

UNIT 2

LIFE SCIENCE BIOLOGY BOOSTERS™

Buddy

PRACTICE QUESTIONS

EdBoosters™

Name: _____

Dear Student,

Welcome to the new Life Science: Biology Regents!

The new Regents includes a **different style of questions.** The questions are organized into clusters, with several questions connected to the same topic and set of stimuli. Learning how to answer these questions is a new skill, and it may take some time and practice.

To help you master this new format, this book is divided into **three sections:**

1 Content Review Questions

These straightforward, non-Regents questions check your understanding of the biology content. If you know the material, you should be able to answer them. If you are getting these questions wrong, return to that topic in the Life Science: Biology Boosters™ book and review it before continuing.

2 Regents Questions by Topic

In this section, Regents questions are organized by topic. We selected the specific stimuli needed to answer each question. You will need to use:

- The Regents skills taught in the Life Science: Biology Boosters™ book
- Your knowledge of biology
- Careful thinking and common sense

Do not become discouraged if it takes time to adjust to this new question style. Most students struggle at first, but with practice, they gradually get the hang of it.

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3 Regents Question Clusters

The third section includes **complete clusters.** A cluster is a group of questions connected to one topic and its stimuli. As you work through a cluster, you may need to flip back and use stimuli from earlier questions.

We begin integrating Regents Question Clusters in **Unit 2.** Review **Skill Booster 4: Cluster Questions** in the Life Science: Biology Boosters™ book for strategies that will help you work through these questions successfully.

Keep in mind: because the Regents is organized in clusters, if a question refers to information you do not see on that page, check the stimuli from earlier questions in the cluster. You will also find questions that you already mastered inside the clusters.

Remember, you are building new pathways in your brain. It is okay for your brain to work hard and even "hurt" a little! Each question you complete strengthens your skills and makes the next one easier.

Wishing you much success as you master this new skill!

R. Hertz

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How to Complete Your Homework Log

To track your progress and build responsibility skills, complete one numbered section each time homework is assigned.

1 Pages and Questions

Write the assigned page numbers and question numbers.

2 Done

Check the box after you have completed the entire assignment.

3 How Was It?

Circle the symbol that best describes the assignment:

- 👍 I understood it.
- 😐 Some parts were challenging.
- 👎 I found it difficult and need help.

4 How Long

Record the number of minutes you spent completing the assignment.

5 Score

After checking your answers, write the number you answered correctly over the total number of questions.

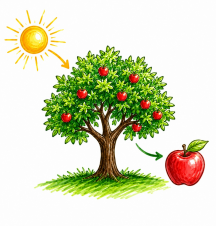
6 Review Notes

Review the questions you answered incorrectly. Return to the corresponding topic in the Life Science: Biology Boosters™ book if necessary. Check the box when you have finished reviewing.

Complete the log honestly. The goal is to track your effort and progress, not to get everything correct the first time.

At the end of the unit, cut out the completed log along the dotted line and submit it to your teacher before the unit test.

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UNIT

2

MATTER AND ENERGY IN ORGANISMS AND ECOSYSTEMS

15 Regents questions **5** topics

Topics in this packet

1. **Building Blocks for Life**
   Content Questions Only
2. **Photosynthesis**
   4 Regents questions
3. **Cellular Respiration**
   3 Regents questions
4. **Cycles in the Ecosystem**
   3 Regents questions
5. **Energy Flow Through Ecosystems**
   5 Regents questions

Note

The Regents is organized in clusters - groups of questions. Stimuli can be used from previous questions in the cluster. This book is organized by topic, so the stimuli are prepared for you here. Be sure to practice clusters later in this unit to learn how to choose the correct stimuli.

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HOMEWORK LOG

UNIT 2: MATTER AND ENERGY

MARK _____ / _____

NAME _____ CLASS _____

1 Pages _____ Questions: _____

DONE	HOW WAS IT?	HOW LONG	SCORE	REVIEW NOTES
☐	👍 😐 👎	_____ minutes	__ / __	☐

2 Pages _____ Questions: _____

DONE	HOW WAS IT?	HOW LONG	SCORE	REVIEW NOTES
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3 Pages _____ Questions: _____

DONE	HOW WAS IT?	HOW LONG	SCORE	REVIEW NOTES
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4 Pages _____ Questions: _____

DONE	HOW WAS IT?	HOW LONG	SCORE	REVIEW NOTES
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5 Pages _____ Questions: _____

DONE	HOW WAS IT?	HOW LONG	SCORE	REVIEW NOTES
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6 Pages _____ Questions: _____

DONE	HOW WAS IT?	HOW LONG	SCORE	REVIEW NOTES
☐	👍 😐 👎	_____ minutes	__ / __	☐

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HOMEWORK LOG

UNIT 2: MATTER AND ENERGY

MARK _____ / _____

NAME _____ CLASS _____

7 Pages _____ Questions: _____

DONE	HOW WAS IT?	HOW LONG	SCORE	REVIEW NOTES
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8 Pages _____ Questions: _____

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9 Pages _____ Questions: _____

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10 Pages _____ Questions: _____

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11 Pages _____ Questions: _____

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12 Pages _____ Questions: _____

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UNIT 2 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.

25	15	10
questions	multiple choice	constructed response

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

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Topic 1: Building Blocks for Life

Content focus: HONC elements; digestion and synthesis; conservation of matter

MULTIPLE-CHOICE QUESTIONS

1. **Which group contains the four elements identified in the book as the main building blocks of living things?**

   (1) hydrogen, oxygen, nitrogen, and carbon

   (2) helium, oxygen, neon, and calcium

   (3) hydrogen, iron, sodium, and chlorine

   (4) carbon, calcium, potassium, and sulfur

2. **During digestion, proteins are broken down into**

   (1) glucose

   (2) amino acids

   (3) fatty acids and glycerol

   (4) nucleotides

3. **A chemical reaction begins with six carbon atoms in its reactants. If matter is conserved, how many carbon atoms must be present in the products?**

   (1) 0

   (2) 3

   (3) 6

   (4) 12

CONSTRUCTED-RESPONSE QUESTIONS

4. **Distinguish between digestion and synthesis. Include one biological example of each process.**

5. **Explain why atoms are rearranged, rather than created or destroyed, when an organism digests food.**

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Topic 2: Photosynthesis

Content focus: Inputs and outputs; chloroplasts; plant transport; energy transformation

MULTIPLE-CHOICE QUESTIONS

6. Which equation best represents photosynthesis?

(1) glucose + oxygen → carbon dioxide + water + ATP
(2) carbon dioxide + water + light energy → glucose + oxygen
(3) oxygen + ATP → glucose + carbon dioxide
(4) nitrogen + water → amino acids + oxygen

7. Photosynthesis occurs mainly in chloroplasts because chloroplasts contain

(1) chlorophyll that absorbs light
(2) enzymes that digest proteins
(3) DNA that leaves the cell
(4) ATP that enters through roots

8. Which plant structure-function pairing is correct?

(1) xylem transports glucose from leaves
(2) phloem carries water upward from roots
(3) stomates allow gases to enter and leave a leaf
(4) guard cells absorb light energy for the plant

CONSTRUCTED-RESPONSE QUESTIONS

9. Explain how roots, xylem, stomates, chloroplasts, and phloem work together during and after photosynthesis.

10. Predict one benefit and one cost to a plant when guard cells close the stomates during hot, dry weather.

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Topic 3: Cellular Respiration

Content focus: ATP production; aerobic and anaerobic respiration; relationship to photosynthesis

MULTIPLE-CHOICE QUESTIONS

11. Which equation best represents cellular respiration?

(1) carbon dioxide + water + light → glucose + oxygen

(2) glucose + oxygen → carbon dioxide + water + ATP

(3) ATP + water → glucose + nitrogen

(4) oxygen + carbon dioxide → glucose + ATP

12. Which statement about cellular respiration is correct?

(1) It occurs only in plant cells during daylight.

(2) It occurs only in animal cells during exercise.

(3) It occurs in the mitochondria of living cells and releases usable energy.

(4) It occurs in chloroplasts and stores light energy.

13. Compared with aerobic respiration, anaerobic respiration

(1) requires more oxygen and produces more ATP

(2) requires no oxygen and produces less ATP

(3) occurs only in plants and produces glucose

(4) stops all ATP production in a cell

CONSTRUCTED-RESPONSE QUESTIONS

14. Explain how photosynthesis and cellular respiration are related in terms of their reactants, products, and energy changes.

15. During intense exercise, muscle cells may not receive enough oxygen. Predict how this affects ATP production and identify the substance that may build up.

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Topic 4: Cycles in the Ecosystem

Content focus: Carbon, nitrogen, and water cycles; Earth spheres; movement of matter

MULTIPLE-CHOICE QUESTIONS

16. Which statement correctly compares matter and energy in ecosystems?

(1) Both matter and energy are recycled completely.
(2) Matter cycles, while energy flows in one direction.
(3) Energy cycles, while matter flows in one direction.
(4) Neither matter nor energy moves between organisms.

17. Which process removes carbon dioxide from the atmosphere?

(1) photosynthesis
(2) cellular respiration
(3) decomposition
(4) burning fossil fuels

18. How does nitrogen from the atmosphere first become available for plants?

(1) Plants absorb nitrogen gas directly through stomates.
(2) Nitrogen-fixing bacteria convert it into usable compounds in soil.
(3) Animals release nitrates during photosynthesis.
(4) Xylem changes nitrogen gas into glucose.

CONSTRUCTED-RESPONSE QUESTIONS

19. Trace nitrogen from the atmosphere into an animal and then back to the soil.

20. Construct an explanation for how increased burning of fossil fuels can change the carbon cycle.

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Topic 5: Energy Flow Through Ecosystems

Content focus: Food chains and food webs; trophic levels; energy and biomass pyramids

MULTIPLE-CHOICE QUESTIONS

21. In a food chain, an arrow points from grass to a rabbit. The arrow represents

(1) the movement of energy from the grass to the rabbit

(2) the movement of the rabbit toward the grass

(3) the recycling of all heat into the grass

(4) the transfer of energy from the rabbit to the grass

22. A producer contains 10,000 units of energy. According to the 10% rule, about how much energy is available to the primary consumer?

(1) 10 units

(2) 100 units

(3) 1,000 units

(4) 9,000 units

23. Why is the base of an energy pyramid usually the widest level?

(1) Producers contain the greatest amount of available energy.

(2) Top consumers create energy for all lower levels.

(3) Decomposers prevent any energy from being lost as heat.

(4) Every trophic level receives all the energy from the level below.

CONSTRUCTED-RESPONSE QUESTIONS

24. Predict how a major decrease in producers would affect the consumers in a food web. Explain your reasoning.

25. Explain why a food web is usually a more realistic model than a single food chain, and why energy is not recycled in either model.

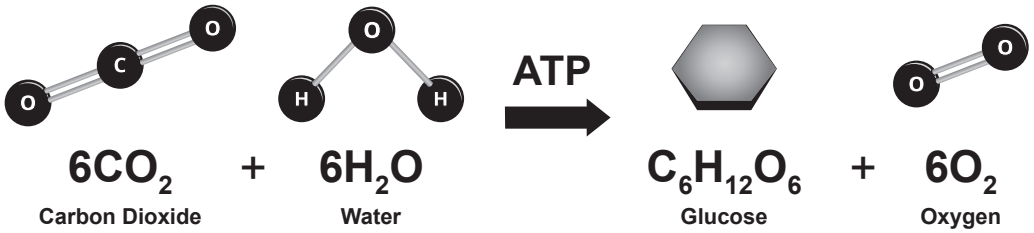
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QUESTION

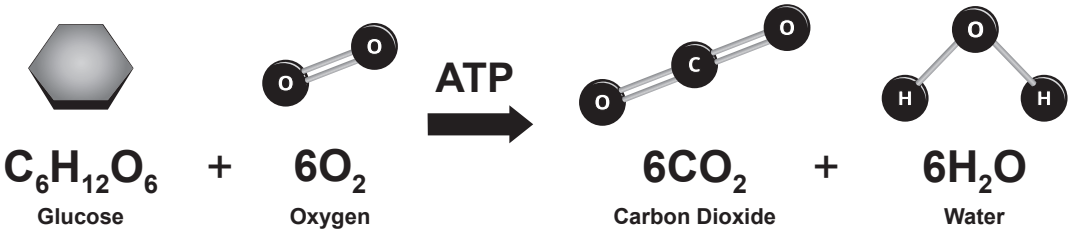
Q1

Which model identifies the process that converts light energy into chemical energy inside the kelp?

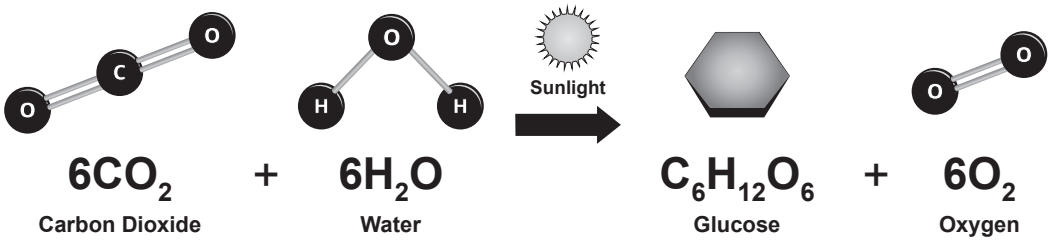
(1)



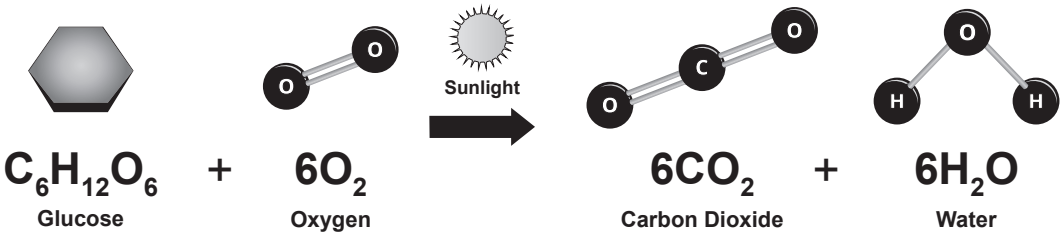
(2)



(3)



(4)

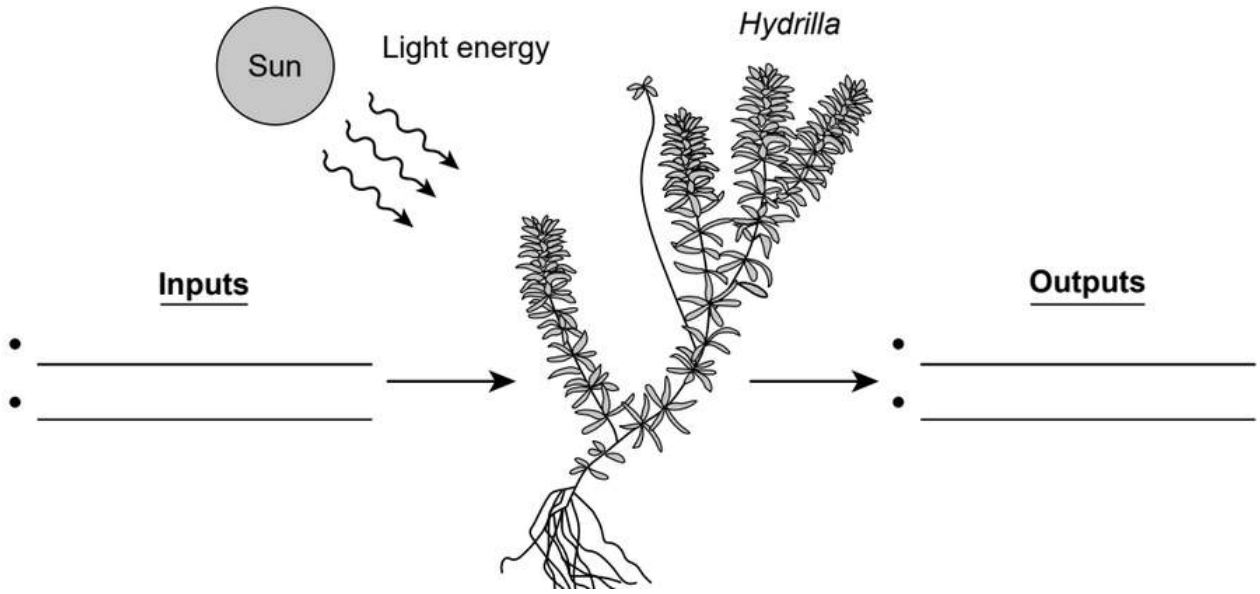


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QUESTION

Q2

Complete the model by identifying the inputs *and* outputs of the process used by *Hydrilla* to outcompete native plants. [1]



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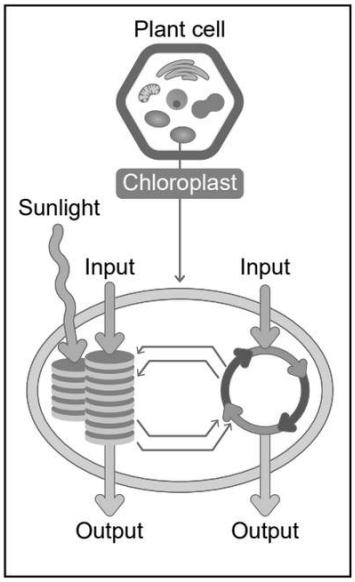
Purple Insect Eater

Carnivorous plants are unique in the way they obtain and cycle compounds necessary for life functions. The purple pitcher plant (*Sarracenia purpurea*) is a photosynthetic carnivorous plant often found in wetland soil, such as peat bogs in the Adirondack mountains.

The pitcher part of the plant is a modified hollow leaf that naturally fills with water. Insects are attracted to a sugary nectar secreted by the flared flap of the pitcher. The downward-pointing hairs lining the flap encourage insects to travel into the pitcher. The insects slide down into the fluid-filled main body of the pitcher and are digested by enzymes released by the plant.

Like most plants, the cells of pitcher plants are able to cycle carbon, as shown in the model below.

Model of the Processes of the Purple Pitcher Plant



Question on the next page →

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QUESTION

Q3

Using the model, which statement best identifies the energy conversion that occurs in the pitcher plant?

(1) The chemical energy in carbon dioxide is transformed into light energy for glucose and oxygen.

(2) Light energy allows carbon dioxide to enter the leaf and allows glucose to exit.

(3) Light energy is captured by the leaf and converted into stored energy within the chemical bonds of glucose.

(4) The chemical energy in glucose is converted into light energy, stored in oxygen.

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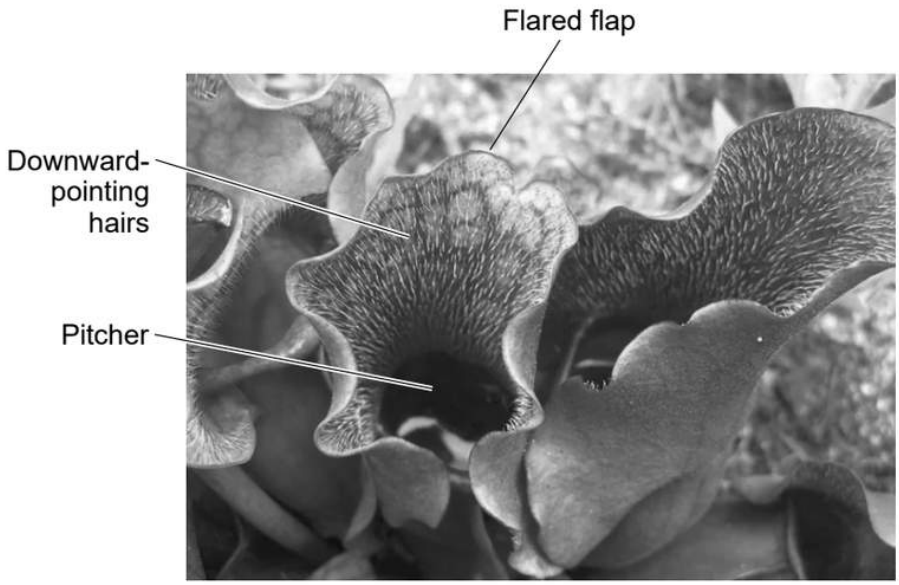
STIMULUS

Purple Insect Eater

Carnivorous plants are unique in the way they obtain and cycle compounds necessary for life functions. The purple pitcher plant (*Sarracenia purpurea*) is a photosynthetic carnivorous plant often found in wetland soil, such as peat bogs in the Adirondack mountains.

The pitcher part of the plant is a modified hollow leaf that naturally fills with water. Insects are attracted to a sugary nectar secreted by the flared flap of the pitcher. The downward-pointing hairs lining the flap encourage insects to travel into the pitcher. The insects slide down into the fluid-filled main body of the pitcher and are digested by enzymes released by the plant.

Purple Pitcher Plant



Peat bogs are low in available essential nutrients such as nitrogen, calcium, magnesium, and potassium. Only 20% of the nitrogen used by pitcher plants is absorbed from the peat soil in which they grow. Pitcher plants break down the protein-rich insects into smaller molecules, using enzymes found in their fluid-filled pitchers.

Pitcher plants produce both pitchers and flat leaves. Flat leaves are more efficient at carrying out photosynthesis. Acid rain resulting from the combustion of fossil fuels has gradually added more nitrogen to the peat bogs in the Adirondacks.

Scientists wanted to know if the changes in the amount of available nitrogen caused changes in the pitcher plants. They planted several pitcher plants in different pots. Each pot had soil with a different amount of nitrogen in it. They found that the plants with more nitrogen in the soil produced fewer pitchers and more flat leaves than pitcher plants in low-nitrogen soils.

Question on the next page →

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QUESTION

Q4

How does this evidence support the scientists' claim that increased nitrogen makes the pitcher plants more effective at cycling carbon?

(1) Pitcher plants that have sufficient nitrogen in their soil have less of a need to undergo photosynthesis, so they produce fewer pitchers.

(2) The pitcher plants in higher-nitrogen soils have less of a need to consume insects, so they are able to use more of their leaves for photosynthesis.

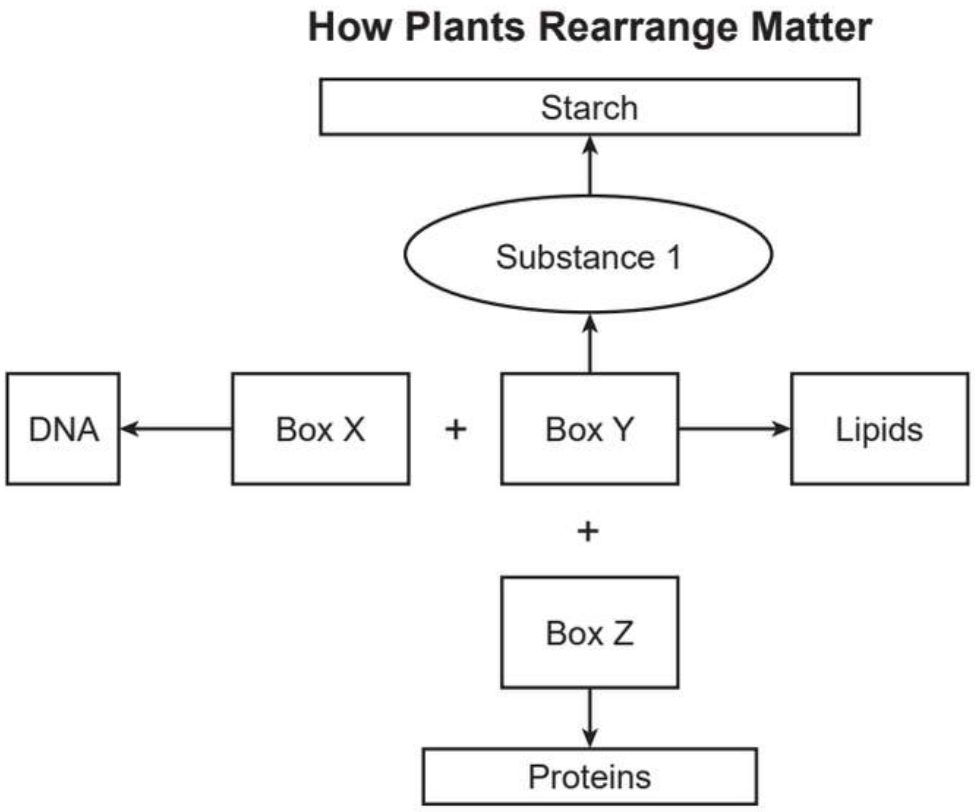
(3) The pitcher plants in high-nitrogen soils grow more flat leaves because they need other elements from insects to combine with nitrogen.

(4) Pitcher plants produce more flat leaves so that they are better at obtaining nitrogen from the soil.

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STIMULUS

Plants rearrange matter to produce other needed compounds. The model below shows some of the compounds that plants synthesize. Boxes *X*, *Y*, and *Z* represent element(s) used to make these compounds.



QUESTION

Q5

Which explanation best supports the claim that elements from Substance 1 in the model combine with different elements to form other carbon-based molecules?

(1) The elements in Box *Y* are broken down into nitrogen and phosphorous and then combined to form lipids.

(2) Substance 1 molecules can be joined together to make starch.

(3) The elements in Box *Y* are combined with nitrogen to make the substances which are used to form proteins.

(4) Substance 1 molecules can be joined together to make DNA.

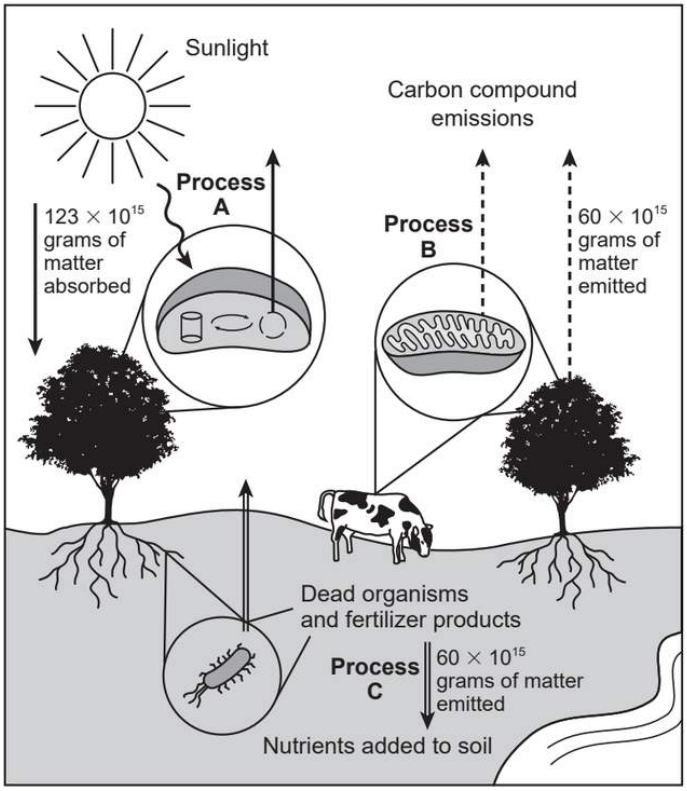
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STIMULUS

Does It Matter?

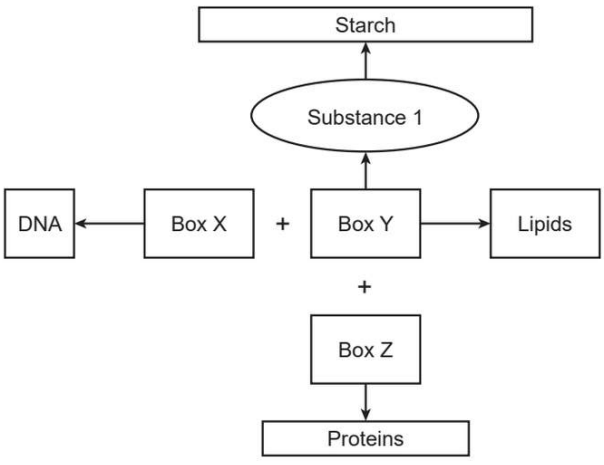
The carbon used by plants is moved between living organisms, the minerals in the soil, the hydrosphere, and the atmosphere through processes in the carbon cycle.

Matter Conversions



Plants rearrange matter to produce other needed compounds. The model below shows some of the compounds that plants synthesize. Boxes *X*, *Y*, and *Z* represent element(s) used to make these compounds.

How Plants Rearrange Matter



Question on the next page →

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QUESTION

Q6

Based on the information in all the models provided, which claim can be made about why Substance 1 is essential for plant metabolism?

(1) Process *B* combines Substance 1 with other elements to form lipids to be utilized by the plant.

(2) Process *A* rearranges elements of carbon, hydrogen, and oxygen to form Substance 1 to be utilized by the plant.

(3) Processes *A* and *C* combine nitrogen and phosphorus with Substance 1 to form proteins utilized by the plant.

(4) Processes *B* and *C* rearrange nitrogen and Substance 1 to form DNA and starches utilized by the plant.

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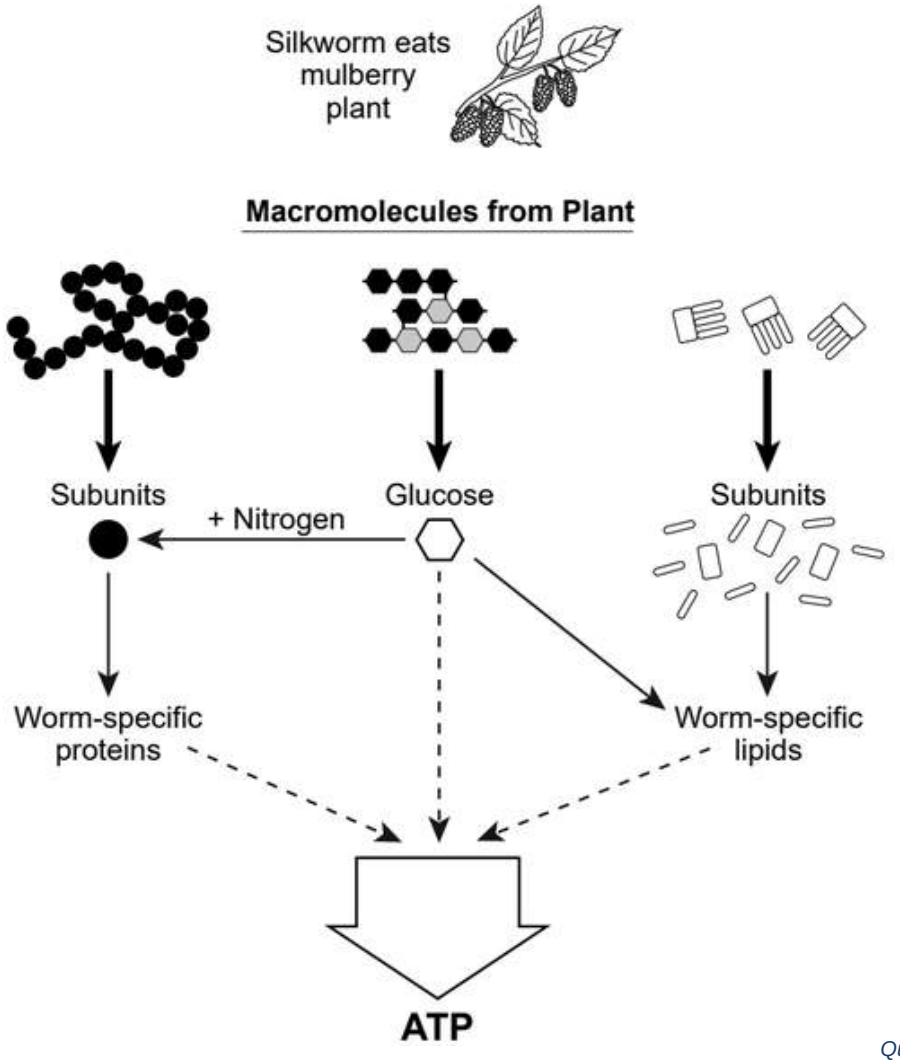
STIMULUS

A Unique Relationship: Mulberries and Silk

The ability of living organisms to rearrange elements into different forms and groups is fundamental to life. Mulberry plants use specific biological processes to combine molecules present in the environment in order to produce the substances they need to carry out life functions. Silkworms eat mulberry leaves exclusively, getting all of their water and other nutrients from these leaves.

Most nutrients from the mulberry leaves enter the silkworm in the form of macromolecules. The macromolecules must be metabolized by body systems of the silkworm into a form that the cells of the worm are able to use. The model below summarizes some of the processes the silkworm uses to convert the nutrient macromolecules from the mulberry tree into a usable form.

Possible Metabolic Pathways of Macromolecules in Silkworm



Question on the next page →

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QUESTION

Q7

Use evidence from the model to explain how the elements in the glucose can be used by the silkworm to synthesize protein molecules needed to sustain life. [1]

YOUR ANSWER

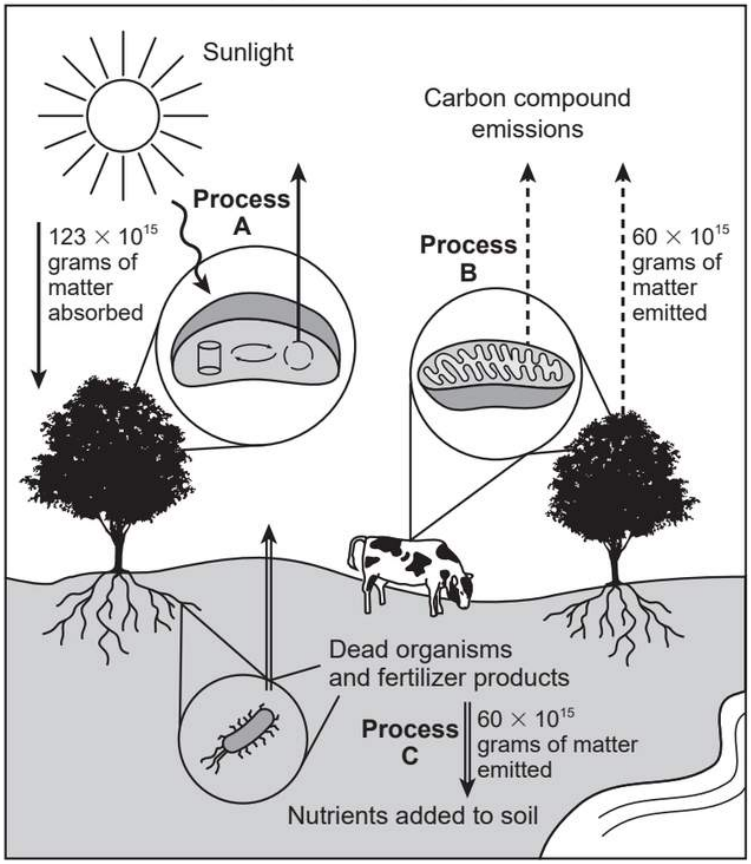
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STIMULUS

Does It Matter?

The carbon used by plants is moved between living organisms, the minerals in the soil, the hydrosphere, and the atmosphere through processes in the carbon cycle.

Matter Conversions



QUESTION

Q8

Using information from the model, which statement correctly identifies how the movement of matter in this ecosystem provides energy for different organisms?

(1) The plant takes in carbon compounds from the atmosphere, which get converted into sugar and then used by the cow during Process *B* to produce usable energy.

(2) The plant takes in oxygen from the soil, which gets converted into nutrients during Process *B* to produce usable energy.

(3) The cow performs Process *C*, which releases sugars into the atmosphere and then is used by plants during Process *A* to produce usable energy.

(4) The cow's wastes are broken down through Process *A*, which releases sugars into the soil and then is used by plants during Process *C* to produce usable energy.

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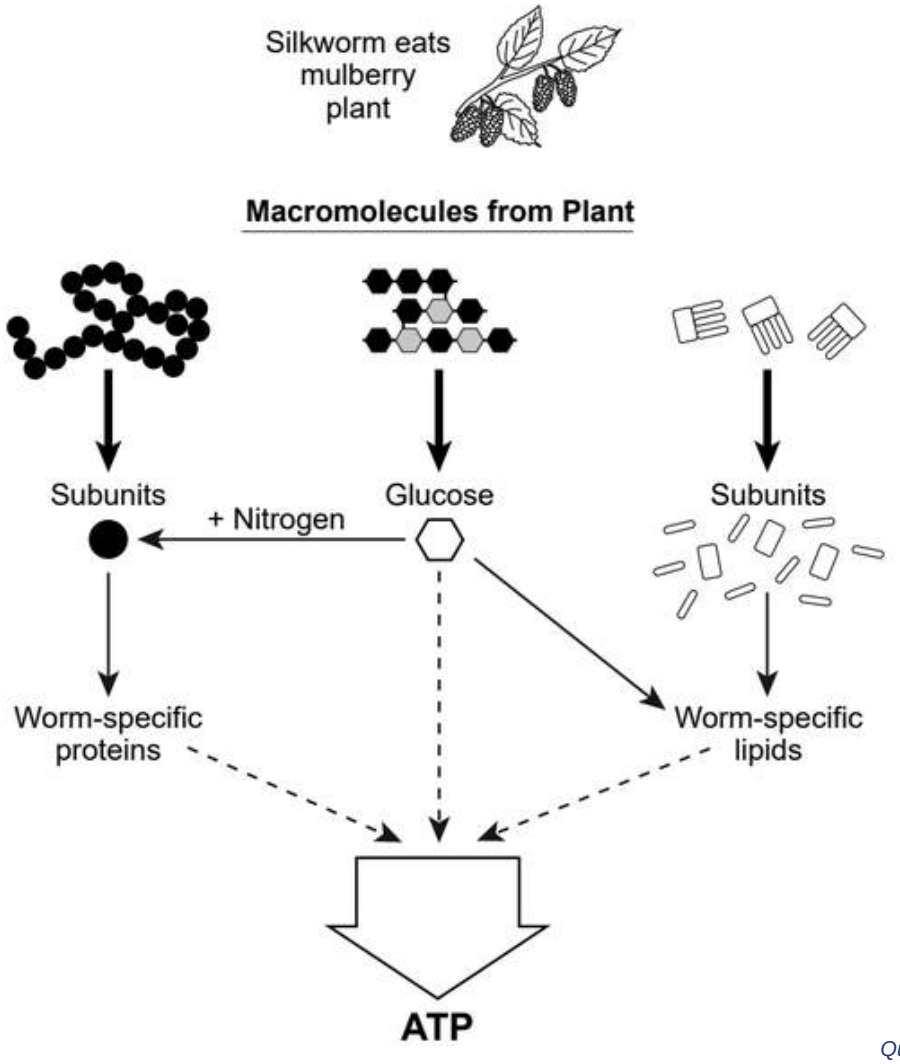
STIMULUS

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Possible Metabolic Pathways of Macromolecules in Silkworm



Question on the next page →

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QUESTION

Q9

Based on information in the model, which statement describes the chemical process by which the energy in glucose from the mulberry plant is converted and made available to the silkworm?

(1) Cellular respiration within the cells of the silkworm breaks the bonds of glucose to release energy that can be used to produce ATP, a usable source of cellular energy.

(2) Cellular respiration within the cells of the mulberry tree breaks the bonds of glucose to release amino acids, a usable source of cellular energy.

(3) Digestion within the cells of the silkworm breaks the bonds of glucose to release amino acids that can be used to build ATP for energy.

(4) Digestion within the cells of the mulberry tree breaks the bonds of glucose to release elements that can be used to build lipids for energy.

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STIMULUS

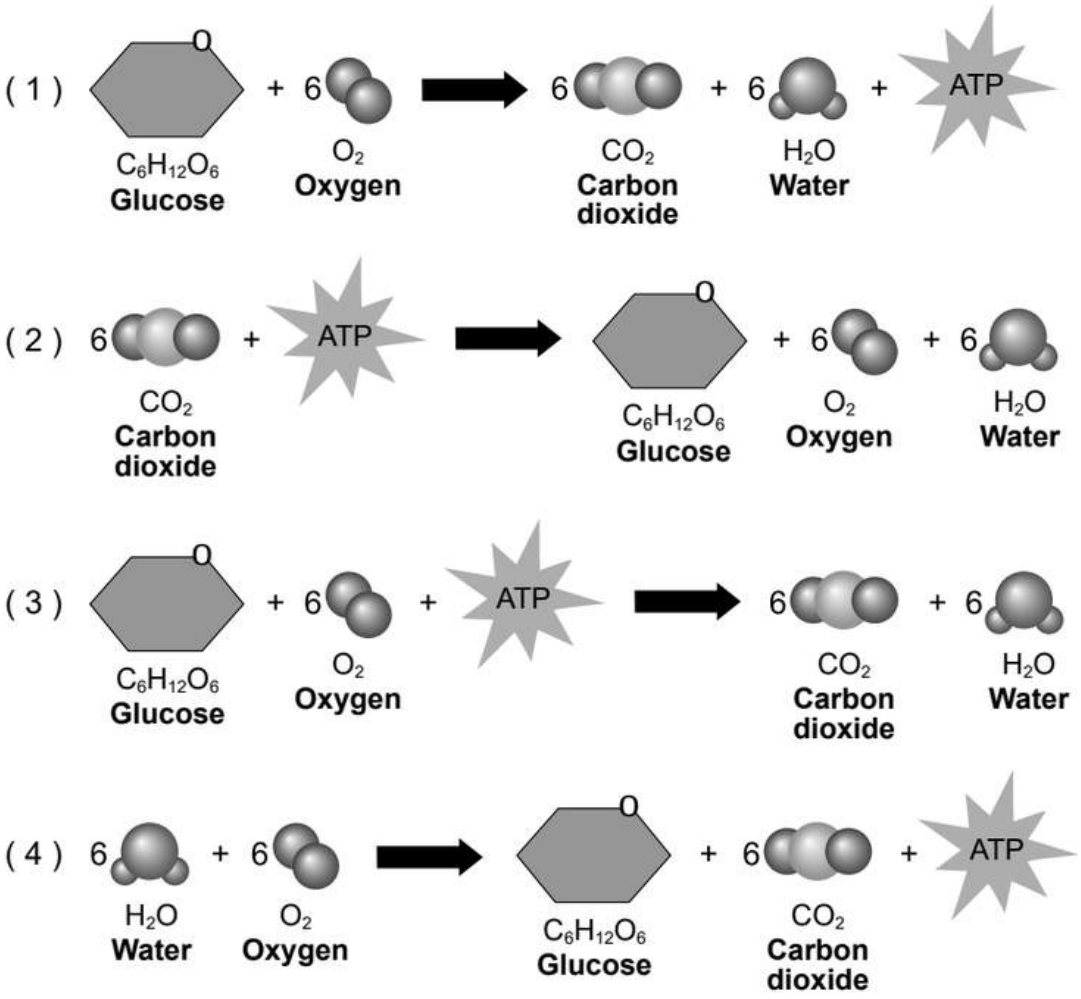
Diabetes

Diabetes is a chronic health condition that affects how the body regulates blood sugar (glucose). There are multiple forms of diabetes, including Type 1 and Type 2. Multiple symptoms can be used to diagnose diabetes. One of the symptoms associated with diabetes is muscle weakness and fatigue.

QUESTION

Q10

Which model summarizes the process that could be disrupted by diabetes, resulting in muscle fatigue?



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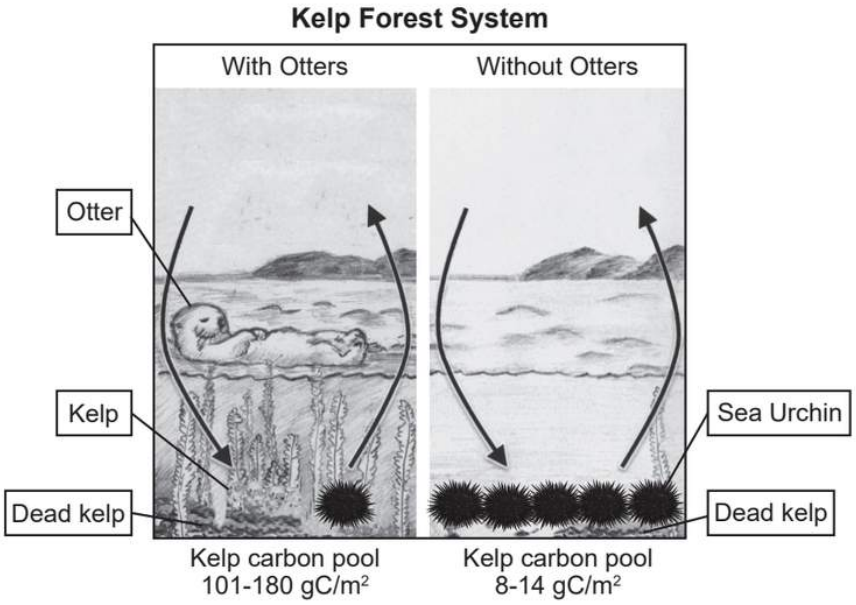
STIMULUS

Carbon! Where Does It Come From? Where Does It Go?

On Earth, carbon compounds are found in the oceans, atmosphere, and living organisms, as well as stored in rocks and sediments. Earth and its atmosphere can be considered a closed system. The amount of carbon in different locations within Earth's system is always changing.

Sea otters help maintain the carbon balance in their ecosystem. Otters eat sea urchins. Eating sea urchins is important, as sea urchins are herbivores that can destroy a kelp forest. Kelp are large autotrophic algae that grow much faster than most plants. When kelp die, they sink into the deep ocean. The low oxygen conditions of the sea floor cause decomposition to be slow or incomplete.

Scientists calculated the carbon pool (how much carbon kelp stores) with and without sea otters, as shown in the model below.



QUESTION

Q11

Which claim about the kelp carbon pool is best supported by evidence from the information and the model above?

(1) The carbon storage is higher with the otters present because the sea otters eat the sea urchins.

(2) The carbon storage is higher with the sea urchins present because they control the kelp population.

(3) The carbon storage is lower with the otters present because the sea otters eat the kelp.

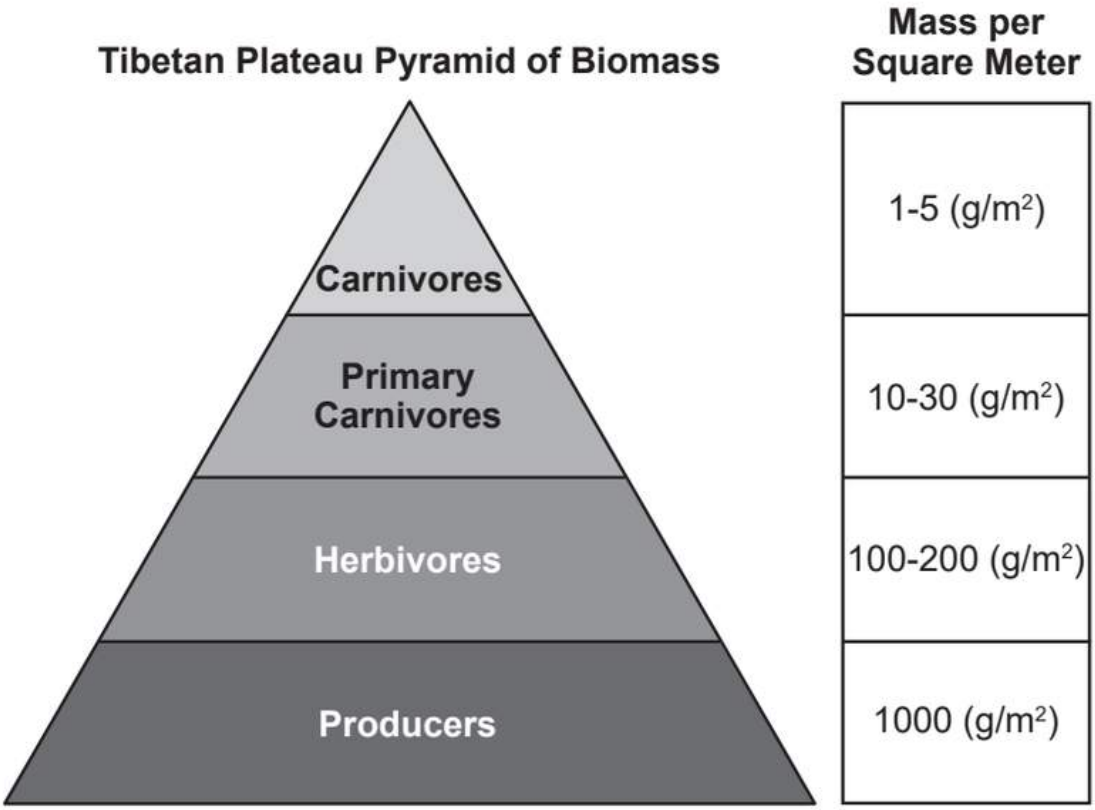
(4) The carbon storage is lower with the sea urchins present because they carry out autotrophic nutrition.

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STIMULUS

Other organisms that are part of the Tibetan Plateau ecosystem include carnivores such as wolves, eagles, and snow leopards.

The model below shows some approximate biomass at each trophic level of the Tibetan Plateau ecosystem.



QUESTION

Q12

Use the evidence provided to make a claim about how energy flow among organisms in the Tibetan Plateau ecosystem affects biomass. [1]

YOUR ANSWER

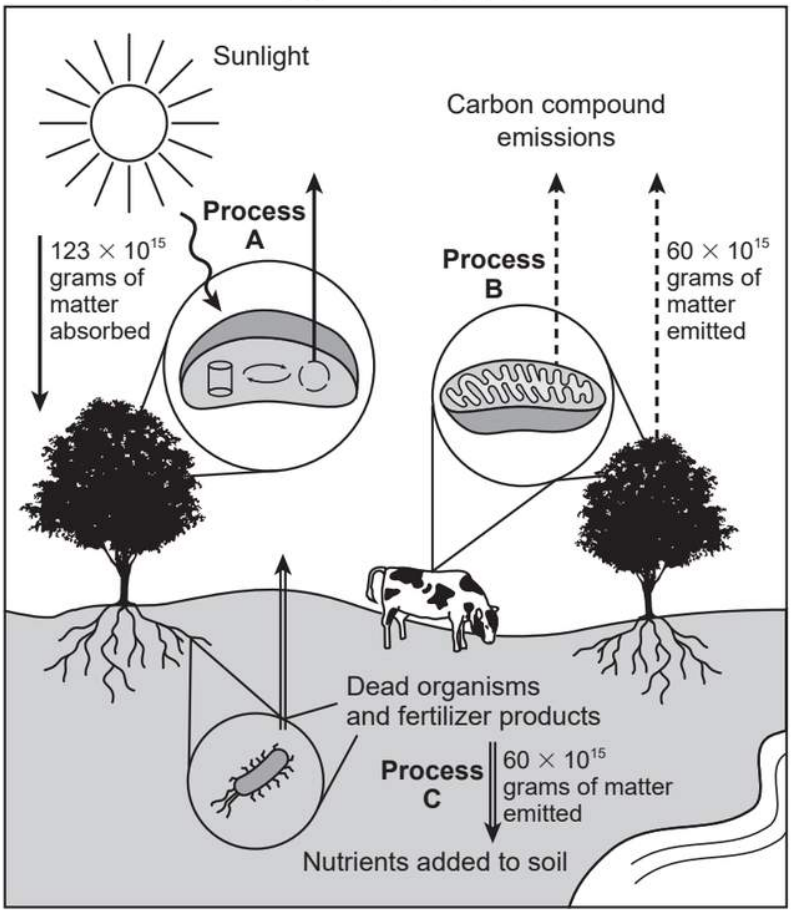
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STIMULUS

Does It Matter?

The carbon used by plants is moved between living organisms, the minerals in the soil, the hydrosphere, and the atmosphere through processes in the carbon cycle.

Matter Conversions



QUESTION

Q13

Using evidence from the model, construct an explanation for the role of Process *C* in the cycling of matter between living organisms in this ecosystem. [1]

YOUR ANSWER

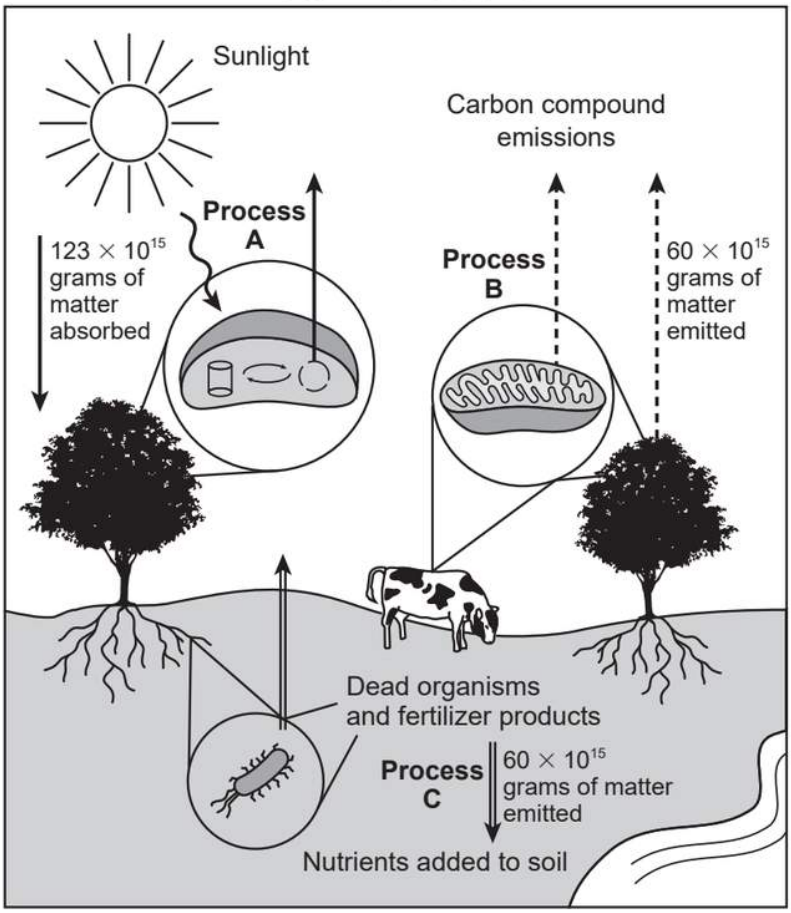
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STIMULUS

Does It Matter?

The carbon used by plants is moved between living organisms, the minerals in the soil, the hydrosphere, and the atmosphere through processes in the carbon cycle.

Matter Conversions



QUESTION

Q14

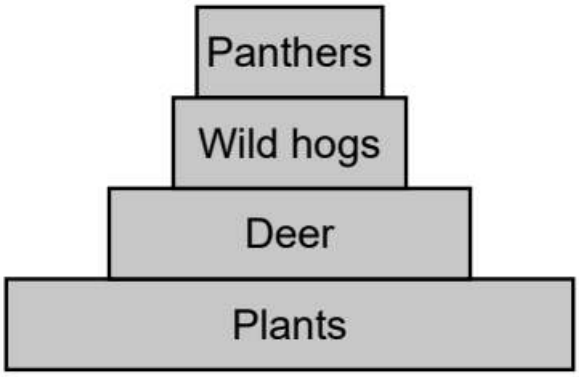
Construct an explanation using quantitative evidence for how the cycling of matter in plants results in changes to carbon stored in the atmosphere and biosphere. [1]

YOUR ANSWER

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STIMULUS

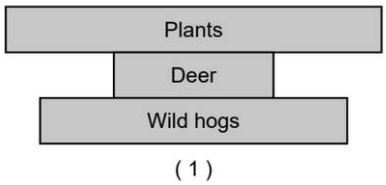
The model below represents a balanced Florida ecosystem.



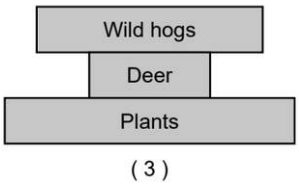
QUESTION

Q15

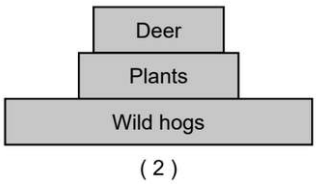
Which pyramid of biomass would best represent the Florida ecosystem if the panthers went extinct, causing a sudden imbalance in the ecosystem?



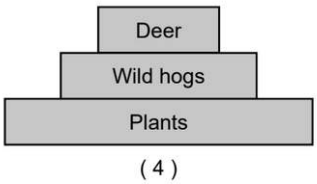
(1)



(3)



(2)



(4)

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UNIT 2 PRACTICE

Part 3: Unit 2 Cluster

A cluster is a group of Regents questions based on related information.

DIRECTIONS

Remember: When answering a question, you may use the stimuli from any earlier question in the cluster.

Note: You may recognize some questions that you practiced in a previous section. That earlier practice prepared you to apply those skills to the complete cluster.

4	Aug 2025	20·23
questions	Regents exam	original question numbers

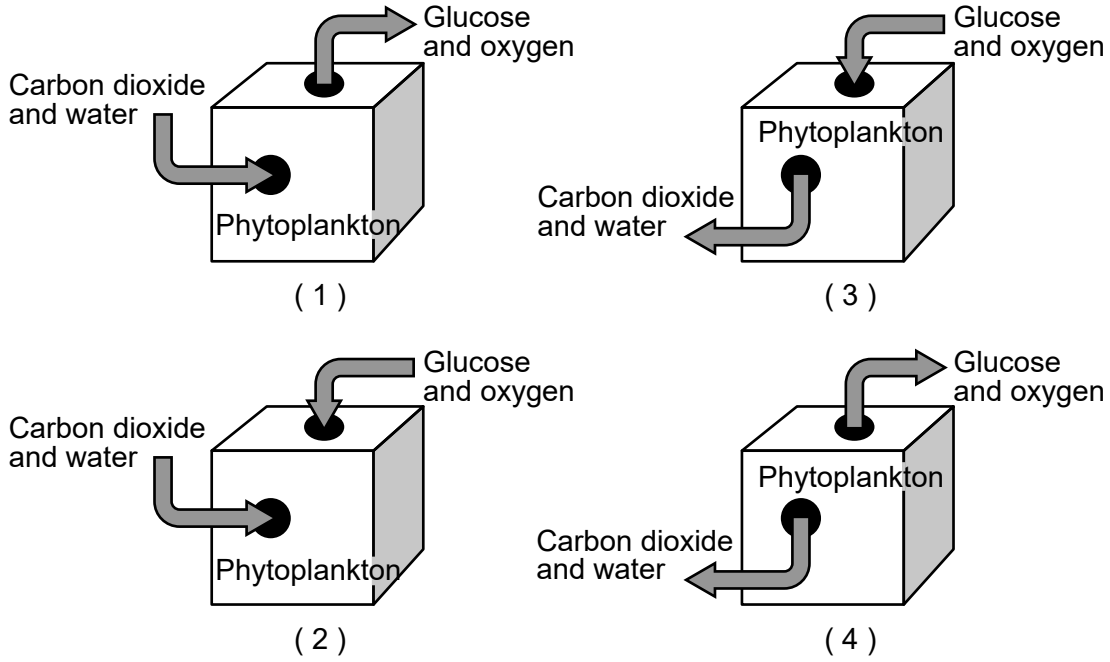
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Base your answers to questions 20 through 23 on the information below and on your knowledge of biology.

Carbon Cycle Supports Life on Earth

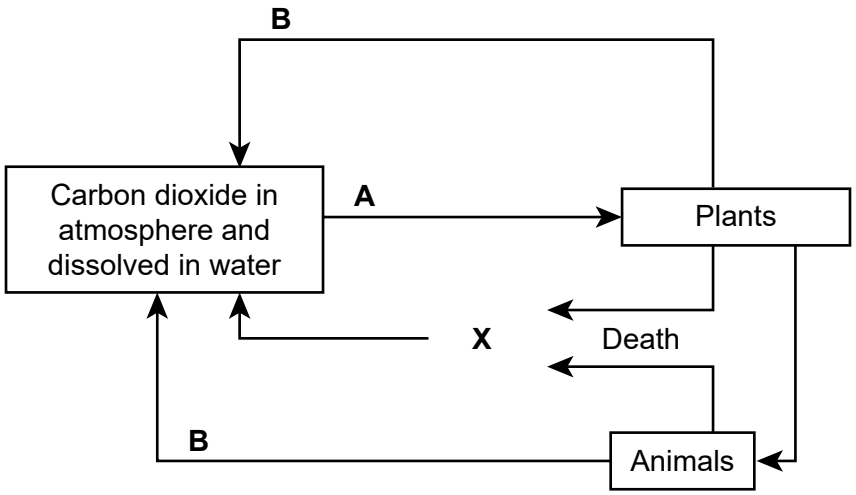
Life on Earth is only possible with carbon. Organisms on Earth rely on carbon for the production of molecules used in life functions. Various processes in the environment cycle carbon. In the ocean, the main producers in this cycle are plant-like microscopic organisms called phytoplankton.

20 Which model below best identifies how phytoplankton cycle carbon between two of Earth's spheres?



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The model below represents how processes *A*, *B*, and *X* play a significant role in the exchange of carbon.



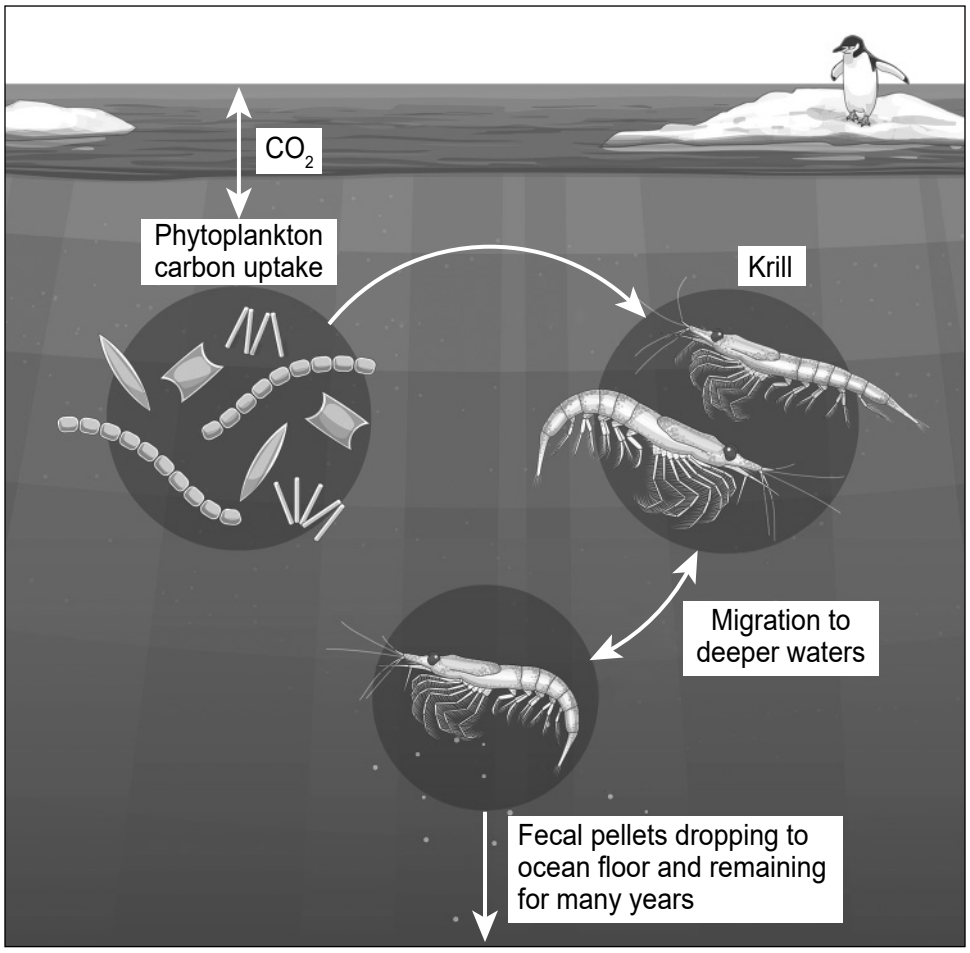
21 Based on the model, identify the process represented by *X and* describe how this process contributes to the cycling of carbon between *two* of Earth's spheres. [1]

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Krill are small shrimp-like creatures that live in the southern oceans around Antarctica and consume phytoplankton. They play an important role in the carbon cycle. Krill contribute to the removal of up to 12 billion tons of carbon from the Earth's atmosphere each year.

The model below illustrates the role of krill in the carbon cycle.

Carbon Cycling in Antarctica



22 Based on the model, explain how rapid growth in the krill population would affect the cycling of carbon between the atmosphere and biosphere. [1]

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23 A carbon sink is anything that absorbs more carbon from the environment than it releases. Which process carried out by krill results in the accumulation and storage of carbon for a period of time?

(1) Photosynthesis in the atmosphere releases carbon to the atmosphere.

(2) Respiration in the geosphere releases carbon wastes into the atmosphere.

(3) Elimination of wastes in the hydrosphere stores carbon on the ocean floor.

(4) Acidification in the biosphere stores carbon in the bodies of organisms.

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