Glencoe Science

Biology

Interactive Classroom

Click the advance arrow or press the space bar to continue

Mc Graw Hill Glencoe

Chapter 1 The Study of Life

EXIT

Click on a lesson name to select.

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

Concepts In Motion Interactive Table

Characteristics of Living Organisms

Click here to proceed!

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.

1.1 Introduction to Biology

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.

1.1 Introduction to Biology

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.

1.1 Introduction to Biology

Reproduces

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

1.1 Introduction to Biology

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.

Venus flytrap

- The reaction to a stimulus is a response.

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

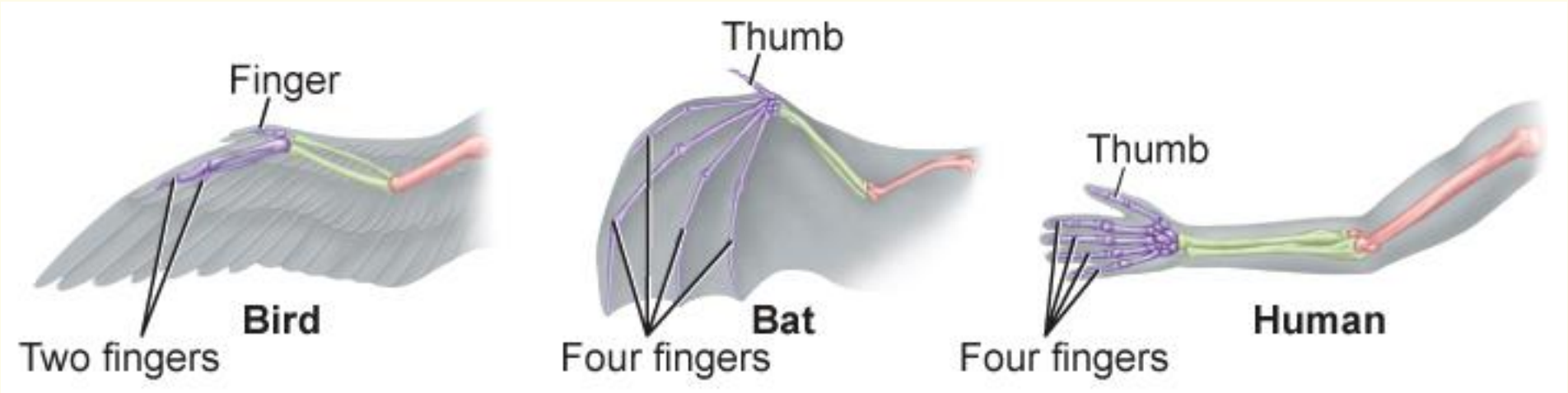
Challenges Accepted Theories

- 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)
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April 17	2.5
April 20	2.6
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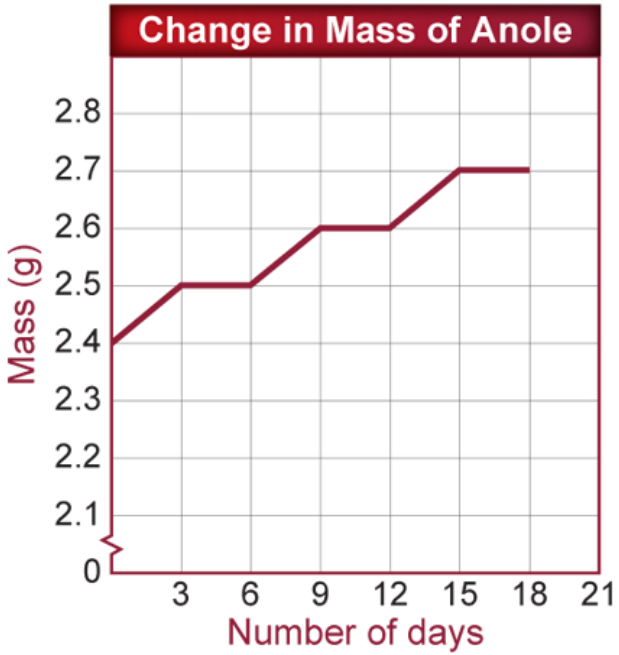
April 29	2.7



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.

Chapter Resource Menu

Click on a hyperlink to view the corresponding lesson.

Chapter Diagnostic Questions

CheckPoint

Why is the metric system preferred by scientists?

Answer: Using the same system of measurements allows a scientist to repeat another's work knowing that he or she is performing the experiments exactly the same.

Chapter Diagnostic Questions

CheckPoint

What is a testable explanation?

A. observation
B. hypothesis
C. experiment
D. constant

Chapter Diagnostic Questions

CheckPoint

Which is not a characteristic of all organisms?

A. made of one or more cells

B. grows and develops

C. capable of rational thought

D. maintains homeostasis

1.1 Formative Questions

CheckPoint

What area of science takes scientific knowledge and applies it to meet human needs?

A. exploration
B. dynamics
C. physics
D. technology

1.1 Formative Questions

CheckPoint

What is the process of change that takes place during the life of an organism?

A. adaptation

B. development

C. growth

D. maturation

1.1 Formative Questions

CheckPoint

Some species of plants begin opening their flowers in the morning when they are exposed to sunlight. What characteristic of living things does this represent?

A. acquiring energy

B. adapting to the environment

C. displaying organization

D. responding to stimuli

1.1 Formative Questions

CheckPoint

What process regulates an organism's internal conditions and keeps them stable?

A. adaptation

B. equilibrium

C. homeostasis

D. metabolism

1.2 Formative Questions

CheckPoint

What is a theory?

A. a body of knowledge about a natural phenomenon

B. a creative tool for designing investigations

C. a scientific inquiry that seeks to provide an explanation

D. an explanation supported by observations and experiments

1.2 Formative Questions

CheckPoint

True or False

Scientists discard observations and data that are not consistent with current scientific understanding.

1.2 Formative Questions

CheckPoint

A scientist wants to report the findings from her investigations. Before her information can be published, what must it go through?

A. forensics

B. peer review

C. scientific methods

D. the metric system

1.2 Formative Questions

CheckPoint

What do issues such as AIDS, global warming, genetic engineering, and cloning have in common?

A. They involve ethics.

B. They involve forensics.

C. They must be addressed by scientists.

D. They require the metric system.

1.3 Formative Questions

CheckPoint

When you form a logical conclusion based on your observations and what you already know, what are you making?

A. a conjecture

B. an inference

C. a speculation

D. a theory

1.3 Formative Questions

CheckPoint

What is a hypothesis?

A. a defined question

B. a curious assumption

C. a tested inference

D. a testable explanation

1.3 Formative Questions

CheckPoint

What type of discovery is a serendipitous discovery?

A. accidental

B. anticipated

C. ingenious

D. whimsical

1.3 Formative Questions

CheckPoint

True or False

In order for scientific experiments to be valid, they must be based on scientific methods that use controlled experiments.

Chapter Assessment Questions

CheckPoint

Identify the term used to describe an explanation of a natural phenomenon supported by observation and experimentation.

A. forensics

B. natural law

C. theory

D. physics

Chapter Assessment Questions

CheckPoint

In a controlled experiment, which factor can change?

A. control group

B. experimental group

C. dependent variable

D. independent variable

Chapter Assessment Questions

CheckPoint

Look at the figure below. Why is scientific data often displayed in graphs?

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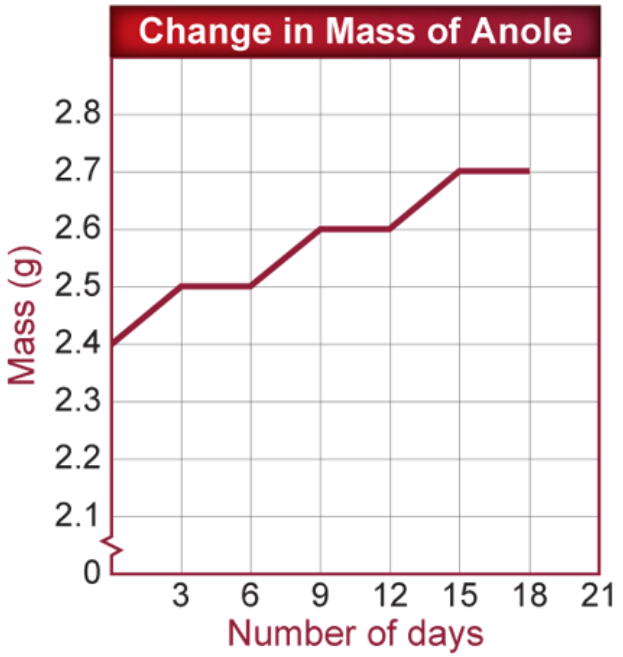

Chapter Assessment Questions

CheckPoint

Answer: Graphs help show patterns in the data and make it easier to understand.

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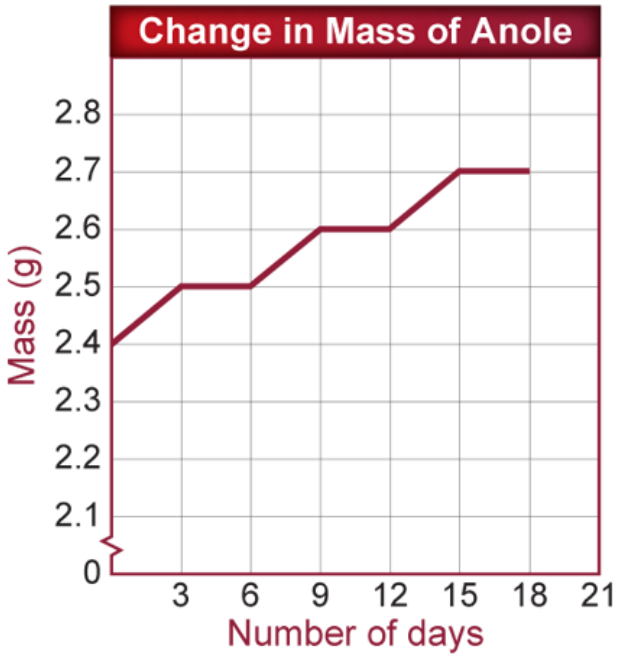

Standardized Test Practice

CheckPoint

Which biological science was Jane Goodall studying when she observed chimpanzees?

A. ecology
B. genetics
C. animal behavior
D. biotechnology

Standardized Test Practice

CheckPoint

In which activity would an environmental biologist most likely be involved?

A. genetically engineering plants

B. finding ways to protect species

C. preventing the spread of disease

D. developing new medicines and vaccines

Standardized Test Practice

CheckPoint

Which is an indication that an idea is based on pseudoscience?

A. It brings up more questions.

B. It causes disagreement and debate.

C. It does not welcome scientific investigation.

D. It does not receive acceptance by scientists.

Standardized Test Practice

CheckPoint

Scientists use laboratory rats to test the effects of a new drug, Razatrin. What do rats in the control group receive?

A. food containing Razatrin

B. food without Razatrin

C. food containing another drug

D. food containing a variety of drugs

Standardized Test Practice

CheckPoint

Which is the dependent variable in this experiment?

A. mass

B. number of days

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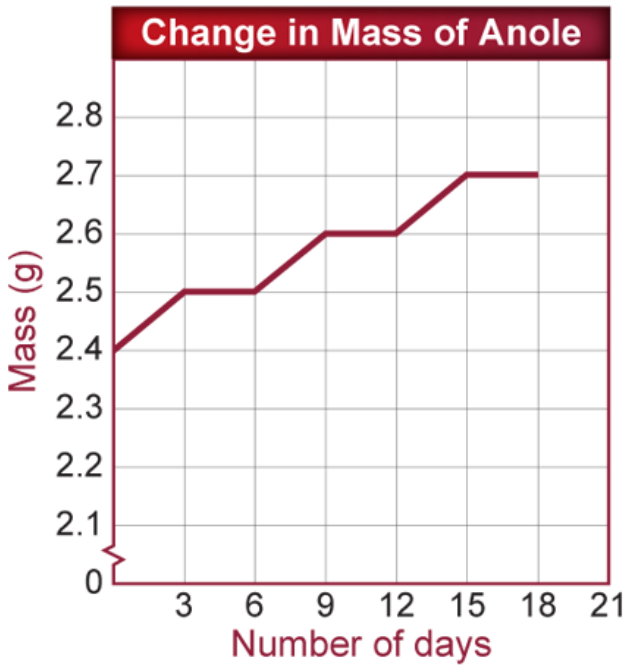

Glencoe Biology Transparencies

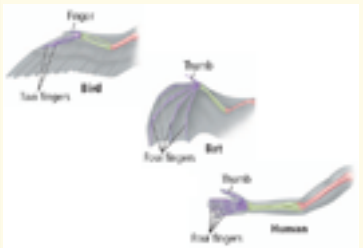

Image Bank

Vocabulary

Section 1

- biology
- organism
- organization
- growth
- development
- reproduction
- species
- stimulus
- response
- homeostasis
- adaptation

Vocabulary

Section 2

- science
- theory
- peer review
- metric system
- SI
- forensics
- ethics

Vocabulary

Section 3

- observation
- inference
- scientific method
- hypothesis
- serendipity
- experiment
- control group
- experimental group
- independent variable
- dependent variable
- constant
- data
- safety symbol

Animation

Concepts In Motion

- Visualizing Scientific Method