

TEACHER EDITION

LIFE SCIENCE BIOLOGY BOOSTERS™

Buddy

PRACTICE QUESTIONS



Name: _____



Dear Teacher,

Welcome to the new Life Science Biology Regents!

The new Regents introduces a **very different style of questioning**. Questions are organized into clusters, with several questions connected to the same topic and set of stimuli. Students may need time and guided practice to become comfortable navigating this format.

In response to teachers' concerns, questions, and suggestions, we developed a **clear, step-by-step homework approach** that gradually prepares students to answer Regents question clusters.

How the Homework Book Is Structured

1 Content Review Questions

The first section of each unit contains **straightforward, content-based questions**. These questions assess students' understanding of the biology material without the added complexity of Regents-style question-analysis skills.

This section allows teachers to determine whether students have **mastered the essential content** before asking them to apply it to more complex questions. It is especially valuable for topics for which limited Regents practice is currently available.

The content-review questions were developed using:

- The 2024 Life Science Biology Educator Guide
- The New York State Science Learning Standards
- The Life Science Biology Performance Level Descriptions

If students struggle with these questions, they should **return to the corresponding topic** in the Life Science Biology Boosters™ book and review the material before continuing.





2 Individual Regents-Style Questions

In the second section, Regents questions are **organized by topic**. Each question appears with the specific stimulus or stimuli needed to answer it. Students do not need to flip back through the cluster to locate the necessary information.

This format:

- **Addresses the challenge** of Regents clusters that contain multiple topics
- **Allows students to focus** on one question and its relevant stimuli
- **Helps students master** individual Regents-style questions before progressing to complete clusters
- **Gives students practice** using the Regents skills taught in the Life Science Biology Boosters™ book together with their biology knowledge, careful thinking, and common sense

Students may initially struggle with this new question style. **This is normal**. With consistent practice, they will gradually learn how to analyze the stimuli and apply the appropriate skills.

3 Regents Question Clusters

The third section contains **complete Regents question clusters** in which most of the questions relate to the unit's content. We begin integrating complete clusters in **Unit 2**, after students have had time to build their content knowledge and practice individual Regents-style questions.

While completing a cluster, students may need to **flip back and use stimuli** presented with earlier questions. This gives them practice navigating the format they will encounter on the actual Regents exam.

Students should review **Skill Booster 4: Cluster Questions** in the Life Science Biology Boosters™ book for a clear approach to working through complete clusters.

Remember - the Regents is organized in clusters. If a question refers to information students do not see, check the stimuli from earlier questions in the cluster. Students will find questions they already mastered inside the clusters.

Students are building new pathways in their brains as they adjust to this question format. It is normal for the work to feel challenging at first. With gradual practice and consistent reinforcement, students will become more confident and capable.

Wishing you much success as you guide your students in mastering these new skills!

R. Hertz



How to Use the Homework Log

To track students' progress and strengthen responsibility skills, students should complete one numbered section of the log each time homework is assigned.



LIFE SCIENCE
BIOLOGY

REGENTS PRACTICE

1 Assign the Work

Provide the page numbers and question numbers. Students should record both on the log.

2 Complete the Work

Students check Done only after completing the entire assignment.

3 Reflect

Students circle the symbol that best describes their experience: (thumbs up) they understood the assignment, (neutral face) some parts were challenging, (thumbs down) they found it difficult and need help.

4 Record the Time

Students write the number of minutes they spent completing the assignment.

5 Record the Score

After checking their answers, students record the number answered correctly over the total number of questions.

6 Review Content

Students review the topic's content from their notes or the Life Science Biology Boosters book.

The log is intended to encourage honest reflection, responsibility, and consistent effort. It also allows teachers to identify patterns in students' scores, completion time, and level of difficulty.

We recommend collecting the completed log before each unit test and including it as part of the student's grade. Students can cut out the log along the dotted line before submitting it.

Each part of the homework log can be worth a separate point: completing the assignment, recording the number correct, reflecting on how it went, noting the time spent, and reviewing notes. This makes the homework grade reflect both completion and the learning habits that build accountability.

Add the points earned for each homework assignment and record the student's total homework-log grade in the MARK section at the top of the page.

Note: Feel free to choose the sections that work for you and adapt partially.



HOMEWORK LOG

COLLECT BEFORE TEST

UNIT 1: STRUCTURE AND FUNCTION

MARK

____ / ____

NAME _____ CLASS _____

1

Pages _____ Questions: _____

DONE

☐

HOW WAS IT?



HOW LONG

_____ minutes

SCORE

____ / ____

REVIEW NOTES

☐

2

Pages _____ Questions: _____

DONE

☐

HOW WAS IT?



HOW LONG

_____ minutes

SCORE

____ / ____

REVIEW NOTES

☐

3

Pages _____ Questions: _____

DONE

☐

HOW WAS IT?



HOW LONG

_____ minutes

SCORE

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REVIEW NOTES

☐

4

Pages _____ Questions: _____

DONE

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HOW WAS IT?



HOW LONG

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REVIEW NOTES

☐

5

Pages _____ Questions: _____

DONE

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HOW WAS IT?



HOW LONG

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SCORE

____ / ____

REVIEW NOTES

☐

6

Pages _____ Questions: _____

DONE

☐

HOW WAS IT?



HOW LONG

_____ minutes

SCORE

____ / ____

REVIEW NOTES

☐



HOMEWORK LOG

COLLECT BEFORE TEST

UNIT 1: STRUCTURE AND FUNCTION

MARK

____ / ____

NAME _____ CLASS _____

7

Pages _____ Questions: _____

DONE

☐

HOW WAS IT?



HOW LONG

_____ minutes

SCORE

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REVIEW NOTES

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8

Pages _____ Questions: _____

DONE

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HOW LONG

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9

Pages _____ Questions: _____

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11

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12

Pages _____ Questions: _____

DONE

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HOW WAS IT?



HOW LONG

_____ minutes

SCORE

__ / __

REVIEW NOTES

☐

UNIT 1 CONTENTS

Structure and Function

TEACHER'S EDITION

This section corresponds to **Unit 1: Structure and Function** and **Skills 1-3** in the **Life Science: Biology Boosters™** book.

Learn the content and skills first, then complete the homework.

Homework Log (collect before test) 4

PART 1 Non-Regents Content Questions 7

Topic 1: Structure and Function 8

2 questions

Topic 2: Levels of Organization 9

7 questions

Topic 3: Body Systems Working Together 11

8 questions

Topic 4: Feedback Mechanisms and Homeostasis 13

10 questions

Topic 5: DNA and Proteins 15

1 question

PART 2 Regents Questions by Topic 16

Topic 3: Body Systems Working Together 17

8 questions | 4 multiple choice, 4 constructed response

Topic 5: Homeostasis and Feedback 27

4 questions | 1 multiple choice, 3 constructed response

PART 3 Cluster Questions 31



UNIT

1

STRUCTURE AND FUNCTION



Unit 1: Structure and Function

TEACHER ANSWER KEY

UNIT 1 PRACTICE

Non-Regents Content Questions

This section checks for content understanding only. Continue on to the Regents questions for content plus skills practice.

DIRECTIONS

Choose the best answer for each multiple-choice question.
For each constructed-response question, answer every part.

29

questions

17

multiple choice

12

constructed response

Answer each question below. If you get stuck, go back and review that topic in the book.



PART

1

**NON-REGENTS
CONTENT
QUESTIONS**



Unit 1: Structure and Function

TEACHER ANSWER KEY — NON-REGENTS CONTENT QUESTIONS

Topic 1: Structure and Function

Content focus: Structure-function relationships; effects of structural change

MULTIPLE-CHOICE QUESTIONS

1. Which statement best explains the relationship between structure and function in living things?

- (1) A structure can perform any function as long as it is part of a living organism.
- (2) **The shape and arrangement of a structure help determine the job it can perform.**
- (3) The function of a structure determines which DNA is present in the organism.
- (4) Structures with different shapes always perform the same function.

CONSTRUCTED-RESPONSE QUESTIONS

2. Choose one biological structure. Explain how one feature of its structure helps it perform its function.

SAMPLE ANSWER

The plant cell wall is rigid and acts like a tough outer shell. Its rigid structure gives the cell strength and protection and keeps it from bursting when too much water enters.



Topic 2: Levels of Organization

Content focus: Hierarchy; plant structures; organelles; interactions among levels

MULTIPLE-CHOICE QUESTIONS

4. Which sequence lists the levels of organization from smallest to largest?

- (1) **organelle » cell » tissue » organ » organ system » organism**
- (2) cell » organelle » organ » tissue » organism » organ system
- (3) tissue » cell » organelle » organ system » organ » organism
- (4) organelle » tissue » cell » organism » organ » organ system

5. A cell's ribosomes stop functioning. Which cell activity would be affected most directly?

- (1) controlling which materials enter and leave
- (2) **building proteins**
- (3) storing water and wastes
- (4) releasing energy from food

6. Which organelle–function pairing is correct?

- (1) nucleus — produces ATP for the cell
- (2) **mitochondrion — releases usable energy for cell activities**
- (3) vacuole — contains the cell's genetic instructions
- (4) ribosome — controls what enters and leaves the cell

7. Which statement best compares a plant cell with an animal cell?

- (1) Only animal cells contain a cell membrane.
- (2) Only plant cells contain mitochondria.
- (3) **Plant cells contain a cell wall for support and chloroplasts for photosynthesis.**
- (4) Animal cells contain chloroplasts, while plant cells contain ribosomes.



Topic 2: Levels of Organization (cont.)

CONSTRUCTED-RESPONSE QUESTIONS

- 8. Describe how the nucleus and ribosomes interact to help a cell function. Include the role of each organelle in your answer.**

SAMPLE ANSWER

The nucleus stores DNA and provides instructions for all cell functions. Ribosomes carry out protein synthesis. The nucleus provides the DNA instructions, and the ribosomes use those instructions to make the proteins the cell needs to function.

- 9. Explain how roots, xylem, phloem, and leaves work together to help a plant survive.**

SAMPLE ANSWER

Roots absorb water and minerals from the soil. Xylem moves water upward from the roots to the leaves. The leaves use sunlight, water, and carbon dioxide to perform photosynthesis and make food. Phloem transports sugars and nutrients from the leaves to the rest of the plant.

- 10. Predict how a large decrease in the number of working mitochondria could affect a cell and the tissue that contains it. Explain your reasoning.**

SAMPLE ANSWER

Mitochondria perform cellular respiration to produce ATP energy. If a cell had far fewer working mitochondria, it would have less energy for its organelles and cell activities. The cell would not work as well, and the tissue made from these cells would be less able to perform its function.



Topic 3: Body Systems Working Together

Content focus: System interactions; immune response; disease prevention and disruption

MULTIPLE-CHOICE QUESTIONS

11. How do the respiratory and circulatory systems work together during exercise?

- (1) **The respiratory system absorbs oxygen, and the circulatory system transports it to cells.**
- (2) The circulatory system digests food, and the respiratory system carries nutrients.
- (3) The respiratory system produces hormones, and the circulatory system removes bones.
- (4) The circulatory system absorbs oxygen directly through the skin.

12. Which statement best describes an interaction between the digestive and circulatory systems?

- (1) **The digestive system absorbs nutrients, and the circulatory system transports them to cells.**
- (2) The circulatory system breaks food into nutrients inside the heart.
- (3) The digestive system transports oxygen from the lungs to the muscles.
- (4) The circulatory system produces digestive organs when food is eaten.

13. How do the excretory and circulatory systems interact to remove wastes?

- (1) The kidneys carry oxygen to the blood, and the heart stores the oxygen.
- (2) **The blood carries wastes to excretory organs, which remove the wastes from the body.**
- (3) The bladder makes nutrients, and the blood digests them.
- (4) The skin produces wastes, and the circulatory system changes them into DNA.

14. Why does the immune system usually respond to a pathogen?

- (1) **The pathogen has foreign antigens that the immune system recognizes as not belonging.**
- (2) The pathogen has no molecules on its surface.
- (3) The pathogen is made from the body's own tissues.
- (4) The pathogen prevents all receptor molecules from having a shape.



Topic 3: Body Systems Working Together (cont.)

CONSTRUCTED-RESPONSE QUESTIONS

- 15. Describe two different ways the immune system can respond after a pathogen enters the body. Include the role of immune cells or antibodies in each response.**

SAMPLE ANSWER

One response is that white blood cells detect a pathogen, engulf it, and destroy it. A second response is that the immune system produces antibodies. Each antibody has a shape that matches a specific antigen, clicks into the matching pathogen, and destroys it.

- 16. Construct an explanation for why vaccination can protect an individual from a later infection by a specific pathogen.**

SAMPLE ANSWER

A vaccine introduces a weakened or inactive antigen. The body produces antibodies without getting sick, and memory cells remain for future defense. Later, when the real pathogen enters, the immune system recognizes its antigen and uses the matching antibodies to fight off the invader.

- 17. A transplant patient takes an immunosuppressant drug. Explain one benefit and one risk of this treatment.**

SAMPLE ANSWER

Benefit: The immunosuppressant weakens the immune system so it will not attack and reject the transplanted organ. Risk: It also weakens the body's ability to fight other diseases, so even a simple infection may be harder to fight.

- 18. Explain why an allergy is considered an immune-system mistake. Include the roles of an allergen and histamine in your answer.**

SAMPLE ANSWER

An allergy is an immune-system mistake because the immune system treats a harmless substance, called an allergen, as dangerous and launches an attack. The body releases histamine, which can cause sneezing, itching, swelling, or trouble breathing.



Topic 4: Feedback Mechanisms and Homeostasis

Content focus: Dynamic equilibrium; negative and positive feedback; regulation; investigations

MULTIPLE-CHOICE QUESTIONS

19. Which statement best defines homeostasis?

- (1) The body prevents all internal conditions from changing.
- (2) **Living things maintain internal conditions within ranges that allow them to function.**
- (3) The outside environment remains constant for an organism.
- (4) All body systems perform the same function at the same time.

20. A person's body temperature changes slightly throughout the day but remains within a normal range. This is best described as

- (1) loss of regulation
- (2) **dynamic equilibrium**
- (3) positive feedback
- (4) immune rejection

21. Which statement describes negative feedback?

- (1) A response increases a change until a process is completed.
- (2) **A response reverses a change and returns a condition toward its normal range.**
- (3) A response causes every body system to stop working.
- (4) A response keeps an internal condition moving farther from its normal range.

22. Which response helps lower body temperature on a hot day?

- (1) skin blood vessels constrict and sweating stops
- (2) **skin blood vessels dilate and sweating increases**
- (3) the pancreas releases glucagon
- (4) platelets attract additional platelets

23. Why do blood vessels near the skin constrict in a cold environment?

- (1) to increase heat loss from the skin
- (2) **to reduce blood flow near the skin and conserve heat for core organs**
- (3) to lower the amount of glucose in the blood
- (4) to increase water loss through stomates



Unit 1: Structure and Function

TEACHER ANSWER KEY — NON-REGENTS CONTENT QUESTIONS

Topic 4: Feedback Mechanisms and Homeostasis (cont.)

24. After a meal, a person's blood glucose level rises above its normal range. Which response helps restore homeostasis?

- (1) The pancreas releases insulin, which lowers blood glucose.**
- (2) The pancreas releases glucagon, which lowers blood glucose.
- (3) The lungs release insulin, which raises blood glucose.
- (4) The kidneys release antibodies, which remove glucose.

25. Which process is an example of positive feedback?

- (1) sweating lowers a high body temperature
- (2) insulin lowers a high blood glucose level
- (3) platelets attract more platelets until a blood clot forms**
- (4) guard cells close stomates to reduce water loss

CONSTRUCTED-RESPONSE QUESTIONS

26. Explain how an increase in heart rate and breathing rate during exercise helps the body maintain homeostasis.

SAMPLE ANSWER

During exercise, a faster heart rate pumps more blood to the muscles, bringing the oxygen and nutrients they need. A faster breathing rate pulls in more oxygen and removes extra carbon dioxide, the waste product of cellular respiration. These responses help the body meet the muscles' increased needs and maintain homeostasis.

27. Explain how guard cells help a plant maintain homeostasis during hot, dry weather.

SAMPLE ANSWER

Guard cells control the size of openings called stomates. During hot, dry weather, the guard cells close the stomates to prevent water loss. This feedback response conserves water and helps the plant maintain homeostasis.

28. Describe how the nervous, circulatory, respiratory, and muscular systems interact when a person begins to run.

SAMPLE ANSWER

The nervous system sends messages that direct the muscles to contract. The muscular system produces movement. The respiratory system increases breathing to pull in more oxygen and remove extra carbon dioxide. The circulatory system increases heart rate and transports oxygen and nutrients to the muscles. Together, these systems help the person run while maintaining homeostasis.



Topic 5: DNA and Proteins

Content focus: DNA instructions; protein shape and function; effects on cells and traits

MULTIPLE-CHOICE QUESTIONS

29. What is one main role of DNA in a cell?

- (1) to store instructions used to build proteins
- (2) to release usable energy directly from food
- (3) to transport oxygen through blood
- (4) to digest pathogens inside the stomach



Unit 1: Structure and Function

TEACHER ANSWER KEY

UNIT 1 PRACTICE

Regents Questions by Topic

These are official New York State Regents questions, organized by topic. Each question includes the specific stimuli needed to answer it.

DIRECTIONS

Read the stimuli carefully before answering. For multiple-choice questions, choose the best answer. For constructed-response questions, answer every part.

12

Regents questions

2

topics

5

multiple choice

7

constructed response

Answer each question below. If you get stuck, go back and review that topic in the book.



PART

2

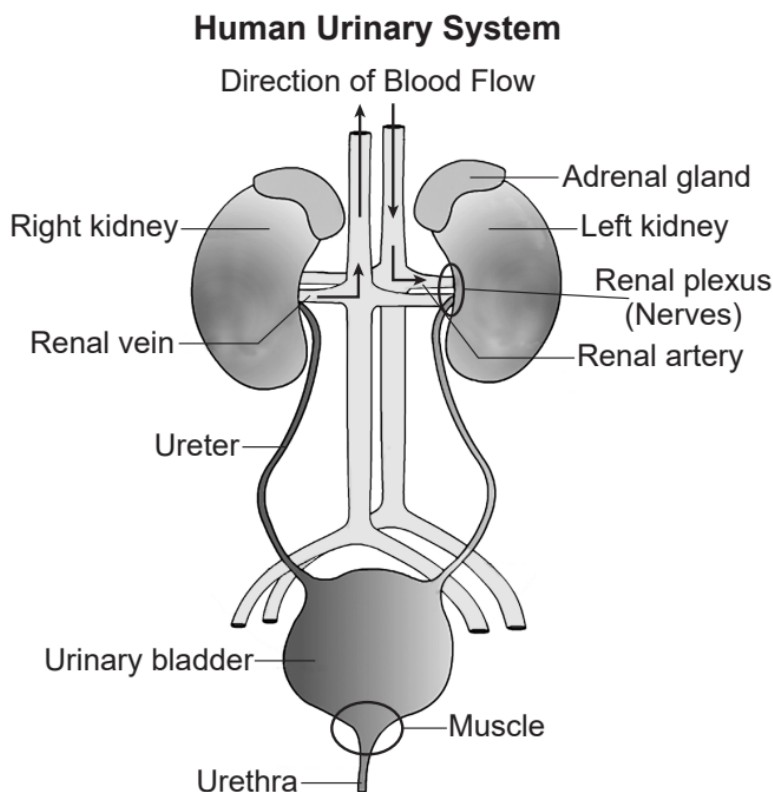
REGENTS
QUESTIONS
BY
TOPIC



STIMULUS

Drinking Water Is Just The Beginning!

The amount of water taken in must be in balance with the amount lost. The urinary system is involved in maintaining the salt and water balances within the body.



QUESTION

Q1

Which statement describes how the organization of the urinary system and *one* other system interact to maintain homeostasis in the human body?

- (1) The adrenal gland, part of the endocrine system, delivers nutrients to the cells of the urinary system to remove carbon dioxide from the blood.
- (2) The internal urethral sphincter muscle, part of the muscular system, contracts to signal the cells of the urinary system to regulate blood sugar.
- (3) The brain, part of the nervous system, sends messages to the renal plexus (nerves) to signal the cells of the urinary system to deliver oxygen to the blood.
- (4) The arteries, part of the circulatory system, deliver unfiltered blood to the cells of the urinary system to remove wastes.

ANSWER

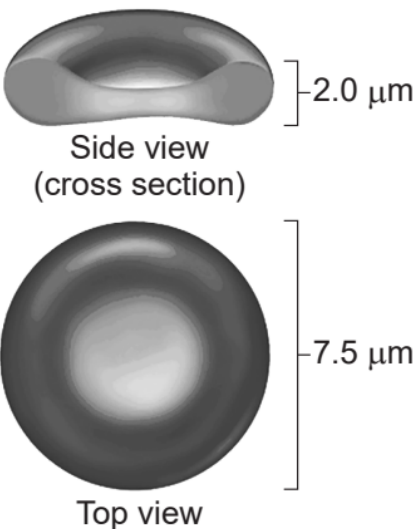
Correct answer: (4)



STIMULUS MATERIAL

RBCs typically have a biconcave disk shape. A scientific study examined the effect of changing the RBC shape and membrane flexibility on its ability to transfer oxygen. For this study, when the RBC membrane was less flexible, the oxygen transfer capacity decreased by 18%. When the RBC was more flexible, the oxygen carrying capacity increased by 21%. When RBCs take on water their membrane initially becomes more flexible.

Typical Biconcave Disc
Shape of Red Blood Cells



QUESTION

Q2

What evidence would support the claim that consuming water after exercise helps an athlete's body maintain homeostasis?

	Number of RBCs Taking on Water	RBC Flexibility	Rate of Oxygen Transfer
(1)	increases	decreases	decreases
(2)	increases	increases	increases
(3)	decreases	increases	increases
(4)	decreases	decreases	decreases

ANSWER

Correct answer: (2)



STIMULUS MATERIAL

Trees Have Organ Systems

Trees have two systems, compared to the multiple systems that are present in animals. Trees are multicellular organisms with organ systems that enable them to carry out specific functions necessary for maintaining homeostasis. However, that does not diminish the importance of these two systems, which have numerous critical functions.

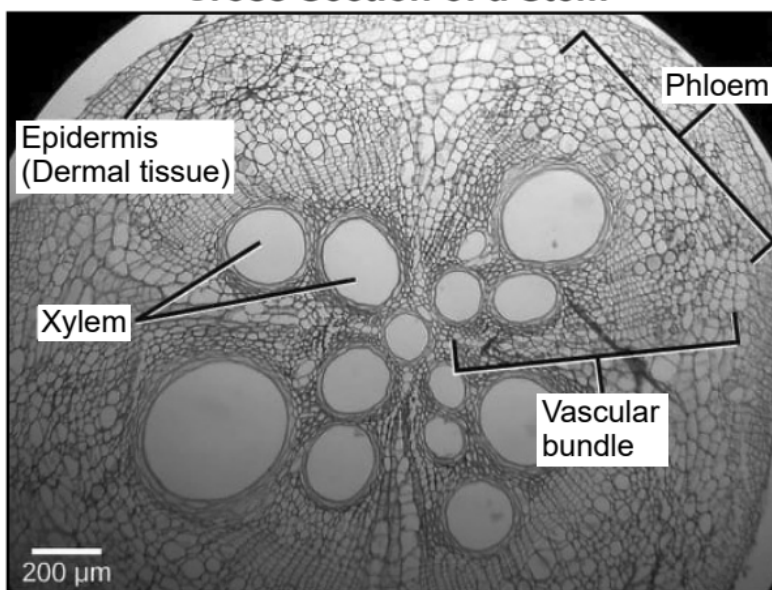
The table below contains information about the structures and functions of the systems found in trees.

Systems in Trees

	Root System	Shoot System
Structures	roots	stem/trunk, branches, leaves
Functions	– anchor the tree – absorb water and minerals from the soil – store and modify products of photosynthesis	– connect roots to branches – transport material – perform photosynthesis – contain reproductive structures

The model below is a cross section of a stem as viewed through a microscope that was observed during an investigation. The stem contains the xylem and phloem, which together make up the vascular bundle, a structure that transports materials within a tree.

Cross Section of a Stem



Question on the next page →



Unit 1: Structure and Function

Topic 3: Body Systems Working Together

Q3

Aug 2025 Q1 · Constructed Response

QUESTION

Q3

Describe an interaction between the vascular bundle with both the root and shoot systems in a plant. [1]

ANSWER

Acceptable responses (NYSED Rating Guide) — any ONE earns credit

1. The vascular bundle delivers absorbed water from the root system to parts of the shoot system, such as the leaves, so they can perform photosynthesis.
2. Leaves use materials such as water, which is transported by the vascular bundle from the root system to the shoot system.
3. Roots absorb water/minerals, that are carried by the vascular bundle through the shoots to the rest of the plant.
4. The vascular bundle carries food from the shoots/leaves to the roots to be stored.



Unit 1: Structure and Function

Topic 3: Body Systems Working Together

Q4

Aug 2025 Q2 · Multiple Choice

STIMULUS MATERIAL

The compounds needed by plants to carry out life functions are delivered to plant cells in different ways. Maple trees are one type of tree that produce a liquid, known as sap, that circulates sugar, water, and other molecules throughout the plant. Root hairs are single-celled structures that exchange oxygen and carbon dioxide within air pockets in the soil. They also absorb water from the soil. These materials are then delivered to all plant cells.

QUESTION

Q4

Which statement best explains why the function of sap and root hairs is necessary for the functioning of plant cells to maintain homeostasis?

- (1) Cellular respiration occurs only in root cells since the sap only travels to those cells.
- (2) The sugar in the sap combines with carbon dioxide to form new sugars for the root cells.
- (3) Sap and root hairs contribute to the transport of materials necessary for the plant cells to carry out cellular respiration.
- (4) Sap and root hairs contain the raw materials required for the root cells to carry out photosynthesis.

ANSWER

Correct answer: (3)



Unit 1: Structure and Function

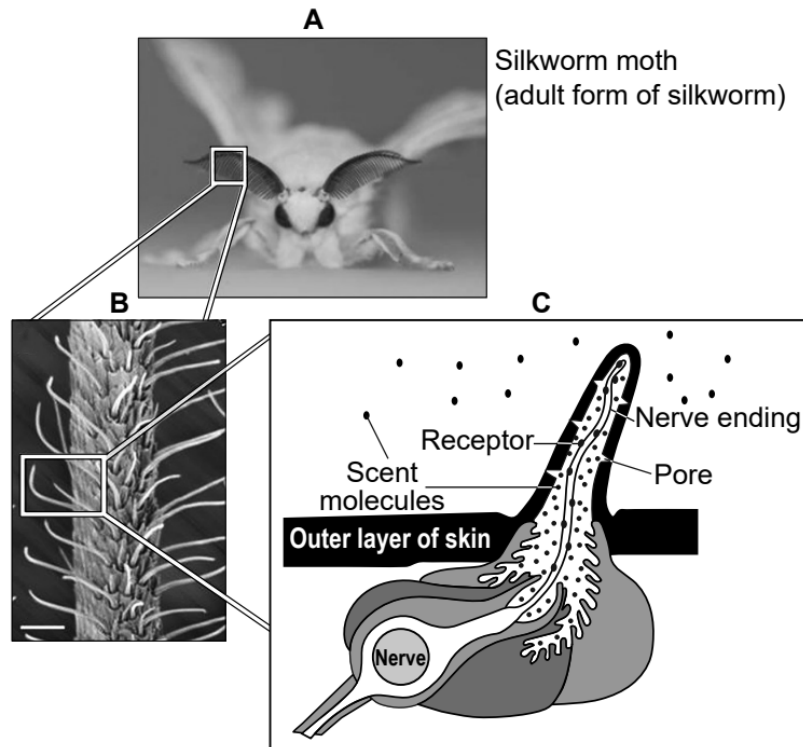
Topic 3: Body Systems Working Together

Q5

Aug 2025 Q13 · Multiple Choice

STIMULUS MATERIAL

Researchers have determined that silkworm moths have a mechanism that enables them to locate mulberry leaves. Mulberry leaves emit scented chemical molecules that are detected by highly sensitive receptors within the antennae of the silkworm, as shown in the models below.



QUESTION

Q5

Which statement best describes how the organization and interactions of *two* systems present within the silkworm moth enables it to find and use mulberry leaves as their source of nutrients?

- (1) Special receptors in the nervous system of the silkworm pick up the scent of the mulberry leaves and send messages to the muscular system to spin a silk cocoon.
- (2) Receptors in the nervous system within the antennae pick up scent molecules from mulberry leaves. The silkworm is able to find and eat the leaves, using the digestive system to break down the nutrient molecules into a usable form.
- (3) The nervous system of the silkworm sends messages to the digestive system to begin to break down the fats that are taken in to produce new muscle tissue for movement.
- (4) The muscular system sends messages to the nervous system to receive scent messages from the mulberry leaves.

ANSWER

Correct answer: (2)



STIMULUS MATERIAL

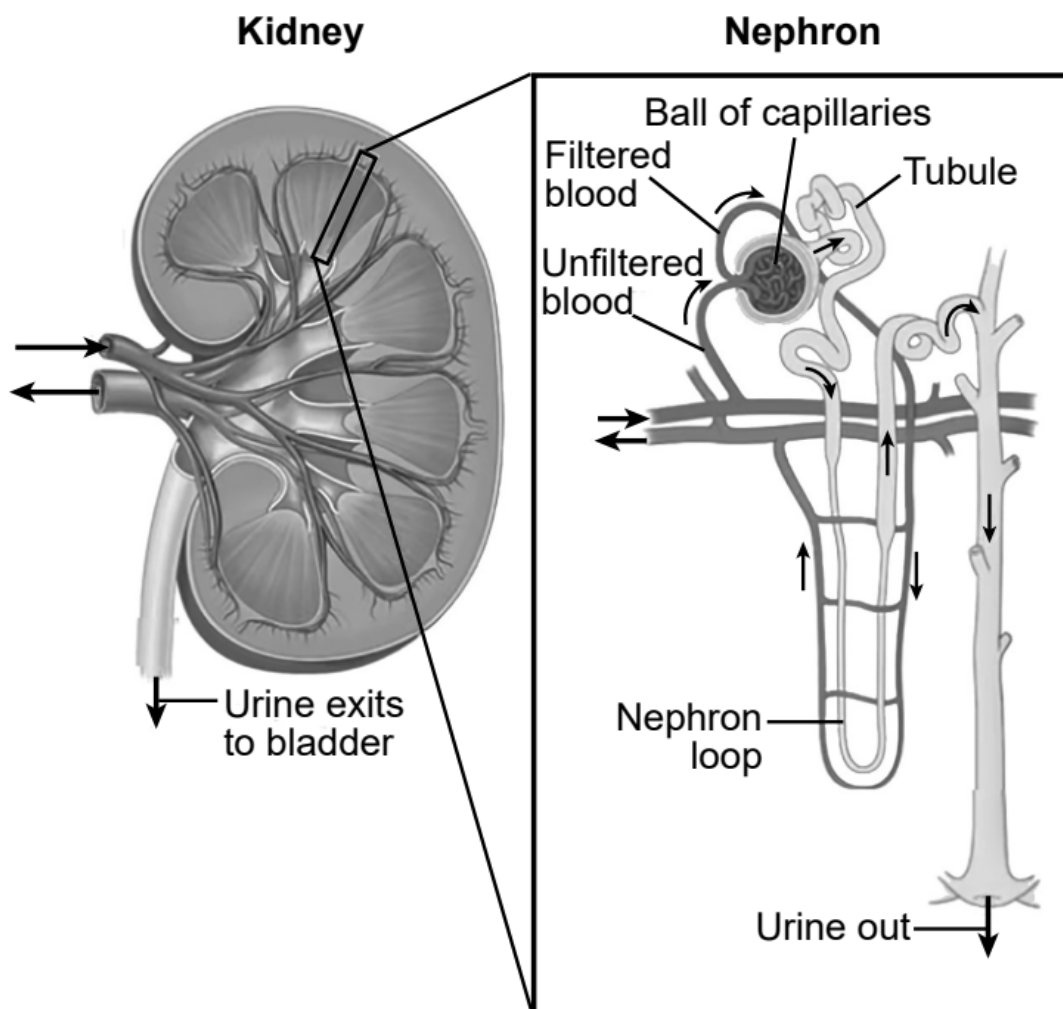
How Do Kangaroo Rats Survive in the Desert?

Kangaroo rat species live in the desert and conserve water so efficiently that they can survive without drinking. The body systems of these animals have various adaptations that allow the rats to extract water from the food they eat.

Kangaroo rats produce highly concentrated urine containing a minimal amount of water. Urine concentration depends on specialized structures in the kidney called nephrons.

The model below shows the organization of specific parts of the circulatory and excretory systems that are needed to filter water and waste from the blood.

Flow of Blood Through Kidney



Question on the next page →



Unit 1: Structure and Function

Topic 3: Body Systems Working Together

Q6

Aug 2025 Q29 · Constructed Response

QUESTION

Q6

Describe how specific parts of the circulatory *and* excretory systems interact within the kangaroo rat to conserve water. [1]

ANSWER

Acceptable responses (NYSED Rating Guide) — any ONE earns credit

1. The circulatory system is made up of blood vessels. The excretory system includes the kidney, which is made of nephrons. The blood vessels bring blood to the nephron, where it is filtered to form concentrated urine.
2. Blood vessels of the circulatory system bring blood to the kidney, where the nephrons filter the blood, conserving water.
3. As blood flows through blood vessels of the circulatory system to the kidneys of the excretory system, it enters capillaries within a nephron. The nephron filters out waste, and most water is returned to the body.
4. Water and wastes diffuse out of the capillaries into the nephrons of the kidney. The blood is filtered in the nephron to produce urine that contains little water.



Unit 1: Structure and Function

Topic 3: Body Systems Working Together

Q7

Aug 2025 Q31 · Multiple Choice

STIMULUS MATERIAL

Survival in the desert also requires that kangaroo rats have the ability to escape predators. Various body systems must work together to enable the kangaroo rat to perform lightning-quick escape maneuvers.

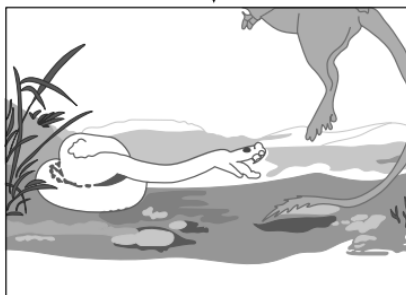
Scientists studied the evolution of the kangaroo rat leap. They determined that although 81% of snake strikes were accurate, 78% of the time the kangaroo rats were fast enough to evade a bite that would kill.

Kangaroo Rat Escape Maneuver

Kangaroo rat detects rattlesnake strike using hearing, vision, or sensing ground vibrations. The kangaroo rat will initiate escape response.



Kangaroo rat completes escape maneuver by launching itself into the air.



QUESTION

Q7

Which statement best describes an interaction that occurs between body systems during the kangaroo rat's lightning-quick maneuver?

- (1) The respiratory and nervous systems interact when sending a signal to the spinal cord to leap.
- (2) The circulatory and nervous systems interact when sending a signal to the leg muscles.
- (3) The respiratory and muscular systems interact to slow cellular respiration prior to the muscle contraction.
- (4) The nervous and muscular systems interact to trigger the leg muscle to contract.

ANSWER

Correct answer: (4)



Unit 1: Structure and Function

Topic 3: Body Systems Working Together

Q8

Jan 2026 Q15 · Constructed Response

STIMULUS

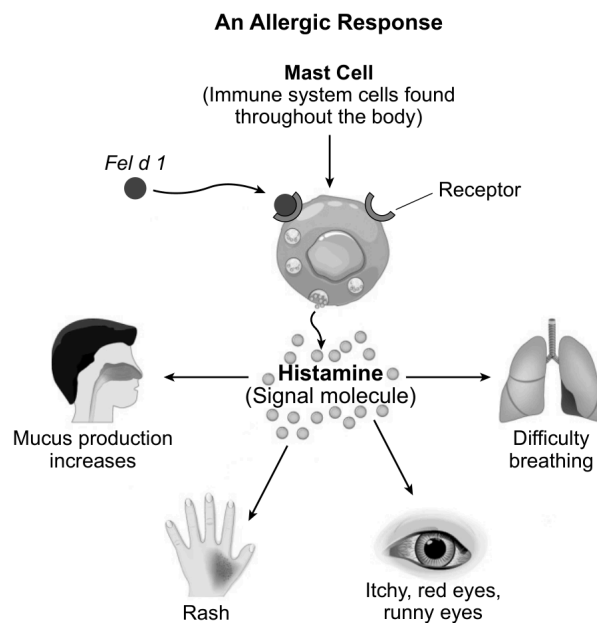
Solving the Problem of Cat Allergies

Domestic cats are a very popular pet for humans. However, for 10–20% of people, cats can cause allergic reactions. Allergy symptoms are caused by exposure to an allergen, which can sometimes be a protein. Most cat allergy symptoms can be traced to the protein, *Fel d 1*. This protein is produced by the cells of various structures within the body of the cat, including salivary glands within the mouth and oil glands within the skin.

Information regarding the structure of *Fel d 1* is included below.

Protein	Partial Amino Acid Sequence
<i>Fel d 1</i> (Allergen)	GLU TYR VAL GLU GLN VAL ALA GLN TYR LYS ALA LEU

Part of the mechanism responsible for the symptoms of a cat allergy are shown in the model below.



QUESTION

Q8

Based on the model above, describe how components of the immune system *and* respiratory system interact when a person with a cat allergy is exposed to *Fel d 1*. [1]

ANSWER

Acceptable responses (NYSED Rating Guide) — any ONE earns credit

1. Histamines are released by mast cells of the immune system when *Fel d 1* binds to their receptors. These histamines signal cells of the nasal passages in the respiratory system to produce mucus.
2. Immune system cells called mast cells release a signaling molecule that causes the airways in the lungs to constrict/the lungs to have difficulty breathing.





Unit 1: Structure and Function

Topic 3: Body Systems Working Together

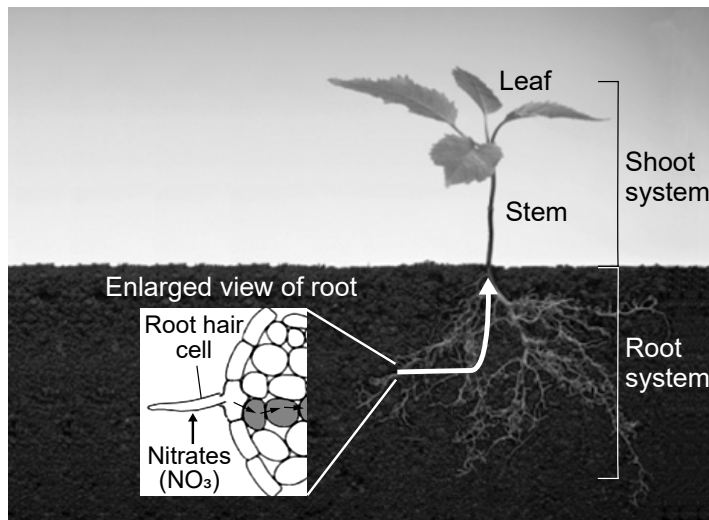
Q9

Jan 2026 Q40 · Constructed Response

STIMULUS MATERIAL

Plants must obtain necessary compounds from their surrounding environment using specialized structures. Below is a representation of the process of nitrogen uptake occurring in non-carnivorous plants.

Plant Structures and Systems Involved in Nutrient Uptake



QUESTION

Q9

Using the model above, describe how components of the two systems interact in the non-carnivorous plant to obtain nitrogen from the surrounding environment that is necessary for its leaves to produce chlorophyll. [1]

ANSWER

Acceptable responses (NYSED Rating Guide) — any ONE earns credit

1. The root hair cell in the root system takes in nitrogen in the form of nitrates from the soil and transports it throughout the plant through the stem of the shoot system.
2. Nitrogen/nitrates are taken in by the root hair cells and moved to the leaves of the plants through the stem.
3. Nitrogen/nitrates are taken in by the root system and moved to the cells of the plant through the shoot system.



Unit 1: Structure and Function

Topic 5: Homeostasis and Feedback Mechanisms

Q10

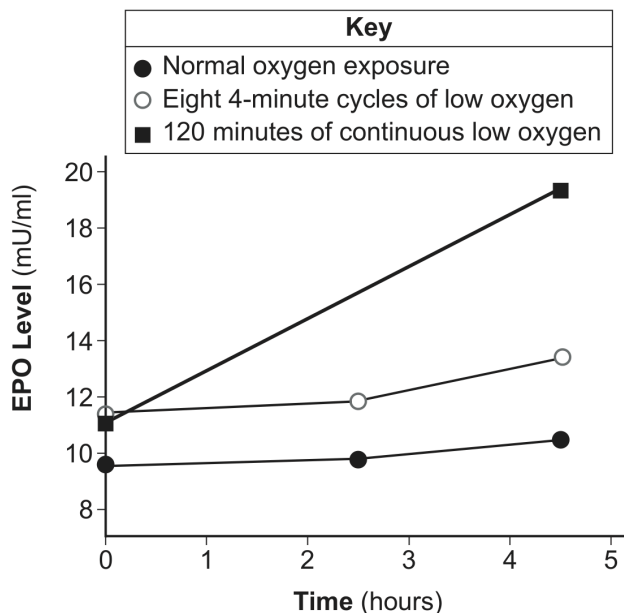
June 2025 Q8 · Constructed Response

STIMULUS

Another function of the kidney is to aid in regulating the number of red blood cells. The kidneys produce a protein known as Erythropoietin (EPO) that stimulates the increased production of red blood cells.

The graph below shows the results of a study. Participants were exposed to different conditions prior to time zero, then EPO levels were measured over a 4.5-hour time period.

Effect of Oxygen Exposure on EPO Production



QUESTION

Q10

Using the information provided, describe the evidence to support the claim that exposure to low oxygen levels results in a feedback mechanism that allows the body to maintain homeostasis. [1]

ANSWER

Acceptable responses (NYSED Rating Guide) — any ONE earns credit

1. When participants were exposed to 120 minutes of low oxygen, their EPO levels increased from about 11 mU/ml to 19 mU/ml over 4.5 hours. More red blood cells make it possible to transport more oxygen until the appropriate blood oxygen level (set point) is reached.
2. When there is a decrease in the amount of oxygen the blood is carrying to the kidney, the cells of the kidney release the EPO protein, which causes an increase in red blood cell production. This causes oxygen levels to increase back to normal.
3. The graph shows that the longer a person is exposed to low oxygen levels, the more EPO is released. More red blood cells are produced to carry more oxygen until the normal oxygen level is reached.

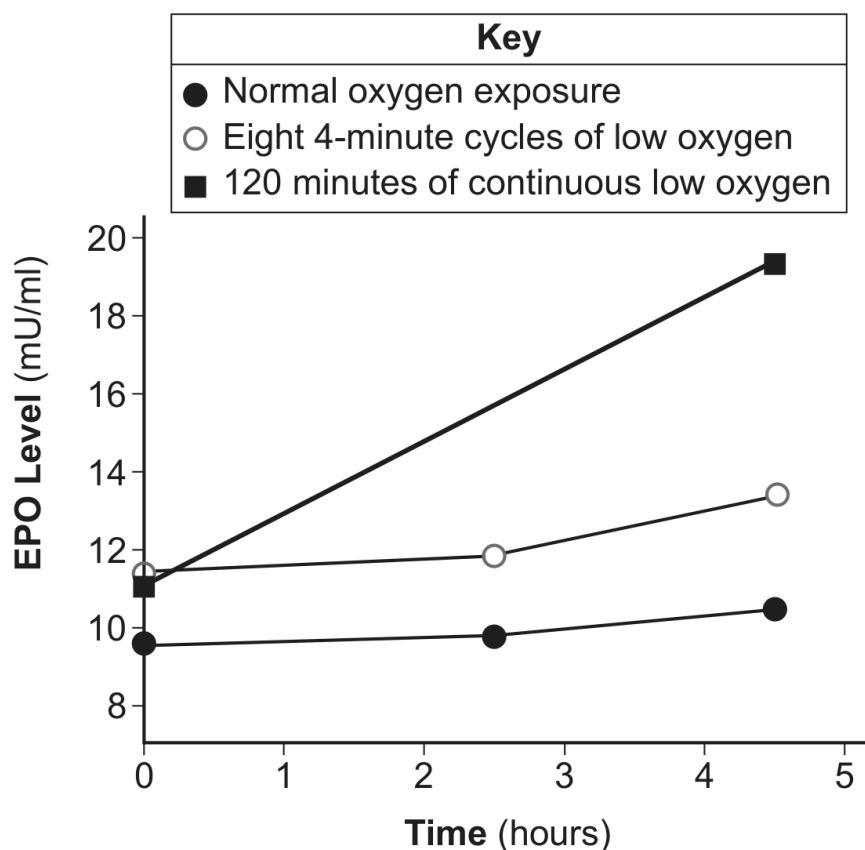


STIMULUS MATERIAL

Another function of the kidney is to aid in regulating the number of red blood cells. The kidneys produce a protein known as Erythropoietin (EPO) that stimulates the increased production of red blood cells.

The graph below shows the results of a study. Participants were exposed to different conditions prior to time zero, then EPO levels were measured over a 4.5-hour time period.

Effect of Oxygen Exposure on EPO Production



In addition to their other functions, red blood cells (RBCs) have the capacity to carry water. The surface of the cell contains structures called aquaporins, which transport water across cell membranes. Due to their unique cell structure, RBCs are able to expand up to 74% or shrink up to 40% compared to the original cell size.

Question on the next page →



Unit 1: Structure and Function

Topic 5: Homeostasis and Feedback Mechanisms

Q11

June 2025 Q9 · Multiple Choice

QUESTION

Q11

Which statement provides the best explanation for how red blood cells contribute to a feedback mechanism that maintains homeostasis?

- (1) The aquaporins in the red blood cells facilitate the exchange of water in environments of different concentrations and help the kidneys more efficiently regulate salt and water balance.
- (2) The aquaporins in the red blood cells prevent the exchange of water in environments of different concentrations and help the kidneys more efficiently regulate salt and water balance.
- (3) The red blood cells change their shape to move through the kidney but have minimal effect on salt and water balance in the kidneys.
- (4) The red blood cells change their shape to move through the kidney but do not regulate any feedback mechanisms.

ANSWER

Correct answer: (1)



Unit 1: Structure and Function

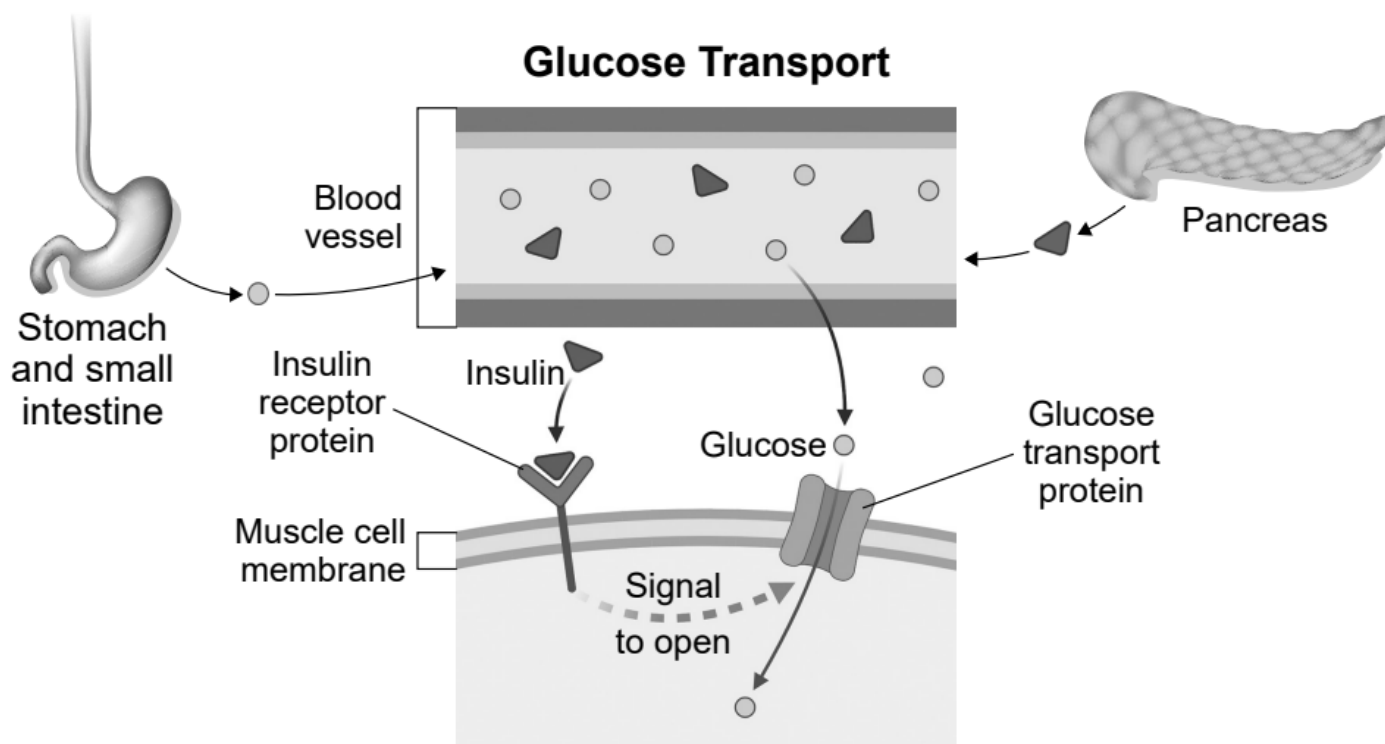
Topic 5: Homeostasis and Feedback Mechanisms

Q12

Jan 2026 Q24 · Constructed Response

STIMULUS MATERIAL

The model below represents the interaction of structures within body systems that maintain normal levels of blood glucose in a person without diabetes.



QUESTION

Q12

Using the model above, identify *two* body systems and describe how the systems interact to regulate glucose in an individual *without* diabetes. [1]

ANSWER

Acceptable responses (NYSED Rating Guide) — any ONE earns credit

1. The endocrine system releases insulin into the circulatory system, which carries insulin to the cells.
2. The blood vessels of the circulatory system carry the insulin/glucose to the muscles of the musculoskeletal system.
3. The digestive system breaks down food into glucose, which diffuses into the circulatory system to transport glucose throughout the body.



Unit 1: Structure and Function

Topic 5: Homeostasis and Feedback Mechanisms

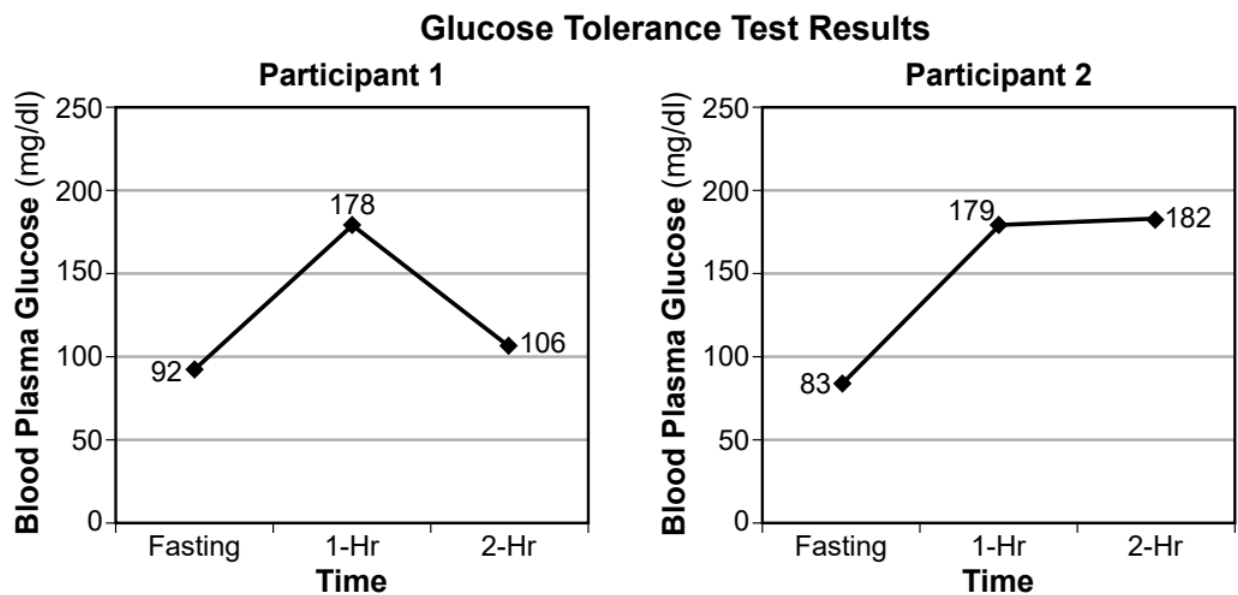
Q13

Jan 2026 Q25 · Constructed Response

STIMULUS MATERIAL

Type 1 and Type 2 diabetes differ in their causes, onset, and management even though both result in issues with insulin. Type 1 diabetes is characterized by the reduced ability of the pancreas to produce insulin. Insulin is produced normally in Type 2 diabetes, but the cells of the body do not respond properly.

Glucose tolerance tests are used to diagnose issues with blood glucose regulation. Twenty study participants were asked to fast (not eat) before consuming 75g of glucose. Their blood was drawn at intervals to assess the body's response. The graphs below show some information from two participants in the study.



QUESTION

Q13

Use evidence to describe the role of insulin in a feedback mechanism that helps an individual maintain homeostasis in Participant 1 but *not* in Participant 2. [1]

ANSWER

Acceptable responses (NYSED Rating Guide) — any ONE earns credit

1. The blood plasma glucose kept increasing at the two-hour mark in Participant 2, indicating that insulin is not playing a role in bringing glucose back to the set point as it did in Participant 1.
2. The blood plasma glucose levels returned to a normal range after two hours in Participant 1 but not in Participant 2. This indicates that insulin is functioning normally in a properly functioning feedback loop in Participant 1 but not in Participant 2.



Unit 1: Structure and Function

TEACHER ANSWER KEY

UNIT 1 PRACTICE

Cluster Questions

On the Regents, questions come in clusters - a group of questions that share the same set of stimuli. Sometimes the stimulus you need is attached to an earlier question in the cluster.

DIRECTIONS

No clusters are included in this unit. We will practice cluster questions in the next units after we master the stimulus analysis skills.



PART

3

CLUSTER
QUESTIONS