

**Chapter 3 Ecosystems: What Are They and How Do They Work?  
Reading Guide**

**3-1 What is ecology?**

- Draw an illustration for each of the following:

| Cell | Organism | Population | Community | Ecosystem | Biosphere |
|------|----------|------------|-----------|-----------|-----------|
|      |          |            |           |           |           |

**3-2 What keeps us and other organisms alive?**

- Earth's 4 main spherical systems:

| Atmosphere | Hydrosphere | Geosphere | Biosphere |
|------------|-------------|-----------|-----------|
|            |             |           |           |

- Biomes

- Terrestrial biomes include:

- |    |    |
|----|----|
| 1. | 4. |
| 2. | 5. |
| 3. | 6. |

- Aquatic biomes include:

- |    |    |
|----|----|
| 1. | 2. |
|----|----|

- Three factors sustain life on earth:

- 1.
- 2.
- 3.

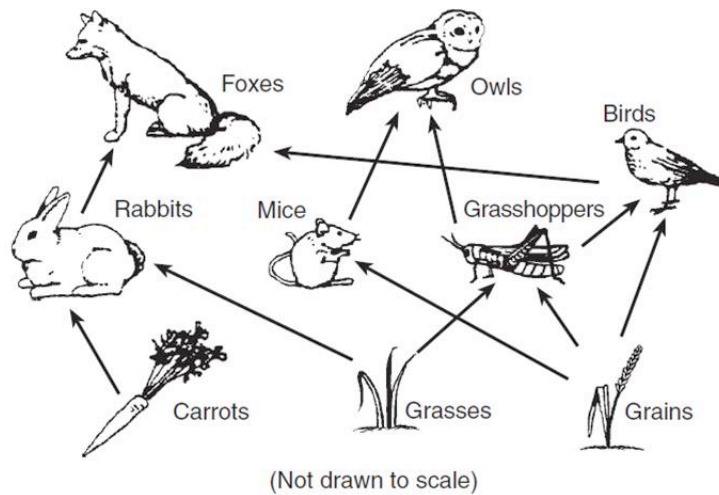
- Draw a diagram describing the greenhouse effect:

### 3-3 What are the major components of an ecosystem?

| Biotic Factors | vs | Abiotic Factors |
|----------------|----|-----------------|
| Examples:      |    | Examples:       |

| Limiting Factors in Terrestrial Environments | Limiting Factors in Aquatic Environments |
|--|--|
|  |  |

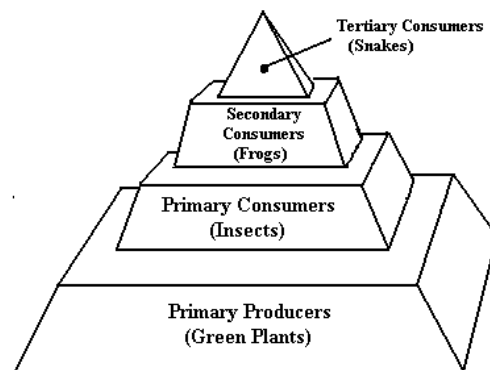
- Use the food web below
  - Identify the trophic level of each organism in the food web
  - Add a decomposer and a detritivore to the food web. Draw arrows to show how they obtain energy.



- Write the chemical formula for photosynthesis:
  
- Write the chemical formula for aerobic cell respiration:
  
- Compare and contrast the process of photosynthesis and aerobic cell respiration.

### 3-4 What happens to energy in an ecosystem?

- Define biomass.
- Define ecological efficiency.
- Typically, what percentage of energy is transferred to the next trophic level in a food chain?
- What happens to the other 90% of the energy?
- Use the pyramid below.
  - There are 100,000 units of energy in green plants. Write this number in the “primary producer” level.
  - Write the amount of energy (in units) at the primary consumer, secondary consumer, and tertiary consumer level.



- Define each of the following:

$$\boxed{\text{NPP}} = \boxed{\text{GPP}} - \boxed{\text{R}}$$

$$\begin{array}{l} \text{Net} \\ \text{Primary} \\ \text{Productivity} \end{array} = \begin{array}{l} \text{Gross} \\ \text{Primary} \\ \text{Products} \end{array} - \text{Respiration}$$

### 3-5 What happens to matter in an ecosystem?

- Describe each of the following cycles. You may draw diagrams to supplement the descriptions.

**Water Cycle**

**Carbon Cycle**

**Nitrogen Cycle**

**Phosphorus Cycle**