1. Nov/2021/Paper_41/No.6

Fig. 6.1 outlines the first three stages of respiration in aerobic conditions.

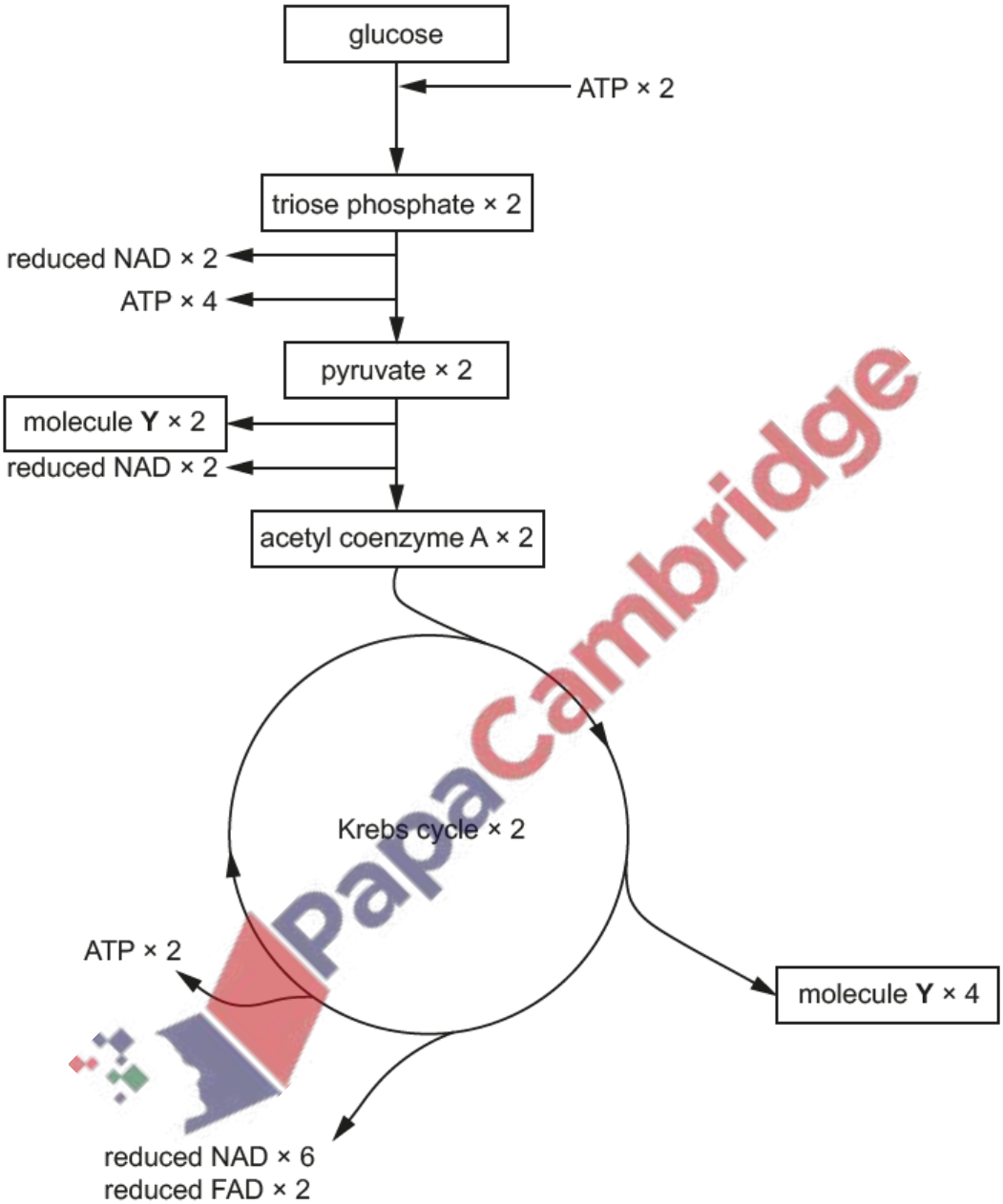

Fig. 6.1

(a) Name molecule **Y** in Fig. 6.1.

..... [1]

(b) Explain how Fig. 6.1 shows that glycolysis involves oxidation.

.....

..... [1]

(c) At one time it was thought that the oxidative phosphorylation of:

- one molecule of reduced NAD results in the synthesis of 3 ATP molecules
- one molecule of reduced FAD results in the synthesis of 2 ATP molecules.

Using Fig. 6.1, a theoretical value for the net number of ATP molecules that are synthesised for each molecule of glucose can be calculated.

Modern research has shown that the actual net number of ATP molecules synthesised for each glucose molecule respired is much lower than this theoretical value.

(i) Using Fig. 6.1, calculate the theoretical value for the net number of ATP molecules that are synthesised for each molecule of glucose respired in **all** phosphorylation reactions.

Show your working.

answer = ... [2]

(ii) Suggest **two** reasons why the actual net number of ATP molecules synthesised is less than the theoretical number.

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..... [2]

(d) Outline the roles of NAD and FAD in aerobic respiration.

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..... [3]

(e) Rotenone is used as an insecticide. Rotenone kills insects by inhibiting the transfer of electrons in the electron transport chain of the mitochondrion.

Explain how rotenone affects ATP synthesis in the mitochondrion.

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..... [3]

[Total: 12]