MOUNT VERNON CITY SCHOOL DISTRICT

Living Environment ®
Curriculum Guide

THIS HANDBOOK IS FOR THE IMPLEMENTATION OF THE LIVING ENVIRONMENT ® CURRICULUM IN MOUNT VERNON CITY SCHOOL DISTRICT.

2019-20
Mount Vernon City School District

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IMPORTANT DATES 2019-20

REPORT CARD

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<tr>
<th>MARKING PERIOD</th>
<th>MARKING PERIOD BEGINS</th>
<th>INTERIM PROGRESS REPORTS</th>
<th>MARKING PERIOD ENDS</th>
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</thead>
<tbody>
<tr>
<td>MP 1</td>
<td>September 4, 2019</td>
<td>October 4, 2019</td>
<td>November 8, 2019</td>
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<tr>
<td>MP 2</td>
<td>November 12, 2019</td>
<td>December 13, 2019</td>
<td>January 31, 2020</td>
</tr>
<tr>
<td>MP 3</td>
<td>February 3, 2020</td>
<td>March 13, 2020</td>
<td>April 17, 2020</td>
</tr>
<tr>
<td>MP 4</td>
<td>April 27, 2020</td>
<td>May 21, 2020</td>
<td>June 26, 2020</td>
</tr>
</tbody>
</table>

The Parent Notification Policy states “Parent(s) / guardian(s) or adult students are to be notified, in writing, at any time during a grading period when it is apparent - that the student may fail or is performing unsatisfactorily in any course or grade level. Parent(s) / guardian(s) are also to be notified, in writing, at any time during the grading period when it becomes evident that the student's conduct or effort grades are unsatisfactory.”
PREFACE

This curriculum for Living Environment is organized into instructional units based on the key ideas and major understandings of the New York State curriculum. These are further organized into specific objectives for lessons and laboratory activities to be completed throughout the year.

This Living Environment Core Curriculum was written to assist teachers and supervisors as they prepare curriculum, instruction, and assessment for the Living Environment content and process skills of the New York State Learning Standards for Mathematics, Science, and Technology. The Core Curriculum is part of a continuum that elaborates the science content of Standard 4, which identifies Key Ideas and Performance Indicators. Key Ideas are broad, unifying, general statements of what students need to know. The Performance Indicators for each Key Idea are statements of what students should be able to do to provide evidence that they understand the Key Idea. As part of this continuum, this Core Curriculum presents Major Understandings that give more specific detail to the concepts underlying each Performance Indicator.

The topic content, skills, and major understandings address the content and process skills as applied to the rigor and relevancy to be assessed by the Regents examination in Living Environment. Focus will also be on application skills related to real-world situations. Assessments will test students’ ability to explain, analyze, and interpret Earth science processes and phenomena, and generate science inquiry.*

*from New York State Core Curriculum: Living Environment
The Mount Vernon City School District recognizes that the understanding of science is necessary for students to compete in today’s technological society. The study of science encourages students to examine the world around them. As individuals, they will use scientific processes and principles to make informed personal and public decisions. Students will become scientifically literate and apply scientific thinking, reasoning, and knowledge throughout their lives.

All Regents science courses culminate in a NY State Regent’s examination. All students enrolled in science Regents courses MUST take the June Examination. According to the State Education Department regulations, all students must successfully complete the laboratory component of the course in order to be admitted to the Regent’s examination.

In order to satisfy this requirement each student must:
1. Complete at least 30 full laboratory periods (1200 minutes)
2. Complete a satisfactory written report for each laboratory experience
3. Demonstrate proficiency in laboratory skills.

The current format of the Regents Examination in Living Environment/Biology will remain unchanged. Part D, using multiple choice and open-ended questions, will continue to assess the concepts, content, and process skills associated with laboratory experiences in Living Environment that are aligned to the New York State Learning Standards for Mathematics, Science, and Technology and The Living Environment Core Curriculum. Items assessing the concepts, content, and process skills associated with laboratory experiences will be referenced to The Living Environment Core Curriculum, not to specific laboratory activities.

The current four required laboratory activities (Relationships and Biodiversity, Making Connections, The Beaks of Finches, and Diffusion Through a Membrane) will continue to be included in the Part D component of the Regents Examination in Living Environment. Additional laboratory activities will be developed and implemented for use during the regular course of instruction. These laboratory activities, as well as, the original four required laboratory activities will align to the concepts, content, and process skills included in The Living Environment Core Curriculum.
LIVING ENVIRONMENT ® PACING GUIDE

This guide using Discovery Education Science Techbook and Prentice Hall Brief Review Biology was created to provide teachers with a time frame to complete the New York State Living Environment Curriculum.

PREFACE

NYS Standards
1.1.1a 1.2.1 1.3.2, 1.1.1b 1.2.2a 1.3.3, 1.1.1c 1.2.3a 1.3.4a, 1.1.2a, 1.2.3b 1.3.4b, 1.1.2b 1.2.3c, 1.3.4c, 1.1.3a, 1.2.4, 1.3.5a, 1.1.3b, 1.3.1a, 1.3.5b, 1.1.4a, Appendix A: Bullets 5, 1-8, 9–17

Scientific Inquiry and Skills

- What Is Science?
- Scientific Inquiry
- Further Science Understandings

Laboratory Skills

- Tools for Measurement
- Microscope Skills
- Additional Laboratory Techniques
- Laboratory Safety

Hands-On Activity

- Independent Variables
- Dependent Variables
- Controlling Variables
- Laboratory Safety
- Microscope

Assessment: Exam

Prentice Hall Brief Review in The Living Environment

Topic 8 – Scientific Inquiry and Skills

- What Is Science?
- Scientific Inquiry
- Further Science Understandings

Topic 9 – Laboratory Skills

- Tools for Measurement
- Microscope Skills
- Additional Laboratory Techniques
- Observing Plant and Animal Specimens
- Laboratory Safety

NYS Mandated Lab: Making Connections
## UNIT 1 THE CHEMISTRY OF LIVING THINGS

<table>
<thead>
<tr>
<th>Next Generation Standards</th>
<th>Lesson</th>
<th>Essential Question</th>
<th>Hands-On Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS-PS1-1, HS-PS1-4, HS-PS1.A, HS-LS1-6, HS-LS1-7, HS.LS1.C, HS-ESS2-7, HS.ESS2.D, HS.ESS2.E</td>
<td>1.1: Atoms, Elements, Compounds and Chemical Bonds</td>
<td>How has the basic structure of an atom led to the diversity of compounds making up living and nonliving things??</td>
<td>• Modeling Atoms</td>
</tr>
<tr>
<td>HS-PS1-2, HS-PS1-4, HS-PS1-5, HS-PS1-6, HS-PS1-7</td>
<td>1.5 The Chemistry of Life</td>
<td>What are some ways in which the structure of a compound influences its function?</td>
<td>• Forming Carbohydrates • Identifying Organic Nutrients</td>
</tr>
</tbody>
</table>

### Unit Assessment: Exam

**Prentice Hall Brief Review in The Living Environment**

**Topic 4 - Homeostasis in Organisms**
- Basic Biochemical Processes of Living Organisms
- Feedback and Homeostasis
- Disease as a Failure of Homeostasis
UNIT 2 ENERGY AND LIFE

<table>
<thead>
<tr>
<th>Next Generation</th>
<th>Lesson</th>
<th>Essential Question</th>
<th>Hands-On Activity</th>
</tr>
</thead>
</table>
| HS.PS3.D, HS-LS1-5, HS-LS2-3, HS-LS2-5, HS.LS1.C, HS.LS2.B | 2.1: Photosynthesis | Can you explain the steps involved in converting sunlight into the energy that is stored in food and compare the processes of cellular respiration and photosynthesis? | • Photosynthesis  
• Modeling the Carbon Cycle  
• How Does Light Wavelength Affect Photosynthesis?  
• Measuring Plant Respiration and Photosynthesis  
• Energy Conversions of ATP Production  
• The Colors of White Light |
| PS3.D, HS-LS1-6, HS-LS1-7, HS-LS2-3, HS-LS2-5, LS1.C, LS2.B | 2.2 Cellular Respiration | How is food converted into the energy needed to move these athletes? | • Yeast Fermentation  
• Aerobic vs. Anaerobic Respiration  
• Explaining Cellular Respiration in Plants |
| HS-LS2-4, LS2.B | 3.3: Energy for Life | Why is energy important to living things? | • Energy in Ecosystems  
• Energy in Food  
• Energy for Life |

Unit Assessment: Exam

Prentice Hall Brief Review in The Living Environment

Topic 1 – Similarities and Differences Among Living Organisms
- The Characteristics of Life
- Cells: The Basic Structure of Life
- Multicellular Organisms
- Comparing Single-celled and Multicellular Organisms
## UNIT 3 CELLS

<table>
<thead>
<tr>
<th>Next Generation</th>
<th>Lesson</th>
<th>Essential Question</th>
<th>Hands-On Activity</th>
</tr>
</thead>
</table>
| HS-LS1-1, HS-LS1-2, HS-LS1-3 | 3.1 Cell Structure and Function | What kind of structures must a cell have that would be analogous to a modern business? | - Classifying Prokaryotic and Eukaryotic Cells  
- Creating and Evaluating Scientific Models of the Cell  
- Examining Cells and Tissues  
- Modeling Plant and Animal Cells |
| HS-LS1-4, LS1.B | 3.2 Cell Division | What steps are involved in the cell division of a prokaryote versus a eukaryote? | - Observing Mitosis  
- The Role of Mitosis |
- Cell Membranes and Diffusion  
- Observing Active Transport: Phagocytosis  
- Osmosis  
- Homeostasis at the Cellular Level |
| HS-LS1-2, HS.LS1.A | 6.8 Reproductive System | How do the structures and functions of an animal’s reproductive system contribute to the continuity of life? | - Observing Gametes |
- The Fertilization and Development of Clay  
- The Same or Different?  
- Meiosis Simulation  
- Investigating DNA |

**Unit Assessment: Exam**
Prentice Hall Brief Review in The Living Environment

Topic 1 – Similarities and Differences Among Living Organisms
- The Characteristics of Life
- Cells: The Basic Structure of Life
- Multicellular Organisms
- Comparing Single-celled and Multicellular Organisms

Topic 4 – Reproduction and Development
- Types of Reproduction
- Cell Division
- Human Reproduction and Development
- Applications of Reproductive Technology

NYS Mandated Lab: Diffusion through a Membrane
<table>
<thead>
<tr>
<th>Next Generation</th>
<th>Lesson</th>
<th>Essential Question</th>
<th>Hands-On Activity</th>
</tr>
</thead>
</table>
| HS-LS3-1, HS-LS1.A, HS-LS3.A | 4.1 Genetics | How does the genetic information inherited from an organism’s parents affect its characteristics? | • Dominant vs. Recessive in a Sample Population  
• EDVO-Kit: Blood Typing  
• Investigating DNA  
• Modeling Mendel’s Laws  
• Examining Flowers  
• Punnett Squares  
• EDVO-Kit: DNA Paternity Testing Simulation |
• Modeling DNA  
• Creating and Evaluating Scientific Models of DNA  
• EDVO-Kit: Whose DNA was Left Behind? |
| HS-LS1-1, HS-LS3-1, HS-LS3-2, HS-LS3-3, HS-LS1.A, HS-LS3.A, HS-LS3.B | 4.3 Transcription and Translation | How is transcription related to translation by the steps in which different types of RNA are processed, thereby allowing cells to control gene expression, and how is gene expression affected by various types of mutations? | • Transcription and Translation  
• Changes in DNA  
• Investigating DNA  
• Nature versus Nurture  
• Variation and Distribution of Expressed Traits  
• Researching Genetic Traits |
• Sickle Cell Gene Detection |
<table>
<thead>
<tr>
<th>Next Generation</th>
<th>Lesson</th>
<th>Essential Question</th>
<th>Hands-On Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS-LS3-1, HS-LS3-2, HS.LS3.A, HS.LS3.B, HS-ETS1-1, HS-ETS1-4, HS.ETS1.A, HS.ETS1.B</td>
<td>4.5 Genetic Engineering</td>
<td>How has knowledge of DNA and genetics led to advancements in technology that improve the quality of life?</td>
<td>• Transformation of E. coli Bacteria</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Calculating a Hardy-Weinberg Equation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• The Evolution Game</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Piecing Together the Fossil Record</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Explaining Evolutionary Processes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Common Ancestry</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>• Investigating Adverse Impacts of Human Activity on Biodiversity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Investigating the Hardy-Weinberg Equation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Recognizing Common Ancestors</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>• Bean Selection</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Investigating the Effect of Environmental Change on Species</td>
</tr>
</tbody>
</table>

**Unit Assessment: Exam**

*Prentice Hall Brief Review in The Living Environment*

**Topic 3 – Genetics Continuity**
- Heredity and Genes
- The Genetic Code
- Genetic Engineering

**NYS Mandated Lab: Relationships and Biodiversity**
## UNIT 5 DIVERSITY OF LIVING THINGS

<table>
<thead>
<tr>
<th>Next Generation</th>
<th>Lesson</th>
<th>Essential Question</th>
<th>Hands-On Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS-LS3-1, HS.LS1.A, HS.LS3.A, HS.LS3.B</td>
<td>5.3 Viruses</td>
<td>How do the characteristics of viruses make them such efficient pathogens?</td>
<td>• Infection Inspection</td>
</tr>
</tbody>
</table>

**Unit Assessment: Exam**

**Prentice Hall Brief Review in The Living Environment**

**Topic 5 – Evolution**
- The Theory of Evolution
- The Mechanics of Evolution
- Patterns of Change

**NYS Mandated Lab: The Beaks of Finches**
<table>
<thead>
<tr>
<th>NEXT GENERATION</th>
<th>LESSON</th>
<th>ESSENTIAL QUESTION</th>
<th>HANDS-ON ACTIVITY</th>
</tr>
</thead>
</table>
| HS-LS2-1, LS2.A | 8.1 Aquatic Biomes | What adaptations do organisms living in aquatic biomes have that help them to survive? | • Abiotic Factors  
• Biotic Factors  
• Heavy Metal Accumulation |
| HS-LS1-4, HS.LS1.B | 8.2 Describing Populations | What factors impact animal populations? | • Carrying Capacity  
• Population Demographics |
• Stream Ecology  
• How Does Trampling Impact Plant Species Composition, Diversity, and Percentage Cover?  
• Food Webs and Trophic Levels |
| HS-LS2-1, HS-LS2-2, HS.LS2.A | 8.4 Terrestrial Biomes | How does climate influence the characteristics of a terrestrial biome? | • Experience Your Biome |

Prentice Hall Brief Review in The Living Environment

**Topic 6 – Ecology**
- Organisms and Their Environment
- Population Interactions
- Energy Flow Through an Ecosystem
- Diversity Benefits Species and Habitats
- Environmental Changes

**Topic 7 - Human Impact on Ecosystems**
- Need for Awareness and Understanding
- Our Environment
- People and the Environment
- The Impact of Technology and Industrialization
- Individual Choices and Societal Actions
## Students with Disabilities (SWDs)

### Modifications
- Pre-teach vocabulary
- Use picture vocabulary
- Picture examples of safety measures posted
- Pictures for each category of science
- Scaffold Depth of Knowledge questions
- Provide copy of notes in "cloze" form
- Peer partner
- Extended time for written tasks/verbal response
- Break long tasks over multiple days
- Allow for multiple ways to respond (verbal, written, response board, scribe)
- Provide mock/model of performance task
- Model use of graphic organizers (fade until mastery)
- Modify informational text to shorter passages
- Provide model of exemplar lab write-up
- Provide interactive notebook
- Present complex tasks in multiple ways
- Model steps to read, interpret, and construct graphs
- Multiple opportunities to perform to repeat labs
- Provide advance organizer of class tasks

### Assistive Technology:
- Computer for lengthy writing tasks
- Audio textbook
- Videos to clarify concepts
- Recording device to record class lecture/discussions

### Other
- Arrange seating for maximum engagement and minimum distraction
- Accessible lab space (counter level)

### Assessment
- Scaffold written assignments
- Individual criteria for success
- Provide review packet
- Modify the number of questions
- Provide model of the task
- Provide multiple options for projects
- Practice calculations with sample problem before assessing student

## ENL

### Listening
- Build Background Knowledge
- Audio

### Speaking
- Sentence Frames
- Academic conversation Starters

### Reading
- Supplementary Texts
- Visual Aids
- Video
- Standards-based questions

### Writing
- Sentence Frames
- Graphic Organizers
- Standards-based sentence stems

### Accommodations
- Extended time
- Directions read 3x
- Oral interpretation
- Translated version of test (may have both English and other)
- Responses in home language
# SYSTEMATIC DESIGN OF A SCIENCE LESSON

What are the components of a Science Lesson?

## Summary of the 5E Instructional Model

<table>
<thead>
<tr>
<th>Phase</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>The teacher or a curriculum task accesses the learners’ prior knowledge and helps them become engaged in a new concept through the use of short activities that promote curiosity and elicit prior knowledge. The activity should make connections between past and present learning experiences, expose prior conceptions, and organize students’ thinking toward the learning outcomes of current activities.</td>
</tr>
<tr>
<td>Exploration</td>
<td>Exploration experiences provide students with a common base of activities within which current concepts (i.e., misconceptions), processes, and skills are identified and conceptual change is facilitated. Learners may complete lab activities that help them use prior knowledge to generate new ideas, explore questions and possibilities, and design and conduct a preliminary investigation.</td>
</tr>
<tr>
<td>Explanation</td>
<td>The explanation phase focuses students’ attention on a particular aspect of their engagement and exploration experiences and provides opportunities to demonstrate their conceptual understanding, process skills, or behaviors. This phase also provides opportunities for teachers to directly introduce a concept, process, or skill. Learners explain their understanding of the concept. An explanation from the teacher or the curriculum may guide them toward a deeper understanding, which is a critical part of this phase.</td>
</tr>
<tr>
<td>Elaboration</td>
<td>Teachers challenge and extend students’ conceptual understanding and skills. Through new experiences, the students develop deeper and broader understanding, more information, and adequate skills. Students apply their understanding of the concept by conducting additional activities.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>The evaluation phase encourages students to assess their understanding and abilities and provides opportunities for teachers to evaluate student progress toward achieving the educational objectives.</td>
</tr>
</tbody>
</table>
**IMPORTANT NOTICE**

- Writing assignments at the end of the lesson (closure) bring great benefits. Not only do they enhance students' general writing ability, but they also increase both the understanding of content while learning the specific vocabulary of the disciplines.

- Demonstration (using manipulatives) must be incorporated in all lessons. With students actively involved in manipulating materials, interest in science will be aroused. Using manipulative materials in teaching science will help students learn:
  a. to relate real world situations to science symbolism.
  b. to work together cooperatively in solving problems.
  c. to discuss scientific ideas and concepts.
  d. to verbalize their scientific thinking.
  e. to make presentations in front of a large group.
  f. that there are many different ways to solve problems.
  g. that problems can be symbolized in many different ways.
  h. that they can solve problems without just following teachers' directions.

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  c. to discuss scientific ideas and concepts.
  d. to verbalize their scientific thinking.
  e. to make presentations in front of a large group.
  f. that there are many different ways to solve problems.
  g. that problems can be symbolized in many different ways.
  h. that they can solve problems without just following teachers' directions.
SCIENCE GRADING POLICY

This course of study includes different components, each of which are assigned the following percentages to comprise a final grade. I want you--the student--to understand that your grades are not something that I give you, but rather, a reflection of the work that you give to me.

1. Exams → 35%
2. Quizzes → 15%
3. Homework → 10%
4. Labs, Projects, Literacy Tasks, Presentations, Portfolios → 20%
5. Classwork / Class Participation → 20%

- Class participation will play a significant part in the determination of your grade. Class participation will include the following: attendance, punctuality to class, contributions to the instructional process, effort, work in the laboratory, contributions during small group activities and attentiveness in class.
- Minimum grades for the first three (3) marking periods of 60, 55, & 55 are recommended to encourage student performance. The fourth (4th) marking period has no minimum and students’ report card scores will reflect their actual grade earned.

Important Notice

As per MVCSD Board Resolution 06-71, the Parent Notification Policy states “Parent(s) / guardian(s) or adult students are to be notified, in writing, at any time during a grading period when it is apparent - that the student may fail or is performing unsatisfactorily in any course or grade level. Parent(s) / guardian(s) are also to be notified, in writing, at any time during the grading period when it becomes evident that the student's conduct or effort grades are unsatisfactory.
SETUP OF THE SCIENCE CLASSROOM

I. Prerequisites for a Science Classroom
A Bulletin Board is meant to display necessary information related to the class itself. Displayed on the Bulletin Boards should be the following;

- Teacher Schedule
- Class List
- Seating Chart
- Code of Conduct / Discipline
- School Policies – dress code, attendance, important dates, etc.
- Grading Policy
- Safety and Laboratory Procedures
- Science Diagrams
- Extra Help Schedule

II. Updated Student Work
A section of the classroom must display recent student work. This can be of any type of assessment, graphic organizer, and writing activity. Teacher feedback must be included on student’s work.

III. Board Set-Up
Every day, teachers must display the Objective, NYS Standard(s) and Engagement task.

<table>
<thead>
<tr>
<th>Student’s Name:</th>
<th>School:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher’s Name:</td>
<td>Date:</td>
</tr>
</tbody>
</table>

Objective:
NYS Standard(s):
Engagement:

IV. Spiraling Homework
Homework is used to reinforce daily learning objectives. The secondary purpose of homework is to reinforce objectives learned earlier in the year. The assessments are cumulative, spiraling homework requires students to review coursework throughout the year.
WORD WALLS ARE DESIGNED …

- to promote group learning.
- to support the teaching of important general principles about words and how they work.
- to foster reading and writing in content area.
- to provide reference support for children during their reading and writing.
- to promote independence on the part of young students as they work with words.
- to provide a visual map to help children remember connections between words and the characteristics that will help them form categories.
- to develop a growing core of words that become part of their vocabulary.

IMPORTANT NOTICE
- A science word wall must be present in every science classroom.

Sample Science Word Wall

<table>
<thead>
<tr>
<th>Process Skills</th>
<th>Plants</th>
<th>Soils</th>
<th>Animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>classify</td>
<td>root</td>
<td>soil</td>
<td>inherit</td>
</tr>
<tr>
<td>measure</td>
<td>stem</td>
<td>humus</td>
<td>trait</td>
</tr>
<tr>
<td>predict</td>
<td>leaf</td>
<td>topsoil</td>
<td>mammal</td>
</tr>
<tr>
<td>observe</td>
<td>seed</td>
<td>clay</td>
<td>bird</td>
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<tr>
<td>record</td>
<td>germinate</td>
<td>loam</td>
<td>amphibian</td>
</tr>
<tr>
<td>infer</td>
<td>seedling</td>
<td>resource</td>
<td>gills</td>
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<tr>
<td>variable</td>
<td>photosynthesis</td>
<td>conservation</td>
<td>fish</td>
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<tr>
<td>compare</td>
<td>chlorophyll</td>
<td>strip cropping</td>
<td>scales</td>
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<td></td>
<td>cotyledon</td>
<td>contour plowing</td>
<td>reptile</td>
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<table>
<thead>
<tr>
<th>Habitats</th>
<th>Food Chains</th>
<th>Rocks and Minerals</th>
</tr>
</thead>
<tbody>
<tr>
<td>environment</td>
<td>interact</td>
<td>mineral</td>
</tr>
<tr>
<td>ecosystem</td>
<td>producer</td>
<td>rock</td>
</tr>
<tr>
<td>population</td>
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<td>food chain</td>
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<td>energy pyramid</td>
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<td>landform</td>
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<tr>
<td>fresh water</td>
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# SCIENCE CLASSROOM AESTHETICS

“PRINT–RICH” ENVIRONMENT CONDUCTIVE TO LEARNING

**TEACHER NAME:**

**PERIOD:**

**ROOM:**

## CHECKLIST

<table>
<thead>
<tr>
<th>Item</th>
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<tr>
<td>Teacher Schedule</td>
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<td>Class List</td>
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<td>Seating Chart</td>
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<td>Code of Conduct / Discipline</td>
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<td>Grading Policy</td>
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<td>List of Core Laboratories</td>
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<td>Safety and Laboratory Procedures</td>
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<td>Science Diagrams, Posters, Displays</td>
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<td><strong>Updated</strong> Student Work (Projects, Assessments, Writing, etc.)</td>
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<td>Organization of Materials</td>
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Principal Signature: _______________________________  Date: ____________

Administrator Signature: ___________________________  Date: ____________
Laboratory reports are the vehicle in which scientific information is passed on from the experimenter to others who have an interest in the scientific study. It is therefore very important that each student enrolled in a science class at University High School learn the proper format and procedure for writing a scientific report.

The following is a brief summary of what information is to be included in an acceptable laboratory report. **Not all experiments will include all of the sections shown below.** If your experiment (or your teacher) does not call for certain parts of the report format simply leave that section out.

Formal lab reports should always be word-processed or at least written neatly in ink. Never write any section in pencil. Graphs should be hand drawn or done by a computer-graphing program. The report does not necessarily have to be lengthy or elaborate. Scientific writing should be clear, concise and accurate. Correct spelling and grammar is always important and will have an impact on the evaluation of your report. Unless your teacher informs you that this will be a group report, each student in the lab group will be responsible for completing his/her own report. The report may include:

| **Title Page** | This section includes your name, title of the lab and the names of all lab partners. The page should also include the course title, instructor, period and the date the lab was conducted |
| **Title** | The title of the report must clearly reflect what the experiment was all about. This is not an appropriate place for creative or ambiguous titles. |
| **Purpose** | This section of the report clearly states in one or two sentences what is to be studied in this experiment. What are you trying to find out in this experiment? |
| **Hypothesis** | Write a brief statement outlining your specific expected outcomes of the experiment. The hypothesis is what you think will happen during the experiment. It differs from a guess in that it is based upon prior knowledge or evidence. |
| **Materials** | List what equipment was used in your experimental setup. In many experiments, it may be helpful to include a detailed and labeled diagram of how the equipment is set up. Experiments involving measurements of electrical circuits must include a circuit diagram. |
| **Procedure** | If you are reporting on an experiment with a written procedure, summarize briefly how the experiment was performed. Include only the basic elements the will give the reader an understanding of how the data was collected. Please do not include small details such as size of beakers, specific times, computer commands, or how specific equipment is to be connected together, etc. Do NOT just recopy the procedure from the lab book or hand out. Write the procedure as if you were describing the experiment to an interested friend. If you are writing a report on an experiment of your own design, list the numbered steps of the procedure you followed. This should look a lot like the procedure section of your lab book. |
| **Safety** | Write a short statement outlining whatever safety precautions might apply to the experiment. Consider the potential dangers of flammables, corrosives, toxins, sharps, heat or cold, among others. Eye protection is required for experiments involving the use of chemicals, boiling water, dissections or the possibility of flying projectiles. |
| **Experimental Data** | This section of the report will contain the raw data collected during the experiment. Experimental data may take the form of qualitative observations made during the experiment. Observations may include color changes, new products formed, phase changes, sounds, lights, positions or other non-measurement observations. This type of information is often best given in paragraph form where you describe your observations during a particular step. Include in your description what you did and what happened when you did it. Do not attempt to include interpretations of what happened at this time. This section is for raw data only. Data may also take the form of numerical measurements collected during the experiment. Quantitative Data should be included in a data table with clearly labeled headings that include the units used. Do not ignore suspected faulty data but include it you report. Later, in your CONCLUSIONS, you will have the opportunity to explain why you have decided not to include the suspected errors in your analysis. |
| **Charts and Graphs** | To look for relationships in the data it is often of benefit to graph the data collected. Make sure all graphs and charts are fully titled and labeled. See handout on how to construct a scientific graph for format instructions. |
| **Sample Calculations** | Every time that you perform a new calculation for data analysis, show a sample calculation of how it was done in this section of your report. Show a sample for each type of calculation done in the experiment, no matter how trivial it seems. Use data from your experiment in your sample calculation, not made up numbers. Fully label each calculation so that the reader understands what you are calculating. Show the equation used for each |
### Questions

All analysis questions found at the end of the experiment are to be answered in **complete sentences** (except calculations, where you need to show your work). One or two word answers are never acceptable. Do not rewrite the original question; instead, word your answer such that the question is obvious from the wording of your answer.

### Conclusions

This is the most important part of your lab report. It is here that you answer the questions asked in the purpose. Your conclusion should always be stated in terms of what you said your purpose was. Did the experiment verify your hypothesis? How do you know?

Begin your conclusion by restating your purpose and/or hypothesis. In a sentence or two, indicate how the experiment was conducted. State whether the results verified or refuted your hypothesis. List the evidence or logic from your experimental results that lead you to that conclusion. Be specific. If your results did not agree with the expected results, how far off were you from the accepted value? A percent error might be appropriate here. Is this error significant? Looking back on how the experiment was conducted, identify several sources of error. "Experimental error", "measurement error", "human error" and "calculation error" are not acceptable statements of error. Be much more specific! Your discussion of error should include the effects of each source with regard to both magnitude and direction. If you were to do this experiment again, how could you modify this experiment to improve your results?

Many of the points made above may have been previously discussed elsewhere in the report. **Do not leave them out of your conclusion!** Your conclusion should be able to stand alone without the rest of the report.

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All reports should be signed and dated by the author at the bottom of the report. The date should reflect the date that the report is submitted.
What do I do?
Choose your topic. Get ideas from your teacher, parents, friends, science books, newspaper articles, television, Internet, etc. You are not to experiment on any human or animal without the prior permission of your teacher. Collect and put together your ideas and materials you will need. Follow the Scientific Method as much as possible.

What is the Scientific Method?
Scientific Method refers to the process that scientists go through when solving a problem. It involves the following steps:
1. State the Problem: Write the problem clearly, perhaps in the form of a question.
2. Present a Hypothesis: Describe your educated guess of the possible solution (your prediction of the outcome of your experiment) and justify your reasoning.
3. Present a Procedure: Describe how you will go about solving the problem. Include a list of all the materials needed. Do the experiment.
4. Present the Results: Tell what happened in words. Show what you have discovered using tools like charts, tables, graphs, diagrams and pictures.
5. State your conclusions: Write a paragraph that tells whether the experiment solved your problem. Did it prove or disprove your hypothesis? If your hypothesis was incorrect, what might be some of the reasons?

How do I display my experiment?
Your experiment should be placed on a display board that stands by itself, such as on a threesided display, as shown below. It should not be over 48 inches wide when open.

Example of display layout:
1. Graphs and Charts
2. Photographs or drawings and diagrams of your work
3. Notebooks may be placed in front of the project
4. K-3 only: Equipment may be placed on table in front of display. Do not include liquids or smelly items
5. Grades 4-6: No equipment or apparatus
6. Student’s and teacher’s names should be written only ON THE BACK of the display
SOME SUGGESTIONS FOR STEM INVESTIGATIONS:
Use these if you need ideas, but it’s best to think of your own!

1. How can you stop cut apples from going brown?
2. How does the color of light affect plant growth?
3. How does temperature influence yeast cell reproduction?
4. Which surfaces provide the least amount of friction?
5. Which materials insulate best against the cold?
6. How high do you have to raise a smooth board to get a block to slide down it? How does covering the block with felt or sandpaper or other materials affect that height? How does changing the weight of the block affect height?
7. What affects how fast an ice cube melts in air? How can you get it to melt faster than in air?
8. What is the biggest shadow you can make with a piece of paper 8 ½ inches by 11 inches? What is the smallest shadow you can make with the same piece of paper?
9. How can you get seeds to germinate fastest?
10. Which seeds germinate fastest? Do little seeds germinate faster than big seeds?
11. What is the fastest way to cool a cup of hot water?
12. Do people who play sports regularly have the same heart rate as people who don’t? Do sports people recover from exercise more quickly than less active people?
13. How can you make suds last longest? Compare shampoos to dishwashing detergents. Compare different brands of shampoo or different brands of dishwashing detergent to each other.
14. Does toilet paper stop bacteria getting through? Try touching agar with a naked finger and then with a finger wrapped in one layer of toilet paper.
15. Which materials conduct electricity? Try different kinds of liquids too.
16. Which design of paper plane will fly the furthest?
17. Who can react faster to a bell - children or adults?
18. Can people identify different kinds of Kool-Aid by taste alone?
19. What age group is best at estimating the passage of time?
20. Does the type of liquid affect how fast an ice cube melts?
21. Does changing the temperature of water affect the buoyancy of an egg?
22. Does the type of wood affect how long it burns?
23. Does the flavor of ice cream affect how fast the ice cream melts?
24. Does changing the wingtip direction affect an airplane’s flight? What design flies the farthest?
25. Does changing the height of a ramp affect how far a car will travel?
26. Does the type of shoe worn during a 20-yard dash affect the speed in which you can run?
27. How does changing the amount of baking soda and vinegar affect the height of an explosion? (Careful to change only one: baking soda or vinegar)
28. How does the type of light affect how quickly a plant will grow?
29. Do artificial sugars attract ants?
30. Does the type of insulation on the wire affect the strength of an electromagnet?
31. What effect does temperature have on the strength of different types of magnets?
32. On which surface can a snail move the fastest - dirt, cement, or grass?
33. How can you make a parachute fall more slowly?
34. Does the direction seeds are planted affect plant growth?
35. Is there an effect on evaporation rates when forming crystals from sugar and sugar substitutes?
36. Does the length of the wire affect the power of the circuit?
37. What materials provide the best insulation?
38. Will more air inside a basketball make it bounce higher?
39. Do heavier toy cars roll faster than lighter toy cars?
40. Does surrounding color affect an insect’s eating habits?
41. What is the effect of different amounts of chlorine on plant growth- a lot, a little, or none?
42. What is the effect of different amounts of air movement on plant growth?
43. Do ants prefer artificial sweeteners, natural sugar, or hard candy?
44. Can mealworms or other invertebrates be taught to go through a maze?
45. Which increases your heart rate more: walking up and down real stairs or using a stair-master?
46. How does the temperature of water affect the time it takes to freeze into ice cubes?
47. Given the same amount of water, how does pot size affect the amount of time it takes to boil?
48. How does a light bulb’s wattage affect the amount of heat detected above a light?
49. Does the color of a shirt affect the amount of heat it absorbs?
50. Can people use their sense of hearing alone to tell apart a penny, nickel, dime, and quarter?
51. How does increasing the height of a ramp affect how far a ball rolls down the ramp?
52. How does caffeine affect people’s heart rate?
53. How does talking on a cell phone or listening to music affect reaction time?
54. How does temperature affect a magnet?
55. What type of travel mug keeps hot drinks hot for the longest time?
56. Does the direction of a multiplication problem affect how fast you solve it?
57. How does temperature affect the stretchiness of a gummy worm?
58. Does positive encouragement or negative trash-talking affect free throw accuracy?
59. Which eggs can support the most weight?
60. Does mint-flavored gum affect the temperature of your mouth?