Biology Honors (1 of 2)

Course Description:

Biology Honors (1 of 2) is one of two courses that explore life on Earth. This first course focuses on life at the cellular level. Students begin by reviewing the scientific method so they understand how science works to investigate questions and present findings. Then, it's full speed ahead into cells! After a study of cells' chemical makeup and size, students examine cell structures and how they function together. From there, students progress to how materials move through cells as well as how cells obtain and use energy to carry out their functions. One such function is cell division, which students examine in depth and use to segue into a study of genetics. As students learn about DNA and RNA, they come to understand how traits are inherited and how the study of inheritance is applied.

Course Objectives:

- Apply scientific processes to conduct investigations.
- Use logical thinking to identify relationships and draw conclusions.
- Examine how investigations in biology are important to gaining historical perspective and understanding the societal value of scientific advances.
- Evaluate topics in biology to better understand the scientific process, the characteristics of life, the relationship between structure and function within living organisms, the manner in which living organisms obtain energy and reproduce, genetics and heredity, and concepts in biotechnology.

Required Materials:

Unit 1

Lessons 1-5: Yogurt Lab

- 2 cups or glasses
- 2 clean liquid measuring cups OR 2 clean teaspoons
- 2 clean stirrers (spoons, coffee stirrers, etc.)
- 80 mL of whole milk
- 10 mL of buttermilk
- masking tape or other labels for the different cups
- a labeling pen

Unit 2

Lesson 7: Cell Size

- 1 potato (avoid sweet potatoes)
- 3 cups
- food coloring (any color)
- knife
- cutting board
- ruler with centimeters

Unit 3

Lessons 11-13: Osmosis

- 1 potato
- 1 knife or other instrument to cut or slice the potato
- 1 potato peeler
- 2 bowls or cups

- 1 C water
- 1 Tbsp salt
- masking tape or other labels for each bowl
- 1 pen
- 1 small piece of plastic wrap
- ruler

Course Overview:

Unit 1: How Science Works

- Understanding Science
- Reading Science
- Studying Life
- The Scientific Process
- Enrichment: Forming a Hypothesis
- Data
- The SI System
- Scientific Tools and Measurements
- Lab Safety
- Atoms
- Bonds and Water
- Macromolecules
- Solutions, Acids, and Bases
- Review: The Scientific Process
- Review: Lab Safety
- Review: Measurements and Graphs
- Review: The Chemistry of Life

Unit 2: A Look at Cells

- Characteristics of Life
- Microscopes
- Enrichment: Microscopes
- Cell Size
- Types of Cells
- Eukaryotic Cells
- The Cell Membrane
- Enzymes
- Review: Characteristics of Life
- Review: Cells

Unit 3: Cell Transport and Energy

- Diffusion and Osmosis
- Facilitated Diffusion
- Active Transport
- Energy in a Cell
- Photosynthesis
- Aerobic Respiration

- Fermentation
- Review: Cell Transport
- Review: Chemical Energy

Unit 4: Cell Division

- Why Do Cells Divide?
- Chromosomes
- The Cell Cycle
- Cell Regulation
- Cancer
- Meiosis
- Review: Cell Division
- Review: Chromosomes and Reproduction

Unit 5: Heredity

- Heredity's Beginnings
- Mendel's Experiments
- A Look Back: Mendel's Math
- Enrichment: Mendel's Math
- Predicting Genetic Crosses
- Practicing Punnett Squares
- Complex Patterns of Inheritance
- Blood Type
- Enrichment: X-Linked Inheritance
- What Is DNA?
- DNA and RNA
- DNA at Work
- Changes in DNA
- Review: Heredity
- Review: DNA and Gene Expression

Unit 6: Genetic Engineering and Review

- Enzymes as Molecular Machines
- Common Tools of the Trade
- DNA Sequencing
- Genomes and Genomics
- The Future Today
- Review: The Scientific Process
- Review: Lab Safety
- Review: Measurements and Graphs
- Review: The Chemistry of Life
- Review: Characteristics of Life
- Review: Cells
- Review: Cell Transport
- Review: Chemical Energy
- Review: Cell Division
- Review: Chromosomes and Reproduction
- Review: Heredity
- Review: DNA and Gene Expression

This StrongMind course is Quality Matters certified.