

> Review Questions

- Most of the ATP creation during respiration occurs as a result of what driving force?
 - Electrons moving down a concentration gradient
 - Electrons moving down the electron transport chain
 - Protons moving down a concentration gradient
 - Sodium ions moving down a concentration gradient
 - Movement of pyruvate from the cytoplasm into the mitochondria
 - Which of the following processes occurs in both respiration and photosynthesis?
 - Calvin cycle
 - Chemiosmosis
 - Citric acid cycle
 - Krebs cycle
 - Glycolysis
 - What is the cause of the cramps you feel in your muscles during strenuous exercise?
 - Lactic acid fermentation
 - Alcohol fermentation
 - Chemiosmotic coupling
 - Too much oxygen delivery to the muscles
 - Oxidative phosphorylation
 - Which of the following statements is *incorrect*?
 - Glycolysis can occur with or without oxygen.
 - Glycolysis occurs in the mitochondria.
 - Glycolysis is the first step of both anaerobic and aerobic respiration.
 - Glycolysis of one molecule of glucose leads to the production of 2 ATP, 2 NADH, and 2 pyruvate.
- For questions 5–8, use the following answer choices:
- Glycolysis
 - Krebs cycle
 - Oxidative phosphorylation
 - Lactic acid fermentation
 - Chemiosmosis
- This reaction occurs in the matrix of the mitochondria and includes FADH_2 among its products.

B
 - This reaction is performed to recycle NAD^+ needed for efficient respiration.

D
 - This process uses the proton gradient created by the movement of electrons to form ATP.

E
 - This process includes the reactions that use NADH and FADH_2 to produce ATP.

C
 - Which of the following molecules can give rise to the most ATP?
 - NADH
 - FADH_2
 - Pyruvate
 - Glucose
 - Which of the following is a proper representation of the products of a single glucose molecule after it has completed the Krebs cycle?
 - 10 ATP, 4 NADH, 2 FADH_2
 - 10 NADH, 4 FADH_2 , 2 ATP
 - 10 ATP, 4 FADH_2 , 2 NADH
 - 10 NADH, 4 ATP, 2 FADH_2
 - 10 NADH, 4 FADH_2 , 2 ATP

5. You are asked to estimate if a certain species of plant could live in a salt marsh. You collect the following data:

- The overall Ψ of the soil (Ψ_{soil}): -2.2 MPa
- Solute concentration of plant cell contents: 0.08 M (assume $i = 1$, and 12°C)
- Pressure potential of the plant cells: -1.2 MPa
- $R = 0.00831 \text{ liter MPa/mole K}$

Do you think the plant could grow in this environment? Why or why not? Show your work.

3. The phenotype for scale color in gila monsters is determined by a specific locus. The dominant allele (black) is represented by G and the recessive allele (brown) is represented by g . The cross between a male gila monster with black scales and a female gila monster with brown scales produced the following F_1 generation:

- Black-scaled gila monsters: 52
- Brown-scaled gila monsters: 55
- White-scaled gila monsters: 1

The black-scaled females and brown-scaled males from the F_1 generation were then crossed to produce the following F_2 generation:

- Black-scaled gila monsters: 53
- Brown-scaled gila monsters: 54
- White-scaled gila monsters: 0

A. Based on the data presented here, determine the P-generation genotypes. Provide Punnett squares that support your answer.

B. The white-scaled female in the F_1 generation resulted from a mutational change. Explain what a mutation is and discuss a type of mutation that might have produced the white-scaled female in the F_1 generation.

4. The idea of surface area is an important concept in biology. Explain how surface area plays a critical role in the digestive system.

6. In Earth's early history, the evolution of photosynthesis in simple cells occurred before the evolution of more complex cells. Briefly describe the significance of photosynthesis being present first.

7. What evidence supports the theory that chloroplasts and mitochondria are evolved from prokaryotic cells?