

1 Respiration is often described to be a fundamental process to all organisms.

(a) Suggest why.

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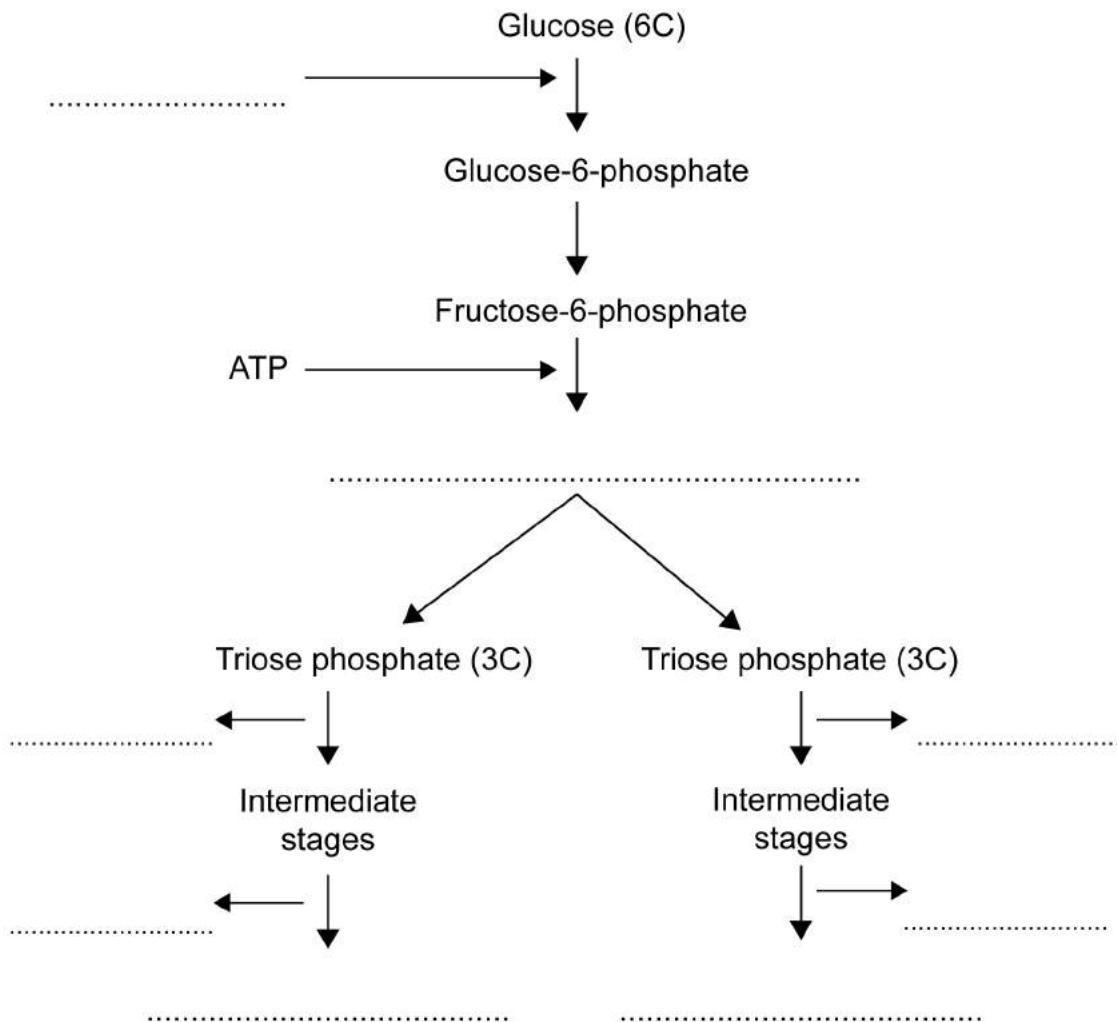
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[2 marks]

(b) Figure 1.1. shows a flow chart that outlines briefly the glycolytic pathway used by humans in respiration.

Figure 1.1



Complete the flow chart.

[3 marks]

**(c)** Explain the significance of the reduced NAD produced in this pathway for an individual respiring **aerobically**.

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**[3 marks]**

**(d)** When glucose enters a cell, it is immediately converted into glucose-6-phosphate. Suggest why.

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**[2 marks]**

**(e)** Glycolysis occurs in the cytoplasm of a cell while subsequent aerobic reactions do not. Almost all living organisms use the glycolysis pathway. What does this suggest about the evolution of the cell?

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**[3 marks]**

**[Total: 14]**





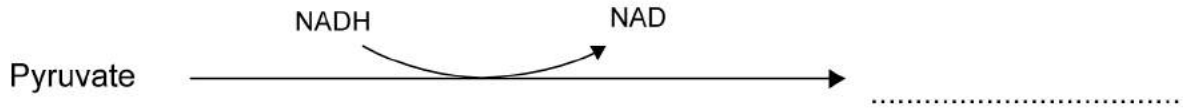






- 5 **Figure 5.1** shows an outline of anaerobic respiration in mammals and yeast.  
 (a) Fill in the gaps in **Figure 5.1**.

**Figure 5.1**



**[6 marks]**

- (b) Explain why anaerobic respiration in mammals has a lower yield of ATP than aerobic respiration.

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**[4 marks]**





6 Table 6.1 shows the energy values per gram of three respiratory substrates.

Table 6.1

Respiratory substrate	Mean energy value / $\text{kJ g}^{-1}$
Carbohydrate	15.8
Protein	17.0
Lipid	39.4

(a) Explain what you understand by the term 'respiratory substrate'.

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[2 marks]

(b) Calculate how much more energy proteins release per unit gram compared to carbohydrates.

Give your answer as a percentage to **nearest whole number**.

.....%

[2 marks]

(c) Theoretically, 1 mol of glucose should produce 2870 kJ of energy.

It takes 30.6 kJ to produce 1 mol ATP.

Given that the true efficiency of glucose turnover is about 32%, show that 1 mol of glucose is likely to produce 30 mol ATP.

[2 marks]



