



## Chapter 7 Exercises

### Review Questions

- The energy currency used by cells is \_\_\_\_\_.
  - ATP
  - ADP
  - AMP
  - adenosine
- A reducing chemical reaction \_\_\_\_\_.
  - reduces the compound to a simpler form
  - adds an electron to the substrate
  - removes a hydrogen atom from the substrate
  - is a catabolic reaction
- During the second half of glycolysis, what occurs?
  - ATP is used up.
  - Fructose is split in two.
  - ATP is made.
  - Glucose becomes fructose.
- What is removed from pyruvate during its conversion into an acetyl group?
  - oxygen
  - ATP
  - B vitamin
  - carbon dioxide
- What do the electrons added to  $\text{NAD}^+$  do?
  - They become part of a fermentation pathway.
  - They go to another pathway for ATP production.
  - They energize the entry of the acetyl group into the citric acid cycle.
  - They are converted to NADP.
- GTP or ATP is produced during the conversion of \_\_\_\_\_.
  - isocitrate into  $\alpha$ -ketoglutarate
  - succinyl CoA into succinate
  - fumarate into malate
  - malate into oxaloacetate
- How many NADH molecules are produced on each turn of the citric acid cycle?
  - one
  - two
  - three
  - four
- What compound receives electrons from NADH?
  - FMN
  - ubiquinone
  - cytochrome  $c_1$
  - oxygen
- Chemiosmosis involves:
  - the movement of electrons across the cell membrane
  - the movement of hydrogen atoms across a mitochondrial membrane
  - the movement of hydrogen ions across a mitochondrial membrane
  - the movement of glucose through the cell membrane
- Which of the following fermentation methods can occur in animal skeletal muscles?
  - lactic acid fermentation
  - alcohol fermentation
  - mixed acid fermentation
  - propionic fermentation
- A major connection for sugars in glycolysis is \_\_\_\_\_.
  - glucose-6-phosphate
  - fructose-1,6-bisphosphate
  - dihydroxyacetone phosphate
  - phosphoenolpyruvate
- Beta-oxidation is \_\_\_\_\_.
  - the breakdown of sugars
  - the assembly of sugars
  - the breakdown of fatty acids
  - the removal of amino groups from amino acids

13. The effect of high levels of ADP is to \_\_\_\_\_ in cellular respiration.
- increase the activity of specific enzymes
  - decrease the activity of specific enzymes
  - have no effect on the activity of specific enzymes
  - slow down the pathway
14. The control of which enzyme exerts the most control on glycolysis?
- hexokinase
  - phosphofructokinase
  - glucose-6-phosphatase
  - aldolase

### Critical Thinking Questions

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15. Why is it beneficial for cells to use ATP rather than energy directly from the bonds of carbohydrates? What are the greatest drawbacks to harnessing energy directly from the bonds of several different compounds?
16. Nearly all organisms on Earth carry out some form of glycolysis. How does that fact support or not support the assertion that glycolysis is one of the oldest metabolic pathways?
17. Because they lose their mitochondria during development, red blood cells cannot perform aerobic respiration; however, they do perform glycolysis in the cytoplasm. Why do all cells need an energy source, and what would happen if glycolysis were blocked in a red blood cell?
18. What is the primary difference between a circular pathway and a linear pathway?
19. How do the roles of ubiquinone and cytochrome c differ from the other components of the electron transport chain?
20. What accounts for the different number of ATP molecules that are formed through cellular respiration?
21. What is the primary difference between fermentation and anaerobic respiration?
22. Would you describe metabolic pathways as inherently wasteful or inherently economical? Why?
23. How does citrate from the citric acid cycle affect glycolysis?
24. Why might negative feedback mechanisms be more common than positive feedback mechanisms in living cells?