

Cell Respiration Review ANSWERS

1. Define the term metabolism

The sum of the physical and chemical processes in an organism

2. Write the balanced chemical equation for aerobic cellular respiration of glucose



3. How many carbon atoms are in:

a) Glucose 6 b) pyruvate 3 c) acetyl-CoA 2 d) citrate 6

4. How many carbon atoms remain from the original glucose at the end of Krebs cycle? 0

a) Where did the carbon atoms go? Exhaled as CO_2

b) Where did the oxygen atoms go? Exhaled as CO_2

c) Where did the hydrogen atoms go? Free protons or bound to NADH & FADH_2

5. Identify reactants needed for each of the following processes:

a) Glycolysis Glucose, ATP & NAD^+ b) pyruvate oxidation pyruvate, NAD^+ , CoA

c) Krebs cycle acetyl-CoA, NAD^+ , FAD, oxaloacetate, $\text{ADP} + \text{P}_i$

d) ETC (oxidative phosphorylation) Oxygen, NADH, FADH_2 , H^+ , $\text{ADP} + \text{P}_i$

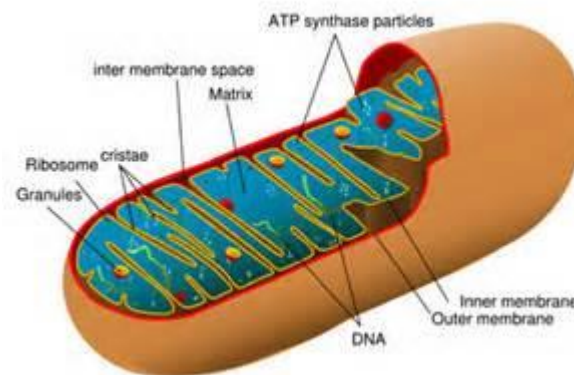
6. Identify the location in the cell and net products of:

a) Glycolysis cytoplasm b) pyruvate oxidation moves from cytoplasm to mitochondrial matrix

c) Krebs cycle Mitochondrial matrix d) ETC (oxidative phosphorylation) Mitochondrial inner membrane

7. Be able to label diagrams of glycolysis, pyruvate oxidation, Krebs and ETC. See class notes

8. Draw and label a mitochondrion and it's parts



9. Explain what is happening in these specific steps:

a) Conversion of phosphoenol pyruvate to pyruvate in glycolysis substrate level phosphorylation

b) Conversion of isocitrate to α -ketoglutarate in Krebs cycle
Decarboxylation & reduction of NAD^+

10. If a patient was deficient in the enzyme that converts fructose-

1,6-bisphosphate into DHAP, what molecules might start building up in the cell?

ADP, NAD^+

11. What is the role of NAD^+ , NADH, FAD, FADH_2 ? Which is the oxidized/reduced form? Electron carriers

Reduced = NADH & FADH_2 Oxidized = NAD^+ & FAD

12. Describe the role of oxygen in the ETC. Final electron acceptor

a) How does the lack of oxygen affect both the ETC and Krebs cycle? Stops ETC, lack of NAD^+ and FAD will eventually stop Krebs as well

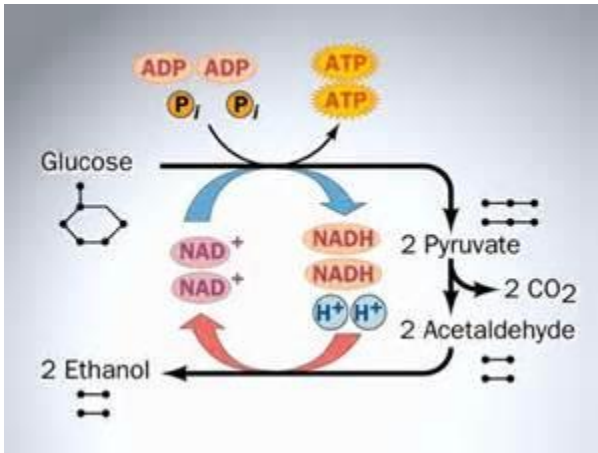
b) Is glycolysis affected? Why? No, it is an anaerobic process

c) What is the effect if ubiquinone is blocked from accepting electrons? **NADH and FADH₂ could not be oxidized & ETC would stop**

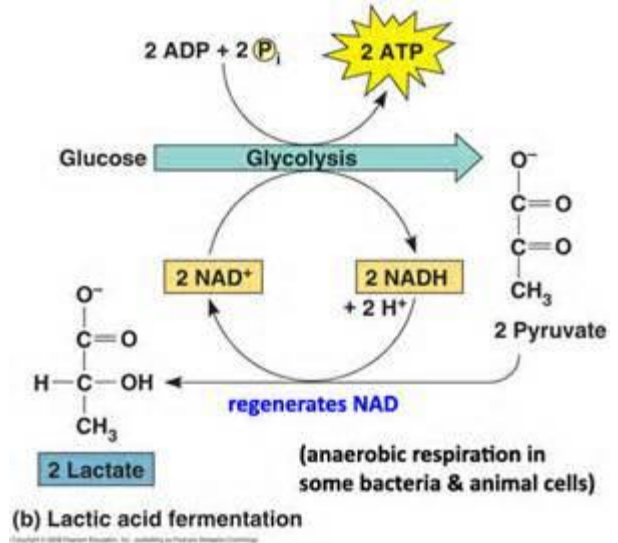
13. How many pyruvate molecules would be produced by the glycolysis of 5 glucose molecules? **10**

14. Draw the reactions for:

a) Alcoholic fermentation

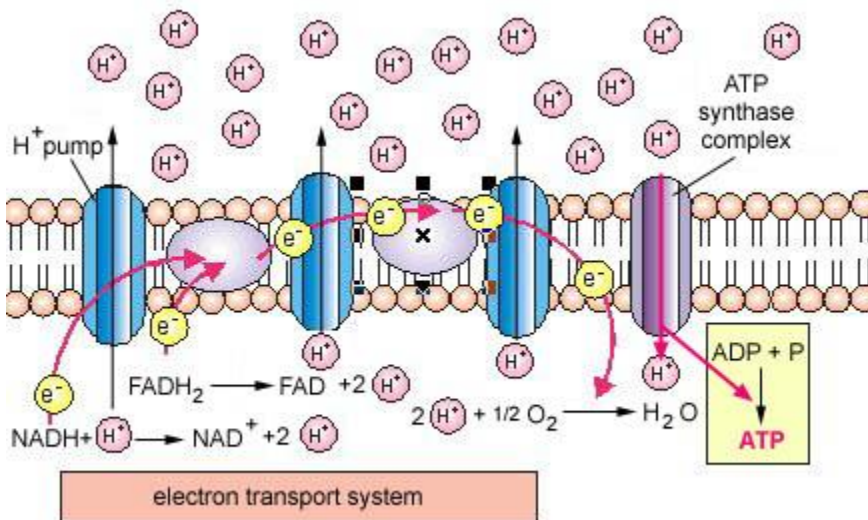


b) Lactate fermentation



15. What is the real purpose of fermentation? **Oxidize NADH so glycolysis can continue**

16. Describe, with the use of a diagram, how ATP is synthesized by the ETC.



17. Describe how these foods enter into the metabolic cycles of cellular respiration:

a) Lipids **Gluconeogenesis & β - oxidation**

b) Proteins **Deamination**