



Energy & Matter in Ecosystems

Chapter 13

The Big Idea

Matter cycles between organisms and the abiotic environment. Energy flows one way, from sunlight to producers to consumers and decomposers.

Lesson 1: Producers & Consumers

Producers make their own food, most using energy from the Sun. All other organisms depend on producers as their energy source.

Lesson 2: Energy in Ecosystems

Energy flows through ecosystems, from producers to consumers and decomposers.

Lesson 3: Matter in Ecosystems

Matter cycles in ecosystems.

Producers & Consumers

Lesson 1

Lesson 1: Producers & Consumers

Main Idea

Producers make their own food, most using energy from the Sun. All other organisms depend on producers as their energy source.

What You'll Learn

- ❖ **Categorize organisms into producers and consumers.**
- ❖ **Classify consumers into herbivores, carnivores, and omnivores.**

Why It's Important

Learning about producers and consumers will help you understand the connection between all living things.

VOCABULARY

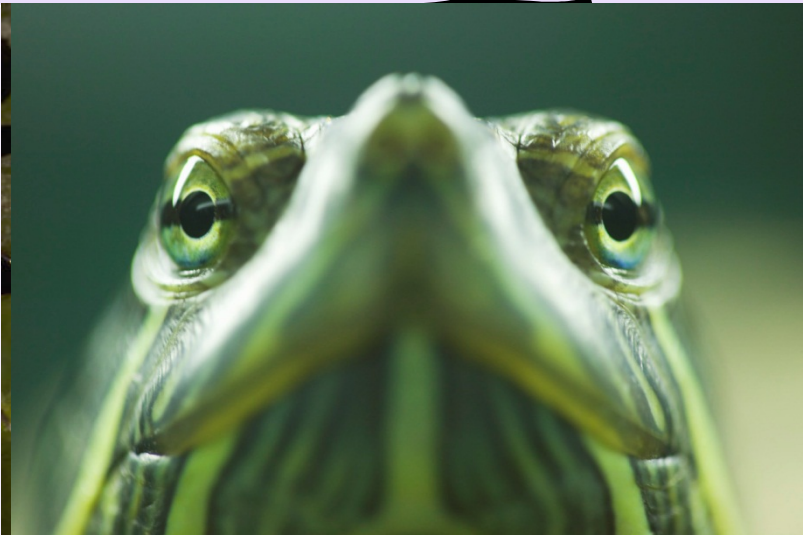
Use your book to locate the definitions for the Review Vocabulary, New Vocabulary, and Academic Vocabulary words on page 142 of your Science Notebook.

Ecosystems

Classify factors in a pond ecosystem as biotic or abiotic. Include at least six factors.

Factors of a Pond Ecosystem

Biotic



Abiotic



Ecosystems

Summarize the key relationship between the biotic factors and the abiotic factors in an ecosystem.

Abiotic factors determine what sort of organisms, or biotic factors, will be able to live in an ecosystem.

Ecosystems

Sequence the steps by which plants make and use food.

sunlight + carbon dioxide + water
are used to make

```
graph TD; A[sunlight + carbon dioxide + water are used to make] --> B[simple sugars which]; B --> C[Release energy]; B --> D[Are used to make starches, proteins, oils, and other compounds];
```

simple sugars which

Release
energy

Are used to make starches,
proteins, oils, and other
compounds

SUMMARIZE IT

**Summarize three main ideas
of the above sections.**

Producers

**Compare and Contrast photosynthesis with chemosynthesis.
Identify the energy source for each and list organisms that use each.**

**Uses energy
from sunlight
Used by plants,
plantlike
protists, and
cyanobacteria**

PHOTOSYNTHESIS

**Method
used by
producers
to make
food**

**Uses energy
from chemical
reactions
Used by
chemosynthetic
bacteria**

CHEMOSYNTHESIS

Consumers

Distinguish between the types of consumers. Give at least two examples of each type of consumer and identify what they eat.

Types of Consumers	Examples	What They Eat
Herbivores	Elephants, squirrels caterpillars	Plants
Carnivores	sea anemones, lions	Other animals
Omnivores	grizzly bears, nonvegetarian humans	Other organisms
Scavengers	crows, vultures, sometimes coyotes	Dead animals

Consumers

Identify two beneficial roles played by decomposers and scavengers.

Decomposers



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graph LR; A[Decomposers] --- B[Dispose of dead organisms]; A --- C[Make nutrients available];
```

A diagram with a central orange box labeled 'Decomposers'. Two lines extend from the right side of this box to two purple boxes stacked vertically. The top purple box contains the text 'Dispose of dead organisms' and the bottom purple box contains the text 'Make nutrients available'.

**Dispose of
dead
organisms**

**Make
nutrients
available**

SUMMARIZE IT

Highlight the main idea in the information below.

Consumers are categorized by the kinds of foods they eat. For example, lions are categorized as carnivores because they eat meat, and bears are omnivores because they eat both animals and plants.

Energy & Matter in Ecosystems

Lesson 2

Lesson 2: Energy & Matter in Ecosystems

Main Idea

Energy flows through ecosystems, from producers to consumers and decomposers.

What You'll Learn

- ❖ **Explain how matter is transferred from one organism to another.**
- ❖ **Draw an energy pyramid showing loss of energy from one level to another.**

Why It's Important

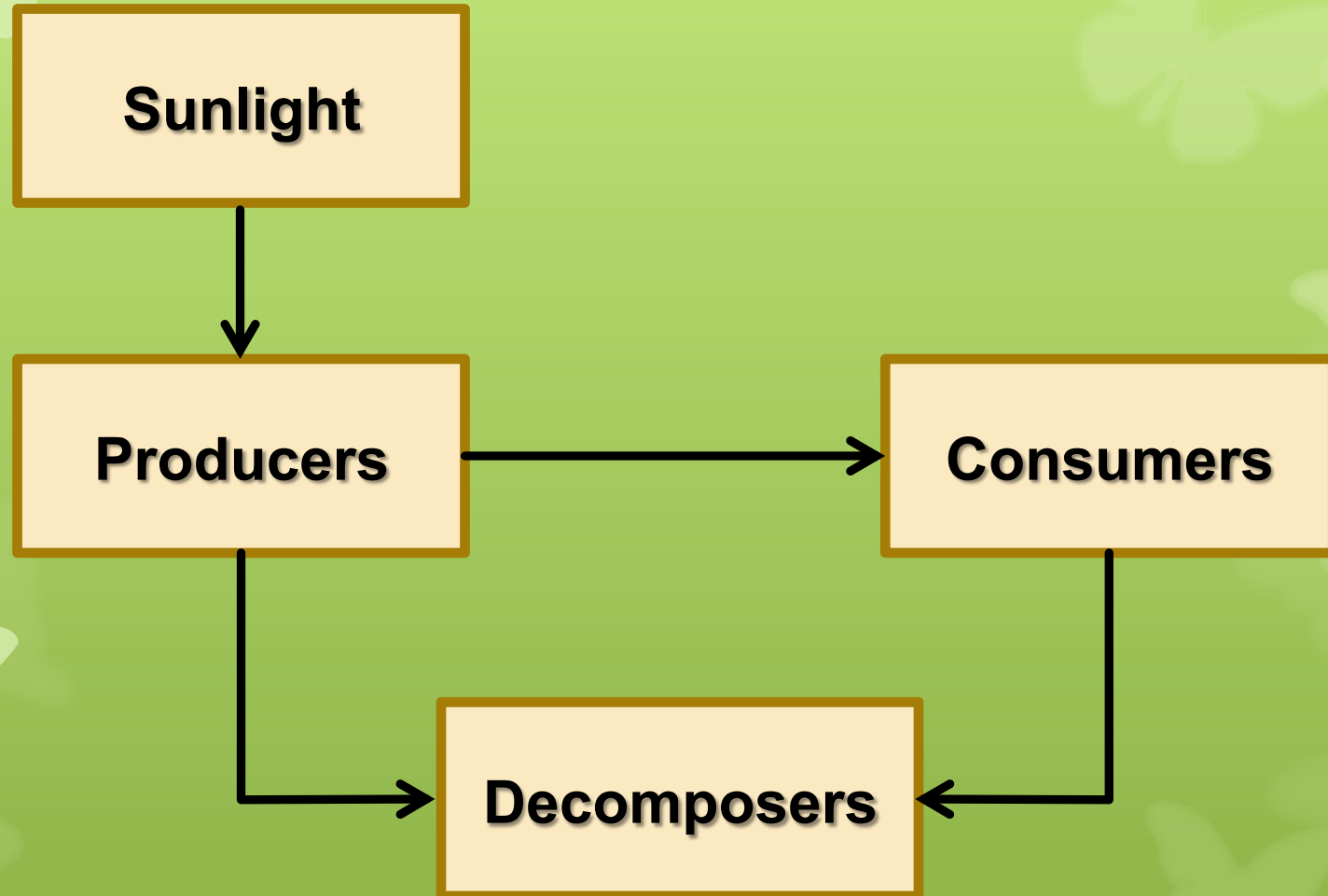
Learning how energy flows through ecosystems shows why organisms depend on each other.

VOCABULARY

Use your book to locate the definitions for the Review Vocabulary, New Vocabulary, and Academic Vocabulary words on page 145 of your Science Notebook.

Energy Through the Ecosystem

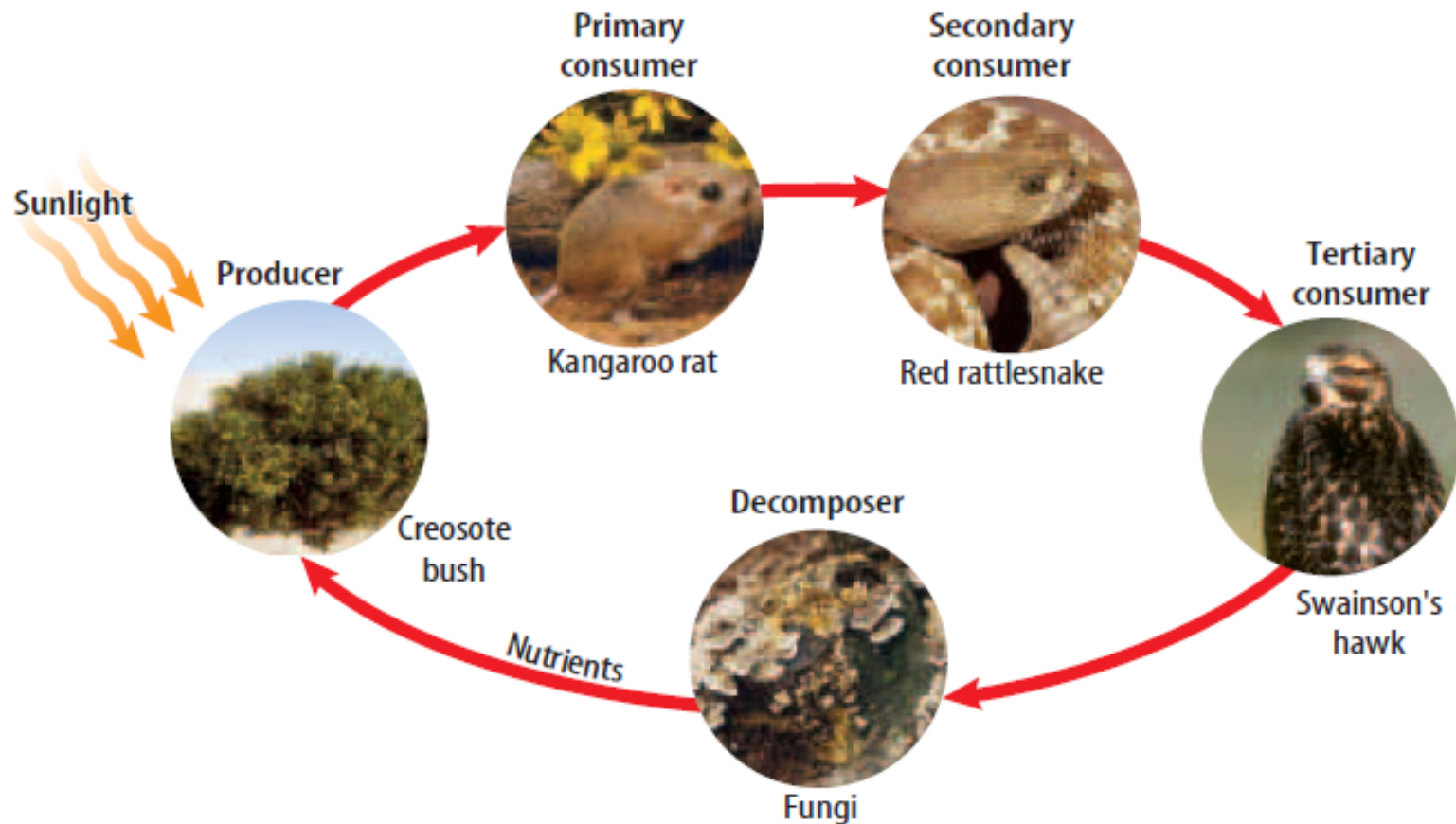
Sequence the flow of energy through ecosystems.



Food As Energy

Create an example of a food chain.

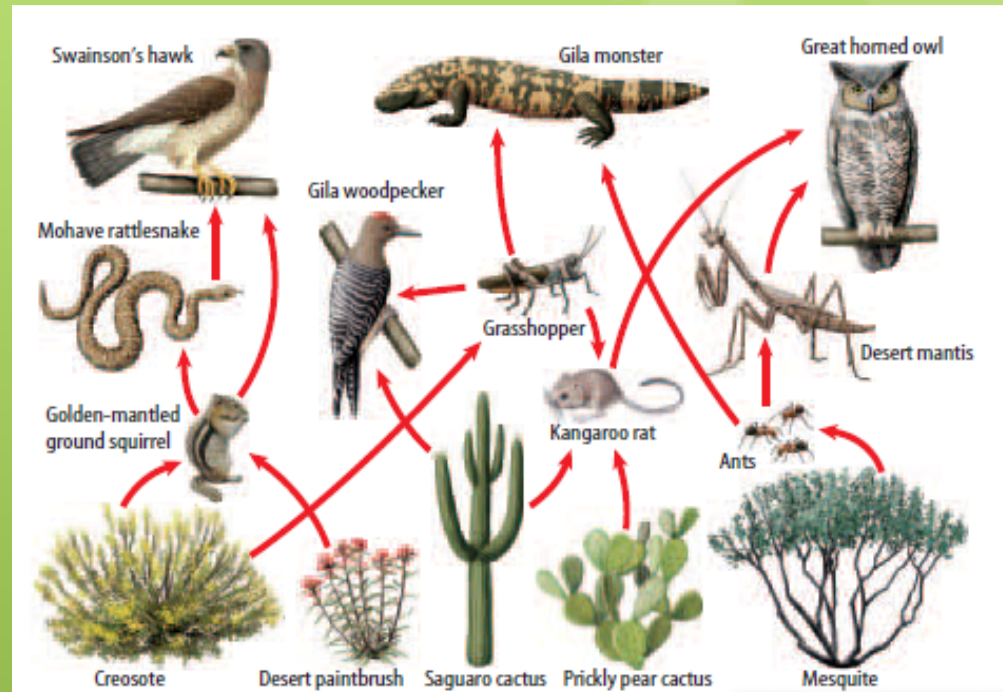
Figure 7 Food Chain This food chain shows the energy flow in the desert environment pictured in **Figure 6**.



Food As Energy

Why is a food web a more accurate model of energy flow through an ecosystem than a food chain?

A food web shows that an ecosystem contains more than one type of producer, or that consumers might eat more than one type of food. These relationships are not shown on a food chain.

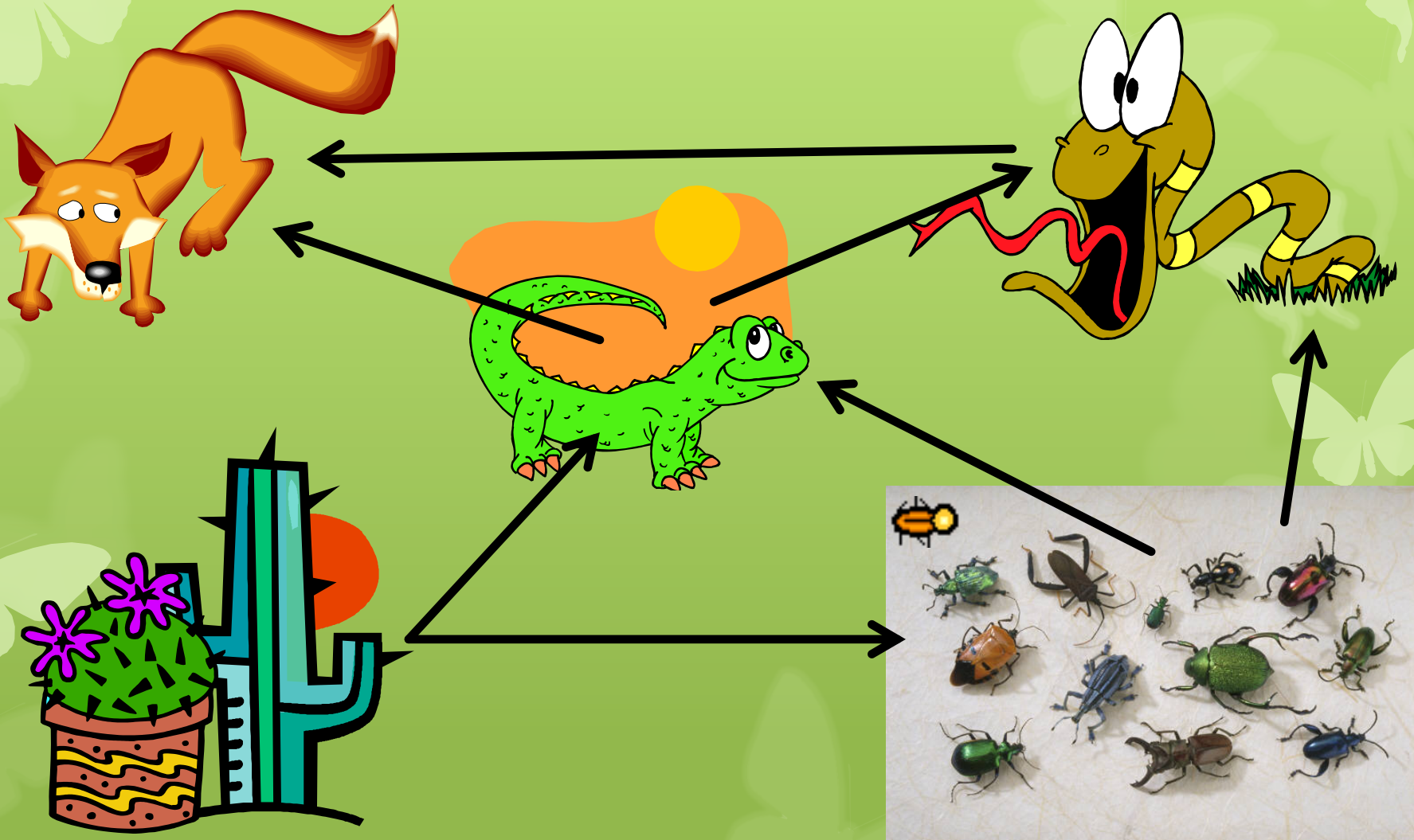


SUMMARIZE IT

**Summarize the two main ideas
of this section.**

Food As Energy

Draw arrows to show how energy would flow in this food web.



Food As Energy

Identify an example of an organism at each level of the energy pyramid.

Mountain Lion

**Tertiary
Consumer**

Coyote

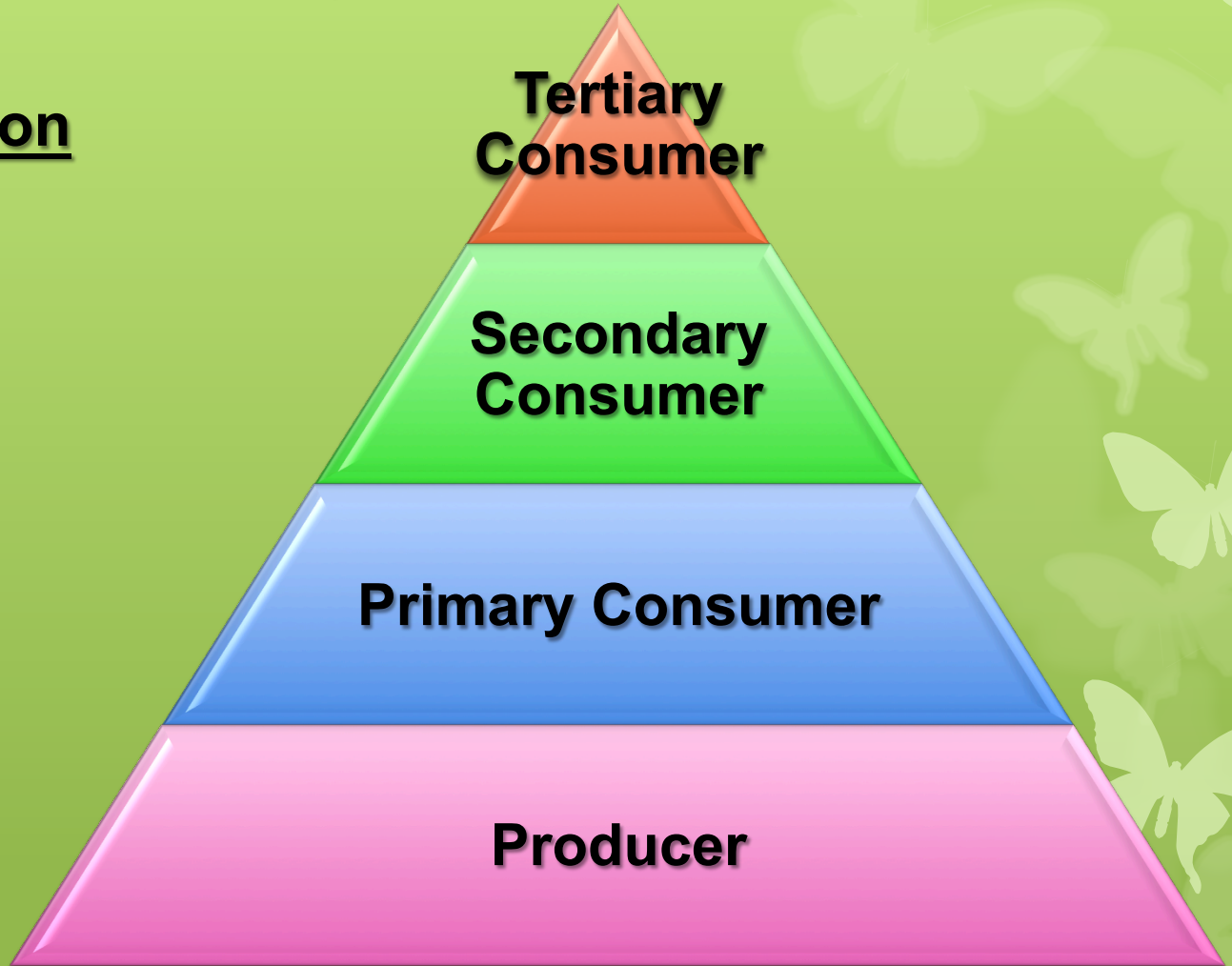
**Secondary
Consumer**

Rabbit

Primary Consumer

Grass

Producer



Food As Energy

Why is a pyramid used as the model for energy flow through an ecosystem?



A pyramid has a wide base but decreases in size with height. Likewise, available energy decreases with each level of an ecosystem because each organism releases some chemical energy to the air as heat.

SUMMARIZE IT

**Write two sentences to
summarize the above section.**

Matter in Ecosystems

Lesson 3

Lesson 3: Energy & Matter in Ecosystems

Main Idea

Matter cycles in ecosystems.

What You'll Learn

- ❖ **Summarize cycles of matter.**
- ❖ **Explain where matter comes from for plant growth.**

Why It's Important

Matter needed for life on Earth is neither created nor destroyed, but it is cycled through producers, consumers, and decomposers.

VOCABULARY

Use your book to locate the definitions for the Review Vocabulary, New Vocabulary, and Academic Vocabulary words on page 148 of your Science Notebook.

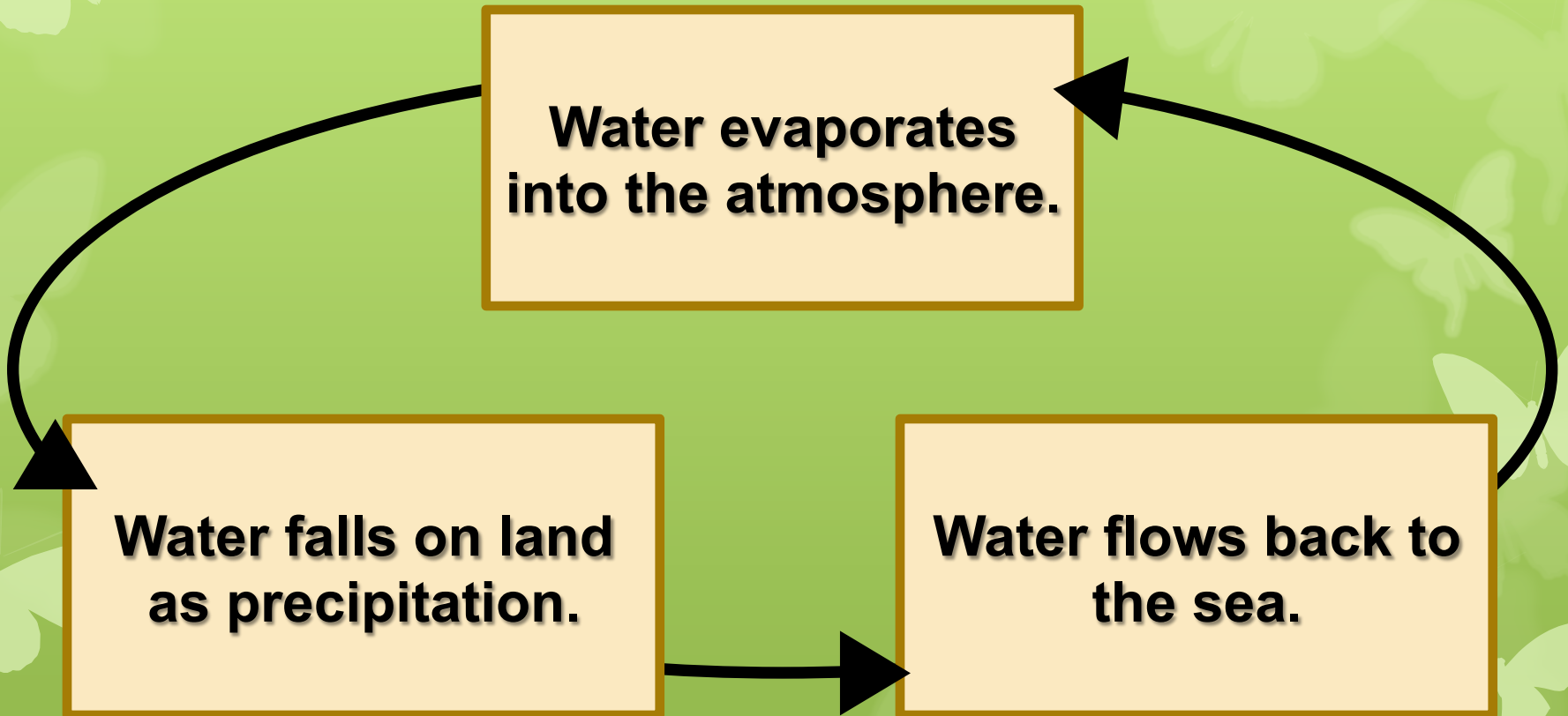
Cycles of Matter

Summarize how dead plant and animal material are made available to support new life.

When dead organisms break down, some of the chemicals they contain become part of the organic matter in soil. Other chemicals go into the air as gases. Because of this, carbon, nitrogen, and other elements become available to support new life.

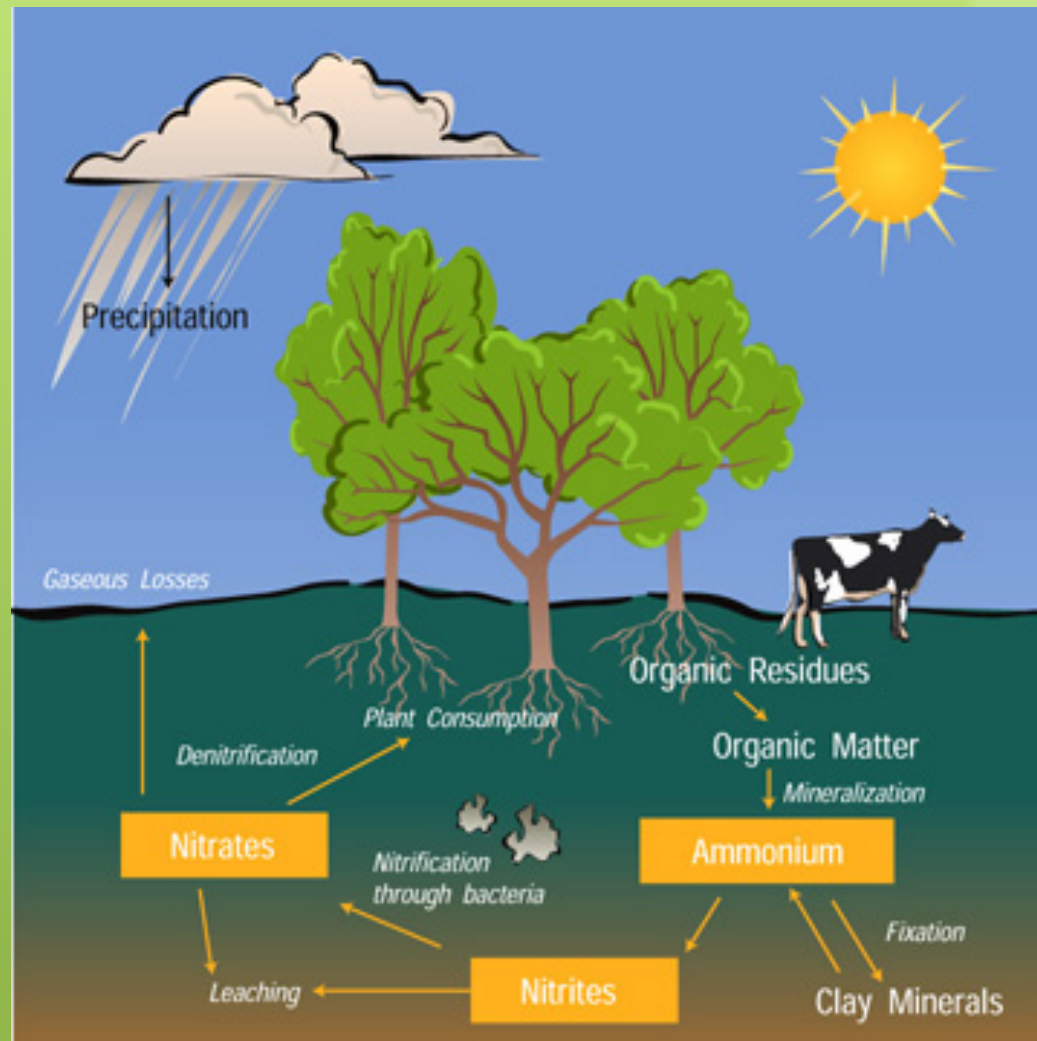
Water Cycle

Sequence the main steps in the water cycle.



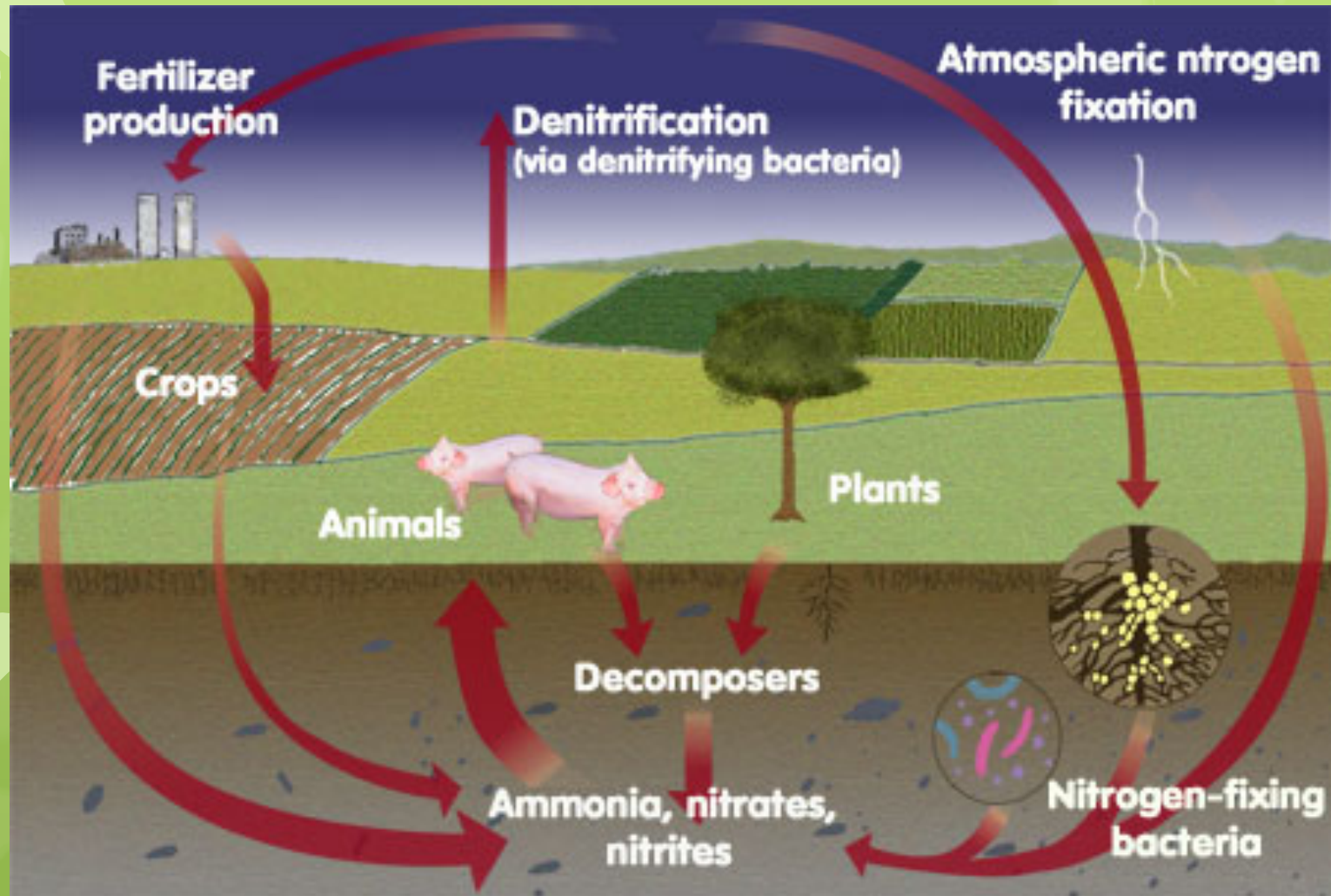
Nitrogen Cycle

Model the Nitrogen Cycle.



Nitrogen Cycle

Model the Nitrogen Cycle.



SUMMARIZE IT

Summarize two main ideas of the above section with bullet points.

Phosphorus Cycle

Compare and contrast the phosphorus cycle and the nitrogen cycle.

Unlike nitrogen, phosphorus:

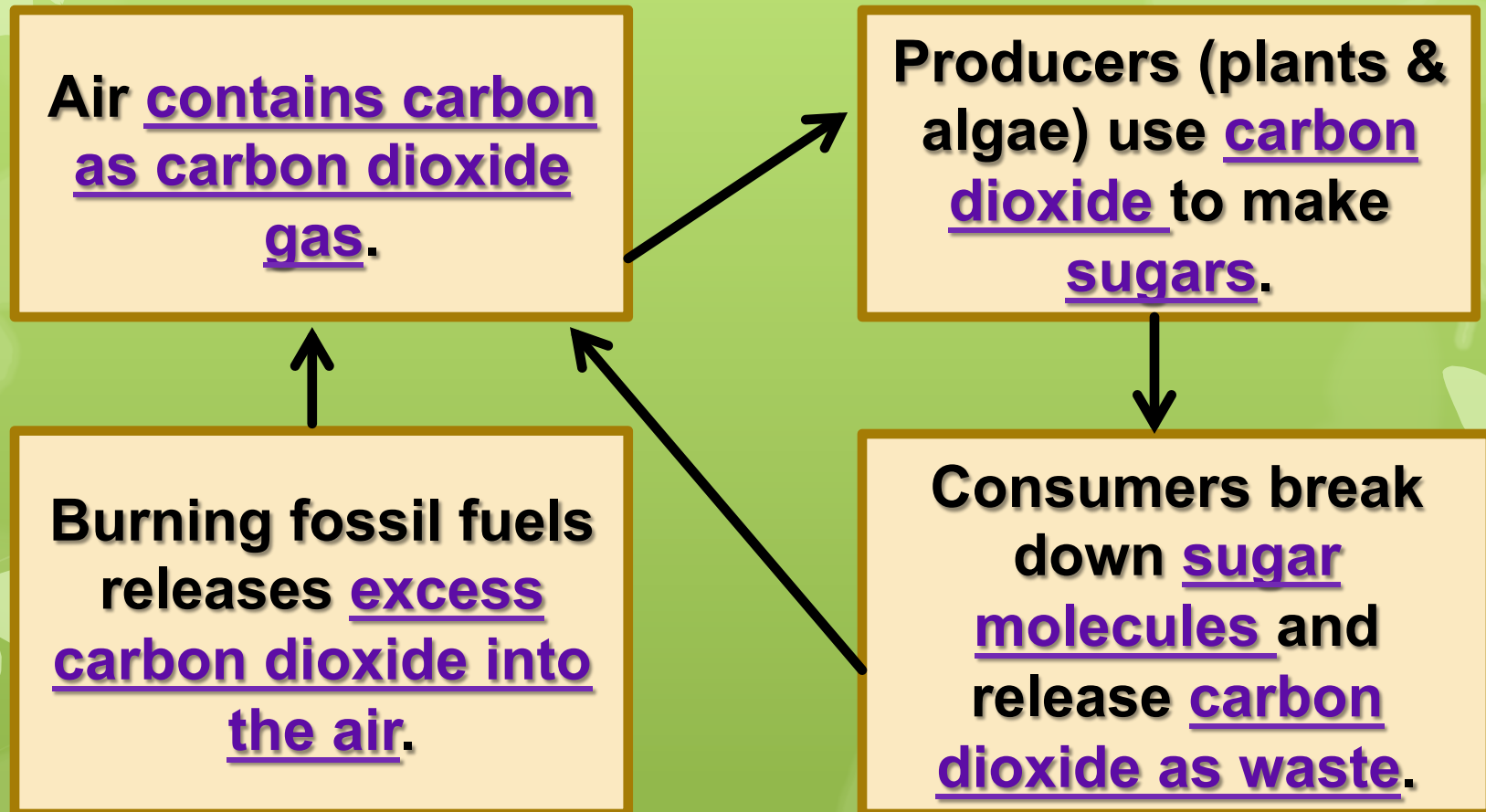
- Does not exist as a gas
- Is in the soil through weathering of rocks

Like nitrogen, phosphorus:

- Moves from plants to animals when herbivores eat plants and when carnivores eat herbivores
- Returns to the soil through animal wastes and when dead animals and plants decay.

Carbon Cycle

Compare and contrast the phosphorus cycle and the nitrogen cycle.



SUMMARIZE IT

**Summarize the main idea of
the above section.**