

## Cellular Respiration Concept Questions

1. Describe how photosynthesis and cellular respiration are reverse processes.
2. Identify the feature of mitochondria that is an adaptation for carrying out cellular respiration. Explain how this feature increases the amount of cellular respiration that can occur inside a mitochondrion.
3. Propose a reason that cells that are more active have a higher number of mitochondria.
4. Cellular respiration uses glucose, a high energy molecule and produces CO<sub>2</sub> and water, low energy molecules.
  - a) State whether it is spontaneous or not. Provide reasoning for your response.
  - b) State whether it is exergonic or not. Provide reasoning for your response.
  - c) Describe the purpose of the energy released from glucose.
5. Describe the importance of the energy-releasing reactions that take place in living cells.
6. Describe the difference between oxidation and reduction reactions.
7.
  - a) Describe how ADP is converted into ATP.
  - b) Describe why oxidation reactions are often coupled to the production of ATP.
8. Explain how the citric acid (Krebs) cycle contributes to the production of ATP.
9. When you exhale, your breath contains carbon dioxide. Identify the source of this carbon dioxide.
10. Describe the importance of an electron transport system to living organisms.
11. Explain how energy is released in a slow, controlled fashion through the ETC.
12. Provide evidence to support the claim that cellular respiration is more efficient than glycolysis alone.
13.
  - a) Identify when animal cells perform photosynthesis.
  - b) Identify when plant cells perform photosynthesis.
  - c) Identify when animal cells perform cellular respiration.
  - d) Identify when plant cells perform cellular respiration.
14. Compare and contrast alcoholic fermentation in yeast cells, lactic acid fermentation (in human cells), and glycolysis.
15. Think of the difference between alcohol fermentation in yeast and lactic acid fermentation in humans. Predict the result if an enzyme in your body removed the carbon dioxide from pyruvate before lactic acid formed.
16.
  - a) Describe the conditions under which lactic acid fermentation occurs in muscle cells.
  - b) Identify the symptoms of lactic acid fermentation in muscle cells.
17. After a heart attack, small amounts of lactic acid can be found in heart muscle cells. Make a claim about what happens during a heart attack based on this observation.

18. Complete the chart below:

|                               | Aerobic Respiration | Anaerobic Respiration |
|-------------------------------|---------------------|-----------------------|
| a) net amount of ATP produced |                     |                       |
| b) terminal electron acceptor |                     |                       |
| c) location in cell           |                     |                       |
| d) final products             |                     |                       |

19. Explain why hard (or distilled) liquor is available at concentrations of up to 75% alcohol while the maximum alcohol concentration in wine is usually no more than 12-14%.
20. If yeast cells were large organisms, they could not live anaerobically. Provide evidence to support or refute this claim.
21. a) Describe what happens to the NADH produced by yeast cells that are living in anaerobic conditions.  
b) Describe why it is important for this to happen.
22. Identify the use of each of the reactants in cellular respiration and the source of each of the products.
23. Describe how a cell can use noncarbohydrate foods such as proteins and fats as a source of energy.
24. Explain why it is useful for AMP to stimulate cellular respiration and ATP to inhibit it.