

CELLULAR RESPIRATION

Enduring Understandings

- All living things perform cellular respiration reactions that break-down biomolecules to convert stored energy into the usable form of energy for all of life which is ATP.
- These reactions can occur with oxygen (aerobic) and in some organisms without oxygen (anaerobic).
- Aerobic reactions convert more energy than anaerobic reactions, and can lead to muscle fatigue when reactions run in low oxygen situations.

Essential Questions

- How do living things attain usable energy from glucose?
- How is glucose broken down differently in a high concentration of oxygen (aerobically) and a low concentration of oxygen (anaerobically)?
- What causes muscles to fatigue?

Targets

1. **Vocabulary** — glucose, glycolysis, aerobic, anaerobic, NAD⁺, NADH, cytoplasm, ATP, mitochondria, inner membrane, outer membrane, matrix, outer compartment, pyruvate, pyruvate conversion (prep. Step), acetyl Co-A, Krebs' Cycle, carbon dioxide, FAD⁺, FADH₂, electron transport system, oxidation, reduction, ATP synthetase, lactic acid fermentation, alcoholic fermentation, muscle fatigue
2. Know the two types of respiration and the two major differences between them.
3. Account for the production of 36 or 38 ATP molecules per glucose in the chemical reactions of aerobic respiration.
4. Account for the production of 2 ATP molecules per glucose in the chemical reactions of anaerobic respiration and explain the need for the steps after glycolysis.
5. Trace the carbons of the initial glucose molecule through the chemical reactions of aerobic respiration to their immediate destinations.
6. Explain the importance of oxygen and account for the formation of water in aerobic respiration.
7. Explain the process of muscle fatigue.