Biological Molecules – 2021/20 GCE Biology A Component 02

1. Nov/2021/Paper_H420/02/No.1

Which of the options is a function of fibrous proteins?

A aids rigidity of membranes

B involved in cell signalling

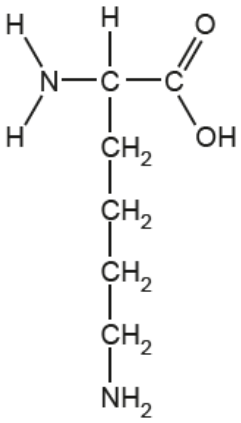
C provides elasticity in alveoli

D speeds up reactions

Your answer ☐ **[1]**

2. Nov/2021/Paper_H420/02/No.2

Which of the types of molecule is shown in the diagram?



A amino acid

B fatty acid

C nitrogenous base

D nucleotide

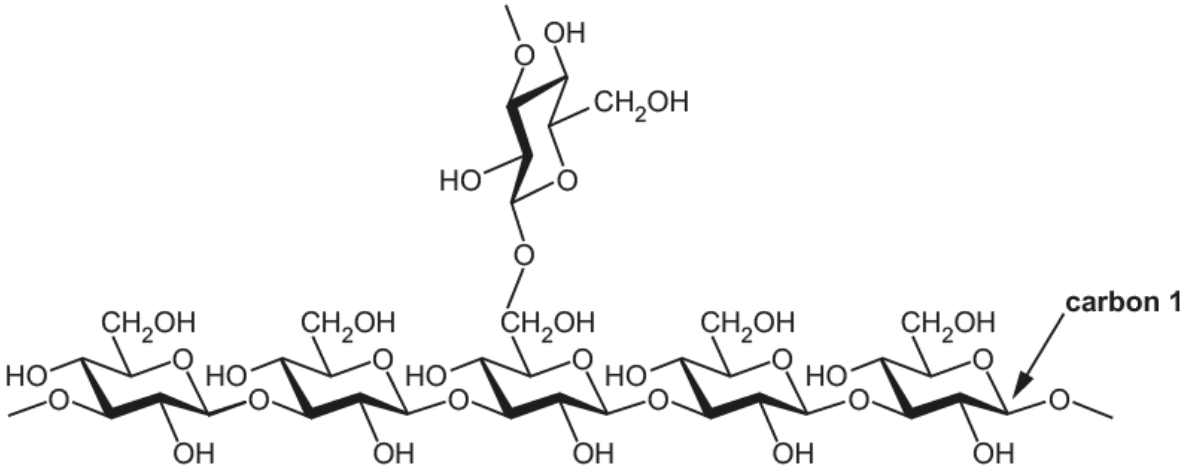
Your answer ☐ **[1]**

3. Nov/2021/Paper_H420/03/No.3(a)

Callose is a polysaccharide produced by plants.

(a) Callose is formed from β-glucose monomers.

The figure below shows a section of callose.



Describe the differences between the structures of callose and cellulose.

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..... **[2]**

4. Nov/2021/Paper_H420/03/No.4

(a) Some organisms use a disaccharide called trehalose as a respiratory substrate. Trehalose has a similar structure and very similar chemical properties to sucrose.

Suggest how you could test for the presence of trehalose.

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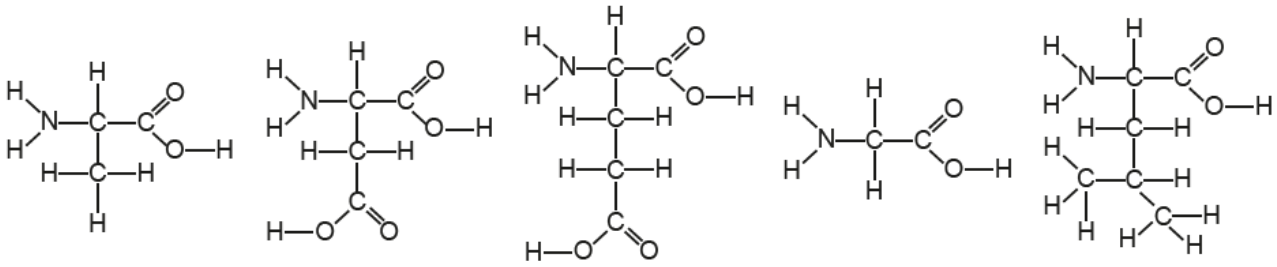
..... **[2]**

(b) Amino acids can be converted to other molecules and used in respiration.

Fig. 4.1 shows the formulae of five amino acids that can be used in respiration.



alanine aspartic acid glutamic acid glycine leucine

Fig. 4.1

Fig. 4.2 shows an outline of the link reaction and the Krebs cycle.

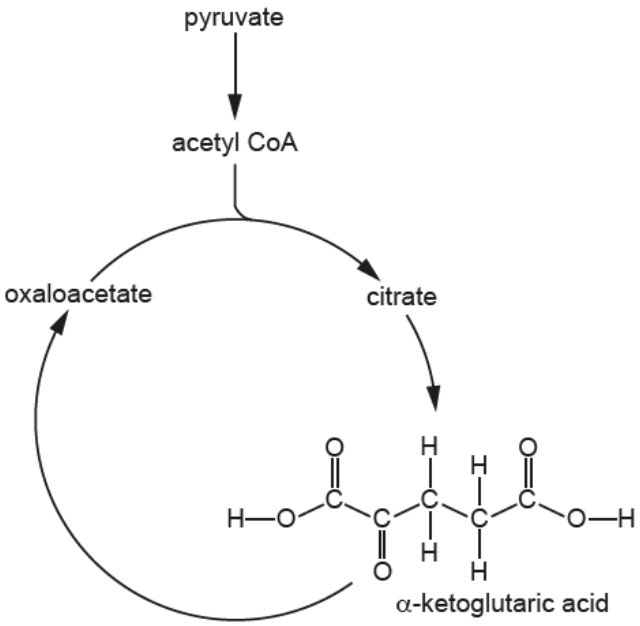


Fig. 4.2

(i) The table below contains information about three amino acids.

Use **Fig. 4.1** and **Fig. 4.2** and your own knowledge to draw a conclusion about which amino acid is being described.

Write your conclusions and a justification for each conclusion in the table.

Information about amino acid	Conclusions	
	Name of amino acid	Justification
Converted to pyruvate with the fewest changes		....
Converted to α-ketoglutaric acid with the fewest changes		....
The amino acid with the highest RQ		....

[4]

(ii) Outline the reactions that must occur to convert α-ketoglutaric acid to oxaloacetate in **Fig. 4.2**.

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..... **[2]**

(c) Most ATP is produced in mitochondria by chemiosmosis.

Outline how ATP is produced in mitochondria by chemiosmosis.

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..... **[3]**

(d) A person's RQ changes when they exercise.

Fig. 4.3 shows how RQ changes with the power a person exerts during exercise. Power, measured in watts (W), increases as the intensity of physical exercise increases.

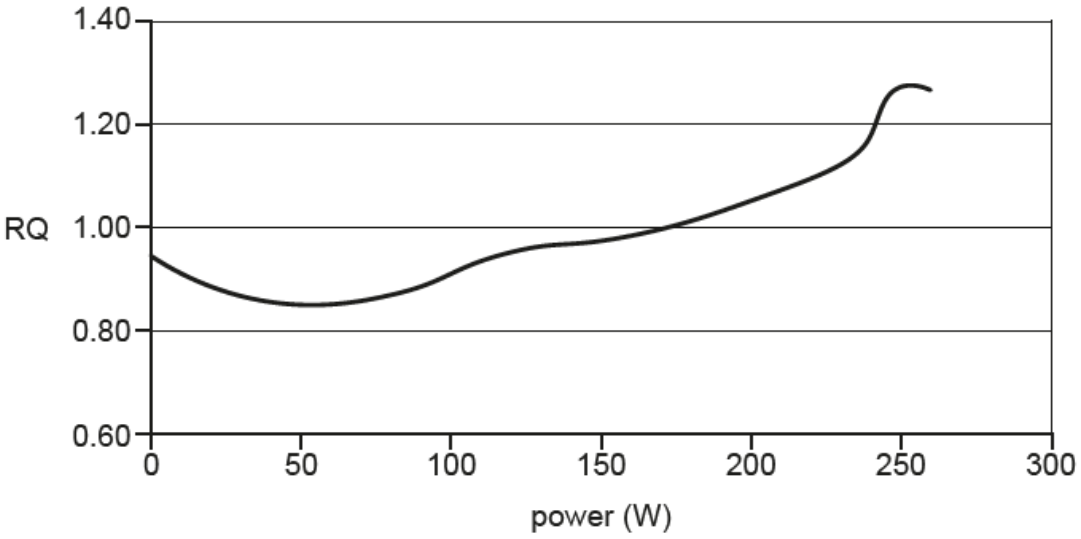

Fig. 4.3

What can you conclude about respiration at 0, 50 and 250 W based on the RQ values?

0 W .....

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50 W .....

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250 W .....

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[3]

5. Nov/2021/Paper_H420/03/No.5(a)

(a) Amylose is formed from the glucose molecules produced in photosynthesis. **Table 5.1** shows three statements about amylose, which may be true or false.

Complete **Table 5.1** by writing either 'True' or 'False' in the empty boxes provided.

Statement	True or False?
Amylose is soluble	
Amylose is branched	
Amylose is formed by condensation reactions	

[1]

Table 5.1

(b) Light intensity is one factor that affects the rate of photosynthesis.

Fig. 5.1 shows how the rate of photosynthesis varies with light intensity in two plants: a fern species, *Dicksonia antarctica*, and maize, *Zea mays*.

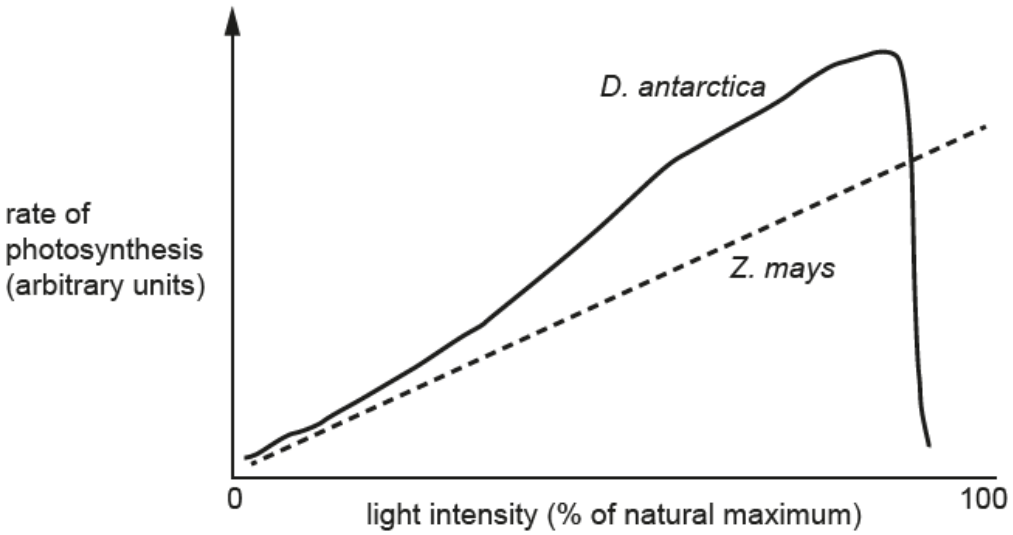

Fig. 5.1

What can you conclude from **Fig. 5.1** about the habitat of *D. antarctica* compared to the habitat of *Z. mays*?

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..... **[2]**