

# **PART III**

## **SAMPLE ITEMS**



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Following are a series of sample questions for each **content area domain** (life, earth, physical science) and **strand** (e.g., ecosystems, structure of matter, astronomy). These sample items are meant to help elucidate the breadth and depth of questions that students can expect to find on the CAPT. The items may be reproduced and used as part of regular classroom instruction and assessment. These sample items may be used to help assess students' understanding of the CAPT strands and to provide practice in answering CAPT-like questions.

This packet includes samples of both open-ended and multiple-choice questions. While the multiple-choice items in this packet are both clustered and “stand alone,” it must be remembered that on the CAPT all multiple-choice items will be clustered. The questions within a cluster will assess students' understanding in a number of different strands.

## **A Framework for the Second Generation of the CAPT Science Assessment**

### **I. CONCEPTUAL UNDERSTANDING AND APPLICATION OF SCIENTIFIC KNOWLEDGE**

- Describe natural phenomena with appropriate scientific terms.
- Explain natural phenomena with scientific concepts.
- Predict future events based on scientific knowledge.
- Apply scientific reasoning and knowledge.
- Interpret and communicate scientific information using words, equations, graphs and charts.

### **II. EXPERIMENTATION**

- Recognize and define problems for scientific investigations.
- Design appropriate procedures to solve the problem.
- Predict the results based on knowledge of problem-related content.
- Conduct investigations, collect data and record observations.
- Interpret data, draw conclusions and assess their validity.

*All of the above processes in the following content areas:*

#### **LIFE SCIENCE**

- Ecosystems
- Genetics and Evolution
- Cells
- Human Biology

#### **PHYSICAL SCIENCE**

- Structure of Matter
- Reactions and Interactions
- Forces and Motion
- Energy Sources and Transformations

#### **EARTH SCIENCE**

- Astronomy
- Earth's Natural Resources
- Meteorology
- Earth History and Dynamics

## ECOSYSTEMS

As a result of studying various ecosystems:

**Students understand that while matter is recycled in an ecosystem, there is a one-way flow of energy in ecosystems.**

- ***Describe the oxygen, carbon and nitrogen cycles and explain their significance. (LIA1)***

A sprig of an *Elodea* plant was placed in a test tube as shown below. The test tube was then placed in sunlight for 6 hours.



The bubbles of gas in the diagram are composed mainly of

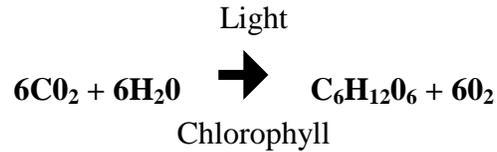
- a. carbon monoxide
- b. carbon dioxide
- c. nitrogen
- d. oxygen

Which of the following properties of the Earth is the result of the processes of living things?

- a. The Earth's oceans are salty.
- b. The Earth has magnetic poles.
- c. The Earth's atmosphere contains a lot of oxygen.
- d. The Earth's crust contains a lot of volcanic rock.

- ***Explain how carbon dioxide and water are converted into energy-rich foods through an energy capturing mechanism (photosynthesis). (LIA2)***

The following equation represents the process of photosynthesis in green plants.



(Carbon Dioxide + Water, in the Presence of Light and Chlorophyll → Sugar + Oxygen)

What happens to most of the light energy during photosynthesis?

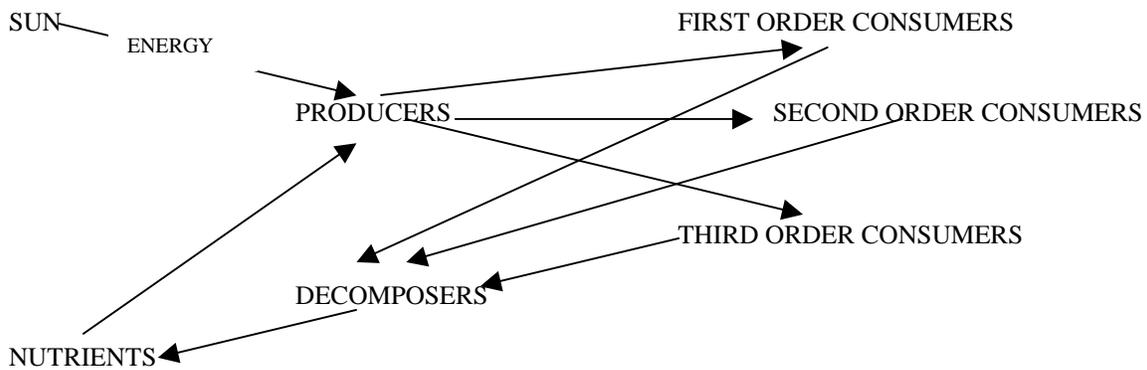
- It is transformed into heat energy.
- It is transformed into chemical energy.
- It is changed into carbon dioxide.
- It is changed into oxygen.

Which statement about green plants is true?

- Most green plants do not need food.
- Most green plants take in food through their roots.
- Most green plants take in food through their leaves.
- Most green plants manufacture their own food.

- ***Describe the transfer of energy from the sun to the environment and back to space, through food webs consisting of producers, consumers and decomposers. (LIA3)***

A group of organisms that interact with and depend upon one another is called a community. The movement of matter and energy through a community can be studied by examining its food web. As organisms eat other organisms, energy and nutrients pass through various feeding levels. These feeding levels are called trophic levels. The following is a diagram of the energy and nutrient flow through a simple community.



Which group would **most likely** contain living algae?

- a. producers
- b. first-order consumers
- c. second-order consumers
- d. decomposers

According to the diagram, nutrients from dead organisms are released into the soil by the action of \_\_\_\_\_.

- a. producers
- b. first-order consumers
- c. third-order consumers
- d. decomposers