

Biology Level 2, 1A

**Unit:** The Chemistry of Life

Essential Questions

1. What three subatomic particles make up atoms?
2. How are all of the isotopes of an element similar?
3. What are the two main types of chemical bonds?
4. Why are water molecules polar?
5. What are acidic solutions?
6. What are basic solutions?
7. What are the functions of each group of organic compounds?
8. What happens to chemical bonds during chemical reactions?
9. How do energy changes affect whether a chemical reaction will occur?
10. Why are enzymes important to living things?

Framework Standard	Content/Skills	Resources	Instructional Strategies	Assessments
<p>1.1 Recognize that biological organisms are composed primarily of very few elements. The six most common are C, H, N, O, P, S.</p> <p>See last page for all <b>CCSS reading and writing standards</b> for grades 9-10:</p> <p><b>RSL #</b> (reading standard for literacy: 4,6</p> <p><b>WSL #</b> (Writing Standard for literacy: 1,2,3,9,10</p>	<p>-Distinguish between protons, neutrons, electrons</p> <p>-Compare and contrast elements and compounds; covalent and ionic bonds; polar and nonpolar molecules; acids and bases</p> <p>-Describe some of the bonding properties of carbon</p> <p>-List the 6 elements of life</p>	<p>-Molecular model set</p> <p>-Molecular Model Activity Student Handout</p> <p>-Periodic table</p> <p>-Atomic Structure Worksheet and Practice Chart</p> <p>-Index cards</p> <p>-Basic Chemistry Guided Notes</p> <p>-Basic Chemistry Study Guide</p> <p>-Overhead/SmartBoard</p>	<p>-Molecular Modeling Activity</p> <p>-10-2 Guided Notes Basic Chemistry on Overhead/SmartBoard</p> <p>-Create/Draw CHNOPS index cards</p> <p>-Practice worksheets</p> <p>-white board practice of bohr models</p>	<p>-Molecular Modeling Activity</p> <p>-Homework completion: Atomic Structure Worksheet</p> <p>-Homework completion: Basic Chemistry Study Guide</p> <p>-Basic Chemistry Quiz</p> <p>-Informal observation during class activities and white board practice</p> <p>-Biochemistry Unit Test</p>

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<p>1.2 Describe the basic molecular structures and primary functions of the four major categories of organic molecules (carbohydrates, lipids, proteins, and nucleic acids).  See last page for all <b>CCSS reading and writing standards</b> for grades 9-10:</p> <p><b>RSL #</b> (reading standard for literacy:4,6</p> <p><b>WSL #</b> (Writing Standard for literacy: 1,2,3,9,10</p>	<ul style="list-style-type: none"> <li>-Differentiate between organic and inorganic chemicals</li> <li>-Distinguish between families of organic compounds</li> <li>-Describe the structure, properties and functions of lipids, proteins, carbohydrates, and nucleic acids and their functions in cells, provide examples of each</li> <li>-Distinguish between a monomer to a polymer and identify them for each organic compound</li> <li>-Compare and contrast element, types of bonds, functions</li> </ul>	<ul style="list-style-type: none"> <li>-Molecular model set</li> <li>-Molecular Model Activity Student Handout</li> <li>-Periodic table</li> <li>-Macromolecules Graphic organizer</li> <li>-Macromolecule Study Guide</li> </ul>	<ul style="list-style-type: none"> <li>-Macromolecules Graphic Organizer</li> <li>-Molecular Modeling Activity Drawings</li> <li>-Review Study Guide with learning buddies</li> </ul>	<ul style="list-style-type: none"> <li>-Molecular Modeling Activity</li> <li>-Homework completion: Organic Macromolecules Study Guide</li> <li>-Organic Macromolecules Quiz</li> <li>-Biochemistry Unit Test</li> </ul>
<p>1.3 Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, which have an effect on enzymes.</p> <p>See last page for all <b>CCSS reading and writing standards</b> for grades 9-10:</p> <p><b>RSL #</b> (reading standard for literacy:1,3,4,7,9</p> <p><b>WSL #</b> (Writing Standard for literacy: 1,2,3,4,7,10</p>	<ul style="list-style-type: none"> <li>-Discuss how enzymes speed up chemical reactions in the cell</li> <li>-Use the pH scale and estimate the location of various chemicals on the pH scale</li> <li>-Identify enzymes functions based on their prefix/ suffix</li> <li>-Use of hand held probe ware</li> </ul>	<ul style="list-style-type: none"> <li>-Vernier lab quests , pH probes pH paper</li> <li>-Demos: indicators with NaOH, HCl, Lactase, catalase</li> <li>-PPT Enzymes</li> <li>-PPT pH</li> <li>-pH Guided Notes</li> <li>-Enzyme Guided Notes</li> <li>-pH Lab Handouts</li> <li>-WAC type 2 Enzymatic reactions</li> <li>-The Occurrence of Water in Living Things Activity</li> <li>-Water in the Living Body Article</li> </ul>	<ul style="list-style-type: none"> <li>-Enzyme PPT with Enzyme Guided Notes</li> <li>-pH PPT with pH Guided Notes</li> <li>-Think pair share with Water in the Living Body Article</li> <li>-pH Lab Activity</li> </ul>	<ul style="list-style-type: none"> <li>-Homework completion: Enzyme Worksheet</li> <li>-WAC type 2 Enzymatic reactions</li> <li>-pH Lab Activity Analysis Questions and informal observation</li> <li>-Biochemistry Unit Test</li> <li>-Informal observations</li> </ul>

**Unit: Cell Biology**

Essential Questions

1. What is the cell theory?
2. What are the characteristics of prokaryotic and eukaryotic cells?
3. What are the functions of the major organelles?
4. What are the distinguishing characteristics of plant animal and bacteria cells?
5. What occurs during osmosis, diffusion?
6. What are the differences between active and passive transport?
7. What is cell specialization?
8. What are the biological levels of organization?
9. What are the six kingdoms of life as they are now identified?
10. What is the three domain system of classification?
11. Where do plants get the energy they need to produce food?
12. What is the role of ATP in cellular activities?
13. What is the overall equation for photosynthesis?
14. What is the role of light and chlorophyll in photosynthesis?
15. What happens in the light dependent reactions?
16. What is the Calvin cycle?
17. What is cellular respiration?
18. What happens during glycolysis?
19. What are the two main types of fermentation?
20. What happens during the Krebs cycle?
21. How are the high energy electrons used in the electron transport chain?
22. What problems does growth cause for cells?
23. What are the main events of the cell cycle?
24. What are the four phases of mitosis?
25. How is the cell cycle regulated?
26. How are cancer cells different from other cells?
27. What happens during the process of meiosis?
28. How is sex determined?
29. What is non-disjunction and what problems does it cause?
30. How is meiosis different from mitosis?
31. What structures actually assort independently?
32. What is the structure of a virus?
33. How do viruses cause infection?

Framework Standard	Content/Skills	Resources	Instructional Strategies	Assessments
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<p>2.1 Relate cell parts/organelles (plasma membrane, nuclear envelope, nucleus, nucleolus, cytoplasm, mitochondrion, endoplasmic reticulum, Golgi apparatus, lysosome, ribosome, vacuole, cell wall, chloroplast, cytoskeleton, centriole, cilium, flagellum, pseudopod) to their functions. Explain the role of cell membranes as a highly selective barrier (diffusion, osmosis, facilitated diffusion, and active transport).</p> <p>See last page for all <b>CCSS reading and writing standards</b> for grades 9-10:  <b>RSL #</b> (reading standard for literacy: 1-10  <b>WSL #</b> (Writing Standard for literacy: 1-10</p>	<ul style="list-style-type: none"> <li>-Describe the structure and function and interconnectedness of all the organelles in the cell</li> <li>-Describe the structure and function of membranes</li> <li>-Explain the process of passive transport: diffusion, osmosis and facilitated diffusion</li> <li>-Explain the process of active transport: endocytosis, pinocytosis and phagocytosis, exocytosis</li> <li>-Compare the effects of osmosis on animal and plant cells</li> <li>-Distinguish between passive and active transport</li> <li>- Draw and label cell structures</li> <li>- Describe the methods of movement in various cell types.</li> <li>- Discuss and describe the role of a concentration gradient in active and passive transport</li> <li>- Basic microscopy</li> </ul>	<ul style="list-style-type: none"> <li>-Colored paper</li> <li>-Cell Organelle PPT/notes</li> <li>-3D Cell Model Project</li> <li>-Cell Analogy worksheet</li> <li>-Cell Membrane PPT/notes</li> <li>-Cell Transport Lab</li> <li>-Cell Membrane Coloring Worksheet</li> <li>-Types of Solutions Guided Notes</li> <li>-Red onion, microscopes, slides, cover slips beakers, salt</li> </ul>	<ul style="list-style-type: none"> <li>-10-2 Cell Organelle notes *Foldable optional</li> <li>-Microscope Diagram Labeling</li> <li>-10-2 Cell Membrane notes</li> <li>-Types of Solutions Guided Notes</li> <li>-Cell Transport Lab</li> <li>-Learning buddies with cell analogy</li> <li>-Dipsticking</li> </ul>	<ul style="list-style-type: none"> <li>-Homework completion: Organelle worksheets</li> <li>-Homework completion: Diffusion worksheet</li> <li>-Homework completion: Cell Membrane Coloring Worksheet</li> <li>-3D Cell Model Project</li> <li>-Microscope quiz</li> <li>-Structure and function of the cell membrane WAC</li> <li>-Cell Membrane Vocab Quiz</li> <li>-Informal observations</li> <li>-Informal directed questioning</li> <li>-Cell Organelles and Kingdoms Test</li> <li>-Cell Transport Test</li> <li>-Cell Transport Lab Report</li> </ul>
<p>2.2 Compare and contrast, at the cellular level, prokaryotes and eukaryotes (general structures and degrees of complexity).</p> <p>See last page for all <b>CCSS reading and writing standards</b> for grades 9-10:  <b>RSL #</b> (reading standard for literacy: 7  <b>WSL #</b> (Writing Standard for literacy:</p>	<ul style="list-style-type: none"> <li>-List the major differences between prokaryotic and eukaryotic cells</li> <li>-Identify the characteristics that prokaryotes share with the mitochondria and chloroplasts that support the endosymbiotic theory</li> <li>-Describe the cell theory and several scientist contribution to the theory</li> <li>-Compare and contract prokaryotic and eukaryotic cells</li> </ul>	<ul style="list-style-type: none"> <li>-Cell Types Lab Handout</li> <li>-Kingdoms prepared slides</li> <li>-protists specimens</li> <li>-Protist Lab Handout</li> <li>-Lesson 17: Viruses</li> <li>-Lesson 18: Bacteria</li> <li>-Kingdoms Problem Venn diagram</li> </ul>	<ul style="list-style-type: none"> <li>-Kingdoms Graphic organizer</li> <li>-Protists Lab</li> <li>-Cell Types Lab</li> <li>-Think pair share Lesson 17&amp;18 readings</li> <li>-Group work kingdoms problem</li> <li>-Question/answer session matching organisms to proper kingdoms</li> </ul>	<ul style="list-style-type: none"> <li>-Protist Lab</li> <li>-Cell Types Lab</li> <li>-Kingdoms Problem group work</li> <li>-Kingdoms Quiz</li> <li>-Informal observation during class activities</li> </ul>

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<p>2.6 Use cellular evidence (such as cell structure, cell number, and cell reproduction) and modes of nutrition to describe six kingdoms (Archaeobacteria, Eubacteria, Protista, Fungi, Plantae, Animalia).</p> <p>See last page for all <b>CCSS reading and writing standards</b> for grades 9-10:</p> <p><b>RSL #</b> (reading standard for literacy:7</p> <p><b>WSL #</b> (Writing Standard for literacy: 1,2,3,4,9,10</p>	<ul style="list-style-type: none"> <li>-Compare and contrast animal and plant cells</li> <li>-Discuss the importance of bacteria</li> <li>-Compare and contrast Archaeobacteria and Eubacteria</li> <li>-State the general characteristics of archaeobacteria, eubacteria, protists, fungi, plants and animals including cell type, cell structures, number of cells, mode of nutrition, and examples.</li> </ul>	<ul style="list-style-type: none"> <li>-Cell Types Lab Handout</li> <li>-Kingdoms prepared slides</li> <li>-protists specimens</li> <li>-Protist Lab Handout</li> <li>-Lesson 17: Viruses</li> <li>-Lesson 18: Bacteria</li> <li>-Kingdoms Problem Venn diagram</li> </ul>	<ul style="list-style-type: none"> <li>-Kingdoms Graphic organizer</li> <li>-Protists Lab</li> <li>-Cell Types Lab</li> <li>-Think pair share Lesson 17&amp;18 readings</li> <li>-Group work kingdoms problem</li> <li>-Question/answer session matching organisms to proper kingdoms</li> </ul>	<ul style="list-style-type: none"> <li>-Protist Lab</li> <li>-Cell Types Lab</li> <li>-Kingdoms Problem group work</li> <li>-Kingdoms and Viruses Quiz</li> <li>-Informal observation during class activities</li> </ul>
<p>2.4 Identify the reactants, products, and basic purposes of photosynthesis and cellular respiration. Explain the interrelated nature of photosynthesis and cellular respiration in the cells of photosynthetic organisms.</p> <p>See last page for all <b>CCSS reading and writing standards</b> for grades 9-10:</p> <p><b>RSL #</b> (reading standard for literacy:1-10</p> <p><b>WSL #</b> (Writing Standard for literacy: 1-10</p>	<ul style="list-style-type: none"> <li>-Explain and locate the fermentation process in a cell</li> <li>-Write the chemical equation for respiration</li> <li>-Describe and locate the process of aerobic respiration</li> <li>-List the conditions under which muscles operate anaerobically</li> <li>-Write the chemical equation for photosynthesis</li> <li>-Identify the products of the light reactions and of carbon fixation</li> <li>-Locate on a diagram where the reactions of photosynthesis occur</li> <li>-Compare and contrast the processes of respiration and photosynthesis</li> </ul>	<ul style="list-style-type: none"> <li>-Coloring Worksheets: Mitochondria &amp; Chloroplasts</li> <li>-Is Yeast Alive? Lab</li> <li>-Yeast, Balloons, Test Tubes, Spoons, String</li> <li>-Magic School Bus Photosynthesis movie</li> </ul>	<ul style="list-style-type: none"> <li>-Draw Picture/Diagram of Chloroplast</li> <li>-Is Yeast Alive? Lab</li> <li>-Reactions of Photosynthesis Graphic Organizer and notes</li> <li>-Cell Respiration notes and graphic organizer</li> </ul>	<ul style="list-style-type: none"> <li>-Homework completion: Chloroplast and Mitochondria coloring</li> <li>-Is Yeast Alive? Lab Questions</li> <li>-Photosynthesis and Cell Respiration Test</li> <li>-Chloroplast drawing</li> </ul>
<p>2.5 Explain the important role that ATP serves in metabolism. See last page for all <b>CCSS</b></p>	<ul style="list-style-type: none"> <li>-Diagram the formation and explain the function of ATP in a cell</li> </ul>	<ul style="list-style-type: none"> <li>-Guided Notes on ATP</li> <li>-Food Chain cards</li> </ul>	<ul style="list-style-type: none"> <li>-ATP notes</li> <li>-Food chain class activity</li> <li>-dip sticking</li> </ul>	<ul style="list-style-type: none"> <li>-Photosynthesis and Cell Respiration Test</li> <li>-Informal questioning and</li> </ul>

<p><b>reading and writing standards</b> for grades 9-10:</p> <p><b>RSL #</b> (reading standard for literacy: 1-10)</p> <p><b>WSL #</b> (Writing Standard for literacy: 1-10)</p>				<p>observations during class activity</p>
<p>2.6 Describe the cell cycle and the process of mitosis. Explain the role of mitosis in the formation of new cells, and its importance in maintaining chromosome number during asexual reproduction.</p> <p>See last page for all <b>CCSS reading and writing standards</b> for grades 9-10:</p> <p><b>RSL #</b> (reading standard for literacy: 1-10)</p> <p><b>WSL #</b> (Writing Standard for literacy: 1-10)</p>	<ul style="list-style-type: none"> <li>-Describe the phases of mitosis</li> <li>-Identify the role of each cell structure involved in mitosis and cell division</li> <li>-Compare cytokinesis in plant and animal cells</li> <li>-Explain the importance of mitosis and cell division in unicellular and multicellular organisms</li> <li>-Describe how mitosis and cell division aid in the replacement and regeneration of cells</li> <li>-State several factors that affect the lifespan of a cell</li> <li>-List some of the regulators that control growth in healthy cells</li> <li>-Describe how cancer cells overcome healthy cells</li> </ul>	<ul style="list-style-type: none"> <li>-The Cell Cycle PPT/Notes</li> <li>-Lesson 8: DNA and Cell Division and Mitosis worksheet</li> <li>-Mitosis Vocabulary Quiz</li> </ul>	<ul style="list-style-type: none"> <li>-Cell Cycle PPT/notes</li> <li>-Cell Division tableware activity</li> <li>-work in pairs on mitosis worksheet</li> <li>-Dip-Sticking</li> </ul>	<ul style="list-style-type: none"> <li>-Homework completion: Lesson 8 and mitosis practice worksheets</li> <li>-Cell Division Test</li> <li>-Mitosis Vocabulary Quiz</li> </ul>
<p>2.7 Describe how the process of meiosis results in the formation of haploid cells. Explain the importance of this process in sexual reproduction, and how gametes form diploid zygotes in the process of fertilization.</p> <p>See last page for all <b>CCSS reading and writing standards</b> for grades 9-10:</p>	<ul style="list-style-type: none"> <li>-Distinguish between sexual and asexual reproduction</li> <li>-Explain what is meant by homologous chromosomes</li> <li>-Describe the process of meiosis</li> <li>-Compare and contrast mitosis and meiosis</li> <li>-Explain how chromosome theory accounts for the principles of segregation and independent assortment</li> </ul>	<ul style="list-style-type: none"> <li>-Meiosis PPT/notes</li> <li>-Create a karyotype</li> <li>-Lesson 10: Sex Cells and Meiosis</li> </ul>	<ul style="list-style-type: none"> <li>- Meiosis tableware activity</li> <li>-Meiosis and Sexual Reproduction PPT/Notes</li> <li>-Create a karyotype activity</li> <li>-Venn Diagram Mitosis vs. Meiosis</li> <li>- phases questioning with whiteboards</li> </ul>	<ul style="list-style-type: none"> <li>-Venn Diagram and Essay: Compare and Contrast Meiosis and Mitosis</li> <li>-Homework completion: Cell Division Study Guide</li> <li>-Homework completion: Lesson 10</li> <li>-Homework completion: Study Guide</li> <li>-Informal observation</li> <li>-Cell Division Test</li> </ul>

<p><b>RSL #</b> (reading standard for literacy: 1-10)</p> <p><b>WSL #</b> (Writing Standard for literacy: 1-10)</p>				
<p>2.8 Compare and contrast a virus and a cell in terms of genetic material and reproduction.</p> <p>See last page for all <b>CCSS reading and writing standards</b> for grades 9-10:</p> <p><b>RSL #</b> (reading standard for literacy: 1,2,3,5,8,9,10)</p> <p><b>WSL #</b> (Writing Standard for literacy: 1,2,3,8,9,10)</p>	<p>-Describe the structure of a typical virus</p> <p>-Compare RNA viruses with DNA viruses</p>	<p>-Lesson 17, 18, 19 Packet: Viruses, Bacteria, The Importance of Viruses and Bacteria</p> <p>-Are Viruses Alive? Article</p>	<p>-Recall, Characteristics of Life: Viruses vs. Cells</p> <p>-think, pair, share with Are Viruses Alive? Article</p>	<p>-Kingdoms and Viruses Quiz</p> <p>-Essay- Are Viruses Alive?</p>

- Unit: Genetics**
- Essential Questions
1. What did scientists discover about the relationship between genes and DNA?
  2. What is the overall structure of the DNA molecule/
  3. What happens during DNA replication?
  4. What are the three main types of RNA?
  5. What is transcription and translation?
  6. What are mutations?
  7. What is the principle of dominance?
  8. What happens during segregation?
  9. How do geneticists use the principles of probability?
  10. How do geneticists use a Punnett Square? (monohybrid and dihybrid crosses)
  11. What are Mendel's two laws and why are they important?
  12. What inheritance patterns exist aside from simple dominance?
  13. How is sex determined?
  14. How do small changes in DNA cause genetic disorders?

15. Why are sex-linked disorders more common in males than females?  
 16. What is non-disjunction and what problems does it cause?

Framework Standard	Content/Skills	Resources	Instructional Strategies	Assessments
<p>3.1 Describe the basic structure (double helix, sugar/phosphate backbone, linked by complementary nucleotide pairs) of DNA, and describe its function in genetic inheritance.</p> <p>See last page for all <b>CCSS reading and writing standards</b> for grades 9-10:</p> <p><b>RSL #</b> (reading standard for literacy: 1,2,6,8,10)</p> <p><b>WSL #</b> (Writing Standard for literacy: 1,2,34,10)</p>	<ul style="list-style-type: none"> <li>-Name several events that led to the discovery of the structure and function of DNA</li> <li>-Describe the structure of a nucleotide</li> <li>-Explain the relationship between nucleotide sequence and DNA structure</li> <li>-Distinguish between autosomes and sex chromosomes</li> <li>-Explain the chromosomal basis of sex determination</li> </ul>	<ul style="list-style-type: none"> <li>-Paper DNA nucleotides</li> <li>-Watson and Crick Article</li> <li>-Strawberry DNA extraction activity</li> </ul>	<ul style="list-style-type: none"> <li>-Building DNA models</li> <li>-DNA PPT/Notes</li> <li>-think, pair, share Watson and Crick Article</li> <li>-Strawberry DNA Lab</li> </ul>	<ul style="list-style-type: none"> <li>-Informal observation during class activities</li> <li>-DNA and Protein Synthesis Test</li> <li>-Watson and Crick Article Questions</li> </ul>
<p>3.2 Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic code. Explain the basic processes of transcription and translation, and how they result in the expression of genes. Distinguish among the end products of replication, transcription, and translation.</p> <p>See last page for all <b>CCSS reading and writing standards</b> for grades 9-10:</p>	<ul style="list-style-type: none"> <li>-Outline the process of DNA replication and explain its importance</li> <li>-Compare and contrast RNA and DNA</li> <li>-List the types of RNA and explain their functions</li> <li>-Distinguish between transcription and translation</li> <li>-Outline the steps involved in making messenger RNA (transcription)</li> <li>-Describe how a protein is made (translation)</li> <li>-Describe the effect of the environment on gene expression</li> </ul>	<ul style="list-style-type: none"> <li>-DNA PPT/notes</li> <li>-Paper DNA model</li> <li>-Codon Bingo</li> <li>-Protein Synthesis activity</li> <li>-mRNA codon chart</li> <li>-National Geographic's Twins article</li> </ul>	<ul style="list-style-type: none"> <li>-Protein Synthesis Activity</li> <li>-Dip sticking</li> <li>-white board practice with transcription</li> <li>-Movie clips</li> </ul>	<ul style="list-style-type: none"> <li>-Protein Synthesis activity</li> <li>-WAC on Twins article</li> <li>-DNA and Protein Synthesis Test</li> </ul>

<b>RSL #</b> (reading standard for literacy: 1-10)				
<b>WSL #</b> (Writing Standard for literacy: 1-10)				
3.5 Describe how Mendel’s laws of segregation and independent assortment can be observed through patterns of inheritance (such as dihybrid crosses).  See last page for all <b>CCSS reading and writing standards</b> for grades 9-10:  <b>RSL #</b> (reading standard for literacy: 4,7)  <b>WSL #</b> (Writing Standard for literacy: 1,2,10)	-State and give examples for each of Mendel’s principles -Discuss the effect of linkage on independent assortment -Describe how crossing over affects linkage	-Dihybrid genetics problems	-Graphic Organizer	-Chapter 11 & 14 test

**Unit: Scientific Inquiry Skills Standards**

Framework Standard	Content/Skills	Resources	Instructional Strategies	Assessments
SIS 1a Make observations, raise questions, and formulate hypotheses.	-Observe the world around them from a scientific perspective.	-pH of common substances activity	-See 1.3	
SIS 1 b Make observations, raise questions, and formulate hypotheses.	-Pose questions and form hypotheses based on personal observations, scientific articles, experiments, and knowledge.	-Catalase lab	-See 1.3	
SIS 1 c Make observations, raise questions, and formulate hypotheses.	-Read, interpret, and examine the credibility and validity of scientific claims in different sources of information, such as	-Lamarck vs. Darwin dueling theories Comparison.	-See 5.3	

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	scientific articles, advertisements, or media stories.			
SIS 2 a Design and conduct scientific investigations.	-Articulate and explain the major concepts being investigated and the purpose of an investigation.	-Lung Capacity Lab -Heart Rate and Exercise Lab -Baby Face Lab	-See 4.3 -See 4.2 -See 3.6	
SIS 2 b Design and conduct scientific investigations.	-Pose questions and form hypotheses based on personal observations, scientific articles, experiments, and knowledge.	-Lung Capacity Lab -Heart Rate and Exercise Lab -Baby Face Lab	-See 4.3 -See 4.2 -See 3.6	
SIS 2 c Design and conduct scientific investigations.	-Identify independent and dependent variables.	-Heart rate and Exercise Lab -Simpsons Experimental Design Activity	-See 4.2 -Guided reading activity	-Simpsons Experimental Design Activity
SIS 2 d Design and conduct scientific investigations.	-Write procedures that are clear and replicable.	-Heart Rate and Exercise Lab	-See 4.2	
SIS 2 e Design and conduct scientific investigations.	-Employ appropriate methods for accurately and consistently -Making observations; -Making and recording measurements at an appropriate level of precision and; -Collect data & evidence in organized way	-Fork and Beans -Catalase lab -Hardy Weinberg activity -Oh Deer activity	-See 5.3 -See 1.3 -See 5.3 -See 6.1	
SIS 2 f Design and conduct scientific investigations.	-Properly use instruments, equipment, and materials (such as scales, probeware, meter sticks, microscopes, computers, etc.) including: set-up, calibration (if required), technique, maintenance, and storage.	-pH Lab -Mitosis microscopy lab -Reaction rate lab	-See 1.3 -See 2.6 -See 4.4	
SIS 2 g Design and conduct scientific investigations.	-Follow safety guidelines	-All Labs See Flinn Lab Safety Contract		
SIS 3 a Analyze and interpret results of scientific investigations	-Present relationships between variables in appropriate forms.	-Heart Rate and exercise lab -Lung capacity lab	-See 4.2 -See 4.3	
SIS 3 b Analyze and interpret results of scientific investigations	-Use mathematical operations to analyze and interpret data results.	-Fork and Beans -Hardy Weinberg Catalase lab	-See 5.3 -See 5.3	
SIS 3 c Analyze and interpret results of scientific investigations	-Identify reasons for inconsistent results, such as sources of error or uncontrolled conditions, and assess the reliability of data.	-Heart Rate and exercise lab -Lung capacity lab	-See 4.2 -See 4.3	

SIS 3 d Analyze and interpret results of scientific investigations	-Use the results of an experiment to develop a conclusion to an investigation that addresses the initial questions and supports or refutes the stated hypothesis.	-pH Lab -Reaction rate lab -Heart Rate and exercise lab	-See 1.3 -See 4.4 -See 4.2	
SIS 3 e Analyze and interpret results of scientific investigations	-State questions raised by an experiment that may require further investigation.	-Reaction rate lab -Heart Rate and exercise lab -Lung Capacity	-See 4.4 -See 4.2 -See 4.3	

**Unit: Mathematic skills**

Framework Standard	Content/Skills	Resources	Instructional Strategies	Assessments
Use Mathematics as a tool in understanding, supporting, and defending scientific concepts.	<ul style="list-style-type: none"> <li>-Construct and use tables and graphs to interpret data sets</li> <li>-Solve simple algebraic expressions</li> <li>-Perform basic statistical procedures to analyze the center and spread of data</li> <li>-Measure with accuracy and precision</li> <li>-Convert within a unit</li> <li>-Use common prefixes</li> <li>-Use scientific notation, where appropriate</li> <li>-Use ratio and proportion in the solution of problems</li> <li>-Determine the correct number of significant figures</li> <li>-Determine the percent error from e</li> <li>-Determine the correct number of significant figures</li> <li>-Determine the percent error from experimental and accepted values</li> <li>-Use appropriate metric/standard international (SI) units of Measurement</li> <li>-Use Celsius the scale</li> </ul>	<ul style="list-style-type: none"> <li>-Reaction rate lab</li> <li>-Lung Capacity</li> <li>-Heart Rate and exercise lab</li> <li>-Mendel Genetics Challenge Problems</li> </ul>	<ul style="list-style-type: none"> <li>-See 4.4</li> <li>-See 4.3</li> <li>-See 4.2</li> <li>-See 3.4</li> </ul>	

## Reading Standards for Literacy in Science and Technical Subjects 6–12

[RST]

### Grades 6–8 students:

### Grades 9–10 students:

### Grades 11–12 students:

#### Key Ideas and Details

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|---|--|--|
| 1. Cite specific textual evidence to support analysis of science and technical texts.   | 1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.  | 1. Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.        |
| 2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. | 2. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.          | 2. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.         |
| 3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.                | 3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. | 3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. |

#### Craft and Structure

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|---|--|---|
| 4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 6–8 texts and topics</i> . | 4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 9–10 texts and topics</i> . | 4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 11–12 texts and topics</i> . |
| 5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.  | 5. Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., <i>force, friction, reaction force, energy</i> ).                                     | 5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.  |
| 6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.   | 6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.                               | 6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.                              |

#### Integration of Knowledge and Ideas

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| 7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). | 7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. | 7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. |
| 8. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.   | 8. Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.  | 8. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with                   |

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<b>9.</b> Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.	<b>9.</b> Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	<b>9.</b> Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
<i>Range of Reading and Level of Text Complexity</i>		
<b>10.</b> By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.	<b>10.</b> By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.	<b>10.</b> By the end of grade 12, read and comprehend science/technical texts in the grades 11–CCR text complexity band independently and proficiently.

## Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6–12

[WHST]

The standards below begin at grade 6; standards for pre-k–5 writing in history/social studies, science, and technical subjects are integrated into the pre-k–5 Writing standards. The CCR anchor standards and high school standards in literacy work in tandem to define college and career readiness expectations—the former providing broad standards, the latter providing additional specificity.

Grades 6–8 students:	Grades 9–10 students:	Grades 11–12 students:
<i>Text Types and Purposes</i>		
<p>1. Write arguments focused on <i>discipline-specific content</i>.</p> <ol style="list-style-type: none"><li>Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.</li><li>Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.</li><li>Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.</li><li>Establish and maintain a formal style.</li><li>Provide a concluding statement or section that follows from and supports the argument presented.</li></ol>	<p>1. Write arguments focused on <i>discipline-specific content</i>.</p> <ol style="list-style-type: none"><li>Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.</li><li>Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience’s knowledge level and concerns.</li><li>Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.</li><li>Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.</li><li>Provide a concluding statement or section that follows from or supports the argument presented.</li></ol>	<p>1. Write arguments focused on <i>discipline-specific content</i>.</p> <ol style="list-style-type: none"><li>Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.</li><li>Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience’s knowledge level, concerns, values, and possible biases.</li><li>Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.</li><li>Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.</li><li>Provide a concluding statement or section that follows from or supports the argument presented.</li></ol>

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6–12

[WHST]

Grades 6–8 students:	Grades 9–10 students:	Grades 11–12 students:
<i>Text Types and Purposes (continued)</i>		
<p>2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <ul style="list-style-type: none"> <li>a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.</li> <li>b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.</li> <li>c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.</li> <li>d. Use precise language and domain-specific vocabulary to inform about or explain the topic.</li> <li>e. Establish and maintain a formal style and objective tone.</li> <li>f. Provide a concluding statement or section that follows from and supports the information or explanation presented.</li> </ul>	<p>2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <ul style="list-style-type: none"> <li>a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.</li> <li>b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic.</li> <li>c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.</li> <li>d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.</li> <li>e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.</li> <li>f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).</li> </ul>	<p>2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <ul style="list-style-type: none"> <li>a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.</li> <li>b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic.</li> <li>c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.</li> <li>d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.</li> <li>e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).</li> </ul>
<p>3. (See note; not applicable as a separate requirement)</p>	<p>3. (See note; not applicable as a separate requirement)</p>	<p>3. (See note; not applicable as a separate requirement)</p>

**Note:** Students' narrative skills continue to grow in these grades. The standards require that students be able to incorporate narrative elements effectively into arguments and informative/explanatory texts. In history/social studies, students must be able to incorporate narrative accounts into their analyses of individuals or events of historical import. In science and technical subjects, students must be able to write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results.

## Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6–12

[WHST]

Grades 6–8 students:	Grades 9–10 students:	Grades 11–12 students:
<i>Production and Distribution of Writing</i>		
4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
5. With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.	5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.	6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
<i>Research to Build and Present Knowledge</i>		
7. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.	7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
8. Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.	8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard	8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas,

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	format for citation.	avoiding plagiarism and overreliance on any one source and following a standard format for citation.
<b>9</b> Draw evidence from informational texts to support analysis, reflection, and research.	<b>9.</b> Draw evidence from informational texts to support analysis, reflection, and research.	<b>9.</b> Draw evidence from informational texts to support analysis, reflection, and research.
<i>Range of Writing</i>		
<b>10.</b> Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	<b>10.</b> Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	<b>10.</b> Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.