What is Cellular Respiration?

Worksheet

Cellular respiration is the set of metabolic reactions - glycolysis, pyruvate oxidation, the Krebs cycle and oxidative phosphorylation - that break down glucose to produce roughly 30-32 ATP per molecule.

Questions

1. Which stage of cellular respiration does NOT require oxygen?

A) Oxidative phosphorylation
B) Krebs cycle
C) Glycolysis
D) Electron transport chain

2. Where does the electron transport chain take place?

A) Cytoplasm
B) Inner mitochondrial membrane
C) Nucleus
D) Golgi apparatus

3. What is the overall approximate ATP yield of aerobic respiration per glucose?

A) 2 ATP
B) 8 ATP
C) 30-32 ATP
D) 100 ATP

4. What is the final electron acceptor in the electron transport chain?

A) Carbon dioxide
B) Water
C) Oxygen
D) NAD+

5. A cell fully oxidizes 3 glucose molecules aerobically. Estimate the total ATP produced (~31 ATP per glucose).

6. Without oxygen, the same cell can only run glycolysis (2 net ATP per glucose). How much ATP from 3 glucose molecules anaerobically?

7. Glycolysis yields 2 net ATP and 2 NADH per glucose. If oxidative phosphorylation converts each NADH to ~2.5 ATP, how much extra ATP do those 2 NADH contribute?

8. Define: What are the four stages of cellular respiration?

9. Define: Where does glycolysis occur?

10. Define: Which stage produces the most ATP?

Answer Key

1. C) Glycolysis - Glycolysis occurs in the cytoplasm and proceeds with or without oxygen.

2. B) Inner mitochondrial membrane - The electron transport chain is embedded in the inner mitochondrial membrane.

3. C) 30-32 ATP - Full aerobic breakdown of one glucose yields roughly 30-32 ATP.

4. C) Oxygen - Oxygen accepts electrons and protons at the end of the chain, forming water.

5. ATP 31 number of glucose molecules ATP 31 3 = 93 ATP

6. ATP = 2 3 = 6 ATP This is about 15 less than full aerobic respiration.

7. Extra ATP = 2 NADH 2.5 ATP/NADH Extra ATP = 5 ATP

8. Glycolysis, pyruvate oxidation, the Krebs cycle, and oxidative phosphorylation.

9. In the cytoplasm, and it doesn't require oxygen.

10. Oxidative phosphorylation (electron transport chain + chemiosmosis), about 26-28 ATP.