Name _____ Class _____ Date _____

SECTION 7-2 REVIEW

AEROBIC RESPIRATION

VOCABULARY REVIEW Define the following terms.

1. aerobic respiration _____

2. mitochondrial matrix _____

3. Krebs cycle _____

4. FAD _____

MULTIPLE CHOICE Write the correct letter in the blank.

_____ **1.** The breakdown product of glucose that diffuses into the mitochondrial matrix for further breakdown is

a. acetyl CoA. **b.** pyruvic acid. **c.** oxaloacetic acid. **d.** citric acid.

_____ **2.** The starting substance of the Krebs cycle, which is regenerated at the end of the cycle, is

a. acetyl CoA. **b.** pyruvic acid. **c.** oxaloacetic acid. **d.** citric acid.

_____ **3.** The Krebs cycle

a. breaks down a two-carbon molecule into two molecules of CO_2.
b. produces a six-carbon molecule from six molecules of CO_2.
c. produces NAD^+ from NADH and H^+.
d. generates most of the ATP produced in aerobic respiration.

_____ **4.** The electron transport chain of aerobic respiration

a. generates O_2 from H_2O.
b. produces NADH by chemiosmosis.
c. pumps electrons into the mitochondrial matrix.
d. pumps protons into the space between the inner and outer mitochondrial membranes.

_____ **5.** The maximum efficiency of aerobic respiration is approximately

a. 0.66%. **b.** 6.6%. **c.** 66%. **d.** 660%.

Name _____ Class _____ Date _____

SHORT ANSWER Answer the questions in the space provided.

1. In the Krebs cycle, what molecule acquires most of the energy that is released by the oxidation of acetyl CoA, and how many of these molecules are produced during each turn of the cycle?

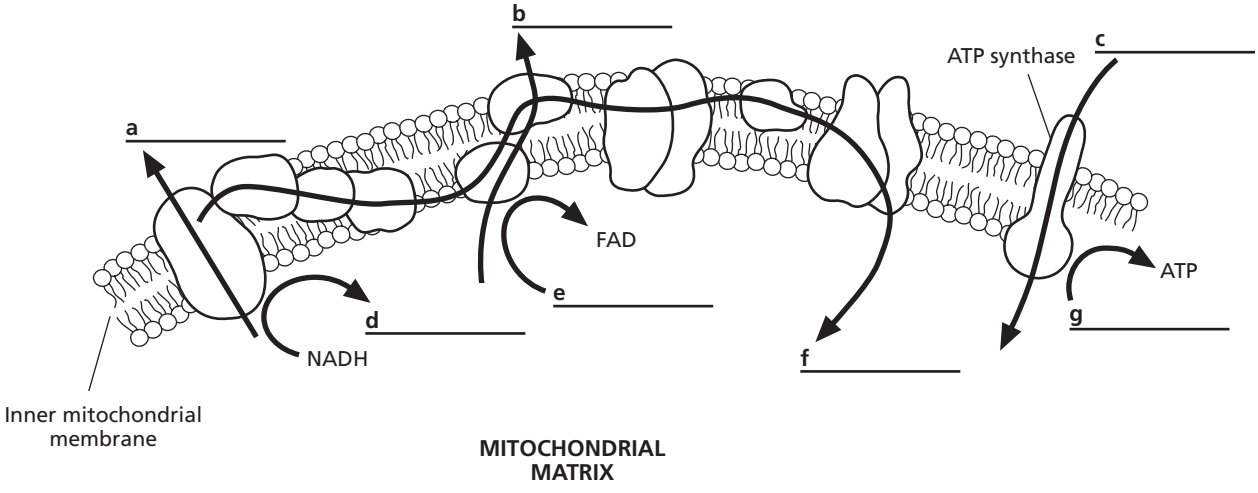
2. Which reactions of aerobic respiration occur in the inner mitochondrial membrane?

3. Write the equation for the complete oxidation of glucose in aerobic respiration.

4. **Critical Thinking** How is the structure of a mitochondrion well adapted for the activities it carries out?

STRUCTURES AND FUNCTIONS Use the diagram to answer the following questions.

The diagram below summarizes the electron transport chain and chemiosmosis in aerobic respiration. Label the substances that are transported along the arrows labeled *a–d* in the spaces provided. Label the reactants or products that are represented by *e–g* in the spaces provided.



Section 7-1

VOCABULARY REVIEW

1. Cellular respiration is the process in which cells make ATP by breaking down organic compounds.
2. Glycolysis is a biochemical pathway in which one molecule of glucose is oxidized to two molecules of pyruvic acid.
3. Lactic acid fermentation is an anaerobic pathway in which pyruvic acid is converted into lactic acid.
4. Alcoholic fermentation is an anaerobic pathway in which pyruvic acid is converted into ethyl alcohol and CO_2.

MULTIPLE CHOICE

1. a **2.** c **3.** d **4.** b **5.** c

SHORT ANSWER

1. The fermentation pathways can operate in the absence of oxygen.
2. The energy-containing products are NADH, ATP, and pyruvic acid.
3. These pathways regenerate NAD^+, which the cells can use to keep glycolysis going to make more ATP in the absence of oxygen.
4. Without niacin or the ability to make it, the person would be deficient in NAD^+. Since NAD^+ is used in Step 3 of glycolysis, glycolysis would be inhibited.

STRUCTURES AND FUNCTIONS

a, glucose; b, glycolysis; c, pyruvic acid; d, lactic acid fermentation; e, alcoholic fermentation; f, lactic acid; g, ethanol

Section 7-2

VOCABULARY REVIEW

1. Aerobic respiration is the set of pathways in cellular respiration that require oxygen.
2. The mitochondrial matrix is the space inside the inner membrane of a mitochondrion.
3. The Krebs cycle is a biochemical pathway that breaks down acetyl coenzyme A, producing CO_2, hydrogen atoms, and ATP.
4. FAD, or flavine adenine dinucleotide, is a molecule that accepts electrons during redox reactions.

MULTIPLE CHOICE

1. b **2.** c **3.** a **4.** d **5.** c

SHORT ANSWER

1. Most of the energy is acquired by NADH; three molecules are produced during each turn of the cycle.
2. The reactions of the electron transport chain occur in the inner mitochondrial membrane.
3. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + energy
4. The mitochondrial membranes segregate the enzymes and reactants of the Krebs cycle, facilitating the reactions they participate in. The folding of the inner mitochondrial membrane provides a large surface area for the molecules of the electron transport chain. The area between the inner and outer mitochondrial membranes provides a confined space in which protons can accumulate, driving chemiosmosis.

STRUCTURES AND FUNCTIONS

a, protons; b, protons; c, protons; d, NAD^+; e, $FADH_2$; f, O_2; g, ADP + phosphate

Section 8-1

VOCABULARY REVIEW

1. Histones help maintain the shape of a chromosome and aid in the tight packing of DNA; nonhistones control the activity of specific regions of DNA.
2. A chromatid is one-half of a chromosome; a centromere is the constricted area of a chromatid that holds the two chromatids in a chromosome together.
3. A sex chromosome is a chromosome that determines the sex of an organism; an autosome is any other chromosome.
4. A diploid cell has both chromosomes in each homologous pair; a haploid cell has only one chromosome in each homologous pair.

MULTIPLE CHOICE

1. d **2.** b **3.** a **4.** c **5.** a

SHORT ANSWER

1. Histones help coil and package the DNA into a very small volume.
2. Homologous chromosomes are the same size and shape and carry genes for the same traits.
3. The picture is called a karyotype. If it shows two X chromosomes, the person is a female; if it shows one X and one Y chromosome, the person is a male.
4. Relatively simple organisms with more chromosomes might have smaller chromosomes containing less DNA. Also, some of the DNA in an organism's chromosomes may not carry information that is actually used by the organism.

STRUCTURES AND FUNCTIONS

a, chromosome; b, centromere; c, chromatids; d, homologous chromosomes, or homologues

Section 8-2

VOCABULARY REVIEW

1. *Telophase* does not belong; it is a phase of mitosis, and the other three are phases of interphase.
2. *Interphase* does not belong; it is a phase of the cell cycle, and the other three are phases of mitosis.
3. *Binary fission* does not belong; it pertains to prokaryotes, and the other three pertain to eukaryotes.
4. *Spindle fiber* does not belong; it pertains to nuclear division, and the other three pertain to cytoplasmic division.
5. *Vesicles* does not belong; vesicles are organelles, some of which participate in cytoplasmic division, and the other three are involved in nuclear division.

MULTIPLE CHOICE

1. c **2.** b **3.** d **4.** a **5.** c

SHORT ANSWER

1. G_1 phase: the cell grows. S phase: DNA is copied. G_2 phase: the cell prepares for cell division. M phase: the nucleus divides. Cytokinesis: the cytoplasm divides.
2. Prophase: the chromatin coils and forms chromosomes, the nucleolus and nuclear envelope disappear, and the mitotic spindle forms. Metaphase: kinetochore fibers move the chromosomes to the cell equator. Anaphase: the chromatids in each chromosome divide and move toward opposite poles of the cell. Telophase: the mitotic spindle