

# **DARIEN PUBLIC SCHOOLS**

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## **CURRICULUM GUIDE**

### **Biology 200**

**Approved by the Board of Education: October 11, 2005**

# **DARIEN PUBLIC SCHOOLS**

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Board of Education Approval: October 11, 2005

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## **SECTION I - Course Information**

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## **STATEMENT OF PHILOSOPHY**

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### **The objectives of the Science Department are:**

1. To acquaint students with the presently accepted theories and laws of the universe and the methods used to develop and test new theories and laws.
2. To help students acquire skills in making accurate observations, assembling and evaluating facts and reaching conclusions.
3. To help students develop an understanding and appreciation of the role of science in humankind's attempts to relate to the universe.
4. To help students appreciate the role they can and should play in protecting and improving their environment.
5. To help students appreciate how their lives are enhanced by future scientific endeavor.

## **PROGRAM GOALS**

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### **Objectives:**

1. To acquaint students with the world of organisms.
2. To help students see the critical relationship of one organism to another.
3. To provide knowledge of the structure and functions of organisms and populations.
4. To give students an understanding and appreciation of the diversity in structure and function of organisms.
5. To help students understand the structure and function of the human being.

## **OVERVIEW**

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200 Biology

Grade 9 (satisfies 9th grade science requirement)

2 semesters | 1/2 credit each semester

**Prerequisite:** Evidence of need for academic assistance.

**Description:** Biology is the science of organisms. Students will be exposed to the great diversity that exists among organisms with an overview of topics ranging from one-celled organisms through the human being. Emphasis is also placed on the environment as it relates to all organisms.

**Expectations:** Students will be required to complete homework assignments and participate in laboratory sessions. They will be expected to cooperate as group members, use equipment properly, and submit lab reports. Students will also be responsible for submitting a research project and essay.

## **ESSENTIAL QUESTIONS**

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1. How is science as a discipline defined by its process?
2. How does an individual observe, record, analyze, interpret, make predictions and form conclusions based upon their observations?
3. What are the common characteristics of living organisms and how are they expressed across a wide range of organisms?
4. How do organisms interact with and impact their environment?
5. How do organisms change over time?
6. How is structure related to function?
7. What is the chemical basis of life?

## **PROCESS SKILLS**

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- Reading (Decoding)
- Reading (Comprehending)
- Reading (Analyzing)
- Reading (Appreciating)
- Writing and Language Mechanics
- Speaking
- Listening
- Viewing
- Studying
- Reasoning and Reflecting
- Using Learning Resources and Technology
- Working Independently and Collaboratively
- Maintaining Physical Fitness
- Inventing
- Designing
- Creating
- Performing
- Quantifying
- Understanding Number Operations
- Using and Creating Formulas
- Problem Solving
- Graphing
- Applying Probability and Statistics
- Applying Scientific Method
- Inquiry (critical questioning)

## **STUDENT PERFORMANCE SUMMARY**

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Narrative, Expository or Persuasive Essay, Letter or Article

- Letter to Darwin
- Final Essay

Research Report

Lab Report

- Osmosis and diffusion (starch bags)
- Protein digestion
- Tobacco seed lab (It isn't Easy Being Green)

Oral Presentation with Visuals (story board, overhead transparencies, Power Point, Whiteboard, Data Projector, Internet site, etc.)

- Human genetics project

Model with Written Explanation

- Meiosis and Mitosis

Dissection (alternatives to dissection are provided)

- Earthworm
- Pig

## **GRADING GUIDELINES**

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	<b><u>Expectations of Students</u></b>	<b><u>% of Report Card Grade</u></b>
<b>Homework</b>	100% of all assignments	10%-25%
<b>Laboratory</b>	100% of all assignments	20%-30%
<b>Tests</b>	All tests taken/made up	25%-55%
<b>Quizzes</b>	All quizzes taken/made up	15%-50%
1 <sup>st</sup> Quarter Grade		40% of 1 <sup>st</sup> semester grade
2 <sup>nd</sup> Quarter Grade		40% of 1 <sup>st</sup> semester grade
Mid-Year Exam		20% of 1 <sup>st</sup> semester grade
3 <sup>rd</sup> Quarter Grade		40% of 2 <sup>nd</sup> semester grade
4 <sup>th</sup> Quarter Grade		40% of 2 <sup>nd</sup> semester grade
Final Exam		20% of 2 <sup>nd</sup> semester grade

## **SECTION II – Units of Study**

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## SUMMARY OF UNITS

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<u>Unit Title</u>		<u>Duration (Days)</u>	
<b>Semester 1</b>			
Unit 1: Biology the Science of Life	.....	5	
Unit 2: Biology as a Science	.....	5	
Unit 3: The Cell and its Environment	.....	8	76 days
Unit 4: Inside the Cell	.....	8	
Unit 5: DNA and Protein Synthesis	.....	15	
Unit 6: Cellular Reproduction	.....	11	
Unit 7: Genetics and Heredity	.....	22	
Unit 8: Human Genetic Disorders	.....	3	
<b>Semester 2</b>			
Unit 9: Evolution	.....	8	
Unit 10: Classification	.....	5	
Unit 11: Reproduction	.....	15	77 days
Unit 12: Nutrition and Digestion	.....	10	
Unit 13: Transport	.....	9	
Unit 14: Gas Exchange and Excretion	.....	9	
Unit 15: Nervous Control	.....	11	
Unit 16: Movement	.....	5	
Unit 17: Ecosystems	.....	4	
Culminating essay	.....	1	

## **UNIT 1: Biology the Science of Life**

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## **UNIT 1: Biology the Science of Life**

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Essential Question 1: What are the common characteristics of living organisms?

Essential Question 2: How are energy and nutrients made available to all members of a community?

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### **Expectations from DHS Mission Statement**

#### ACADEMIC EXPECTATIONS

1. Read actively and critically for a variety of purposes.
4. Listen actively and critically.
6. Reason effectively and solve problems.

#### SOCIAL

- 3c. Participates effectively and efficiently in groups to pursue and generate information.

#### CIVIC

4. Understands the human impact on the environment.

#### ETHICAL EXPECTATIONS

1. Acts responsibly and respectfully toward him/herself and others.
2. Follows the established rules, guidelines and laws of the school community.
3. Explores, discusses and questions the moral issues that arise within the context of his/her day.
4. Demonstrates sensitivity to, and respect for, the perspectives, opinions, needs and customs of others.

### **List State Framework Standards Addressed:**

Grade 9: Core Themes, Content Standards and Expected Performances

Strand I: Energy Transformations Content Standards

Energy Transfer and Transformations – What is the role of energy in our world?

9.1 - Energy cannot be created or destroyed; however, energy can be converted from one form to another.

- Energy enters the Earth system primarily as solar radiation, is captured by materials and photosynthetic processes, and eventually is transformed into heat.

Grade 10: Core Themes, Content Standards and Expected Performances

Science and Technology in Society – How do science and technology affect the quality of our lives?

10.6 - Living organisms have the capability of producing populations of unlimited size, but the environment can support only a limited number of individuals from each species.

D 8. Describe the factors that affect the carrying capacity of the environment.

D 9. Explain how change in population density is affected by emigration, immigration, birth rate and death rate, and relate these factors to the exponential growth of human populations.

**List National Standards addressed:**

**Life Science: CONTENT STANDARD C:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Interdependence of organisms
- Matter, energy, and organization in living systems
- Behavior of organisms

**Science in personal and cultural perspectives: CONTENT STANDARD F:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Population growth
- Natural resources
- Environmental quality
- Natural and human-induced hazards
- Science and technology in local, national, and global challenges

## **CONTENT KNOWLEDGE OBJECTIVES**

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### **Initial Understanding**

**Distinguish** between living and non-living things based upon life functions.

**Distinguish** between producers and consumers and between photosynthesis and cellular respiration.

**Demonstrate** an understanding of the relationship between photosynthesis and cellular respiration.

### **Developing an Interpretation:**

**Discuss** how energy is made available to members of a community.

**Discuss** how organisms are influenced by the non-living factors of their environment.

### **Making Connections**

**Explain** that the process of evolution has resulted in a great diversity of life forms and describe the meaning of the phrase “unity within diversity.”

**Relate** the food and energy needs of an invasive species to the biological problems it causes.

### **Taking a Critical Stance**

**Apply** the knowledge of the biology of an organism to possible methods for controlling them

## **VOCABULARY**

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adaptation  
biology  
cellular respiration  
chlorophyll  
community  
consumer  
decomposer  
development  
energy

evolution  
food chain  
growth  
homeostasis  
organism  
organization  
photosynthesis  
producer  
reproduction

## **ACTIVITIES**

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**LAB:** [Is it Living?](#)

**LAB:** Powers of Observation

Objective: Program objective #1

Objective: Departmental goal #2

**PERFORMANCE ASSESSMENT**

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**CAREER AWARENESS**

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Ecologist

**CORE TEXT FOR STUDENTS**

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Biology: An Everyday Experience by Daniel, Hummer, Kaskel - Published by Glencoe/McGraw-Hill. ISBN: 0028272897

**ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS**

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**MATERIALS AND SUPPLIES**

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Materials as per lab procedures

**INTEGRATED TECHNOLOGY**

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None

## **UNIT 2: Biology as a Science**

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## **UNIT 2 Biology as a Science**

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**Essential Question 1:** How does technology like the microscope aid biologists in learning about the natural world?

**Essential Question 2:** What is the scientific method and how is it applied?

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### **Expectations from DHS Mission Statement**

#### ACADEMIC EXPECTATIONS

1. Read actively and critically for a variety of purposes.
4. Listen actively and critically.
6. Reason effectively and solve problems.
7. Demonstrate the skills and real-world contextual knowledge to meet the demands of a changing world.

#### SOCIAL

- 3c. Participates effectively and efficiently in groups to pursue and generate information.

#### CIVIC

4. Understands the human impact on the environment.

#### ETHICAL EXPECTATIONS

1. Acts responsibly and respectfully toward him/herself and others.
2. Follows the established rules, guidelines and laws of the school community.
3. Explores, discusses and questions the moral issues that arise within the context of his/her day.
4. Demonstrates sensitivity to, and respect for, the perspectives, opinions, needs and customs of others.

### **List State Framework Standards Addressed:**

Grades 9-10 Core Scientific Inquiry, Literacy and Numeracy  
How is scientific knowledge created and communicated?

#### SCIENTIFIC INQUIRY

- Scientific inquiry is a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena.

- Scientific inquiry progresses through a continuous process of questioning, data collection, analysis and interpretation.
- Scientific inquiry requires the sharing of findings and ideas for critical review by colleagues and other scientists.

#### SCIENTIFIC LITERACY

- Scientific literacy includes the ability to read, write, discuss and present coherent ideas about science.

#### SCIENTIFIC NUMERACY

- Scientific numeracy includes the ability to use mathematical operations and procedures to calculate, analyze and present scientific data and ideas.
- D INQ.1 Identify questions that can be answered through scientific investigation.
- D INQ.3 Formulate a testable hypothesis and demonstrate logical connections between the scientific concepts guiding the hypothesis and the design of the experiment.
- D INQ.4 Design and conduct appropriate types of scientific investigations to answer different questions.
- D INQ.5 Identify independent and dependent variables, including those that are kept constant and those used as controls.
- D INQ.6 Use appropriate tools and techniques to make observations and gather data.

#### List National Standards addressed:

##### **Science as Inquiry: CONTENT STANDARD A:**

As a result of activities in grades 9-12, all students should develop

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

##### **Science and Technology: CONTENT STANDARD E:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Abilities of technological design
- Understandings about science and technology

##### **History and Nature of Science: CONTENT STANDARD G:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Science as a human endeavor
- Nature of scientific knowledge
- Historical perspectives

## CONTENT KNOWLEDGE OBJECTIVES

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### Initial Understanding

Students will **explore** techniques for observing and collecting data.

Students will be able to **identify** the parts and function of the compound light microscope.

Students will be able to **prepare** a wet mount slide.

Students will be able to **demonstrate** proper technique in focusing a microscope in various powers.

Students will be able to **calculate** total magnification of the compound light microscope.

### Developing an Interpretation

Students will **relate** the various methods used by scientists to learn about the natural world.

### Making Connections

Students will **understand** how the steps of the scientific method function to accept or reject a hypothesis.

### Taking a Critical Stance

**Compare and contrast** the appropriate use of the compound light microscope, scanning electron microscope, and transmission electron microscope.

## VOCABULARY

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compound light microscope

control group

controlled experiment

data

dependant variable

experiment

experimental group

hypothesis

independent variable

law

magnification

resolving power

science

technology

theory

transmission electron microscope

scanning electron microscope

## ACTIVITIES

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**LAB:** [Use of the Compound Light Microscope](#)

**LAB:** The Dancing Raisins

Objective: Departmental goal #2

Objective: D INQ.1, D INQ.3

## **PERFORMANCE ASSESSMENT**

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### **CAREER AWARENESS**

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Radiology Technician  
Physicist

Anthropologist  
Field Biologist

### **CORE TEXT FOR STUDENTS**

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Biology: An Everyday Experience by Daniel, Hummer, Kaskel - Published by Glencoe/McGraw-Hill

### **ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS**

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Selected materials from:	Page Number
Enrichment Worksheets Supplement	
Reteaching Supplement	
Study Guide Supplement	
Critical Thinking Supplement	

### **MATERIALS AND SUPPLIES**

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Microscopes  
Materials as per lab procedures

### **INTEGRATED TECHNOLOGY**

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Microscopy Lab – Observation and application of technology, data collection

## **UNIT 3: The Cell and its Environment**

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## **UNIT 3: The Cell and its Environment**

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Essential Question 1: How is the cell the basic unit of life?

Essential Question 2: How do materials enter and leave cells?

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### **Expectations from DHS Mission Statement**

#### **ACADEMIC EXPECTATIONS**

1. Read actively and critically for a variety of purposes.
4. Listen actively and critically.
6. Reason effectively and solve problems
7. Demonstrate the skills and real-world contextual knowledge to meet the demands of a changing world.

#### **SOCIAL**

- 3c. Participates effectively and efficiently in groups to pursue and generate information.

#### **CIVIC**

4. Understands the human impact on the environment.

#### **ETHICAL EXPECTATIONS**

1. Acts responsibly and respectfully toward him/herself and others.
2. Follows the established rules, guidelines and laws of the school community.
3. Explores, discusses and questions the moral issues that arise within the context of his/her day.
4. Demonstrates sensitivity to, and respect for, the perspectives, opinions, needs and customs of others.

### **List State Framework Standards Addressed:**

#### **Grade 10**

Core Themes, Content Standards and Expected Performances

Strand IV: Cell Chemistry and Biotechnology

Structure and Function – How are organisms structured to ensure efficiency and survival?

10.1 - Fundamental life processes depend on the physical structure and the chemical activities of the cell.

- Most of the chemical activities of the cell are catalyzed by enzymes that function only in a narrow range of temperature and acidity conditions.
- The cellular processes of photosynthesis and respiration involve transformation of matter and energy.

D 4. Explain the role of the cell membrane in supporting cell functions.

**List National Standards addressed:**

**CONTENT STANDARD C:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- The cell
- Matter, energy, and organization in living systems

**Science and Technology**

**CONTENT STANDARD E:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Understandings about science and technology

**History and Nature of Science**

**CONTENT STANDARD G:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Science as a human endeavor
- Nature of scientific knowledge
- Historical perspectives

## **CONTENT KNOWLEDGE OBJECTIVES**

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### **Initial Understanding**

**Describe** the discovery of cells and the development of cell theory.

**Describe** the mechanics of passive transport, specifically osmosis and diffusion.

**Describe** the mechanics of active transport, specifically endocytosis and exocytosis.

### **Developing an Interpretation**

**Analyze** the structure and function of the cell and its membrane as described by the fluid mosaic model.

### **Making Connections**

**Demonstrate** the various ways that substances enter and leave cells.

### **Taking a Critical Stance**

**Compare and contrast** the process of passive and active transport.

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## **VOCABULARY**

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active transport

cell theory

cell wall

diffusion

dynamic equilibrium

endocytosis

exocytosis

fluid mosaic model

osmosis

passive transport

phagocytosis

plasma membrane

selectively permeable membrane

vesicle

## **ACTIVITIES**

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**LAB:** [Osmosis in a model cell](#)

Objective: D INQ 3, 4, 5, 6, 7, 9

**LAB:** Normal and plasmolized cells

Objective: D4, D7

## **PERFORMANCE ASSESSMENT**

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Lab Report: Osmosis in a model cell

## **CAREER AWARENESS**

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Biochemist  
Cytologist

Fetal Cell Researcher  
Pharmacologist

## **CORE TEXT FOR STUDENTS**

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Biology: An Everyday Experience by Daniel, Hummer, Kaskel - Published by Glencoe/McGraw-Hill

## **ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS**

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[www.cellsalive.com](http://www.cellsalive.com)

Selected materials from:

Page Number

Enrichment Worksheets Supplement  
Reteaching Supplement  
Study Guide Supplement  
Critical Thinking Supplement

## **MATERIALS AND SUPPLIES**

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Materials as per lab procedure  
Microscopes

## **INTEGRATED TECHNOLOGY**

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Microscopy Lab  
Flex Camera

## **UNIT 4: Inside the Cell**

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## **UNIT 4: Inside the Cell**

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Essential Question 1: What are the structures and function of the cell?

Essential Question 2: How are the characteristics of life manifested by the cell?

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### **Expectations from DHS Mission Statement**

#### **ACADEMIC EXPECTATIONS**

1. Read actively and critically for a variety of purposes.
4. Listen actively and critically.
6. Reason effectively and solve problems.
7. Demonstrate the skills and real-world contextual knowledge to meet the demands of a changing world.

#### **SOCIAL**

- 3c. Participates effectively and efficiently in groups to pursue and generate information.

#### **ETHICAL EXPECTATIONS**

1. Acts responsibly and respectfully toward him/herself and others.
2. Follows the established rules, guidelines and laws of the school community.
3. Explores, discusses and questions the moral issues that arise within the context of his/her day.
4. Demonstrates sensitivity to, and respect for, the perspectives, opinions, needs and customs of others.

### **List State Framework Standards Addressed:**

#### **Grade 10**

Core Themes, Content Standards and Expected Performances

Strand IV: Cell Chemistry and Biotechnology

Structure and Function – How are organisms structured to ensure efficiency and survival?  
10.1 - Fundamental life processes depend on the physical structure and the chemical activities of the cell.

- Most of the chemical activities of the cell are catalyzed by enzymes that function only in a narrow range of temperature and acidity conditions.
- The cellular processes of photosynthesis and respiration involve transformation of matter and energy.

D 1. Describe significant similarities and differences in the basic structure of plant and animal cells.

D 3. Describe the general role of enzymes in metabolic cell processes.

D 4. Explain the role of the cell membrane in supporting cell functions.

**List National Standards addressed:**

**CONTENT STANDARD C:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- The cell
- Matter, energy, and organization in living systems

**History and Nature of Science**

**CONTENT STANDARD G:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Science as a human endeavor
- Nature of scientific knowledge
- Historical perspectives

## **CONTENT KNOWLEDGE OBJECTIVES**

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### **Initial Understanding**

**Recognize** general differences between the cells of unicellular and multicellular organisms

**Recognize** general differences between the cells of a plant and animal cell.

**Identify** the role of the mitochondria in cellular respiration.

**Identify** the role of the chloroplast in photosynthesis.

### **Developing an Interpretation**

**Discuss** how the function of the ribosomes, endoplasmic reticulum and Golgi bodies are interrelated.

**Compare** the structure and function of cell organelles.

### **Making Connections**

**Describe** how multicellular organisms are made up of increasingly complex levels of organization beginning with the cell, tissue, organ, organ system, organism.

### **Taking a Critical Stance**

**Compare and contrast** the structure and function of prokaryotic and eukaryotic cells.

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## **VOCABULARY**

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centriole

chloroplast

chromosome

cilia

cytoplasm

cytoskeleton

endoplasmic reticulum (ER)

eukaryote

flagella

Golgi body (Golgi Apparatus)

lysosome

metabolism

mitochondria

nucleolus

nucleus

organ

prokaryote

ribosome

system

tissue

vacuole

vesicle

## **ACTIVITIES**

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**LAB:** Why Don't Cells Grow Indefinitely?

Objective: CT D INQ 3, 4, 5, 6, 7, 8, 9

**LAB:** The Cell: The Basic Unit of Life

Objective: CT 10.1 D1

## **PERFORMANCE ASSESSMENT**

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Cell Collage

Cell Model

Cell Comic Book -Alternate Assessment

## **CAREER AWARENESS**

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Cytologist

Microscopist

Oncologist

Dermatologist

## **CORE TEXT FOR STUDENTS**

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Biology: An Everyday Experience by Daniel, Hummer, Kaskel - Published by Glencoe/McGraw-Hill

## **ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS**

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[Cell Worksheets](#)

The Cell Game

*The Magic of Cells* video

Selected materials from:

Page Number

Enrichment Worksheets Supplement

Reteaching Supplement

Study Guide Supplement

Critical Thinking Supplement

## **MATERIALS AND SUPPLIES**

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As per lab procedures

## **INTEGRATED TECHNOLOGY**

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## **UNIT 5: DNA and Protein Synthesis**

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## **UNIT 5: DNA and Protein Synthesis**

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Essential Question 1: What is the chemical basis of life?

Essential Question 2: How do genes code for proteins?

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### **Expectations from DHS Mission Statement**

#### **ACADEMIC EXPECTATIONS**

1. Read actively and critically for a variety of purposes.
4. Listen actively and critically.
6. Reason effectively and solve problems.
7. Demonstrate the skills and real-world contextual knowledge to meet the demands of a changing world.

#### **SOCIAL**

- 3c. Participates effectively and efficiently in groups to pursue and generate information.

#### **ETHICAL EXPECTATIONS**

1. Acts responsibly and respectfully toward him/herself and others.
2. Follows the established rules, guidelines and laws of the school community.
3. Explores, discusses and questions the moral issues that arise within the context of his/her day.
4. Demonstrates sensitivity to, and respect for, the perspectives, opinions, needs and customs of others.

### **List State Framework Standards Addressed:**

#### **Grade 10**

Core Themes, Content Standards and Expected Performances

Strand IV: Cell Chemistry and Biotechnology

Structure and Function – How are organisms structured to ensure efficiency and survival?

10.1 - Fundamental life processes depend on the physical structure and the chemical activities of the cell.

- Most of the chemical activities of the cell are catalyzed by enzymes that function only in a narrow range of temperature and acidity conditions.

D 2. Describe the general role of DNA and RNA in protein synthesis.

Science and Technology in Society – How do science and technology affect the quality of our lives?

10.3 - Similarities in the chemical and structural properties of DNA in all living organisms allow the transfer of genes from one organism to another.

- The principles of genetics and cellular chemistry can be used to produce new foods and medicines in biotechnological processes.

D 8. Describe, in general terms, how the genetic information of organisms can be altered to make them produce new materials.

D 9. Explain the risks and benefits of altering the genetic composition and cell products of existing organisms.

Core Themes, Content Standards and Expected Performances

Strand V: Genetics, Evolution and Biodiversity

Heredity and Evolution – What processes are responsible for life’s unity and diversity?

10.4. - In sexually reproducing organisms, each offspring contains a mix of characteristics inherited from both parents.

- Genetic information is stored in genes that are located on chromosomes inside the cell nucleus.

**List National Standards addressed:**

**CONTENT STANDARD C:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- The cell
- Molecular basis of heredity
- Matter, energy, and organization in living systems

**History and Nature of Science**

**CONTENT STANDARD G:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Science as a human endeavor
- Nature of scientific knowledge
- Historical perspectives

## **CONTENT KNOWLEDGE OBJECTIVES**

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### **Initial Understanding**

**Explore** the experimental evidence that led Watson and Crick to the conclusion that DNA is a double helix.

Students will **recognize** that DNA is the chemical of which genes are composed.

**Diagram** the double helix model of DNA including nucleotides, nitrogenous bases, phosphate groups and deoxyribose sugar.

Students will **recognize** the importance of the Base Pairing Rule.

**Explore** the events of transcription and translation in their role of protein synthesis.

### **Developing an Interpretation**

If given a diagram students will be able to **identify** DNA and RNA.

**Diagram** the steps involved in the replication of DNA.

### **Making Connections**

**Discuss** the evidence for the fact that DNA codes for proteins

### **Taking a Critical Stance**

**Explain** the connection between the proteins produced by translation and the traits possessed by the individual organism.

**Explain** the difference between identical and fraternal twins.

## VOCABULARY

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adenine	identical twin
amino acid	nitrogen base pair
base pairing rule	nucleotide
chromosome	phenotype
cytosine	phosphate group
deoxyribose sugar	polymer
DNA	protein
DNA polymerase	thymine
double helix	replication
fertilization	RNA
fraternal twin	sugar phosphate backbone
gene	transcription
genotype	translation
guanine	trait
helicase mutation	uracil
	variation

## ACTIVITIES

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<b>LAB:</b> The Paper Helix	Objective: CT 10.3, 10.4
<b>LAB:</b> DNA and RNA	Objective: CT 10.3, 10.4
<b>LAB:</b> How do Genes make Proteins?	Objective: CT 10.3, 10.4

## PERFORMANCE ASSESSMENT

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### CAREER AWARENESS

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Human Genome Researcher	Industrial Agriculturist
Crime Scene Investigator	Virologist
Biochemist	

## CORE TEXT FOR STUDENTS

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Biology: An Everyday Experience by Daniel, Hummer, Kaskel - Published by Glencoe/McGraw-Hill

## **ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS**

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### [Watson and Crick Article](#)

Selected materials from:	Page Number
Enrichment Worksheets Supplement	
Reteaching Supplement	
Study Guide Supplement	
Critical Thinking Supplement	

## **MATERIALS AND SUPPLIES**

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Materials as per lab procedures

## **INTEGRATED TECHNOLOGY**

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**UNIT 6: Cellular Reproduction**

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## **UNIT 6: Cellular Reproduction**

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Essential Question 1: What is the evidence for the biotic origin of life?

Essential Question 2: What are the stages of the cell cycle?

Essential Question 3: What is the role of the cell cycle in organisms?

---

### **Expectations from DHS Mission Statement**

#### **ACADEMIC EXPECTATIONS**

1. Read actively and critically for a variety of purposes.
4. Listen actively and critically.
6. Reason effectively and solve problems.
7. Demonstrate the skills and real-world contextual knowledge to meet the demands of a changing world.

#### **SOCIAL**

- 3c. Participates effectively and efficiently in groups to pursue and generate information.

#### **ETHICAL EXPECTATIONS**

1. Acts responsibly and respectfully toward him/herself and others.
2. Follows the established rules, guidelines and laws of the school community.
3. Explores, discusses and questions the moral issues that arise within the context of his/her day.
4. Demonstrates sensitivity to, and respect for, the perspectives, opinions, needs and customs of others.

### **List State Framework Standards Addressed:**

#### **Grade 10**

Core Themes, Content Standards and Expected Performances

Strand IV: Cell Chemistry and Biotechnology

Structure and Function – How are organisms structured to ensure efficiency and survival?  
10.1 - Fundamental life processes depend on the physical structure and the chemical activities of the cell.

- Most of the chemical activities of the cell are catalyzed by enzymes that function only in a narrow range of temperature and acidity conditions.

## **Grade 10**

Core Themes, Content Standards and Expected Performances

Strand V: Genetics, Evolution and Biodiversity

Content Standards      Expected Performances

Heredity and Evolution – What processes are responsible for life’s unity and diversity?

10.4. - In sexually reproducing organisms, each offspring contains a mix of characteristics inherited from both parents.

- Genetic information is stored in genes that are located on chromosomes inside the cell nucleus.
- Most organisms have two genes for each trait, one on each of the homologous chromosomes in the cell nucleus.

D 1. Explain how meiosis contributes to the genetic variability of organisms.

## **List National Standards addressed**

### **Life Science**

CONTENT STANDARD C:

As a result of their activities in grades 9-12, all students should develop an understanding of

- The cell
- Molecular basis of heredity
- Biological evolution
- Interdependence of organisms
- Matter, energy, and organization in living systems
- Behavior of organisms

### **History and Nature of Science**

CONTENT STANDARD G:

As a result of their activities in grades 9-12, all students should develop an understanding of

- Science as a human endeavor
- Nature of scientific knowledge
- Historical perspectives

## **CONTENT KNOWLEDGE OBJECTIVES**

---

### **Initial Understanding**

**Describe** the debate surrounding spontaneous generation and how Redi's and Pasteur's experiments ended that debate.

**Order** the steps of the cell cycle.

**Identify** the role of interphase.

**Identify** mitosis as a process that produces no genetic variation.

**Identify** meiosis as a process that produces genetic variation.

### **Developing an Interpretation**

**Recognize** that body cells and reproductive cells are produced in different processes.

### **Making Connections**

**Order** prophase, metaphase, anaphase, and telophase in describing mitosis.

**Explain** the significance of meiosis with respect to adaptation and evolution.

### **Taking a Critical Stance**

**Compare and contrast** mitosis and meiosis.

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## **VOCABULARY**

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anaphase  
binary fission  
cell cycle  
cell plate  
centromere  
chromatid  
chromosome  
diploid  
gamete  
haploid  
interphase

meiosis  
metaphase  
mitosis  
prophase  
sexual reproduction  
spindle fiber  
spontaneous generation  
spore  
telophase  
zygote

## **ACTIVITIES**

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<b>LAB:</b> Observing the Cell Cycle	Objectives: CT 10.1, 10.4
<b>LAB:</b> Mitosis (Lab 17)	Objectives: CT 10.1, 10.4
<b>LAB:</b> Time for Mitosis (Lab 18)	Objectives: CT 10.1, 10.4
<b>LAB:</b> Comparing Mitosis and Meiosis	Objectives: CT 10.1, 10.4
<b>LAB:</b> A Model of Meiosis	Objectives: CT 10.1, 10.4

## **PERFORMANCE ASSESSMENT**

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Recipe for a Mouse

## **CAREER AWARENESS**

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Genetic counselor	Occupational therapist
Oncologist	Aging specialist

## **CORE TEXT FOR STUDENTS**

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Biology: An Everyday Experience by Daniel, Hummer, Kaskel - Published by Glencoe/McGraw-Hill

## **ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS**

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Selected materials from:	Page Number
Enrichment Worksheets Supplement	
Reteaching Supplement	
Study Guide Supplement	
Critical Thinking Supplement	

## **MATERIALS AND SUPPLIES**

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Materials as per lab procedures

## **INTEGRATED TECHNOLOGY**

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**UNIT 7: Genetics and Heredity**

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## **UNIT 7: Genetics and Heredity**

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Essential Question 1: How are traits passed from one generation to the next?

Essential Question 2: How does genotype affect phenotype?

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### **Expectations from DHS Mission Statement**

#### **ACADEMIC EXPECTATIONS**

1. Read actively and critically for a variety of purposes.
4. Listen actively and critically.
6. Reason effectively and solve problems.
7. Demonstrate the skills and real-world contextual knowledge to meet the demands of a changing world.
8. Analyze problems from multiple perspectives by understanding past and present cultures.

#### **SOCIAL EXPECTATIONS:**

- 3c. Participates effectively and efficiently in groups to pursue and generate information.

#### **CIVIC EXPECTATIONS:**

1. Develops a healthy sense of self-worth and the worth of others.
2. Demonstrates mutual respect for all members of the school and town community.

#### **ETHICAL EXPECTATIONS**

1. Acts responsibly and respectfully toward him/herself and others.
2. Follows the established rules, guidelines and laws of the school community.
3. Explores, discusses and questions the moral issues that arise within the context of his/her day.
4. Demonstrates sensitivity to, and respect for, the perspectives, opinions, needs and customs of others.

List State Standards addressed

### **Grade 10**

Core Themes, Content Standards and Expected Performances

Strand IV: Cell Chemistry and Biotechnology

## Content Standards Expected Performances

Structure and Function – How are organisms structured to ensure efficiency and survival?

10.1 - Fundamental life processes depend on the physical structure and the chemical activities of the cell.

- Most of the chemical activities of the cell are catalyzed by enzymes that function only in a narrow range of temperature and acidity conditions.

D 2. Describe the general role of DNA and RNA in protein synthesis.

D 3. Describe the general role of enzymes in metabolic cell processes.

10.3 - Similarities in the chemical and structural properties of DNA in all living organisms allow the transfer of genes from one organism to another.

- The principles of genetics and cellular chemistry can be used to produce new foods and medicines in biotechnological processes.

D 8. Describe, in general terms, how the genetic information of organisms can be altered to make them produce new materials.

D 9. Explain the risks and benefits of altering the genetic composition and cell products of existing organisms.

## Strand V: Genetics, Evolution and Biodiversity

### Content Standards Expected Performances

Heredity and Evolution – What processes are responsible for life's unity and diversity?

10.4. - In sexually reproducing organisms, each offspring contains a mix of characteristics inherited from both parents.

- Genetic information is stored in genes that are located on chromosomes inside the cell nucleus.

- Most organisms have two genes for each trait, one on each of the homologous chromosomes in the cell nucleus.

D 1. Explain how meiosis contributes to the genetic variability of organisms.

D 2. Use the Punnett Square technique to predict the distribution of traits in mono- and dihybrid crossings.

D 3. Deduce the probable mode of inheritance of traits (e.g., recessive/dominant, sex-linked) from pedigree diagrams showing phenotypes.

D 4. Describe the difference between genetic disorders and infectious diseases.

## List National Standards addressed

### Life Science

#### CONTENT STANDARD C:

As a result of their activities in grades 9-12, all students should develop an understanding of

- The cell
- Molecular basis of heredity

### Science in personal and cultural perspectives

**CONTENT STANDARD F:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Personal and community health
- Population growth
- Science and technology in local, national, and global challenges

**History and Nature of Science**

**CONTENT STANDARD G:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Science as a human endeavor
- Nature of scientific knowledge
- Historical perspectives

## CONTENT KNOWLEDGE OBJECTIVES

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### Initial Understanding

**Discuss** Mendel's experiments and his results.

**Use** Punnett squares to solve genetic problems.

**Recognize** that genetics follows the rules of probability.

**Use** karyotypes to identify genetic abnormality.

### Developing an Interpretation

**Describe** probability as a mathematical equation.

**Explain** how the expression of a pair of genes may be influenced by other genes as well as by the environment.

### Making Connections

**Demonstrate** the inheritance of traits resulting from incomplete dominance, codominance and multiple alleles.

**Apply** the laws of probability to solve genetics problems involving sex-linked traits.

### Taking a Critical Stance

**Defend** the relationship between genes, alleles and chromosomes in inheritance of traits.

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## VOCABULARY

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allele

codominance

dominant gene

gamete

gene mutation

gene segregation

genotype

heterozygous

homologous chromosomes

homozygous

incomplete dominance

independent assortment

karyotype

loci

nondisjunction

phenotype

probability

punnett square

recessive gene

sex chromosome

sex-linked trait

somatic cell

trisomy

trait

## **ACTIVITIES**

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<b>LAB:</b> It isn't Easy Being Green	Objective: CT D INQ 3, 4, 5, 6, 7, 8, 9
<b>LAB:</b> Mr. Potato Head	Objective: CT D INQ 4, 6, 7, 8, 9
<b>LAB:</b> Finding Phenotype and Genotypes for One Trait (#20)	Obj D INQ 6, 7, 8, 9
<b>LAB:</b> Finding Phenotype and Genotypes for Two Traits (#21)	Obj D INQ 6, 7, 8, 9
<b>LAB:</b> Sex-linked and Non-sex-linked Traits	Objectives: CT D 10.4 D2, D3
<b>LAB:</b> Human Karyotype (online)	Objectives: CT D 10.4 D2, D3

## **PERFORMANCE ASSESSMENT**

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Lab report: It isn't Easy Being Green      **Rubric**

## **CAREER AWARENESS**

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Genetic counselor	Horticulturalist
Neonatal specialist	Animal Husbandry

## **CORE TEXT FOR STUDENTS**

---

Biology: An Everyday Experience by Daniel, Hummer, Kaskel - Published by Glencoe/McGraw-Hill

## **ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS**

---

Genetics Word Problems

Selected materials from:	Page Number
Enrichment Worksheets Supplement	
Reteaching Supplement	
Study Guide Supplement	
Critical Thinking Supplement	

## **MATERIALS AND SUPPLIES**

---

Materials as per lab procedures

## **INTEGRATED TECHNOLOGY**

---

Laptop Lab: Online Karyotype

**UNIT 8: Human Genetic Disorders**

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## **UNIT 8: Human Genetic Disorders**

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Essential Question 1: How is a particular human disorder related to genotype?

Essential Question 2: How can society accommodate human differences based upon biological knowledge?

---

### **Expectations from DHS Mission Statement**

#### **ACADEMIC EXPECTATIONS**

1. Read actively and critically for a variety of purposes.
4. Listen actively and critically.
6. Reason effectively and solve problems.
7. Demonstrate the skills and real-world contextual knowledge to meet the demands of a changing world.
8. Analyze problems from multiple perspectives by understanding past and present cultures.
10. Understand individual learning styles and apply them to his/her learning experiences.

#### **SOCIAL EXPECTATIONS:**

- 3a. Demonstrates emotional maturity by seeking support and responding constructively without violence, intimidation and aggression.
- 3a. Demonstrates self-confidence by setting challenging and appropriate goals, and working towards them.
- 3c. Participates effectively and efficiently in groups to pursue and generate information.

#### **CIVIC EXPECTATIONS:**

1. Develops a healthy sense of self-worth and the worth of others.
2. Demonstrates mutual respect for all members of the school and town community.

#### **ETHICAL EXPECTATIONS**

1. Acts responsibly and respectfully toward him/herself and others.
2. Follows the established rules, guidelines and laws of the school community.
3. Explores, discusses and questions the moral issues that arise within the context of his/her day.
4. Demonstrates sensitivity to, and respect for, the perspectives, opinions, needs and customs of others.

### **List State Standards addressed**

## Grades 9-10 Core Scientific Inquiry, Literacy and Numeracy

How is scientific knowledge created and communicated?

Content Standards    Expected Performances

### SCIENTIFIC INQUIRY

- Scientific inquiry is a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena.
- Scientific inquiry progresses through a continuous process of questioning, data collection, analysis and interpretation.
- Scientific inquiry requires the sharing of findings and ideas for critical review by colleagues and other scientists.

### SCIENTIFIC LITERACY

- Scientific literacy includes the ability to read, write, discuss and present coherent ideas about science.
- Scientific literacy also includes the ability to search for and assess the relevance and credibility of scientific information found in various print and electronic media.

### SCIENTIFIC NUMERACY

- Scientific numeracy includes the ability to use mathematical operations and procedures to calculate, analyze and present scientific data and ideas.
- D INQ.1 Identify questions that can be answered through scientific investigation.
- D INQ.2 Read, interpret and examine the credibility and validity of scientific claims in different sources of information.
- D INQ.6 Use appropriate tools and techniques to make observations and gather data.
- D INQ.7 Assess the reliability of the data that was generated in the investigation.
- D INQ.9 Articulate conclusions and explanations based on research data, and assess results based on the design of the investigation.
- D INQ.10 Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.

## **Grade 10**

Core Themes, Content Standards and Expected Performances

Strand IV: Cell Chemistry and Biotechnology

Content Standards    Expected Performances

Structure and Function – How are organisms structured to ensure efficiency and survival?

10.1 - Fundamental life processes depend on the physical structure and the chemical activities of the cell.

- Most of the chemical activities of the cell are catalyzed by enzymes that function only in a narrow range of temperature and acidity conditions.

D 2. Describe the general role of DNA and RNA in protein synthesis.

D 3. Describe the general role of enzymes in metabolic cell processes.

10.3 - Similarities in the chemical and structural properties of DNA in all living organisms allow the transfer of genes from one organism to another.

- The principles of genetics and cellular chemistry can be used to produce new foods and medicines in biotechnological processes.

D 8. Describe, in general terms, how the genetic information of organisms can be altered to make them produce new materials.

D 9. Explain the risks and benefits of altering the genetic composition and cell products of existing organisms.

#### Strand V: Genetics, Evolution and Biodiversity

##### Content Standards Expected Performances

Heredity and Evolution – What processes are responsible for life’s unity and diversity?

10.4. - In sexually reproducing organisms, each offspring contains a mix of characteristics inherited from both parents.

- Genetic information is stored in genes that are located on chromosomes inside the cell nucleus.

- Most organisms have two genes for each trait, one on each of the homologous chromosomes in the cell nucleus.

D 1. Explain how meiosis contributes to the genetic variability of organisms.

D 2. Use the Punnett Square technique to predict the distribution of traits in mono- and dihybrid crossings.

D 3. Deduce the probable mode of inheritance of traits (e.g., recessive/dominant, sex-linked) from pedigree diagrams showing phenotypes.

D 4. Describe the difference between genetic disorders and infectious diseases.

#### List National Standards addressed

##### Life Science

###### CONTENT STANDARD C:

As a result of their activities in grades 9-12, all students should develop an understanding of

- The cell
- Molecular basis of heredity

##### Science in personal and cultural perspectives

###### CONTENT STANDARD F:

As a result of their activities in grades 9-12, students should develop an understanding of

- Personal and community health
- Population growth
- Science and technology in local, national, and global challenges

##### History and Nature of Science

###### CONTENT STANDARD G:

As a result of their activities in grades 9-12, all students should develop an understanding of

- Science as a human endeavor
- Nature of scientific knowledge
- Historical perspectives

## **CONTENT KNOWLEDGE OBJECTIVES**

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### **Initial Understanding**

Students will **research and present** the symptoms of the disease and the prognosis for someone with the disorder.

Students will **research and present** how the disease is diagnosed and its particular mode of inheritance.

Students will **research and present** how the disease is treated.

Students will be able to **identify** the difference between a person who is a carrier for a trait and a person who expresses that trait.

### **Developing an Interpretation**

Students will be prepared to **answer questions** from their peers based upon their research.

Students will **use visual aids** to help explain the inheritance of the disease or to illustrate symptoms etc.

### **Making Connections**

Students will **demonstrate** how to determine if a person carries the gene for the trait prior to showing symptoms of the disease or before passing the trait on to his or her offspring.

### **Taking a Critical Stance**

Students will **create** a five-question quiz for their particular disorder.

## **VOCABULARY**

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allele	independent assortment
autosome	karyotype
chromosomal mutation	Klinefelter's syndrome
codominance	loci
color blindness	nondisjunction
cystic fibrosis	phenotype
dominant gene	pku
Down syndrome	probability
gamete	Punnett square
gene mutation	recessive gene
gene segregation	recombinant dna
genotype	sex chromosome
hemophilia	sex-linked trait
heterozygous	sickle cell anemia
homologous chromosomes	somatic cell
homozygous	Tay sachs
Huntington's disease	trait
incomplete dominance	trisomy

## **ACTIVITIES**

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[Human Genetic Disorder project](#)

## **PERFORMANCE ASSESSMENT**

---

[Presentation Rubric](#)

## **CAREER AWARENESS**

---

Genetic Counselor

## **CORE TEXT FOR STUDENTS**

---

Biology: An Everyday Experience by Daniel, Hummer, Kaskel - Published by Glencoe/McGraw-Hill

## **ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS**

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[www.Iconn.org](http://www.Iconn.org) Connecticut digital library

Library with initial research supported by library personnel

## **MATERIALS AND SUPPLIES**

---

Materials as per lab procedures

## **INTEGRATED TECHNOLOGY**

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Use of Power Point or other presentation software.

## **UNIT 9: Evolution**

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## **UNIT 9: Evolution**

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Essential Question 1: What is the role of natural selection in creating diversity in organisms?

Essential Question 2: What is the evidence that supports the modern theory of evolution?

Essential Question 3: How do organisms change over time?

---

### **Expectations from DHS Mission Statement**

#### **ACADEMIC EXPECTATIONS**

1. Read actively and critically for a variety of purposes.
4. Listen actively and critically.
6. Reason effectively and solve problems.
8. Analyze problems from multiple perspectives by understanding past and present cultures.
10. Understand individual learning styles and apply them to his/her learning experiences.

#### **SOCIAL EXPECTATIONS:**

- 3a. Demonstrates emotional maturity by seeking support and responding constructively without violence, intimidation and aggression.
- 3a. Demonstrates self-confidence by setting challenging and appropriate goals, and working towards them.
- 3c. Participates effectively and efficiently in groups to pursue and generate information.

#### **CIVIC EXPECTATIONS:**

1. Develops a healthy sense of self-worth and the worth of others.
2. Demonstrates mutual respect for all members of the school and town community.

#### **ETHICAL EXPECTATIONS**

1. Acts responsibly and respectfully toward him/herself and others.
2. Follows the established rules, guidelines and laws of the school community.
3. Explores, discusses and questions the moral issues that arise within the context of his/her day.
4. Demonstrates sensitivity to, and respect for, the perspectives, opinions, needs and customs of others.

### **Darien Standards addressed in this unit**

### **State Standards addressed**

Heredity and Evolution – What processes are responsible for life’s unity and diversity?  
10.5 - Evolution and biodiversity are the result of genetic changes that occur over time in constantly changing environments.

- Mutations and recombination of genes create genetic variability in populations.
- Changes in the environment may result in the selection of organisms that are better able to survive and reproduce.

D 5. Explain how the processes of genetic mutation and natural selection are related to the evolution of species.

D 6. Explain how the current theory of evolution provides a scientific explanation for fossil records of ancient life forms.

D 7. Describe how structural and behavioral adaptations increase the chances for organisms to survive in their environments.

### **National Standards addressed**

#### **Life Science**

##### **CONTENT STANDARD C:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Molecular basis of heredity
- Biological evolution
- Interdependence of organisms
- Behavior of organisms

##### **CONTENT STANDARD D:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Origin and evolution of the earth system
- Origin and evolution of the universe

#### **History and Nature of Science**

##### **CONTENT STANDARD G:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Science as a human endeavor
- Nature of scientific knowledge
- Historical perspectives

## **CONTENT KNOWLEDGE OBJECTIVES**

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### **Initial Understanding**

**Explore** Lamarck's theory of acquired characteristics.

**Examine** how Darwin's observations led him to the conclusion that life forms change over time.

### **Developing an Interpretation**

**Identify** the lines of evidence that led Darwin and others to suggest evolutionary theory.

### **Making Connections**

**Demonstrate** that the process of natural selection has provided the tremendous diversity of life on earth.

**Apply** their knowledge of genetics to explain how alterations have taken place in living organisms to create diversity.

### **Taking a Critical Stance**

**Theorize** about how the first living organisms were formed and how the evolution of the first autotrophs affected the future of life on earth.

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## **VOCABULARY**

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adaptation

analogous

comparative anatomy

comparative embryology

competition

evolution

extinct

fossil

homologous

law of use and disuse

mutation

natural selection

population

random

species

survival of the fittest

variation

vestigial

## ACTIVITIES

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<b>Lab:</b> Horse Evolution	Objectives: CT 10.5 D5, 6, 7
<b>Lab:</b> Evidence of Evolution	Objectives: CT 10.5 D5, 6, 7, D INQ 2
<b>Lab:</b> Natural Selection and Allele Frequency	Objectives: CT 10.5 D5, 6, 7, D INQ 8
<b>Lab:</b> How is Camouflage an Adaptive Advantage?	Objectives: CT 10.5 D5, 6, 7
<b>Lab:</b> Biochemical Evidence for Evolution	Objectives: CT 10.5 D5, 6, 7, 10.3
<b>Worksheet:</b> Inferences and Evolution (footprints)	Objectives: CT 10.5 D6, D INQ 2
<b>Essay:</b> Letter to Darwin	Objectives: CT D INQ 2, 6, 9, 10

## PERFORMANCE ASSESSMENT

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Letter to Darwin **Rubric**

## CAREER AWARENESS

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Archeologist	Forensic artist	Embryologist
Paleontologist	Biochemist	Dog Breeder

## CORE TEXT FOR STUDENTS

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Biology: An Everyday Experience by Daniel, Hummer, Kaskel - Published by Glencoe/McGraw-Hill

## ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS

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[www.Iconn.org](http://www.Iconn.org)

Selected materials from:	Page Number
Enrichment Worksheets Supplement	
Reteaching Supplement	
Study Guide Supplement	
Critical Thinking Supplement	

## MATERIALS AND SUPPLIES

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Materials as per lab procedures

## INTEGRATED TECHNOLOGY

---

Use library resources for Letter to Darwin

## **UNIT 10: Classification**

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## **UNIT 10: Classification**

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Essential Question 1: How and why are organisms grouped?

Essential Question 2: Why have classification systems changed over time?

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### **Expectations from DHS Mission Statement**

#### **ACADEMIC EXPECTATIONS**

1. Read actively and critically for a variety of purposes.
4. Listen actively and critically.
6. Reason effectively and solve problems.
8. Analyze problems from multiple perspectives by understanding past and present cultures.
10. Understand individual learning styles and apply them to his/her learning experiences.

#### **SOCIAL EXPECTATIONS:**

- 3a. Demonstrates emotional maturity by seeking support and responding constructively without violence, intimidation and aggression.
- 3c. Participates effectively and efficiently in groups to pursue and generate information.

#### **CIVIC EXPECTATIONS:**

1. Develops a healthy sense of self-worth and the worth of others.
2. Demonstrates mutual respect for all members of the school and town community.

#### **ETHICAL EXPECTATIONS**

1. Acts responsibly and respectfully toward him/herself and others.
2. Follows the established rules, guidelines and laws of the school community.
3. Explores, discusses and questions the moral issues that arise within the context of his/her day.
4. Demonstrates sensitivity to, and respect for, the perspectives, opinions, needs and customs of others.

### **Darien Standards addressed in this unit**

#### **State Standards addressed**

Heredity and Evolution – What processes are responsible for life’s unity and diversity?

10.5 - Evolution and biodiversity are the result of genetic changes that occur over time in constantly changing environments.

#### **National Standards addressed**

**Science as Inquiry****CONTENT STANDARD A:**

As a result of activities in grades 9 - 12, all students should develop

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

**History and Nature of Science****CONTENT STANDARD G:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Science as a human endeavor
- Nature of scientific knowledge
- Historical perspectives

## **CONTENT KNOWLEDGE OBJECTIVES**

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### **Initial Understanding**

**Understand** the use of binomial nomenclature in organizing living things.

### **Developing an Interpretation**

**Explain** how and why the classification system has changed and will continue to change.

**Describe** how advancements in technology have improved and altered the classification of organisms.

### **Making Connections**

**Relate** the necessity for classification in students' lives to the necessity of classifying organisms.

### **Taking a Critical Stance**

**Create** a phylogenetic key based on the evidence used for classification in biology.

Given several characteristics of a particular organism, appropriately **place** it in the proper taxa.

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## **VOCABULARY**

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binomial nomenclature	order
class	phylogeny
common name	phylum
domain	scientific name
family	species
genus	taxa
kingdom	taxonomy

## **ACTIVITIES**

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**LAB:** Using and Making a Biological Key (shark) Objective: CT 10.5

**LAB:** Construction and Use of a Dichotomous Key (paper shapes) Objective: CT 10.5

**Computer Lab:** The Tree of Life Project Objective: CT 10.5

## **PERFORMANCE ASSESSMENT**

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## **CAREER AWARENESS**

---

Taxonomist

Naturalist

Biochemist

## **CORE TEXT FOR STUDENTS**

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Biology: An Everyday Experience by Daniel, Hummer, Kaskel - Published by Glencoe/McGraw-Hill

## **ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS**

---

Selected materials from:

Page Number

Enrichment Worksheets Supplement

Reteaching Supplement

Study Guide Supplement

Critical Thinking Supplement

## **MATERIALS AND SUPPLIES**

---

Materials as per lab procedures

## **INTEGRATED TECHNOLOGY**

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Computer Lab for Tree of Life project.

## **UNIT 11: Reproduction**

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## **UNIT 11: Reproduction**

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Essential Question 1: What are the different methods of passing heritable material?

Essential Question 2: What are the structures of the human reproductive system and their functions?

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### **Expectations from DHS Mission Statement**

#### **ACADEMIC EXPECTATIONS**

1. Read actively and critically for a variety of purposes.
4. Listen actively and critically.
6. Reason effectively and solve problems.
8. Analyze problems from multiple perspectives by understanding past and present cultures.
10. Understand individual learning styles and apply them to his/her learning experiences.
12. Demonstrate an understanding of the concepts of wellness.

#### **SOCIAL EXPECTATIONS:**

- 3a. Demonstrates emotional maturity by seeking support and responding constructively without violence, intimidation and aggression.
- 3c. Participates effectively and efficiently in groups to pursue and generate information.

#### **CIVIC EXPECTATIONS:**

1. Develops a healthy sense of self-worth and the worth of others.
2. Demonstrates mutual respect for all members of the school and town community.

#### **ETHICAL EXPECTATIONS**

1. Acts responsibly and respectfully toward him/herself and others.
2. Follows the established rules, guidelines and laws of the school community.
3. Explores, discusses and questions the moral issues that arise within the context of his/her day.
4. Demonstrates sensitivity to, and respect for, the perspectives, opinions, needs and customs of others.

### **Darien Standards addressed in this unit**

#### **State Standards addressed**

Strand V: Genetics, Evolution and Biodiversity

Content Standards      Expected Performances

Heredity and Evolution – What processes are responsible for life's unity and diversity?

10.4. - In sexually reproducing organisms, each offspring contains a mix of characteristics inherited from both parents.

- Genetic information is stored in genes that are located on chromosomes inside the cell nucleus.
- Most organisms have two genes for each trait, one on each of the homologous chromosomes in the cell nucleus.

D 1. Explain how meiosis contributes to the genetic variability of organisms.

Heredity and Evolution – What processes are responsible for life’s unity and diversity?

10.5 - Evolution and biodiversity are the result of genetic changes that occur over time in constantly changing environments.

- Mutations and recombination of genes create genetic variability in populations.
- Changes in the environment may result in the selection of organisms that are better able to survive and reproduce.

D 7. Describe how structural and behavioral adaptations increase the chances for organisms to survive in their environments.

Science and Technology in Society – How do science and technology affect the quality of our lives?

10.6 - Living organisms have the capability of producing populations of unlimited size, but the environment can support only a limited number of individuals from each species.

- Human populations grow due to advances in agriculture, medicine, construction and the use of energy.

D 9. Explain how change in population density is affected by emigration, immigration, birth rate and death rate, and relate these factors to the exponential growth of human populations.

D 10. Explain how technological advances have affected the size and growth rate of human populations throughout history.

### **National Standards addressed**

#### **CONTENT STANDARD C:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Behavior of organisms

#### **CONTENT STANDARD F:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Personal and community health
- Population growth
- Science and technology in local, national, and global challenges

## **CONTENT KNOWLEDGE OBJECTIVES**

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### **Initial Understanding**

**Describe** the various patterns of reproduction that are shared by a wide variety of organisms demonstrating the theme of unity within diversity.

**Describe** the structures and associated functions of the human reproductive system.

**Describe** the various steps of the human menstrual cycle.

### **Developing an Interpretation**

**Analyze** the adaptations that exist allowing for external and internal fertilization.

### **Making Connections**

**Understand** the functioning of their own reproductive system and its similarities, in structure and function, to those of other forms of life.

### **Taking a Critical Stance**

**Compare and contrast** the various methods of reproduction and their efficiency and appropriateness for various species.

**Explore** the advantages expressed by those species that have evolved numerous methods for reproduction and defend the superiority of one method over one another.

## VOCABULARY

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alternation of generations	penis
anther	petal
binary fission	pistil
budding	pollen
conjugation	pollination
double fertilization	prostate gland
endosperm	regeneration
estrus	scrotum
filament	semen
flower	seminiferous tubules
follicle	sepal
fragmentation	sporophyte
gametophyte	stamen
hermaphroditic	stigma
hormone	style
menstrual cycle	testes
menstruation	urethra
ovary	uterus
oviduct	vagina
ovulation	vas deferens
ovule	vegetative reproduction

## ACTIVITIES

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<b>LAB:</b> Regeneration: A Form of Asexual Reproduction	Objectives: CT INQ 3,4,5,6,9
<b>LAB:</b> Flower Anatomy	Objectives: CT 10.4
<b>LAB:</b> Steps of the Menstrual Cycle	Objectives: CT 10.4
<b>VIDEO:</b> <i>Life's Greatest Miracle</i>	Objectives: CT 10.4

## PERFORMANCE ASSESSMENT

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### CAREER AWARENESS

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Obstetrician	Fertility specialist
Gynecologist	Horticulturalist
Midwife	Urologist
Proctologist	

## **CORE TEXT FOR STUDENTS**

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Biology: An Everyday Experience by Daniel, Hummer, Kaskel - Published by Glencoe/McGraw-Hill

## **ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS**

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*Life's Greatest Miracle* DVD (ISBN # 6307023651)

Selected materials from:	Page Number
Enrichment Worksheets Supplement	
Reteaching Supplement	
Study Guide Supplement	
Critical Thinking Supplement	

## **MATERIALS AND SUPPLIES**

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Materials as per lab procedures

## **INTEGRATED TECHNOLOGY**

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DVD Player

## **UNIT 12: Nutrition and Digestion**

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## **UNIT 12: Nutrition and Digestion**

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Essential Question 1: How and why do organisms obtain nutrients?

Essential Question 2: What are the structures of the human digestive system and their function?

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### **Expectations from DHS Mission Statement**

#### **ACADEMIC EXPECTATIONS**

1. Read actively and critically for a variety of purposes.
4. Listen actively and critically.
6. Reason effectively and solve problems.
8. Analyze problems from multiple perspectives by understanding past and present cultures.
10. Understand individual learning styles and apply them to his/her learning experiences.
12. Demonstrate an understanding of the concepts of wellness.

#### **SOCIAL EXPECTATIONS:**

- 3a. Demonstrates emotional maturity by seeking support and responding constructively without violence, intimidation and aggression.
- 3c. Participates effectively and efficiently in groups to pursue and generate information.

#### **CIVIC EXPECTATIONS:**

1. Develops a healthy sense of self-worth and the worth of others.
2. Demonstrates mutual respect for all members of the school and town community.

#### **ETHICAL EXPECTATIONS**

1. Acts responsibly and respectfully toward him/herself and others.
2. Follows the established rules, guidelines and laws of the school community.
3. Explores, discusses and questions the moral issues that arise within the context of his/her day.
4. Demonstrates sensitivity to, and respect for, the perspectives, opinions, needs and customs of others.

### **Darien Standards addressed in this unit**

#### **State Standards addressed**

Strand IV: Cell Chemistry and Biotechnology

Content Standards      Expected Performances

Structure and Function – How are organisms structured to ensure efficiency and survival?

10.1 - Fundamental life processes depend on the physical structure and the chemical activities of the cell.

- Most of the chemical activities of the cell are catalyzed by enzymes that function only in a narrow range of temperature and acidity conditions.

D 3. Describe the general role of enzymes in metabolic cell processes.

D 4. Explain the role of the cell membrane in supporting cell functions.

Heredity and Evolution – What processes are responsible for life’s unity and diversity?

10.5 - Evolution and biodiversity are the result of genetic changes that occur over time in constantly changing environments.

D7. Describe how structural and behavioral adaptations increase the chances for

### **National Standards addressed**

#### **CONTENT STANDARD B:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Chemical reactions

#### **CONTENT STANDARD C:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Behavior of organisms

#### **CONTENT STANDARD F:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Personal and community health
- Science and technology in local, national, and global challenges

### **History and Nature of Science**

#### **CONTENT STANDARD G:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Science as a human endeavor
- Nature of scientific knowledge
- Historical perspectives

## **CONTENT KNOWLEDGE OBJECTIVES**

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### **Initial Understanding**

**Describe** the nutritional needs of human beings.

**Describe** the structures and associated functions of the earthworm's digestive system.

**Describe** the structures and associated functions of the human digestive system.

### **Developing an Interpretation**

**Demonstrate** the necessity for digestion and compare the variety of designs employed by organisms to accomplish this function **defending** the suitability of these designs.

### **Making Connections**

**Distinguish between and recognize** the nutritional requirements of autotrophs and heterotrophs and **compare** the many ways organisms meet their nutritional needs.

### **Taking a Critical Stance**

**Compare and contrast** the digestive system of an earthworm to that of a human.

Students will **demonstrate** knowledge of a healthy diet and how human beings can meet their nutritional needs.

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## **VOCABULARY**

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anus

bile

chemical digestion

colon

crop

digestion

epiglottis

esophagus

extracellular digestion

gallbladder

gizzard

HCl

intracellular digestion

large intestine

mouth

nutrient

pancreas

pepsin

peristalsis

pharynx

physical digestion

salivary gland

small intestine

stomach

teeth

tongue

villi

## **ACTIVITIES**

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LAB: Protein Digestion	Objective: CT D INQ 3, 4, 5, 6, 7, 8, 9
LAB: Ingestion and Digestion in Protists	Objective: CT 10.1, 10.5 D7
LAB: Ingestion and Digestion in Planarians	Objective: CT 10.1, 10.5 D7
LAB: Does Soup Provide a Complete Meal?	Objective: CT 10.1, 10.5 D7
Activity: Goldfish Swallowing	Objective: CT 10.1, 10.5 D7

## **PERFORMANCE ASSESSMENT**

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## **CAREER AWARENESS**

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Dietician      Gastroenterologist      Nutritional anthropologist      Internist

## **CORE TEXT FOR STUDENTS**

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Biology: An Everyday Experience by Daniel, Hummer, Kaskel - Published by Glencoe/McGraw-Hill

## **ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS**

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Selected materials from:	Page Number
Enrichment Worksheets Supplement	
Reteaching Supplement	
Study Guide Supplement	
Critical Thinking Supplement	

## **MATERIALS AND SUPPLIES**

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Materials as per lab procedures

## **INTEGRATED TECHNOLOGY**

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## **UNIT 13: Transport**

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## **UNIT 13: Transport**

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Essential Question 1: How and why do necessary life materials move within an organism?

Essential Question 2: What are the structures of the human circulatory system and their functions?

Essential Question 3: How does the circulatory system of animals interact with other body systems?

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### **Expectations from DHS Mission Statement**

#### **ACADEMIC EXPECTATIONS**

1. Read actively and critically for a variety of purposes.
4. Listen actively and critically.
6. Reason effectively and solve problems.
8. Analyze problems from multiple perspectives by understanding past and present cultures.
10. Understand individual learning styles and apply them to his/her learning experiences.
12. Demonstrate an understanding of the concepts of wellness.

#### **SOCIAL EXPECTATIONS:**

- 3a. Demonstrates emotional maturity by seeking support and responding constructively without violence, intimidation and aggression.
- 3c. Participates effectively and efficiently in groups to pursue and generate information.

#### **CIVIC EXPECTATIONS:**

1. Develops a healthy sense of self-worth and the worth of others.
2. Demonstrates mutual respect for all members of the school and town community.

#### **ETHICAL EXPECTATIONS**

1. Acts responsibly and respectfully toward him/herself and others.
2. Follows the established rules, guidelines and laws of the school community.
3. Explores, discusses and questions the moral issues that arise within the context of his/her day.
4. Demonstrates sensitivity to, and respect for, the perspectives, opinions, needs and customs of others.

### **Darien Standards addressed in this unit**

### **State Standards addressed**

Strand IV: Cell Chemistry and Biotechnology

Content Standards      Expected Performances

Structure and Function – How are organisms structured to ensure efficiency and survival?

10.1 - Fundamental life processes depend on the physical structure and the chemical activities of the cell.

- Most of the chemical activities of the cell are catalyzed by enzymes that function only in a narrow range of temperature and acidity conditions.

D 4.    Explain the role of the cell membrane in supporting cell functions.

Heredity and Evolution – What processes are responsible for life’s unity and diversity?

10.5 - Evolution and biodiversity are the result of genetic changes that occur over time in constantly changing environments.

D7.    Describe how structural and behavioral adaptations increase the chances for survival.

### **National Standards addressed**

CONTENT STANDARD B:

As a result of their activities in grades 9-12, all students should develop an understanding of

- Chemical reactions

CONTENT STANDARD C:

As a result of their activities in grades 9-12, all students should develop an understanding of

- Behavior of organisms

CONTENT STANDARD F:

As a result of their activities in grades 9-12, all students should develop an understanding of

- Personal and community health
- Science and technology in local, national, and global challenges

### **History and Nature of Science**

CONTENT STANDARD G:

As a result of their activities in grades 9-12, all students should develop an understanding of

- Science as a human endeavor
- Nature of scientific knowledge
- Historical perspectives

## **CONTENT KNOWLEDGE OBJECTIVES**

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### **Initial Understanding**

**Understand and explain** the necessity for a means of transport in all organisms.

**Explore** the transport system in a vascular plant.

### **Developing an Interpretation**

**Explain** the existence of a system of transport in organisms whose cells are distant from the environment.

### **Making Connections**

**Compare and contrast** the variety of systems that provide transport in organism.

### **Taking a Critical Stance**

**Appreciate** the common characteristics as well as the improvements in complexity and efficiency of transport systems of organisms.

Students will be able to **demonstrate** an appreciation of the importance of maintaining cardiovascular health due to its vital role in connecting the other systems.

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## **VOCABULARY**

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antibody

antigen

aorta

artery

atrium

capillary

closed circulatory system

guard cell

lymph node

open circulatory system

phloem

platelet

red blood cell

root hair

sieve tube

valve

vein

ventricle

vessel

white blood cell

xylem

## **ACTIVITIES**

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<b>LAB:</b> <a href="#">What are the Parts of a Root?</a>	Objectives: CT 10.1, 10.5 D 7
<b>LAB:</b> <a href="#">Roots and Stems</a>	Objectives: CT 10.1, 10.5 D 7
<b>LAB:</b> <a href="#">Leaf Anatomy</a>	Objectives: CT 10.1, 10.5 D 7
<b>LAB:</b> What are the Parts of a Leaf?	Objectives: CT 10.1, 10.5 D 7
<b>LAB:</b> <a href="#">Components of Human Blood</a>	Objectives: CT 10.1, 10.5 D 7
<b>LAB:</b> <a href="#">What Blood Types Can Be Mixed?</a>	Objectives: CT 10.1, 10.5 D 7
<b>LAB:</b> Capillary Circulation in Fish	Objectives: CT 10.1, 10.5 D 7

## **PERFORMANCE ASSESSMENT**

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## **CAREER AWARENESS**

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Cardiologist                  Heart Surgeon                  Phlebotomist                  Lab technician

## **CORE TEXT FOR STUDENTS**

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Biology: An Everyday Experience by Daniel, Hummer, Kaskel - Published by Glencoe/McGraw-Hill

## **ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS**

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### [Human Circulation Worksheets](#)

Selected materials from:	Page Number
Enrichment Worksheets Supplement	
Reteaching Supplement	
Study Guide Supplement	
Critical Thinking Supplement	

## **MATERIALS AND SUPPLIES**

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Materials as per lab procedures

## **INTEGRATED TECHNOLOGY**

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## **UNIT 14: Gas Exchange and Excretion**

## **UNIT 14: Gas exchange and Excretion**

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Essential Question 1: How and why is gas exchange important in maintaining homeostasis?

Essential Question 2: How and why is excretion of metabolic waste important in maintaining homeostasis?

Essential Question 3: What are the structures of the human gas exchange system and their functions?

Essential Question 4: What are the structures of the human excretory system and their functions?

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### **Expectations from DHS Mission Statement**

#### **ACADEMIC EXPECTATIONS**

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4. Listen actively and critically.
6. Reason effectively and solve problems.
8. Analyze problems from multiple perspectives by understanding past and present cultures.
10. Understand individual learning styles and apply them to his/her learning experiences.
12. Demonstrate an understanding of the concepts of wellness.

#### **SOCIAL EXPECTATIONS:**

- 3a. Demonstrates emotional maturity by seeking support and responding constructively without violence, intimidation and aggression.
- 3c. Participates effectively and efficiently in groups to pursue and generate information.

#### **CIVIC EXPECTATIONS:**

1. Develops a healthy sense of self-worth and the worth of others.
2. Demonstrates mutual respect for all members of the school and town community.

#### **ETHICAL EXPECTATIONS**

1. Acts responsibly and respectfully toward him/herself and others.
2. Follows the established rules, guidelines and laws of the school community.
3. Explores, discusses and questions the moral issues that arise within the context of his/her day.
4. Demonstrates sensitivity to, and respect for, the perspectives, opinions, needs and customs of others.

### **Darien Standards addressed in this unit**

**State Standards addressed**

Strand IV: Cell Chemistry and Biotechnology

Content Standards      Expected Performances

Structure and Function – How are organisms structured to ensure efficiency and survival?

10.1 - Fundamental life processes depend on the physical structure and the chemical activities of the cell.

- Most of the chemical activities of the cell are catalyzed by enzymes that function only in a narrow range of temperature and acidity conditions.

D 4.    Explain the role of the cell membrane in supporting cell functions.

Heredity and Evolution – What processes are responsible for life’s unity and diversity?

10.5 - Evolution and biodiversity are the result of genetic changes that occur over time in constantly changing environments.

D7.    Describe how structural and behavioral adaptations increase the chances for survival.

**National Standards addressed**

CONTENT STANDARD B:

As a result of their activities in grades 9-12, all students should develop an understanding of

- Chemical reactions

CONTENT STANDARD C:

As a result of their activities in grades 9-12, all students should develop an understanding of

- Behavior of organisms

CONTENT STANDARD F:

As a result of their activities in grades 9-12, all students should develop an understanding of

- Personal and community health
- Science and technology in local, national, and global challenges

**History and Nature of Science**

CONTENT STANDARD G:

As a result of their activities in grades 9-12, all students should develop an understanding of

- Science as a human endeavor
- Nature of scientific knowledge
- Historical perspectives

## **CONTENT KNOWLEDGE OBJECTIVES**

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### **Initial Understanding**

**Discuss** the role of gas exchange in plants and its necessity in maintaining homeostasis.

**Discuss** the role of the respiratory system in animals and its necessity in maintaining homeostasis.

**Explore** the necessity for having adaptations for maintaining osmotic balance in organisms.

### **Developing an Interpretation**

**Describe** the process of maintaining osmotic balance and excretion in simple freshwater organisms.

**Describe** the function of excretion and the maintenance of osmotic equilibrium in those animals possessing a circulatory system.

### **Making Connections**

**Understand** the function of the human excretory system and its necessity for maintaining homeostasis.

### **Taking a Critical Stance**

**Compare and contrast** the functioning of the respiratory systems of the animal kingdom including annelids, bony fish, mammals and humans.

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## **VOCABULARY**

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alveolus

Bowman's capsule (glomerular capsule)

bronchus

diaphragm

excretion

gill

glomerulus

kidney

lung

nephron

nitrogenous waste

nostril

respiration

trachea

ureter

urethra

urinary bladder

urine

## **ACTIVITIES**

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LAB: Comparing Dormant and Germinating Seeds Objectives: CT 10.1 D1, 4, 10.5 D 7

LAB: Effect of Temperature Changes on Breathing Rate of Fish

Objectives: CT 10.1 D1, 4, 10.5 D 7

LAB: Effect of Exercise on CO<sub>2</sub> Release Objectives: CT D INQ 5, 6, 7, 8, 9

LAB: Spirometer Measurement Objectives: CT D INQ 5, 6, 7, 8, 9

## **PERFORMANCE ASSESSMENT**

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## **CAREER AWARENESS**

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Respiratory Therapist

Pulmonologist

Nephrologist

OSHA

## **CORE TEXT FOR STUDENTS**

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Biology: An Everyday Experience by Daniel, Hummer, Kaskel - Published by Glencoe/McGraw-Hill

## **ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS**

---

Selected materials from:

Page Number

Enrichment Worksheets Supplement

Reteaching Supplement

Study Guide Supplement

Critical Thinking Supplement

## **MATERIALS AND SUPPLIES**

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Materials as per lab procedures

## **INTEGRATED TECHNOLOGY**

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## **UNIT 15: Nervous Control**

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## **UNIT 15: Nervous Control**

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Essential Question 1: What is the structure and function of a neuron?

Essential Question 2: What is the role of the nervous system in maintaining homeostasis?

Essential Question 3: What are the significance of the steps in a reflex arc?

---

### **Expectations from DHS Mission Statement**

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8. Analyze problems from multiple perspectives by understanding past and present cultures.
10. Understand individual learning styles and apply them to his/her learning experiences.
12. Demonstrate an understanding of the concepts of wellness.

#### **SOCIAL EXPECTATIONS:**

- 3a. Demonstrates emotional maturity by seeking support and responding constructively without violence, intimidation and aggression.
- 3c. Participates effectively and efficiently in groups to pursue and generate information.

#### **CIVIC EXPECTATIONS:**

1. Develops a healthy sense of self-worth and the worth of others.
2. Demonstrates mutual respect for all members of the school and town community.

#### **ETHICAL EXPECTATIONS**

1. Acts responsibly and respectfully toward him/herself and others.
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### **Darien Standards addressed in this unit**

#### **State Standards addressed**

Strand IV: Cell Chemistry and Biotechnology

Content Standards      Expected Performances

Structure and Function – How are organisms structured to ensure efficiency and survival?

10.1 - Fundamental life processes depend on the physical structure and the chemical activities of the cell.

- Most of the chemical activities of the cell are catalyzed by enzymes that function only in a narrow range of temperature and acidity conditions.

D 4. Explain the role of the cell membrane in supporting cell functions.

Heredity and Evolution – What processes are responsible for life’s unity and diversity?

10.5 - Evolution and biodiversity are the result of genetic changes that occur over time in constantly changing environments.

D7. Describe how structural and behavioral adaptations increase the chances for survival.

### **National Standards addressed**

#### **CONTENT STANDARD B:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Chemical reactions

#### **CONTENT STANDARD C:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Behavior of organisms

#### **CONTENT STANDARD F:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Personal and community health
- Science and technology in local, national, and global challenges

### **History and Nature of Science**

#### **CONTENT STANDARD G:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Science as a human endeavor
- Nature of scientific knowledge
- Historical perspectives

## **CONTENT KNOWLEDGE OBJECTIVES**

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### **Initial Understanding**

**Describe** the structure of a neuron and demonstrate its relationship to its function.

**Describe** the structures of the Central Nervous System and Peripheral Nervous System.

**Demonstrate** the pathway of an impulse through the nervous system and describe the types of neurons that transport these impulses.

### **Developing an Interpretation**

**Diagram** the transmission of an impulse and explain how this transmission produces an all-or-none response.

### **Making Connections**

**Explain** the interaction that drugs have with the nervous system.

**Explain** the complex workings of the human nervous system and its interaction with the other systems.

### **Taking a Critical Stance**

**Demonstrate** an understanding of the reflex arc and describe its evolutionary rationale.

**Compare and contrast** the nervous systems of animals with an appreciation of the increased complexity derived through evolution.

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## **VOCABULARY**

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action potential

axon

central nervous system

cerebellum

cerebrum

dendrite

effector

interneuron

involuntary

medulla oblongata

motor neuron

myelin sheath

nerve

neuron

neurotransmitter

peripheral nervous system

receptor

reflex

resting potential

sensory neurons

stimuli

synapse

terminal axon

voluntary

## **ACTIVITIES**

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<b>LAB:</b> Sensory Reception	Objectives: CT 10.1 D4, 10.5 D7 INQ 6, 7, 8, 9
<b>LAB:</b> Visual Purple	Objectives: 10.1 D4, 10.5 D7
<b>LAB:</b> Reliability of your Visual Sense	Objectives: 10.1 D4, 10.5 D7
<b>LAB:</b> Reaction Time	Objectives: 10.1 D4, 10.5 D7 INQ 6, 7, 8, 9

## **PERFORMANCE ASSESSMENT**

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## **CAREER AWARENESS**

---

Ophthalmologist	Audiologist	Neurologist	Anesthesiologist
Brain Surgeon	Substance abuse counselor		

## **CORE TEXT FOR STUDENTS**

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Biology: An Everyday Experience by Daniel, Hummer, Kaskel - Published by Glencoe/McGraw-Hill

## **ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS**

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Selected materials from:	Page Number
Enrichment Worksheets Supplement	
Reteaching Supplement	
Study Guide Supplement	
Critical Thinking Supplement	

## **MATERIALS AND SUPPLIES**

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Materials as per lab procedures

## **INTEGRATED TECHNOLOGY**

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## **UNIT 16: Movement**

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## **UNIT 16: Movement**

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Essential Question 1: How and why do organisms move?

Essential Question 2: What are the components of a skeletal system and their functions?

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### **Expectations from DHS Mission Statement**

#### **ACADEMIC EXPECTATIONS**

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6. Reason effectively and solve problems.
8. Analyze problems from multiple perspectives by understanding past and present cultures.
10. Understand individual learning styles and apply them to his/her learning experiences.
12. Demonstrate an understanding of the concepts of wellness.

#### **SOCIAL EXPECTATIONS:**

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#### **ETHICAL EXPECTATIONS**

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### **Darien Standards addressed in this unit**

#### **State Standards addressed**

Strand IV: Cell Chemistry and Biotechnology

Content Standards      Expected Performances

Structure and Function – How are organisms structured to ensure efficiency and survival?

10.1 - Fundamental life processes depend on the physical structure and the chemical activities of the cell.

- Most of the chemical activities of the cell are catalyzed by enzymes that function only in a narrow range of temperature and acidity conditions.

D 4. Explain the role of the cell membrane in supporting cell functions.

Heredity and Evolution – What processes are responsible for life’s unity and diversity?

10.5 - Evolution and biodiversity are the result of genetic changes that occur over time in constantly changing environments.

D7. Describe how structural and behavioral adaptations increase the chances for survival.

### **National Standards addressed**

#### **CONTENT STANDARD B:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Chemical reactions

#### **CONTENT STANDARD C:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Behavior of organisms

#### **CONTENT STANDARD F:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Personal and community health
- Science and technology in local, national, and global challenges

### **History and Nature of Science**

#### **CONTENT STANDARD G:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Science as a human endeavor
- Nature of scientific knowledge
- Historical perspectives

## **CONTENT KNOWLEDGE OBJECTIVES**

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### **Initial Understanding**

**Discuss** the five major ways in which bones meet to form different types of joints, allowing for movement.

**Demonstrate** locomotion methods in organisms without skeletons.

### **Developing an Interpretation**

**Compare and contrast** the endoskeleton and exoskeleton, identifying the advantages and disadvantages of each.

### **Making Connections**

**Make connections** between the skeletal and muscular systems in the human and their interaction to create locomotion.

### **Taking a Critical Stance**

**Distinguish** among the three types of vertebrate muscle and their specific roles.

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## **VOCABULARY**

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ball and socket joint  
cardiac muscle  
cartilage  
extensor  
fixed joint  
flexor  
gliding joint

hinge joint  
ligament  
pivot joint  
smooth muscle  
striated muscle  
tendon

## **ACTIVITIES**

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**LAB:** Skeletal Muscles

Objectives: 10.1 D4, 10.5 D7

**LAB:** What Causes Sports Injuries?

Objectives: 10.1 D4, 10.5 D7

**LAB:** How do Male and Female Skeletons Differ?

Objectives: 10.1 D4, 10.5 D7

## **PERFORMANCE ASSESSMENT**

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## **CAREER AWARENESS**

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Orthopedist    Physical therapist    Sports Trainer    Massage Therapist  
Taxidermist

## **CORE TEXT FOR STUDENTS**

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Biology: An Everyday Experience by Daniel, Hummer, Kaskel - Published by Glencoe/McGraw-Hill

## **ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS**

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Selected materials from:	Page Number
Enrichment Worksheets Supplement	
Reteaching Supplement	
Study Guide Supplement	
Critical Thinking Supplement	

## **MATERIALS AND SUPPLIES**

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Materials as per lab procedures

## **INTEGRATED TECHNOLOGY**

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## **UNIT 17: Ecosystems**

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## **UNIT 17: Ecosystems**

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Essential Question 1: How are energy and nutrients made available to all members of a community?

Essential Question 2: What are the various relationships between the trophic levels?

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### **Expectations from DHS Mission Statement**

#### ACADEMIC EXPECTATIONS

1. Read actively and critically for a variety of purposes.
4. Listen actively and critically.
6. Reason effectively and solve problems.

#### SOCIAL

- 3c. Participates effectively and efficiently in groups to pursue and generate information.

#### CIVIC

4. Understands the human impact on the environment.

#### ETHICAL EXPECTATIONS

1. Acts responsibly and respectfully toward him/herself and others.
2. Follows the established rules, guidelines and laws of the school community.
3. Explores, discusses and questions the moral issues that arise within the context of his/her day.
4. Demonstrates sensitivity to, and respect for, the perspectives, opinions, needs and customs of others.

### **List State Framework Standards Addressed:**

Grade 9: Core Themes, Content Standards and Expected Performances

Strand I: Energy Transformations Content Standards

Energy Transfer and Transformations – What is the role of energy in our world?

9.1 - Energy cannot be created or destroyed; however, energy can be converted from one form to another.

- Energy enters the Earth system primarily as solar radiation, is captured by materials and photosynthetic processes, and eventually is transformed into heat.

Grade 10: Core Themes, Content Standards and Expected Performances

Science and Technology in Society – How do science and technology affect the quality of our lives?

10.6 - Living organisms have the capability of producing populations of unlimited size, but the environment can support only a limited number of individuals from each species.

D 8. Describe the factors that affect the carrying capacity of the environment.

D 9. Explain how change in population density is affected by emigration, immigration, birth rate and death rate, and relate these factors to the exponential growth of human populations.

**List National Standards addressed:**

**CONTENT STANDARD B:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Chemical reactions
- Conservation of energy and increase in disorder
- Interactions of energy and matter

**Life Science: CONTENT STANDARD C:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Interdependence of organisms
- Matter, energy, and organization in living systems
- Behavior of organisms

**CONTENT STANDARD D:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Energy in the earth system
- Geochemical cycles
- Origin and evolution of the earth system

**History and Nature of Science**

**CONTENT STANDARD G:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Science as a human endeavor
- Nature of scientific knowledge
- Historical perspectives

**Science in personal and cultural perspectives: CONTENT STANDARD F:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Population growth

- Natural resources
- Environmental quality
- Natural and human-induced hazards
- Science and technology in local, national, and global challenges

## **CONTENT KNOWLEDGE OBJECTIVES**

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### **Initial Understanding**

**Trace** the pathway of energy through an ecosystem using an energy pyramid and stressing the necessity of a constant source of energy.

**Examine** the recycling of materials in an ecosystem and describe the carbon, nitrogen and water cycles.

**Discuss** the symbiotic relationships that exist between organisms in an ecosystem giving specific examples of commensalism, parasitism and mutualism.

### **Developing an Interpretation**

**Demonstrate** an understanding that ecosystems vary in their interaction of biotic and abiotic factors.

### **Making Connections**

**Examine** the various biomes of the planet and demonstrate the abiotic and biotic factors that are elements of these biomes.

### **Taking a Critical Stance**

Given a particular example of an ecosystem, **predict** the influence of any change in the biotic and or abiotic factors on the stability of the system.

## VOCABULARY

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abiotic factor	food web
algal bloom	mutualism
biomass	herbivore
biotic factor	omnivore
carnivore	parasitism
commensalism	producer
consumer	trophic level
decomposer	scavenger
ecosystem	symbiosis
first-order consumer	

## ACTIVITIES

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<b>LAB:</b> A Yeast Population Study	Objectives: CT D INQ 6,7,8,9
<b>LAB:</b> Owl Pellet Dissection	Objectives: CT D INQ 6,7,8,9
<b>LAB:</b> Field Studies of a Freshwater Ecosystem	Objectives: CT D INQ 6,7,8,9
<b>LAB:</b> Graphing Growth in the Human Population	Objectives: CT D INQ 6,7,8,9, 10.6

## PERFORMANCE ASSESSMENT

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## CAREER AWARENESS

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Ecologist	Hydrologist	Park Naturalist
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## CORE TEXT FOR STUDENTS

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Biology: An Everyday Experience by Daniel, Hummer, Kaskel - Published by Glencoe/McGraw-Hill

## ADDITIONAL TEXTS/ RESOURCES FOR USE BY STUDENTS

---

Selected materials from:	Page Number
Enrichment Worksheets Supplement	
Reteaching Supplement	
Study Guide Supplement	
Critical Thinking Supplement	

## **MATERIALS AND SUPPLIES**

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Materials as per lab procedures

## **INTEGRATED TECHNOLOGY**

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### **SECTION III - Goals and Standards**

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## **RELATED GOALS and STANDARDS**

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Darien Standards for this subject discipline

## **The Connecticut Framework – K-12 Curriculum Goals and Standards**

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Grades 9-10 Core Scientific Inquiry, Literacy and Numeracy

How is scientific knowledge created and communicated?

Content Standards    Expected Performances

### **SCIENTIFIC INQUIRY**

- Scientific inquiry is a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena.
- Scientific inquiry progresses through a continuous process of questioning, data collection, analysis and interpretation.
- Scientific inquiry requires the sharing of findings and ideas for critical review by colleagues and other scientists.

### **SCIENTIFIC LITERACY**

- Scientific literacy includes the ability to read, write, discuss and present coherent ideas about science.
- Scientific literacy also includes the ability to search for and assess the relevance and credibility of scientific information found in various print and electronic media.

### **SCIENTIFIC NUMERACY**

- Scientific numeracy includes the ability to use mathematical operations and procedures to calculate, analyze and present scientific data and ideas.
- D INQ.1        Identify questions that can be answered through scientific investigation.
- D INQ.2        Read, interpret and examine the credibility and validity of scientific claims in different sources of information.
- D INQ.3        Formulate a testable hypothesis and demonstrate logical connections between the scientific concepts guiding the hypothesis and the design of the experiment.
- D INQ.4        Design and conduct appropriate types of scientific investigations to answer different questions.
- D INQ.5        Identify independent and dependent variables, including those that are kept constant and those used as controls.
- D INQ.6        Use appropriate tools and techniques to make observations and gather data.
- D INQ.7        Assess the reliability of the data that was generated in the investigation.
- D INQ.8        Use mathematical operations to analyze and interpret data, and present relationships between variables in appropriate forms.
- D INQ.9        Articulate conclusions and explanations based on research data, and assess results based on the design of the investigation.
- D INQ.10      Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.

## **Grade 9**

Core Themes, Content Standards and Expected Performances

Strand I: Energy Transformations Content Standards

Energy Transfer and Transformations – What is the role of energy in our world?

9.1 - Energy cannot be created or destroyed; however, energy can be converted from one form to another.

- Energy enters the Earth system primarily as solar radiation, is captured by materials and photosynthetic processes, and eventually is transformed into heat.

## **Grade 10**

Core Themes, Content Standards and Expected Performances

Strand IV: Cell Chemistry and Biotechnology

Content Standards      Expected Performances

Structure and Function – How are organisms structured to ensure efficiency and survival?

10.1 - Fundamental life processes depend on the physical structure and the chemical activities of the cell.

- Most of the chemical activities of the cell are catalyzed by enzymes that function only in a narrow range of temperature and acidity conditions.
- The cellular processes of photosynthesis and respiration involve transformation of matter and energy.

D 1. Describe significant similarities and differences in the basic structure of plant and animal cells.

D 2. Describe the general role of DNA and RNA in protein synthesis.

D 3. Describe the general role of enzymes in metabolic cell processes.

D 4. Explain the role of the cell membrane in supporting cell functions.

Science and Technology in Society – How do science and technology affect the quality of our lives?

10.2 - Microorganisms have an essential role in life processes and cycles on Earth.

- Understanding the growth and spread patterns of viruses and bacteria enables the development of methods to prevent and treat infectious diseases.

D 5. Describe the similarities and differences between bacteria and viruses.

D 6. Describe how bacterial and viral infectious diseases are transmitted, and explain the roles of sanitation, vaccination and antibiotic medications in the prevention and treatment of infectious diseases.

D 7. Explain how bacteria and yeasts are used to produce foods for human consumption.

Science and Technology in Society – How do science and technology affect the quality of our lives?

10.3 - Similarities in the chemical and structural properties of DNA in all living organisms allow the transfer of genes from one organism to another.

- The principles of genetics and cellular chemistry can be used to produce new foods and medicines in biotechnological processes.

D 8. Describe, in general terms, how the genetic information of organisms can be altered to make them produce new materials.

D 9. Explain the risks and benefits of altering the genetic composition and cell products of existing organisms.

## **Grade 10**

Core Themes, Content Standards and Expected Performances

Strand V: Genetics, Evolution and Biodiversity

Content Standards Expected Performances

Heredity and Evolution – What processes are responsible for life’s unity and diversity?

10.4. - In sexually reproducing organisms, each offspring contains a mix of characteristics inherited from both parents.

- Genetic information is stored in genes that are located on chromosomes inside the cell nucleus.
- Most organisms have two genes for each trait, one on each of the homologous chromosomes in the cell nucleus.

D 1. Explain how meiosis contributes to the genetic variability of organisms.

D 2. Use the Punnett Square technique to predict the distribution of traits in mono- and dihybrid crossings.

D 3. Deduce the probable mode of inheritance of traits (e.g., recessive/dominant, sex-linked) from pedigree diagrams showing phenotypes.

D 4. Describe the difference between genetic disorders and infectious diseases.

Heredity and Evolution – What processes are responsible for life’s unity and diversity?

10.5 - Evolution and biodiversity are the result of genetic changes that occur over time in constantly changing environments.

- Mutations and recombination of genes create genetic variability in populations.
- Changes in the environment may result in the selection of organisms that are better able to survive and reproduce.

D 5. Explain how the processes of genetic mutation and natural selection are related to the evolution of species.

D 6. Explain how the current theory of evolution provides a scientific explanation for fossil records of ancient life forms.

D 7. Describe how structural and behavioral adaptations increase the chances for organisms to survive in their environments.

Science and Technology in Society – How do science and technology affect the quality of our lives?

10.6 - Living organisms have the capability of producing populations of unlimited size, but the environment can support only a limited number of individuals from each species.

- Human populations grow due to advances in agriculture, medicine, construction and the use of energy.
- Humans modify ecosystems as a result of rapid population growth, use of technology and consumption of resources.

D 8. Describe the factors that affect the carrying capacity of the environment.

D 9. Explain how change in population density is affected by emigration, immigration, birth rate and death rate, and relate these factors to the exponential growth of human populations.

D 10. Explain how technological advances have affected the size and growth rate of human populations throughout history.

## **NSTA National Standards**

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National committee on science education standards and assessment, national research council

ISBN: 0-309-54985-x, 272 pages, 8 1/4 x 10 1/2, (1996)

This free PDF was downloaded from: <http://www.nap.edu/catalog/4962.html>

### **Science as Inquiry**

#### **CONTENT STANDARD A:**

As a result of activities in grades 9 - 12, all students should develop

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

#### **CONTENT STANDARD B:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Structure of atoms
- Structure and properties of matter
- Chemical reactions
- Motions and forces
- Conservation of energy and increase in disorder
- Interactions of energy and matter

### **Life Science**

#### **CONTENT STANDARD C:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- The cell
- Molecular basis of heredity
- Biological evolution
- Interdependence of organisms
- Matter, energy, and organization in living systems
- Behavior of organisms

#### **CONTENT STANDARD D:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Energy in the earth system
- Geochemical cycles
- Origin and evolution of the earth system
- Origin and evolution of the universe

### **Science and Technology**

**CONTENT STANDARD E:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Abilities of technological design
- Understandings about science and technology

**Science in personal and cultural perspectives**

**CONTENT STANDARD F:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Personal and community health
- Population growth
- Natural resources
- Environmental quality
- Natural and human-induced hazards
- Science and technology in local, national, and global challenges

**History and Nature of Science**

**CONTENT STANDARD G:**

As a result of their activities in grades 9-12, all students should develop an understanding of

- Science as a human endeavor
- Nature of scientific knowledge
- Historical perspectives

## **SECTION IV – Learning Resources**

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## SUPPLEMENTAL RESOURCES

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<a href="#"><u>Midterm Examination Vocabulary List</u></a>	.....
<a href="#"><u>Final Examination Vocabulary List</u></a>	.....
<a href="#"><u>Example Essay Rubric</u></a>	.....
<a href="#"><u>Example Lab Report Format</u></a>	.....
<a href="#"><u>Example Lab Report Rubric</u></a>	.....
<a href="#"><u>Example Project Rubric</u></a>	.....

## Midterm Examination Vocabulary Review List

1. consumers
2. decomposers
3. cellular respiration
4. organization
5. reproduction
6. ecosystem
7. chlorophyll
8. organ
9. energy
10. theory
11. electron microscope
12. resolution
13. variable
14. cell theory
15. osmosis
16. cell membrane
17. prokaryote
18. nucleus
19. ER
20. cell wall
21. lysosome
22. chloroplasts
23. passive transport
24. nucleolus
25. endocytosis
26. chromatids
27. allele
28. haploid
29. mitosis (in detail)
30. spontaneous generation
31. centrioles
32. Punnett square
33. homozygous
34. dominant allele
35. genotype
36. producers
37. photosynthesis
38. development
39. adaptation
40. homeostasis
41. community
42. tissue
43. system
44. hypothesis
45. magnification
46. control group
47. experimental group
48. diffusion
49. equilibrium
50. fluid mosaic model
51. eukaryote
52. ribosome
53. Golgi body
54. cytoplasm
55. active transport
56. contractile vacuole
57. vacuoles
58. mitochondria
59. exocytosis
60. chromosome
61. gene
62. diploid
63. meiosis (in detail)
64. sex chromosome
65. zygotes
66. gametes
67. centromeres
68. Mendel
69. heterozygous
70. recessive allele
71. phenotype
72. codominance
73. gene expression
74. hemophilia
75. sickle cell anemia
76. DNA
77. RNA
78. protein
79. thymine
80. guanine
81. deoxyribose sugar
82. nitrogen bases
83. amino acids
84. double helix
85. parasite
86. predator
87. sex-linked trait
88. blood types
89. Down Syndrome
90. Huntington's disease
91. Adenine
92. Cytosine
93. nucleotides
94. phosphates
95. proteins
96. replication
97. Watson & Crick
98. host
99. prey
100. natural selection
101. variation
102. mutation
103. evolution

## Final Examination Vocabulary Review List

### EVOLUTION

Charles Darwin  
fossils  
natural selection  
artificial selection  
homologous structures  
analogous structures  
comparative embryology  
comparative biochemistry  
gene pool  
fossil record

### CLASSIFICATION

domain  
kingdom  
phylum  
class  
order  
family  
genus  
species  
scientific names  
binomial nomenclature  
phylogeny  
Monera  
Protista  
Animalia  
Plantae  
Fungi

### REPRODUCTION

asexual reproduction  
vegetative reproduction  
pollination  
flower, structures and functions  
fragmentation  
fertilization  
endosperm  
double fertilization  
pollen  
egg  
human reproductive systems  
sperm  
menstrual cycle

estrus  
budding  
conjugation

### NUTRITION AND DIGESTION

earthworm digestive system, structures and functions  
human digestive system, structures and functions  
nutrients  
protein  
water  
carbohydrates  
minerals  
vitamins  
fats  
autotrophs  
heterotrophs  
extracellular digestion  
intracellular digestion  
one-way traffic  
two-way traffic  
filter feeding

### TRANSPORT

xylem  
phloem  
roots  
stems  
leaves  
red blood cells  
white blood cells  
antibodies  
antigens  
blood types  
platelets  
human heart, structures and functions  
valves  
veins  
arteries  
capillaries

**EXCRETION AND GAS EXCHANGE**

contractile vacuole  
osmotic balance  
flame cells  
gills  
kidneys  
nephron  
human respiratory system  
inhalation  
exhalation  
diaphragm  
breathing rate  
urine  
nitrogen wastes  
diffusion

**NERVOUS SYSTEM**

stimulus  
response  
sensory  
effector cells  
receptor cells  
motor neurons  
interneurons  
impulse  
neurotransmitters  
reflex act  
reflex arc  
axon  
dendrite  
axon terminal  
cell body  
myelin

**MOVEMENT**

muscle  
endoskeleton  
exoskeleton  
joints

tendons  
ligaments  
cartilage  
hinge joint  
fixed joint  
ball and socket joint  
smooth muscle  
skeletal muscle  
cardiac muscle  
extensor  
flexor  
involuntary muscle  
voluntary muscle

**ECOLOGY**

abiotic factors  
biotic factors  
mutualism  
photosynthesis  
cellular respiration  
ecosystems  
omnivore  
herbivore  
carnivore  
energy  
consumer  
producer  
community  
environment  
decomposer  
predators  
scavengers  
trophic levels:  
first-order consumers  
second-order consumers  
third-order consumers  
food chain  
food web

## Letter to Darwin Essay: EXAMPLE Rubric

<b>Name:</b>		<b>Final Score:</b>		
This analytic rubric is used to verify specific tasks performed when producing an essay. If the task has been successfully completed, all points are awarded. If the task is incomplete half points may be awarded. No points are awarded if the task is not attempted.				
Category	Scoring Criteria	Points	Student Evaluation	Teacher Evaluation
<b>Introduction</b> <i>20 points</i>	A thesis statement makes the purpose of the essay clear. <i>(Thesis statements do not begin, "this essay is about".)</i>	<b>5</b>		
	Background information is provided to establish the importance and scientific context of the thesis statement. <i>(Include definitions of key terms or a short outline of a complicated concept. Don't assume Darwin knows what you are talking about)</i>	<b>15</b>		
<b>Body</b> <i>30 points</i>	Three distinct sources of variation are presented and explained	<b>15</b>		
	Biological concepts for the topic are well covered. <i>DNA, RNA, Genes, Traits, Adaptation, Mutation, Evolution</i>	<b>10</b>		
	The essay demonstrates the application of the most current scientific information to the student's ideas about the topic. <i>(Parenthetical citation should be included.)</i>	<b>5</b>		
	Information in the essay is presented in the student's own words, not "cut and pasted" from research sources. <i>(Any complex terms must be explained)</i>	<b>5</b>		
<b>Conclusion</b> <i>20 points</i>	Student's thoughts presented in the essay are summarized. <i>(This is your chance to emphasize the point of the essay.)</i>	<b>10</b>		
	The most important research findings are restated. <i>(What do you want the reader to remember?)</i>	<b>5</b>		
	No new information is introduced.	<b>5</b>		
<b>Overall</b> <i>30 points</i>	The essay is printed on white paper using black ink with 1-inch margins around all edges with double spacing between lines and Times New Roman or Arial 12-point font.	<b>5</b>		
	First person statements in the essay are supported by outside sources <i>(this means parenthetical citations and a works cited)</i>	<b>10</b>		
	There are no spelling errors or visible corrections. <i>(Proofreading is required - even with spell check.)</i>	<b>5</b>		
	There are no obvious grammar or punctuation errors. <i>(Such as the use of "their - there", and "to - too - two")</i>	<b>5</b>		
<b>Score</b>	<b>Total Points</b>	<b>100</b>		
<b>Self-evaluation</b>	Students are expected to honestly evaluate their own work. If the difference between the student evaluation and the teacher evaluation is less than 5 points, 5 points will be added to the final score when the grade is recorded.			
<b>Deadline</b>	All turned-in assignments will be completed by the assigned deadline. Essays submitted the day after the deadline will receive 3/4 credit. Papers turned after that time will be mulched for use in the greenhouse. The due date for this assignment is: _____			

## Protein Digestion Lab Report

### Lab Reports should follow the following format.

1. **Introduction:** Include a statement of the problem investigated, why the work was carried out, background of the problem including an explanation of how the problem relates to you and the world, a brief statement of the general method of approach to the problem, and expected results.
2. **Methods and materials:** This section tells the reader how and with what “stuff” the work was done. You should try to strike a balance between an over-detailed description of even the most trivial items and a very sketchy statement that provides insufficient information. The important guideline is that another worker of similar training and ability, following your description, should get the same results. This section should be written as a description of what you did, not as a set of instructions.
3. **Results:** Here is the real meat of a report. In this section you should **describe** the important qualitative and quantitative observations in your work. You are **not yet** drawing conclusions from your data. Data should be tabulated and/or graphed and described. One of the common errors in report writing is to say, “The data are plotted in Fig. 1” without saying something like, “As can be seen in the graph, the rate of germination over 5 days was slow for the first three days after which a sharp rise is noted.” Be aware that tables and graphs are not self-explanatory, and must be summarized for the reader. All graphs and tables should be numbered and provided with a title. Any additional information that makes the data more comprehensible should be provided as needed.
4. **Discussion and conclusions:** This section serves two functions. First, it provides a place where the data may be fully discussed and interpreted (you answer all the WHYS and HOWS), and second, it allows the author to delve into the realms of speculation. Here one may address questions like “why did something unexpected happen?” or “what would happen if the HCl solution was of higher concentration” or “why did the expected results not materialize?” In this section the author may (discreetly) pat him- or her-self on the back, criticize other workers results, suggest improvements in methodology, etc. You should also find and explain one major source of experimental error. This could be as simple as “why did not set the electronic balance to zero before measuring.” To concepts as complicated as differences in the osmotic pressure at room temperature for liquids of varied specific gravity.
5. **References:** Some papers have no references while others have 200 or more.

### Required Diagrams

- A diagram of your test tubes and egg white (including solutions) before you began
- A diagram of your test tubes egg white (including solutions) at the conclusion

### Be sure you address the following in your lab report:

- Experimental error (human or otherwise)
- Your conclusion for the permeability of dialysis tubing to starch, iodine, glucose and water
- A labeled drawing of the lab apparatus used in this experiment

## Protein Digestion Lab Report Rubric

Student Name:		Due Date:		
This analytic rubric is used to verify specific tasks performed when producing a lab report. If the task has been completed, all points are awarded. If the task is incomplete half points may be awarded. No points are awarded if the task is not complete.				
Category	Scoring Criteria	Points	Student Evaluation	Teacher Evaluation
<b>Lab Introduction</b> <i>15 points</i>	The question to be answered during the lab is stated.	5		
	The hypothesis clearly shows it is based on facts.	5		
	Specific predictions of solute diffusion are made. (Write these as procedures on the lab report.)	5		
	A connection is made between the lab and the "real world" (how might data from this lab improve life?)	5		
<b>Methods</b> <i>15 points</i>	Procedures are written during pre-lab preparation and clearly state what is planned. ( <i>not written in past tense.</i> )	5		
	There are no "understood" procedures. ( <i>Such as: get out equipment or turn on gas.</i> )	5		
<b>Results</b> <i>15 points</i>	"Results" of a procedure are clearly recorded. ( <i>Some procedures might not have observations</i> )	5		
	Measurements, when required, show proper units. ( <i>Write these as observations on the lab report.</i> )	5		
	Calculations, when required, are clearly shown. ( <i>Write these as observations on the lab report.</i> )	5		
<b>Discussion</b> <i>30 points</i>	Summarize the essential lab data. (come to a conclusion)	10		
	Show how the essential data answers the lab question.	10		
	Identify the one area of the lab most likely responsible for measurable experimental error. ( <i>Think carefully.</i> )	10		
<b>Presentation</b> <i>15 points</i>	Report is printed in black ink on white paper using 12 point Times New Roman or Arial font double spaced with one inch margins on all sides with no visible corrections ( <b>Warning:</b> this is not Word's default setting).	5		
	A diagram of the essential apparatus used in the experiment is drawn in the largest available white space on the front of the lab report.	5		
	Report is written in such a way that others could accurately duplicate the experiment.	5		
<b>Lab Participation</b> <i>10 points</i>	No group members were cited for safety or participation violations.	10		
<b>Score</b>	Total Points	100		
<b>Self-evaluation</b>	If the difference between the student evaluation and the teacher evaluation is less than 5 points, 5 points will added to the teacher's score when the grade is recorded.			
<b>Deadline</b>	Reports will be accepted after the beginning of class for 3/4 credit. Papers turned after that time will be mulched for use in the greenhouse and receive ¼ credit.			

## Science Oral Presentation Evaluation Rubric

<b>Group Name:</b>		<b>Final Score:</b>		
This analytic rubric is used to verify specific tasks performed when producing an essay. If the task has been successfully completed, all points are awarded. If the task is incomplete half points may be awarded. No points are awarded if the task is not attempted.				
Category	Scoring Criteria	Points	Group Evaluation	Teacher Evaluation
<b>Auditory</b> <i>15 points</i>	A thesis statement makes the purpose of the presentation clear. <i>(Thesis statements do not begin, "this is about".)</i>	<b>5</b>		
	Presenters spoke clearly, loudly, and effectively	<b>10</b>		
<b>Information</b> <i>40 points</i>	Chapter concepts for the topic are well covered. <i>DNA, RNA, Genes, Traits, Meiosis, Alleles, Chromosomes</i>	<b>10</b>		
	The project demonstrates the application of the most current scientific information to the student's ideas about the topic. <i>(Your ideas must be included, not just dictionary definitions.)</i>	<b>10</b>		
	Information in the project is presented in the student's own words, not "cut and pasted" from research sources. <i>(Any complex terms must be explained)</i>	<b>10</b>		
	Questions 1-6 are fully and completely answered	<b>10</b>		
<b>Visual</b> <i>25 points</i>	Presenters maintained eye contact and proper body posture	<b>10</b>		
	Visual aides (posters, PowerPoint) are informative and used to increase understanding. (Not just a printout of facts)	<b>10</b>		
	Visual Aides are neatly made and easy to read	<b>5</b>		
<b>Overall</b> <i>35 points</i>	Presentation contains contributions from all members of the group. <i>(All members must speak)</i>	<b>10</b>		
	Presentation is well prepared and organized with all materials present. <i>(no ohh we forgot it at home)</i>	<b>10</b>		
	Appropriate responses to audience question	<b>10</b>		
	There are no spelling errors or visible corrections. <i>(Proofreading is required - even with spell check.)</i>	<b>5</b>		
<b>Score</b>	<b>Total Points</b>	<b>115</b>		
<b>Self-evaluation</b>	Students are expected to honestly evaluate their own work. If the difference between the student evaluation and the teacher evaluation is less than 5 points, 5 points will be added to the final score when the grade is recorded.			
<b>Deadline</b>	All turned-in assignments will be completed by the assigned deadline. Materials submitted the day after the deadline will receive 1/4 credit. Materials turned in after that time will be mulched for use in the greenhouse. The due date for this assignment is: _____			