

Glencoe Science

Biology

Interactive Classroom



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1.1 Introduction to Biology

Biology—the science of life

- Study the origins and history of life and once-living things
- Study the structures of living things
- Study how living things interact with one another
- Study how living things function

1.1 Introduction to Biology

What do biologists do?

- Study the diversity of life
- Research diseases
- Develop technologies
- Improve agriculture
- Preserve the environment

1.1 Introduction to Biology

The Eight Characteristics of Life

- 1.** Made of one or more cells
- 2.** Displays growth
- 3.** Grows and develops
- 4.** Reproduces

1.1 Introduction to Biology

The Eight Characteristics of Life

- 5.** Responds to stimuli
- 6.** Requires energy
- 7.** Maintains homeostasis
- 8.** Adaptations evolve over time

1.1 Introduction to Biology

- Living things are made of one or more cells.
- Cells are the basic unit of structure and function in all living things.

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Displays Organization

- Living things also display **organization**, which means they are arranged in an orderly way.
- Specialized cells are organized into groups that work together called tissues.
- Tissues are organized into organs.
- Organ systems work together to support an organism.

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Grows and Develops

- **Growth** results in the addition of mass to an organism and, in many organisms, the formation of new cells and new structures.

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Reproduces

- A **species** is a group of organisms that can breed with one another and produce fertile offspring.

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Responds to Stimuli

- Anything that is part of the internal or external environments and causes some sort of reaction by the organism is called a **stimulus**.
- The reaction to a stimulus is a **response**.



Venus flytrap

1.1 Introduction to Biology

Requires Energy

- Living things get their energy from food.
- Most plants and some unicellular organisms use light energy from the Sun to make their own food and fuel their activities.
- Organisms that cannot make their own food get energy by consuming other organisms.

1.1 Introduction to Biology

Maintains Homeostasis

- Regulation of an organism's internal conditions to maintain life is called **homeostasis**.
- If anything happens within or to an organism that affects its normal state, processes to restore the normal state begin.

1.1 Introduction to Biology

Adaptations Evolve Over Time

- An **adaptation** is any inherited characteristic that results from changes to a species over time.

1.2 The Nature of Science

What is science?

- **Science** is a body of knowledge based on the study of nature.
- The nature, or essential characteristics, of science is scientific inquiry.
- Scientific inquiry is both a creative process and a process rooted in unbiased observations and experimentation.

1.2 The Nature of Science

Uses Scientific Theory

- A **theory** is an explanation of a natural phenomenon supported by many observations and experiments over time.
- The results are always the same.

1.2 The Nature of Science

Expands Scientific Knowledge

- Most scientific fields are guided by research that results in a constant reevaluation of what is known.
- This reevaluation often leads to new knowledge that scientists then evaluate.

1.2 The Nature of Science

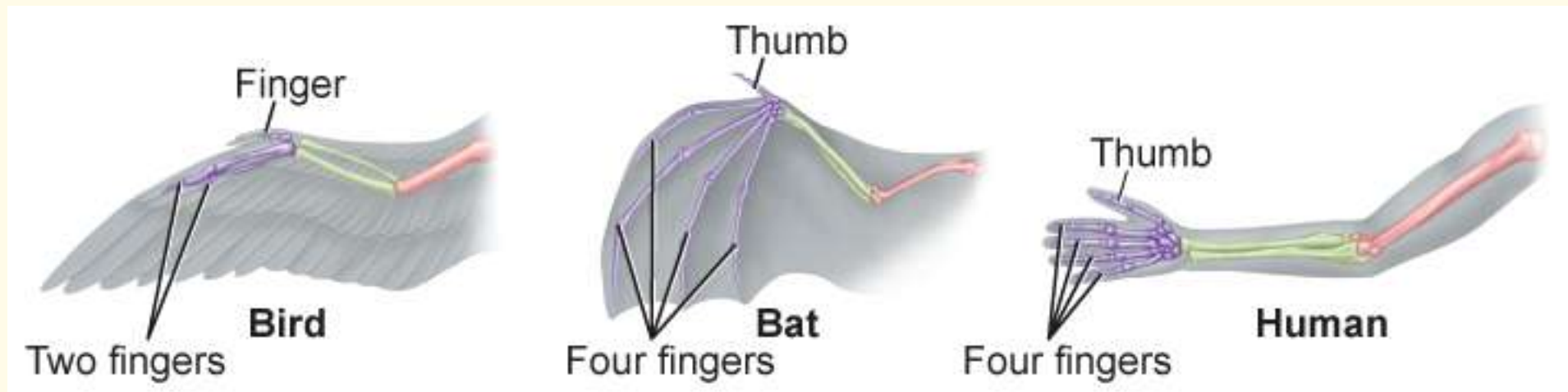
Challenges Accepted Theories

- Scientists welcome debate about one another's ideas.
- Sciences advance by accommodating new information as it is discovered.

1.2 The Nature of Science

Questions Results

- Observations or data that are not consistent with current scientific understanding are of interest to scientists.
- These inconsistencies often lead to further investigations.



1.2 The Nature of Science

Tests Claims

- Science-based information makes claims based on a large amount of data and observations obtained from unbiased investigations and carefully controlled experimentation.
- Conclusions are reached from the evidence.

1.2 The Nature of Science

Undergoes Peer Review

- Before it is made public, science-based information is reviewed by scientists' peers.
- **Peer review** is a process by which the procedures used during an experiment and the results are evaluated by other scientists who are in the same field or who are conducting similar research.

1.2 The Nature of Science

Uses Metric System

- Scientists can repeat the work of others as part of a new experiment.
- The **metric system** uses units with divisions that are powers of ten.

1.2 The Nature of Science

Science in Everyday Life

- A person who is scientifically literate combines a basic understanding of science and its processes with reasoning and thinking skills.
- Ethical issues must be addressed by society based on the values it holds important.

1.3 Methods of Science

Ask a Question

- Scientific inquiry begins with **observation**.
- Science inquiry involves asking questions and processing information from a variety of reliable sources.

1.3 Methods of Science

Form a Hypothesis

- A **hypothesis** is a testable explanation of a situation.
- When a hypothesis is supported by data from additional investigations, usually it is considered valid and is accepted by the scientific community.

1.3 Methods of Science

Collect the Data

- When a biologist conducts an **experiment**, he or she investigates a phenomenon in a controlled setting to test a hypothesis.

1.3 Methods of Science

Controlled Experiments

- A **control group** in an experiment is a group used for comparison.
- The **experimental group** is the group exposed to the factor being tested.

1.3 Methods of Science

Experimental Design

- **Independent variable**—only one factor in a controlled experiment can change at a time.
- **Dependent variable**—results from or depends on changes to the independent variable.

1.3 Methods of Science

Data Gathering

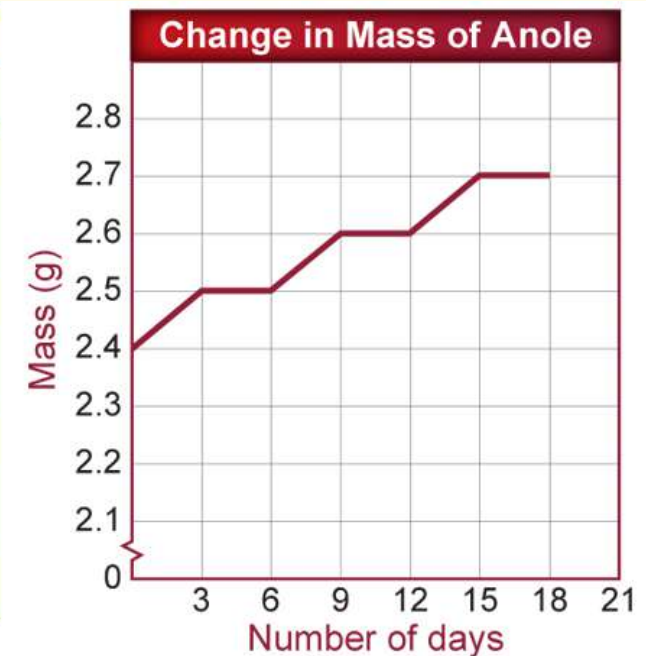
- **Data**—information gained from observations.
- Quantitative data can be measurements of time, temperature, length, mass, area, volume, density, or other factors.
- Qualitative data are descriptions of what our senses detect.

1.3 Methods of Science

Analyze the Data

- A graph of the data makes the pattern easier to grasp.
- Even when a hypothesis has not been supported, it is valuable.

Change in Mass of Anole	
Date	Mass (g)
April 11	2.4
April 14	2.5
April 17	2.5
April 20	2.6
April 23	2.6
April 26	2.7
April 29	2.7



1.3 Methods of Science

Report Conclusions

- If the reviewers agree on the merit of the paper, then the paper is published for review by the public and use by other scientists.