SYNTHESIZE THE UNIT

In your Evidence Notebook, make a concept map, graphic organizer, or outline using the Study Guides you made for each lesson in this unit. Be sure to use evidence to support your claims.

When synthesizing individual information, remember to follow these general steps:

- Find the central idea of each piece of information.
- Think about the relationships between the central ideas.
- Combine the ideas to come up with a new understanding.

DRIVING QUESTIONS

Look back to the Driving Questions from the opening section of this unit. In your Evidence Notebook, review and revise your previous answers to those questions. Use the evidence you gathered and other observations you made throughout the unit to support your claims.

PRACTICE AND REVIEW

1. How does organization make it possible for the human body to carry out the wide range of interactions necessary for survival?

a. Cells are the foundation of the human body and each cell can carry out all interactions necessary for survival.

b. Tissues are the highest level of organization in the human body and tissues are capable of carrying out specialized tasks necessary for survival.

c. Levels of organization make it possible for cells, tissues, organs, and organ systems to specialize and take on specific functions.

d. There is no overlap in the organization and interaction of organ systems, making it possible for the body to fulfill a wide range of life functions.

2. Select a relationship that is similar to the following relationship: neuron : send electrical signal

a. cardiac cell : muscle cell

b. muscle cell : contraction

c. circulatory system : blood cell

d. homeostasis : endocrine system

3. A newly discovered organism has cells with large fluid-filled sacs in the middle. Considering current scientific knowledge about the structure and function of cell organelles, what is a likely function of these structures in the new organism? Select all correct answers.

a. store water and waste

b. store genetic information

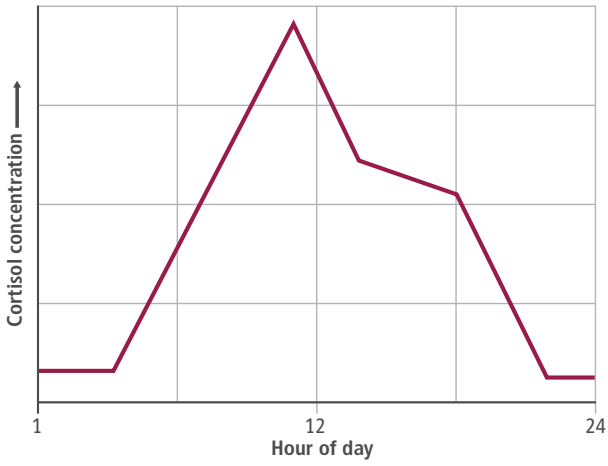
c. produce sugar

d. strengthen the cell

Use the information from Figure 4 to answer Question 4.

Cortisol Concentrations over a 24-Hour Period

FIGURE 4: Cortisol concentrations change throughout the day.



4. Cortisol is produced at certain times of the day, as shown in the graph. Cortisol has a positive feedback on Process A, which outputs Substance Z. At what time of day will the concentration of Substance Z be at its highest if there is no other feedback on Substance Z?

a. morning

b. afternoon

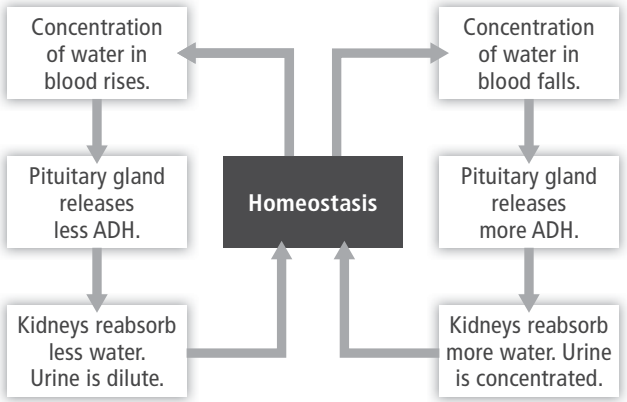
c. evening

d. late night

Use the following information and the diagram to answer Questions 5–8.

The pituitary gland regulates the concentration of water in blood by releasing higher or lower levels of the antidiuretic hormone (ADH). ADH increases the amount of water reabsorbed from urine by tubules in the kidneys.

FIGURE 5: The pituitary gland controls the concentration of water in blood.



5. Which sequence models the correct flow of information in this feedback loop?

a. pituitary gland ⟶ kidney tubules ⟶ pituitary gland

b. kidney tubules ⟶ pituitary gland ⟶ water concentration in blood

c. water concentration in blood ⟶ kidney tubules ⟶ pituitary gland

d. water concentration in blood ⟶ pituitary gland ⟶ kidney tubules

6. How does this feedback loop demonstrate multiple body systems working together to maintain homeostasis?

a. The pituitary gland works with the kidneys to regulate the water concentration in blood.

b. The pituitary gland is part of the endocrine system, which interacts with the excretory and circulatory systems to regulate water concentration in blood.

c. The pituitary gland is part of the nervous system, which interacts with the digestive and immune systems to regulate water concentration in blood.

d. The pituitary gland maintains homeostasis, the kidneys regulate the water concentration in blood, and blood circulates to deliver water to cells.

7. Imagine a disorder that prevented kidney tubules from reabsorbing water from urine. Draw a model that explains how this change would affect this feedback loop.

8. What evidence supports your model and your claim for Question 7? Provide evidence and explain your reasoning.

9. Imagine a solution for a problem scores high for all criteria but violates one of the constraints. What is the relationship between the solution and the problem?

a. The solution will work for the problem because it does not have to satisfy every constraint.

b. The solution may work for the problem if there is a trade-off between criteria and constraints.

c. The solution is not viable for the problem as it is currently defined and delimited.

d. The solution will never be successful and should be abandoned.

10. Imagine your team is developing technology to perform less invasive angioplasty, a surgery typically used to unblock arteries in the heart. You have two solutions. Both solutions are equally effective and safe. Solution 1 costs less than Solution 2. Solution 2 is made from recycled materials and has a lower environmental impact than Solution 1. What is a likely next step to help you choose between the two solutions?

a. Prioritize cost and environmental impact to decide which solution is best for this problem.

b. Redefine the problem and optimize the two solutions to solve the new problem.

c. Design a solution that is cheaper and has a lower environmental impact than both Solution 1 and Solution 2.

d. Add constraints until one solution is no longer viable.

UNIT PROJECT

Return to your unit project. Prepare your research and materials into a presentation to share with the class. In your final presentation, evaluate the strength of your hypothesis, data, analysis, and conclusions.

Remember these tips while evaluating:

- Look at the empirical evidence—evidence based on observations and data. Does the evidence support the explanation?
- Consider if the explanation is logical. Does it contradict any evidence you have seen?
- Think of tests you could do to support and contradict the ideas.