dioxide / CO_2 ; 2. idea that the C has been removed from C_6 or C_5 ;	**(2)**

Question Number	Answer	Mark
1(b) (ii)	1. cycle would stop / eq ; 2. 4 carbon compound would accumulate / eq ; 3. 6 carbon compound would {run short / not be synthesised} / 5 carbon compound would run short / eq ; 4. idea that {molecule T / H} reduce ;	**(3)**

Question Number	Answer	Mark
1(c)	1. idea of electrons being {passed along / eq} the electron transport chain ; 2. idea of {losing / eq} energy ; 3. (used to) add a phosphate to ADP to make ATP / eq ; 4. reference to ATPase ; 5. idea of chemiosmosis ; 6. idea of oxygen as the final acceptor ;	**(3)**

Question Number	Answer	Mark
2(a)	glycolysis ;	**(1)**

Question Number	Answer	Mark
2(b)(i)	B ;	**(1)**

Question Number	Answer	Mark
2(b)(ii)	C ;	**(1)**

Question Number	Answer	Mark
2(c)(i)	1. oxygen {to oxidise hydrogen / as hydrogen acceptor / as final acceptor of electron transport chain} / eq ; 2. reference to reduced {coenzyme / NAD / FAD / eq} ; 3. (reduced coenzyme) from {glycolysis / Krebs Cycle / eq} ; 4. comparison of two {oxygen uptake / respiration rates} from pyruvate, molecules B and C e.g. respiration rate faster in pyruvate than molecule B ; 5. reference to uptake of substrate compared e.g. uptake of molecule B faster than molecule C ; 6. comparison of diffusion rate / molecular size / eq ; 7. comment on oxidation level of substrate e.g. ratio H:O in molecule /eq ; 8. relative quantity of {reduced coenzyme / eq} produced / eq ; 9. pH effect of pyruvate more favourable for {enzyme / reaction} / eq ; 10. number of carbon atoms of {C lower than B} / eq ;	**max (4)**

Question Number	Answer	Mark
2(c)(ii)	1. lactate can be converted to {pyruvate / eq} ; 2. increases oxygen requirement / reference to oxygen debt / eq ; 3. idea of most potential for oxidation / e.g. can make the most {reduced coenzyme / eq} ;	**max (2)**

Question Number	Answer	Additional Guidance	Mark
3(a)(i)	Two from: 1. idea of size of cube ; 2. same {species / eq} of carrot ; 3. same {age / source / eq} of carrot ;	**1 ACCEPT** surface area / volume IGNORE mass	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(a)(ii)	1. (oxygen is) electron acceptor / eq ; 2. (also oxygen) binds with protons / H^+ /hydrogens ; 3. Idea of electrons from {electron transport chain / ETC} ; 4. to form (metabolic) water ;	**3 ACCEPT** from cytochromes	**(3)**

Question	Answer	Additional Guidance	Mark

Number			
3(b)	1. aerobic respiration ; 2. ref. to decarboxylation ; 3. (when) pyruvate broken down / eq ; 4. (decarboxylation occurs) in Krebs cycle ; 5. details of where in Krebs cycle e.g. removed from { C6 / C5 / eq} compound ;	**4 ACCEPT** link reaction **5 ACCEPT** C3 to C2 if refer to link reaction	**(4)**

Question Number	Answer	Additional Guidance	Mark
3(c)	1. as temperature increases, percentage of CO_2 in bag {increases / eq} ; 2. (as temperature increase) {reactants /named / eq} {gain more kinetic energy / collide more often} ; 3. increased enzyme activity / more E-S complexes form / eq ; 4. smaller increase between 5 and 10 because {more active sites occupied / some other factor is limiting / eq} ;	**1 ACCEPT** rises **IGNORE** change unqualified **4 ACCEPT e.g.** O_2 concentration could be limiting, high CO_2 levels inhibit enzymes	**(3)**

Question Number	Answer	Additional Guidance	Mark
3(d)	anaerobic respiration ;	**ACCEPT** fermentation but not lactic acid fermentation **IGNORE:** respiration unqualified	**(1)**