# Respiration

## Mark Scheme 8

| | |
|---|---|
| **Level** | International A Level |
| **Subject** | Biology |
| **Exam Board** | CIE |
| **Topic** | Energy and respiration |
| **Sub Topic** | Respiration |
| **Booklet** | Theory |
| **Paper Type** | Mark Scheme 8 |

**Time Allowed :** **58 minutes**

**Score :** **/ 48**

**Percentage :** **/100**

**Grade Boundaries:**

| A* | A | B | C | D | E | U |
|---|---|---|---|---|---|---|
| >85% | '77.5% | 70% | 62.5% | 57.5% | 45% | <45% |

| Question | Expected Answers | Marks |
|---|---|---|
| 1 **(a)** | anaerobic; R. inaerobic, R. unaerobic<br>lactate / lactic acid;<br>liver;<br>debt; R. deficit<br>aerobic;<br>resting; | **6** |
| | | **[Total : 6]** |

**Question 2**
**(a)**

| | name of structure | stage of respiration |
|---|---|---|
| A | matrix | Krebs cycle ; |
| B | cristae / inner membrane<br>**A** intermembrane space | oxidative phosphorylation/ETC ;<br>**A** build up of protons |

**Penalise once if rows A and B are correct but swapped**
**If both structure names are correct (but stages incorrect) allow one mark**

**2**

**(b)**
membranes separate from rest of cytoplasm ;
allows different pH ;
inner membrane attachment of stalked particles / ATPase ;
allows linear / ordered arrangement of carriers/ETC/respiratory chain ;
ref. to large internal surface area/AW ;
matrix contains enzymes;

**3 max**

**(c)**
carries / transfers protons/hydrogen(atoms) ;
and electrons ;
in/to ETC /FAD/respiratory chain;
ref. to dehydrogenation/oxidising ;
energy used to form ATP;
ref. to coenzyme ;
ref. alternative pathways (named);

**3 max**

**(d)**
light involved ;
occurs in chloroplasts/chlorophyll ;
on thylakoid membranes ;
ref. to cyclic and non-cyclic ;
photolysis of water/produces oxygen;

***If oxidative phosphorylation stated***
light not involved;
oxygen final hydrogen acceptor/oxygen not evolved;

**3max**

**Total:11**

3 **(a)** 1. photosystem I (PI) **and** photosystem II (PII) involved **;**
2. light harvesting clusters **;**
3. light absorbed by accessory pigments **;**
4. primary pigment is chlorophyll a **;**
5. energy passed to, primary pigment / chlorophyll a **;**
6. electrons, excited / raised to higher energy level **;**
7. (electrons) taken up by electron acceptor **;**
8. (electrons) pass down electron carrier chain *(to produce ATP)* **;**
9. PII has (water splitting) enzyme **;**
10. water split into protons, electrons and oxygen **;** **A** equation
11. photolysis **;**
12. electrons from PII pass to PI / electrons from water pass to PII **;**
13. to replace those lost **;** *give either in relation to PI or PII*
14. protons and electrons combine with NADP *(to produce reduced NADP)* **;**

*can award these marking points from a diagram* [9 max]

**(b)** 15. RuBP combines with carbon dioxide **;**
16. rubisco **;**
17. forms unstable 6C compound **;**
18. produces two molecules of, GP / PGA **;**
19. GP / PGA, converted to TP **;**
20. by reduced NADP and ATP **;**
21. from light dependent stage **;**
22. TP used to regenerate RuBP **;**
23. using ATP **;**
24. TP can form, hexose / fatty acids / acetyl CoA [6 max]

**[Total: 15]**

4 **(a (i)** glycolysis **;** [1]

**(ii)** cytoplasm/cytosol **;** [1]

**(iii)** 4 **;** **A** 4 – 2 = 2 [1]

**(b) (i)** inner membrane/cristae/stalked particles **;** [1]

**(ii)** 1 reduced, NAD/FAD **;**

2 dehydrogenase enzymes **;**

3 release hydrogen **;** **A** H **R** $H_2/H^+$

4 hydrogen splits into proton and electron **;**

5 electrons flow down, ETC/AW **;**

6 energy released **;**

7 protons pumped (across inner membrane/from matrix) **;**

8 into intermembrane space **;**

9 proton gradient **;**

10 protons pass through, ATP synthase/stalked particle **;**

11 oxygen final, hydrogen/proton, acceptor **;** [5 max]

**(c) (i)** nuclei **and** ribosomes **;** [1]

**(ii)** 1 glycolysis, does not occur in mitochondrion/only occurs in cytosol or cytoplasm **;**

2 pyruvate produced in glycolysis **;**

3 pyruvate can enter mitochondrion/glucose cannot enter mitochondrion **;**

4 carbon dioxide produced/decarboxylation, in, Krebs/link reaction **;** [3 max]

**(iii)** 1 cyanide, inhibits cytochrome oxidase is a non-competitive inhibitor **;**

2 reduced NAD not oxidised/AW **;**

3 Krebs cycle stops **;**

4 alternative H acceptor needed/pyruvate is H acceptor/pyruvate is reduced **;** **R** $H^+$

5 lactate produced in cytoplasm **;**

6 by anaerobic respiration **;** [3 max]

**[Total: 16]**