



- (d) Glycolysis occurs during germination. One of the products is adenosine triphosphate (ATP).

Which of the following is another product of glycolysis?

(1)

- A** carbon dioxide
- B** glucose
- C** oxygen
- D** pyruvate **D**

- (c) Each liver cell carries out respiration.

During respiration, ATP is formed and broken down.

- (i) During which of the following processes is ATP formed?

(1)

- A** glycolysis and the electron transport chain only
- B** glycolysis and the Krebs cycle only
- C** glycolysis, the Krebs cycle and the electron transport chain only **C**
- D** glycolysis, the link reaction, the Krebs cycle and the electron transport chain

- (ii) Explain why some ATP is broken down during glycolysis.

(2)

- (iii) The electron transport chain occurs in the cristae of mitochondria. The electron transport chain involves a number of carrier molecules.

Explain the role of these carrier molecules in the electron transport chain.

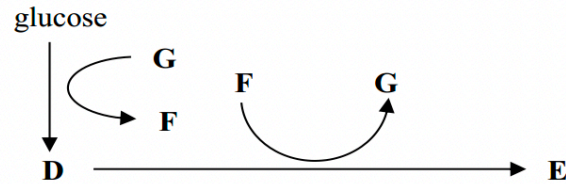
(3)



- (b) Part of the body's response 'fight or flight' is to run away from the threat. Prolonged vigorous exercise puts high demands on the body's metabolism.

The muscle cells require an adequate supply of oxygen for respiration. If insufficient oxygen is available, the cells must respire anaerobically.

**Fig. 20.2** outlines the process of anaerobic respiration in muscle cells.



**Fig. 20.2**

- (i) Identify the compounds labelled **D** and **E** in **Fig. 20.2**.

**D**

**E**

[2]

- (ii) What is the role of compound **D** in anaerobic respiration?

[1]

- (iii) Why is it important that compound **G** is formed during the reaction in which compound **D** is converted into compound **E** in anaerobic respiration?

[2]

- (iv) Compound **E** is toxic and is removed from the muscle cell. It is transported to an organ in the body.

Which organ is compound **E** transported to **and** how does it reach this organ?

[1]



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C

- (ii) Explain why some ATP is broken down during glycolysis.

(2)

1. (because the breakdown of ATP) {donates phosphate to / phosphorylates} the glucose (1)
2. (ATP) supplies energy to break down the glucose (1)
3. to produce (phosphorylated) 3-carbon compounds (1)

1. ALLOW 'hexose' for 'glucose'.
1. ALLOW production of fructose diphosphate
2. ALLOW to make the glucose more reactive, activate the glucose
3. e.g. for 3-carbon compounds: GALP / glyceraldehyde-3-phosphate / glycerate-3-phosphate / GP/ PGAL / G3P / GA3P / GADP/ GAP / TP / triose phosphate

- (iii) The electron transport chain occurs in the cristae of mitochondria. The electron transport chain involves a number of carrier molecules.

Explain the role of these carrier molecules in the electron transport chain.

(3)

1. receive hydrogen from reduced { NAD / FAD } / to allow reduced { NAD / FAD } to be oxidised (1)
2. break hydrogen into { protons / H<sup>+</sup> / hydrogen ions } and electrons (1)
3. electrons transferred by a series of redox reactions (1)
4. energy released is used to pump { hydrogen ions / protons / H<sup>+</sup> } into intermembranal space (1)

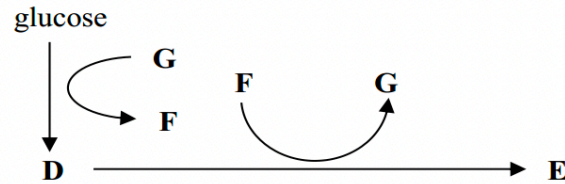
1. ALLOW NAD red / NADH + H<sup>+</sup> for reduced NAD and NAD or NAD<sup>+</sup> for oxidised NAD
2. ALLOW e<sup>-</sup> for electrons
3. ALLOW a series of reduction and oxidation reactions
4. ALLOW 'actively transported / moved into / moved up the concentration gradient' for



- (b) Part of the body's response 'fight or flight' is to run away from the threat. Prolonged vigorous exercise puts high demands on the body's metabolism.

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**Fig. 20.2** outlines the process of anaerobic respiration in muscle cells.



**Fig. 20.2**

- (i) Identify the compounds labelled **D** and **E** in **Fig. 20.2**.

**D** pyruvate

**E** lactate

[2]

- (ii) What is the role of compound **D** in anaerobic respiration?

is a hydrogen acceptor / removed hydrogen from reduced NAD

[1]

- (iii) Why is it important that compound **G** is formed during the reaction in which compound **D** is converted into compound **E** in anaerobic respiration?

two from  
for glycolysis to take place, NAD / G, is needed  
there is a limited amount of NAD in the cell  
formation of, NAD / G, allows, glycolysis to continue / some ATP to be formed

[2]

- (iv) Compound **E** is toxic and is removed from the muscle cell. It is transported to an organ in the body.

Which organ is compound **E** transported to **and** how does it reach this organ?

liver  
**and**  
in the blood

[1]