



**Energy and Respiration :-**

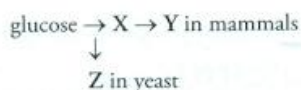
1. What does not occur in the conversion of glucose to two molecules of pyruvate?

- A hydrolysis of ATP
- B phosphorylation of ATP
- C phosphorylation of triose (3C) sugar
- D reduction of NAD

2. Where does each stage of aerobic respiration occur in a eukaryotic cell?

	link reaction	Krebs cycle	oxidative phosphorylation
A	cytoplasm	mitochondrial matrix	mitochondrial cristae
B	mitochondrial cristae	cytoplasm	mitochondrial matrix
C	cytoplasm	mitochondrial cristae	mitochondrial matrix
D	mitochondrial matrix	mitochondrial matrix	mitochondrial cristae

3. The diagram summarises anaerobic respiration.



Which compounds are represented by the letters X, Y and Z?

	X	Y	Z
A	ethanol	pyruvate	lactate
B	lactate	ethanol	pyruvate
C	pyruvate	ethanol	lactate
D	pyruvate	lactate	ethanol

4 Distinguish between:

- a an **energy currency** molecule and an **energy storage** molecule.
- b **decarboxylation** and **dehydrogenation**.

5 State the roles in respiration of:

- a NAD
- b coenzymeA
- c oxygen.

6 Copy and complete the table to show how much ATP is used and produced for each molecule of glucose respired in the various stages of respiration.

	ATP used	ATP produced	net gain in ATP
glycolysis			
link reaction			
Krebs cycle			
oxidative phosphorylation			
total			

7 a Explain why the energy value of lipid is more than twice that of carbohydrate.[2]

b Explain what is meant by **respiratory quotient (RQ)**. [2]

c Copy and complete the table to show that different respiratory substrates have different RQs.

respiratory substrate	RQ
	1.0
	0.7
	0.9

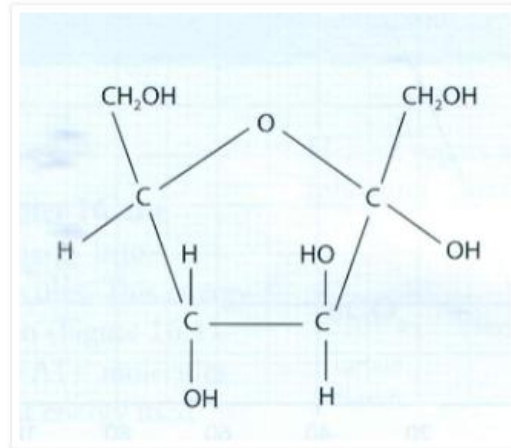
[3]

d Measurements of oxygen uptake and carbon dioxide production by germinating seeds in a respirometer showed that 25 cm<sup>3</sup> of oxygen was used and 17.5 cm<sup>3</sup> of carbon dioxide was produced over the same time period.

i Calculate the RQ for these seeds. [2]

ii Identify the respiratory substrate used by the seeds. [1]

e Dahlia plants store a compound called inulin, which is a polymer of fructose. The structure of fructose is shown in the diagram.



Calculate the RQ when inulin is hydrolysed and then respired aerobically.

[2]

**Photosynthesis :-**

1 What are the products of the light-dependent reactions of photosynthesis?

- A ATP, RuBP and reduced NAD
- B ATP, oxygen and reduced NADP
- C GP, oxygen and reduced NAD
- D GP, reduced NADP and RuBP

2 Where in the chloroplast are the products of photophosphorylation used?

- A envelope
- B granum
- C stroma
- D thylakoid

3 In separate experiments, an actively photosynthesising plant was supplied with one of two labelled reactants:

- water containing the  $^{18}\text{O}$
- carbon dioxide containing the  $^{17}\text{O}$

In which products of photosynthesis would these isotopes be found?

	<sup>16</sup> O	<sup>17</sup> O
A	oxygen produced by chloroplast grana	carbohydrate produced by the chloroplast stroma
B	oxygen produced by the chloroplast stroma	carbohydrate produced by chloroplast grana
C	carbohydrate produced by chloroplast grana	oxygen produced by the chloroplast stroma
D	carbohydrate produced by the chloroplast stroma	oxygen produced by chloroplast grana

- 4 Copy and complete the table to show the adaptations of a dicotyledonous leaf for photosynthesis. The first row has been completed for you.

Feature of leaf	Adaptation for photosynthesis
leaf mosaic	helps plant to absorb as much light as possible
large surface area of leaf lamina	
transparent upper epidermis	
waxy cuticle on upper epidermis	
stomata in lower epidermis	
air spaces in spongy mesophyll	

- 5 Copy and complete the table to show the adaptations of a palisade mesophyll cell for photosynthesis.

Feature of palisade mesophyll cell	Adaptation for photosynthesis
long cells arranged at right angles to the upper epidermis	
	large surface area of contact between cells and air
thin cell walls	
	chloroplasts are restricted to a layer near the outside of the cell where light can reach them

- 6 Rearrange the following statements to make a flow diagram of the mechanism of opening a stoma.

1. volume of guard cell increases
2. H<sup>+</sup> transported out of guard cells
3. water enters guard cells by osmosis
4. K<sup>+</sup> diffuses into guard cells
5. guard cells curve to open stoma
6. water potential of guard cells falls
7. K<sup>+</sup> channels open

- 7 a Explain how the inner membrane system of a chloroplast makes it well adapted for photosynthesis.

- b Copy the table below and insert ticks or crosses to show which structural features are shared by a plant chloroplast and a typical prokaryotic cell.

✓ = structural feature shared; ✗ = structural feature not shared.

Structural feature	Structural feature shared by chloroplast and typical prokaryotic cell
circular DNA	
DNA combined with structural protein to form chromosomes	
ribosomes about 18 nm in diameter	
complex arrangement of internal membranes	
peptidoglycan wall	
size ranges overlap	

**8 a** When isolated chloroplasts are placed in buffer solution with a blue dye such as DCPIP or methylene blue and illuminated, the blue colour disappears. Explain this observation. [4]

**b** Name the compound, normally present in photosynthesis, that is replaced by the blue dye in this investigation. [1]

**[Total: 5]**

**9** Distinguish between:

- a** cyclic and non-cyclic photophosphorylation [2]
- b** photophosphorylation and oxidative phosphorylation [2]
- c** the roles of NAD and NADP in a plant. [2]

**[Total: 6]**

**10 a** Draw a simple flow diagram of the Calvin cycle to show the relative positions in the cycle of the following molecules:

- CO<sub>2</sub> (1C)
- GP/PGA (3C)
- triose phosphate (3C)
- RuBP (5C).

[4]

**b** Show the point in the cycle at which the enzyme rubisco is active. [1]

[1]

**[Total: 5]**

**11 a** Explain what is meant by a limiting factor.

**b** List four factors that may be rate-limiting in photosynthesis.

**c** At low light intensities, increasing the temperature has little effect on the rate of photosynthesis.

At high light intensities, increasing the temperature increases the rate of photosynthesis.

Explain these observations.

[5]

**[Total: 10]**

**12 a** Distinguish between an absorption spectrum and an action spectrum. [4]

**b** Pondweed was exposed to each of three different wavelengths of light for the same length of time. For each wavelength, the number of bubbles produced from the cut ends of the pondweed were counted and are shown in the table.

wavelength of light / nm	mean number of bubbles produced in unit time
450	22
550	3
650	18

Explain these results.

[4]

[Total: 8]

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**Note :-**

- Get past year papers from 2015-2017 [9700- 41,42,43,51,52,53 of F/M, M/J and O/N] spirally bound.
  - Do any 6 papers for the part of syllabus that you have done.
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