

Biology Level 0

<b>Unit: The Chemistry of Life</b> <b>Essential Questions</b>	
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
1.1 Recognize that biological organisms are composed primarily of very few elements. The six most common are C, H, N, O, P, S.  See last page for all <b>CCSS reading and writing standards</b> for grades 9-10:  <b>RSL #</b> (reading standard for literacy):  <b>WSL #</b> (Writing Standard for literacy):	-Distinguish between protons, neutrons, electrons -Compare and contrast elements and compounds; covalent and ionic bonds; polar and nonpolar molecules; acids and bases -Describe some of the bonding properties of carbon -List the 6 elements of life	Molecular model set Periodic table Basic chemistry PowerPoint,  Water in the Body article: Kreutler, Patrica. "Water in the Body." <i>Water in the Body</i> . 1998. Web. 14 May 2012. < <a href="http://www.chemcraft.net/wbody.html">http://www.chemcraft.net/wbody.html</a> >. *NOVA hunting the elements video <a href="http://video.pbs.org/video/2217713569">http://video.pbs.org/video/2217713569</a> Molecular model lab packet Proton, neutron electrons worksheet or notes Index cards *Penny activity (water polarity)  Basic chemistry PowerPoint,	Draw picture/ diagram 10-2 Learning buddies	-Tests CH 2 Biochemistry, quizzes, homework, open response questions and multiple choice chapter summaries, book work model lab, worksheets, flash cards with Bohr's models and Lewis dot diagrams -Text book: Chapter 2 section 1 page 39 questions 1-5 section 2. Page 43 questions 1-4, -informal observation, completion of assignments
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>	-Differentiate between organic and inorganic chemicals -Distinguish between families of organic compounds -Describe the structure, properties and functions of lipids, proteins, carbohydrates, and nucleic acids and their functions in cells, provide examples of each	Basic chemistry PowerPoint, Molecular model set Periodic table Molecular model lab packet PowerPoint presentations Graphic organizer *Demonstrations: Iodine/ starch, oil/water	Graphic organizers Draw pictures/ diagrams 10-2 Learning buddies  Think pair share	-Summative chapter test , and quizzes, graphic organizers -Book work chapter 2 section 3 page 48 1-4 -informal observation, completion of assignments  - Rubric for reading/

<p>for grades 9-10:</p> <p><b>RSL #</b> (reading standard for literacy: 1, 2, 4)</p> <p><b>WSL #</b> (Writing Standard for literacy: 4)</p>	<p>-Distinguish between a monomer to a polymer and identify them for each organic compound</p> <p>-Compare and contrast element, types of bonds, functions</p>	<p>-Article on Fold.it internet challenge for protein structure. Sifferlin, Alexandra, Maia Szalavitz, and Alexandra Sifferlin. "Online Gamers Solve a Tricky AIDS Puzzle   Healthland   TIME.com." <i>Time</i>. Time. Web. 14 May 2012. &lt;<a href="http://healthland.time.com/2011/09/19/online-gamers-solve-a-tricky-aids-puzzle/">http://healthland.time.com/2011/09/19/online-gamers-solve-a-tricky-aids-puzzle/</a>&gt;.</p> <p>Text book</p>		<p>summary expectations</p>
<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: 4, 8)</p> <p><b>WSL #</b> (Writing Standard for literacy: 4, 9)</p>	<p>-Discuss how enzymes speed up chemical reactions in the cell</p> <p>-Use the pH scale and estimate the location of various chemicals on the pH scale</p> <p>-Identify enzymes functions based on their prefix/ suffix</p> <p>-Use of hand held probe ware</p>	<p>Vernier lab quests , pH probes pH paper *Demos: indicators with NaOH, HCl, Lactase, catalase Power point Enzymes/ pH pH of common substances lab activity *Christmas Cactus pH lab WAC type 2 Enzymatic reactions</p> <p>Mini lab-The Occurrence of Water in Living Things</p>	<p>Learning buddies Question/ answer session Think pair share</p>	<p>-Completion of Assignment -Informal observation -Test -pH of common substances activity paragraph write up with data table and scale using Vernier to test common household substances -Textbook chapter 2 section 4. Page 53 1-4 - WAC type 2 Enzymatic reactions</p>

**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
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,	-Describe the structure and function and interconnectedness of all the organelles in the cell -Describe the structure and function of membranes -Explain the process of passive transport: diffusion, osmosis and facilitated diffusion	Diffusion Lab/ Demo Red onion, microscopes, iodine, *dialysis tubing, beakers, salt  Hand out/ coloring worksheets  Prepared slides <b>Animation Sodium/ Potassium</b>	Think pair share  10-2  learning buddies  Ticket to leave	Chapter 7 section 2 page 181 1-4  Organelle structure/ function Quiz  Microscope quiz

<p>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:</p> <p><b>RSL #</b> (reading standard for literacy: 2, 3, 4, 5, 10)</p> <p><b>WSL #</b> (Writing Standard for literacy: 1c, 1d, 1e, 4, 9)</p>	<p>-Explain the process of active transport: endocytosis, pinocytosis and phagocytosis, exocytosis</p> <p>-Compare the effects of osmosis on animal and plant cells</p> <p>-Distinguish between passive and active transport</p> <p>- Draw and label cell structures</p> <p>- Describe the methods of movement in various cell types.</p> <p>- Discuss and describe the role of a concentration gradient in active and passive transport</p> <p>- Basic microscopy</p>	<p><b>Pump</b>  <a href="http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter2/animation__how_the_sodium_potassium_pump_works.html">http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter2/animation__how_the_sodium_potassium_pump_works.html</a></p> <p><b>WS 4 The Living Cell (Sodium/Potassium Pumps)</b></p> <p>*Rainbow Spuds Lab  <a href="http://www.youtube.com/watch?v=LeS2-6zHn6M">http://www.youtube.com/watch?v=LeS2-6zHn6M</a></p> <p>Article: Closer look at Cell Membrane Shows Cholesterol ‘Keeping Order’</p> <p>Mihaela Mihailescu, Rishi G. Vaswani, Eduardo Jardón-Valadez, Francisco Castro-Román, J. Alfredo Freites, David L. Worcester, A. Richard Chamberlin, Douglas J. Tobias, Stephen H. White. <b>Acyl-Chain Methyl Distributions of Liquid-Ordered and -Disordered Membranes.</b> <i>Biophysical Journal</i>, 2011; 100 (6): 1455 DOI: <a href="https://doi.org/10.1016/j.bpj.2011.01.035">10.1016/j.bpj.2011.01.035</a></p>	<p>Warm up questions</p> <p>Draw picture/diagram</p> <p>Luck of the draw</p> <p>Think Pair Share</p>	<p>Prepared slides activity</p> <p>Wet mount slide activity</p> <p>Structure and function of the cell membrane WAC</p> <p>MCAS practice questions</p> <p>Informal observations</p> <p>Informal directed questioning</p> <p>CH 3 Test Cells</p> <p>Rainbow Spuds Lab Rubric</p> <p>Lab conclusion questions</p>
<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:</p> <p><b>RSL #</b> (reading standard for literacy: 2, 5)</p> <p><b>WSL #</b> (Writing Standard for literacy: 4)</p>	<p>-List the major differences between prokaryotic and eukaryotic cells</p> <p>-Identify the characteristics that prokaryotes share with the mitochondria and chloroplasts that support the endosymbiotic theory</p> <p>- Describe the cell theory and several scientist contribution to the theory</p> <p>Compare and contract prokaryotic and eukaryotic cells</p>	<p>Cell type comparisons hand outs</p> <p>CH 3 Cell Structure worksheet</p> <p>Venn diagram</p>	<p>Draw picture/Diagram</p> <p>Graphic organizer</p>	<p>Prepared slides activity</p> <p>CH 3 Test Cells</p> <p>Complete worksheets</p> <p>Chapter 7 section 1 page 173 1-4</p>

<p>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: 2, 3, 5, 10)</p> <p><b>WSL #</b> (Writing Standard for literacy: 1d, 1e, 4)</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>	<p>Vocabulary</p> <p>Microscopes</p> <p>Slides and Cover Slips</p> <p>Proto-Slow ®</p> <p>Kingdoms Video</p>	<p>Graphic Organizer</p> <p>Dip-Sticking</p>	<p>Protists in Pond Water Lab</p> <p>Cheek Cell vs. Onion Cell Lab</p>
<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: 2, 3, 4, 5, 7, 9, 10)</p> <p><b>WSL #</b> (Writing Standard for literacy: 1c, 1d, 1e, 2a-2f, 4, 5, 6, 8, 9)</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>	<p><u>Success In Science: Basic Biology</u></p> <p>Lesson 6: Energy Transport</p> <p>Lesson 7: Photosynthesis</p> <p>Coloring Worksheets: Mitochondria &amp; Chloroplasts</p> <p>Yeast, Balloons, Test Tubes, Spoons, String</p> <p>Vernier Lab Pro Sensors ®</p> <p>*Labs 11A, 11B, 11D and 12A</p> <p>Magic School Bus Photosynthesis movie</p> <p><a href="http://www.youtube.com/watch?v=cq0Fo40oDII">http://www.youtube.com/watch?v=cq0Fo40oDII</a></p>	<p>Draw Picture/Diagram</p> <p>Word Splash</p> <p>Graphic Organizer</p>	<p>Poster Project: Interrelatedness of Photosynthesis and Cellular Respiration showing equations, diagrams and summary</p> <p>Yeast Fermentation Activity</p> <p>Bromothymol Blue demonstration for Cellular Respiration with MCAS Open Response (Elodea in Flasks)</p> <p>Chromatography Demonstration</p> <p>Chapter 8 &amp; 9 Test</p>

<p>2.5 Explain the important role that ATP serves in metabolism.</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: 2, 4)</p> <p><b>WSL #</b> (Writing Standard for literacy: 4)</p>	<p>-Diagram the formation and explain the function of ATP in a cell</p>	<p>Textbook</p> <p>ATP Reading Sheet</p>	<p>Draw Diagram</p>	<p>(See Chapter 8 &amp; 9 Test above)</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: 2, 3, 4, 5, 7, 9)</p> <p><b>WSL #</b> (Writing Standard for literacy: 1e,4, 6, 9)</p>	<p>-Describe the phases of mitosis</p> <p>-Identify the role of each cell structure involved in mitosis and cell division</p> <p>-Compare cytokinesis in plant and animal cells</p> <p>-Explain the importance of mitosis and cell division in unicellular and multicellular organisms</p> <p>-Describe how mitosis and cell division aid in the replacement and regeneration of cells</p> <p>-State several factors that affect the lifespan of a cell</p> <p>-List some of the regulators that control growth in healthy cells</p> <p>-Describe how cancer cells overcome healthy cells</p>	<p>Cell Cycle &amp; Mitosis Coloring Worksheets</p> <p>Animations: "Cells Alive!"</p> <p><a href="http://www.cellsalive.com">www.cellsalive.com</a></p> <p><a href="http://www.arizona.edu">www.arizona.edu</a></p> <p>Web Quest Mitosis in real cells</p> <p><a href="http://staff.chardon.k12.oh.us/webpages/data/lross/files/Mitosis_Webquest.pdf">http://staff.chardon.k12.oh.us/webpages/data/lross/files/Mitosis_Webquest.pdf</a></p> <p>Mitosis Prepared Slides</p> <p>Surface Area to Volume Activity</p> <p>"Why are cells so small?"</p> <p>Balloons or Agar</p>	<p>Draw Diagrams</p> <p>Dip-Sticking</p> <p>Graphic Organizer</p>	<p>Mitosis In Real Cells Web Quest Questions</p> <p>Microscopy Lab: Observing Mitosis</p> <p>Lab: Effects of Size on Diffusion and Osmosis "Why are cells so small?"</p>
<p>2.7 Describe how the process of meiosis results in the formation of haploid cells. Explain the importance of this process in</p>	<p>-Distinguish between sexual and asexual reproduction</p> <p>-Explain what is meant by homologous chromosomes</p>	<p>Crossing Over Coloring Worksheet</p> <p>Meiosis Phases Graphic Organizer</p> <p>Meiosis Animation: <a href="http://www.arizona.edu">www.arizona.edu</a></p>	<p>Draw Diagram</p> <p>Graphic Organizer</p>	<p>Venn Diagram: Compare and Contrast Meiosis and Mitosis</p> <p>Test: Meiosis and Mitosis</p>

<p>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> <p><b>RSL #</b> (reading standard for literacy: 2, 5)</p> <p><b>WSL #</b> (Writing Standard for literacy: 1e, 6)</p>	<p>-Describe the process of meiosis          -Compare and contrast mitosis and meiosis          -Explain how chromosome theory accounts for the principles of segregation and independent assortment</p>	<p>Greenwood Genetic Center Karyotype Book (on T-Drive)</p> <p>Comparing Meiosis and Mitosis Worksheet</p> <p>Chromosome Structure Worksheet</p> <p>8-2 Section Review, Cell Division: Mitosis and Cytokinesis</p> <p>Chapter 6 Thinking Skills: Cell Reproduction Worksheet</p>	<p>Checking for Understanding</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: 2, 4, 5, 9, 10)</p> <p><b>WSL #</b> (Writing Standard for literacy: 1c, 1d, 1e, 9)</p>	<p>-Describe the structure of a typical virus          -Compare RNA viruses with DNA viruses</p>	<p>Lesson 17, 18, 19 Packet: Viruses, Bacteria, The Importance of Viruses and Bacteria</p> <p>Article: Are viruses alive?          Villarreal, Luis P. "Are Viruses Alive?: Scientific American." <i>Are Viruses Alive?: Scientific American</i>. Web. 14 May 2012.          &lt;<a href="http://www.scientificamerican.com/article.cfm?id=are-viruses-alive-2004">http://www.scientificamerican.com/article.cfm?id=are-viruses-alive-2004</a>&gt;.</p>	<p>Draw Diagram</p> <p>Recall, Characteristics of Life: Viruses vs. Cells</p>	<p>Virus &amp; Bacteria Quiz</p> <p>Venn Diagram: Viruses vs. Cells</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
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.  See last page for all <b>CCSS reading and writing standards</b> for grades 9-10:  <b>RSL #</b> (reading standard for literacy:  <b>WSL #</b> (Writing Standard for literacy:	-Name several events that led to the discovery of the structure and function of DNA -Describe the structure of a nucleotide -Explain the relationship between nucleotide sequence and DNA structure -Distinguish between autosomes and sex chromosomes -Explain the chromosomal basis of sex determination	Paper DNA nucleotides DNA coloring sheet  Strawberry DNA extraction activity  Genetic Counselors Handbook	Building models  Draw picture diagram	Chapter 12 section 1 questions 1-4  Chapter 12 section 2 questions 1-4  Chapter 12 Test

<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> <p><b>RSL #</b> (reading standard for literacy:</p> <p><b>WSL #</b> (Writing Standard for literacy:</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>	<p>How genes work worksheet</p> <p>Paper DNA model</p> <p>*Codon Bingo</p> <p>Protein Synthesis activity</p> <p>mRNA codon chart</p> <p>National Geographic's Twins article "Twins." - <i>Pictures, More From National Geographic Magazine</i>. Web. 14 May 2012. &lt;<a href="http://ngm.nationalgeographic.com/2012/01/twins/miller-text">http://ngm.nationalgeographic.com/2012/01/twins/miller-text</a>&gt;.</p> <p>*GATTACA movie with fill in worksheet</p>	<p>Venn Diagrams</p> <p>Graphic organizer</p> <p>Draw Picture/ Diagram</p> <p>Dip sticking</p>	<p>Protein Synthesis activity</p> <p>Protein Synthesis activity quiz</p> <p>WAC on Twins article</p> <p>Chapter 12 Test</p> <p>GATTACA movie with fill in worksheet and 3 essays</p> <p>Chapter 12 section 3 questions 1-4</p>
<p>3.3 Explain how mutations in the DNA sequence of a gene may or may not result in phenotypic change in an organism. Explain how mutations in gametes may result in phenotypic changes in offspring.</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:</p> <p><b>WSL #</b> (Writing Standard for literacy:</p>	<ul style="list-style-type: none"> <li>-Infer the effect on protein manufacture if a strand of DNA is copied incorrectly</li> <li>-Distinguish between a chromosomal and a gene mutation</li> <li>-Explain how mutations are passed from one generation to another</li> </ul>	<p>Genetic Mutations Lab</p>	<p>Dip sticking</p>	<p>Genetic Mutations Lab</p> <p>Chapter 12 section 4 questions 1-4</p> <p>Chapter 12 Test</p>
<p>3.4 Distinguish among observed inheritance patterns caused by several types of genetic traits (dominant,</p>	<ul style="list-style-type: none"> <li>-Explain the difference between genotype and phenotype</li> <li>-Distinguish between a homozygous</li> </ul>	<p>Practice Mendel's genetics problems (monohybrid)</p>	<p>Drawing Diagrams</p> <p>Ticket to leave</p>	<p>Baby Face Lab</p> <p>Dominant/ Recessive</p>

<p>recessive, incomplete dominance, codominant, sex-linked, polygenic, and multiple alleles).</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:</p> <p><b>WSL #</b> (Writing Standard for literacy:</p>	<p>genotype and a heterozygous genotype</p> <ul style="list-style-type: none"> <li>-Compare complete dominance with codominance</li> <li>-Give examples of sex-linked traits and compare sex-linked inheritance with sex-influenced</li> <li>-Distinguish between multiple alleles and multiple genes</li> <li>-Describe several genetic disorders in humans and their patterns of transmission</li> <li>-Explain what a genetic counselor does</li> </ul>	<p>Polar bear Grizzly Hybrids Article</p> <p>Baby face Lab</p> <p>Dominant/ Recessive Traits lab (Freaky Human Traits). PTC paper Sodium Benzoate paper Thiourea paper</p> <p>Bikini Bottom Genetics (1 &amp; 2)</p> <p>Incomplete Dominance &amp; Co-dominance worksheets</p> <p>Blood typing activity</p> <p>Blood Typing Worksheets</p> <p>Oompa Loompa Genetics</p> <p>X-linked traits worksheets</p> <p>Pedigree construction packet</p> <p>Mendel Genetics Challenge Problems</p> <p>Genetic Councilor Extra Credit poster presentation project</p>	<p>Dip sticking</p> <p>The Envelope Please</p> <p>Graphic organizer</p>	<p>Traits lab (Freaky Human Traits)</p> <p>Chapter 11 Section 1-3 Assessments questions 1-4</p> <p>Chapter 14 Section 1,2 Assessments questions 1-4</p> <p>Chapter 11 &amp; 14 test</p>
<p>3.5 Describe how Mendel’s laws of segregation and independent assortment can be observed through patterns of inheritance (such as dihybrid crosses).</p> <p>See last page for all <b>CCSS reading</b></p>	<ul style="list-style-type: none"> <li>-State and give examples for each of Mendel’s principles</li> <li>-Discuss the effect of linkage on independent assortment</li> <li>-Describe how crossing over affects linkage</li> </ul>	<p>Dihybrid genetics problems</p>	<p>Graphic Organizer</p>	<p>Chapter 11 &amp; 14 test</p>

<p><b>and writing standards</b> for grades 9-10:</p> <p><b>RSL #</b> (reading standard for literacy:</p> <p><b>WSL #</b> (Writing Standard for literacy:</p>				
<p>3.6 Use a Punnett Square to determine the probabilities for genotype and phenotype combinations in monohybrid crosses.</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:</p> <p><b>WSL #</b> (Writing Standard for literacy:</p>	<p>-Construct and interpret Punnett squares for monohybrid, dihybrid crosses, and test crosses</p>	<p>Practice Mendel’s genetics problems (monohybrid)</p> <p>Baby face Lab</p> <p>Dominant/ Recessive Traits lab (Freaky Human Traits).</p> <p>PTC paper</p> <p>Sodium Benzoate paper</p> <p>Thiourea paper</p> <p>Bikini Bottom Genetics (1 &amp; 2)</p>	<p>Graphic Organizer</p>	<p>Chapter 11 &amp; 14 test</p>
<p><b>RSL #</b> (reading standard for literacy</p> <p><b>2.</b> 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.</p> <p><b>3.</b> 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.</p> <p><b>4.</b> Determine the meaning of symbols, key terms, and other domain-specific words and</p>				

<p>phrases as they are used in a specific scientific or technical context relevant to <i>grades 9–10 texts and topics</i>.</p> <p><b>7.</b> 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.</p> <p><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.</p>				
<p>WSL # (Writing Standard for literacy)</p> <p><b>2.</b> Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <p>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.</p> <p>b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details,</p>				

<p>quotations, or other information and examples appropriate to the audience's knowledge of the topic.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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).</p> <p>3. (See note; not applicable as a separate requirement) analysis, reflection, and research.</p> <p>4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and</p>				
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<p>audience.</p> <p>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.</p> <p>9. Draw evidence from informational texts to support</p>				
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**Unit: Anatomy and Physiology**  
 Essential Questions

How is the body organized?  
 What is homeostasis?

What are the nutrients your body needs?  
 Why is water such an important nutrient  
 What are the organs of the digestive system  
 What are the functions of the digestive system  
 What are the macromolecules and their monomers?  
 How are enzymes involved in digestion?  
 What are disease/ disorders of the digestive system?

What are the structures and function of the kidneys?  
 How is blood filtered?  
 What is dialysis?

What are the structures and function of the circulatory system?  
 What are the three types of blood vessels in the circulatory system?  
 What are the functions of each of the blood cells and where are they produced?

What is lymph in the lymphatic system?  
 What are disease/ disorders of the circulatory system?

What are the structures and function of the respiratory system?  
 How does smoking affect the respiratory system?  
 What are disease/ disorders of the respiratory system?

What are the structures and function of the Nervous system?  
 How is a nerve impulse transmitted?  
 What are the functions of the central nervous system?  
 What are the functions of the two divisions of the peripheral nervous system?  
 What are the five types of sensory receptors?  
 What are disease/ disorders of the nervous system?

What are the structures and function of the muscular and skeletal system?  
 What are the structures of a typical bone?  
 What are the three different kinds of joints?  
 What are the three types of muscle tissue?  
 How do muscles contract?  
 Why is exercise important?

How are eggs and sperm produced?  
 What is the endocrine system?  
 What's the role of hormones in homeostasis?  
 What the difference between a positive and a negative feedback loop?

Framework Standard	Content/Skills	Resources	Instructional Strategies	Assessments
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<p>4.1 Explain generally how the digestive system (mouth, pharynx, esophagus, stomach, small and large intestines, rectum) converts macromolecules from food into smaller molecules that can be used by cells for energy and for repair and growth.</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):</p> <p><b>WSL #</b> (Writing Standard for literacy):</p>	<ul style="list-style-type: none"> <li>-Compare and contrast chemical digestion and mechanical digestion</li> <li>-Explain how structures in the mouth help prepare food for the rest of the digestive system</li> <li>-Describe the structure and function of the esophagus</li> <li>-Identify several functions of the stomach</li> <li>-List the functions of the pancreas and the liver in digestion</li> <li>-Describe the structure and function of the small intestine</li> <li>-Explain the function of the large intestine</li> </ul>	<p>WAC digestion of a Turkey sandwich</p> <p>Digestive system diagrams</p> <p>Digestive system coloring sheet</p> <p>Standard deviant digestion movie</p> <p>Magic school bus digestion episode</p> <p>Text book: Quick Lab chapter 38 section 2 How do villi help the small intestine absorb nutrients?</p> <p>My pyramid worksheet from <a href="http://choosemyplate.gov">choosemyplate.gov</a></p>	<p>Clock Buddies</p> <p>Think pair share</p> <p>Flow charts</p> <p>Draw picture diagram</p> <p>Graphic organizer</p> <p>Writing summaries</p> <p>Calculate percent absorption</p> <p>Obtain practical knowledge of surface areas significance</p> <p>Visualize system organization</p> <p>Hierarchy to biochemistry - enzymes</p> <p>Relate food choices to biochemistry</p>	<p>Chapter 38 section 1 questions 1-5</p> <p>Chapter 38 section 2 questions 1-4</p> <p>My pyramid worksheet</p> <p>Chapter 38 test</p>
<p>4.2 Explain how the circulatory system (heart, arteries, veins, capillaries, red blood cells) transports nutrients and oxygen to cells and removes cell wastes. Describe how the kidneys and the liver are closely associated with the circulatory system as they perform the excretory function of removing wastes from</p>	<ul style="list-style-type: none"> <li>-Identify the anatomical features of the human heart</li> <li>-Describe how the rate of the heart beat is controlled</li> <li>-List some causes of heart attacks</li> <li>-Trace the path of a single blood cell in a complete circuit through the circulatory system</li> <li>-Compare and contrast the structure</li> </ul>	<p>WAC type 2 Kidney Anatomy</p> <p>Circulatory system diagrams</p> <p>excretory system diagrams</p> <p>circulatory system coloring sheet</p> <p>excretory system coloring sheet</p>	<p>Think pair share</p> <p>Flow charts</p> <p>Draw picture diagram</p> <p>Graphic organizer</p> <p>Assess heart rate in</p>	<p>Chapter 38 section 1 questions 1-4</p> <p>Chapter 37 section 1 questions 1-4</p> <p>Chapter 3 section 2 questions 1-4</p> <p>Chapter test</p> <p>Heart rate lab</p>

<p>the blood. Recognize that kidneys remove nitrogenous wastes, and the liver removes many toxic compounds from blood.</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:</p> <p><b>WSL #</b> (Writing Standard for literacy:</p>	<p>and function of the three kinds of blood vessels</p> <ul style="list-style-type: none"> <li>-Explain the significance of blood pressure</li> <li>-Identify several functions of blood plasma</li> <li>-Contrast the structure and function of white and red blood cells</li> <li>-Give examples of how the liver maintains homeostasis</li> <li>-Describe the location and function of the kidneys</li> </ul>	<p>Standard deviant excretory movie</p> <p>Bill Nye circulatory movie with worksheet</p> <p>Inside Look at Heart Attack Discovery movie <a href="http://www.youtube.com/watch?v=MyZ1-haX_ZE">http://www.youtube.com/watch?v=MyZ1-haX_ZE</a></p> <p>Vernier heart rate monitors</p> <p>Blood composition worksheet</p> <p>Excretory System Flow chart</p> <p>WAC Pathway of blood through heart and lungs</p> <p>Heart rate and exercise lab</p> <p>Pulse rate and lab</p> <p>Kinetic pathway of heart activity and write up</p>	<p>response to varying activity</p> <p>View and summaries various disease of the heart</p>	<p>WAC kidneys</p> <p>WAC pathway of blood</p>
<p>4.3 Explain how the respiratory system (nose, pharynx, larynx, trachea, lungs, alveoli) provides exchange of oxygen and carbon dioxide.</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:</p>	<ul style="list-style-type: none"> <li>-Identify the structures of the human respiratory system and state the function</li> <li>-Trace the path of oxygen and carbon dioxide throughout the body</li> <li>-Describe how air enters and leaves the lungs</li> </ul>	<p>WAC type 2 respiratory breathing process</p> <p>respiratory system diagrams</p> <p>respiratory system coloring sheet</p> <p>Bill Nye Respiration</p> <p>Lung Capacity Lab</p>	<p>Think pair share</p> <p>Flow charts</p> <p>Draw picture diagram</p> <p>Graphic organizer</p> <p>Making models</p>	<p>Chapter 37 section 3 questions 1-4</p> <p>Chapter 37 test</p> <p>WAC type 2 respiratory breathing process</p> <p>Lung Capacity Lab</p>

<p><b>WSL #</b> (Writing Standard for literacy:</p>		<p>Make Model of Lungs</p>		
<p>4.4 Explain how the nervous system (brain, spinal cord, sensory neurons, motor neurons) mediates communication between different parts of the body and the body’s interactions with the environment. Identify the basic unit of the nervous system, the neuron, and explain generally how it works.</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:</p> <p><b>WSL #</b> (Writing Standard for literacy:</p>	<p>-Distinguish between different types of neurons -Name the parts of a neuron -Describe the role of the synapse -Explain how a nerve impulse is transmitted -Relate the role of neurotransmitters to muscle function -Describe the structure and function of the cerebrum -Explain why taste and smell are called “chemical senses”</p>	<p>WAC nerve impulse and kinesthetic simulation</p> <p>Nervous system diagrams</p> <p>Nervous system coloring sheet</p> <p>Reaction rate Lab</p> <p>Skin Sensitivity Lab</p> <p>Understanding Nervous and Endocrine systems Nervous system disease writing assignment</p>	<p>Think pair share</p> <p>Flow charts</p> <p>Draw picture diagram</p> <p>Graphic organizer</p>	<p>Chapter 35 test</p> <p>Chapter 35 section 2 questions 1-4</p> <p>Chapter 35 section 3 questions 1-4</p> <p>Chapter 35 section 4 questions 1-4</p> <p>Chapter 35 section 5 questions 1-4</p> <p>Reaction rate Lab</p> <p>Skin Sensitivity Lab</p> <p>Understanding Nervous and Endocrine systems</p>
<p>4.4 Explain how the muscular/skeletal system (skeletal, smooth and cardiac muscle, bones, cartilage, ligaments, tendons) works with other systems to support and allow for movement. Recognize that bones produce both red and white blood cells.</p> <p>See last page for all <b>CCSS reading and writing standards</b> for grades 9-10:</p>	<p>-Name the four basic types of tissue that make up the human body -Describe the structure of striated muscle -Explain the mechanism of contraction in skeletal muscle -Compare and contrast smooth muscle, cardiac muscle, and striated muscle</p>	<p>Muscular system diagrams</p> <p>Muscular system coloring sheet</p> <p>Skeletal system diagrams</p> <p>Skeletal system coloring sheet</p> <p>Joints worksheet</p> <p>Structure of Bone worksheet</p>	<p>Draw picture diagram</p> <p>Graphic organizer</p> <p>Visualization with models</p> <p>Game: Pin the bone/ muscle name on the model</p>	<p>Chapter 36 test</p> <p>Chapter 36 section 1 questions 1-4</p> <p>Chapter 36 section 2 questions 1-4</p> <p>What do tendons Do quick lab chapter 36</p>

<p><b>RSL #</b> (reading standard for literacy:</p> <p><b>WSL #</b> (Writing Standard for literacy:</p>		<p>Skeletal model/ bones</p> <p>Muscle system notes power point</p> <p>What do Tendons Do quick lab chapter 36</p> <p>Muscles and Joints movie</p> <p>Bones and joints movie</p> <p>Skeleton movie</p>		
<p>4.6 Recognize that the sexual reproductive system allows organisms to produce offspring that receive half of their genetic information from their mother and half from their father and that sexually produced offspring resemble, but are not identical to, either of their parents.</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:</p> <p><b>WSL #</b> (Writing Standard for literacy:</p>	<p>-List the parts of the male and female reproductive systems and their functions</p> <p>-Compare the production of sperm and eggs</p>	<p>See meiosis</p>	<p>See meiosis</p>	<p>See meiosis</p> <p>Chapter 39 section 3 questions 1-4</p>
<p>4.7 Recognize that communication between cells is required for coordination of body functions. The nerves communicate with electrochemical signals, hormones</p>	<p>-Name several hormones and state their sources and functions</p>	<p>See cells for review</p> <p>WAC neuron firing.</p> <p>“Selected Actions of Hormones and</p>	<p>Draw picture diagram</p> <p>Graphic organizer</p>	<p>Chapter 39 test</p> <p>Chapter 39 section 1 questions 1-4</p>

<p>circulate through the blood, and some cells produce signals to communicate only with nearby cells.</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:</p> <p><b>WSL #</b> (Writing Standard for literacy:</p>		<p>Other Chemical Messengers” movie</p> <p>Endocrine system diagrams</p> <p>Understanding Nervous and Endocrine systems Endocrine system disease writing assignment</p>		<p>Chapter 39 section 2 questions 1-4</p> <p>Quiz Endocrine System</p>
<p>4.8 Recognize that the body’s systems interact to maintain homeostasis. Describe the basic function of a physiological feedback loop.</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:</p> <p><b>WSL #</b> (Writing Standard for literacy:</p>	<p>-Define homeostasis -Explain how negative feedback works</p>	<p>“Selected Actions of Hormones and Other Chemical Messengers” movie</p> <p>Homeostasis and Hormones guided practice Scienceaid.co.uk</p> <p>Homeostasis web quest – Ben’s Bad day</p>	<p>Webquest</p> <p>Draw picture diagram</p> <p>Graphic organizer</p>	<p>Chapter 35 Maintaining Homeostasis section 1 questions 2</p> <p>Chapter 39 section 1 questions Control of the Endocrine system questions 2</p>
<p>RSL # (reading standard for literacy</p> <ol style="list-style-type: none"> <li>1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.</li> <li>2. Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of</li> </ol>				

<p>a complex process, phenomenon, or concept; provide an accurate summary of the text.</p> <p>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.</p> <p><i>Craft and Structure</i></p> <p>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>.</p> <p>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>).</p> <p>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.</p> <p>10. By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.</p>				
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WSL # (Writing Standard for literacy)				
4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, 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, 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.				
<i>Research to Build and Present Knowledge</i>				
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 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 format for citation.				
9. Draw evidence from informational texts to support analysis, reflection, and research.				
<i>Range of Writing</i>				
10. 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.				

**Unit: Evolution and Biodiversity**  
 Essential Questions

1. Who is Charles Darwin and what is his contribution to science?
2. What patterns did Darwin observe amongst the Galapagos?
3. Who were Lamarck and Malthus and what were their contributions to science?
4. How is natural variation used in artificial selection?
5. How is natural selection related to species' fitness?
6. What evidence of evolution did Darwin present?
7. What are the major sources of heritable variation in a population?

8. How is evolution defined in genetic terms?
9. What is genetic drift?
10. What five conditions are needed to maintain genetic equilibrium?
11. What factors are involved in the formation of a new species?
12. What is the process of speciation in Darwin's finches?
13. What is the fossil record and how does it relate to carbon isotope dating?

Framework Standard	Content/Skills	Resources	Instructional Strategies	Assessments
<p>5.1 Explain how evolution is demonstrated by evidence from the fossil record, comparative anatomy, genetics, molecular biology, and examples of natural selection.</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:</p> <p><b>WSL #</b> (Writing Standard for literacy:</p>	<ul style="list-style-type: none"> <li>-State how radioactive isotopes are used to date rocks and fossils</li> <li>-List and explain the supporting data for evolutionary theory</li> <li>- Compare and Contrast vertebrate body plan</li> <li>- Compare amino acid sequences between vertebrates</li> <li>- Connect genetics to evolution</li> <li>- Interpret data and draw conclusions about evolution using movies</li> </ul>	<p>Evolution PowerPoint</p> <p>Evolution Series Movies with Movie Questions</p> <p>Evidence for Evolution Guided Notes Packet</p> <p>Amino Acid Sequences to Determine Evolutionary Relationships</p> <p>Find Clues in Rock Layers</p> <p>Charles Darwin: Lesson 8, Active Reading</p> <p>PBS Series: Evolution Videos with Essay Questions</p>	<p>Graphic Organizer</p> <p>Written Summary of Evidences of Evolution</p> <p>Drawing/Coloring Diagrams</p> <p>Interactive Investigation – Lab activity</p> <p>One Question Quiz</p>	<p>Text Book, Ch. 15: Section 1 Assessment Questions #1-4</p> <p>Text Book, Ch. 15: Section 2 Assessment Questions #1-4</p> <p>Text Book, Ch. 15: Section 3 Assessment Questions #1-4</p>
<p>5.2 Describe species as reproductively distinct groups of organisms. Recognize that species are further classified into a hierarchical taxonomic system (kingdom, phylum, class, order, family, genus, species) based on</p>	<ul style="list-style-type: none"> <li>- Describe how organisms are grouped into species</li> <li>- Explain the role of isolation in the formation of new species</li> <li>- Distinguish between divergent evolution and convergent evolution</li> <li>- Explain how selection can stabilize a</li> </ul>	<p>Six Kingdoms and Taxonomy PowerPoint with Classifying Organism Notes and Worksheet</p> <p>Taxonomy Comparison: Computer Lab Activity</p>	<p>Graphic Organizer</p> <p>Drawing/Coloring Diagrams</p> <p>Interactive Investigation – Lab</p>	<p>Text Book, Ch. 18: Section 1 Assessment Questions #1-5</p> <p>Text Book, Ch. 18: Section 2 Assessment Questions #1-5</p> <p>Text Book, Ch. 18: Section 3</p>

<p>morphological, behavioral, and molecular similarities. Describe the role that geographic isolation can play in speciation.</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:</p> <p><b>WSL #</b> (Writing Standard for literacy:</p>	<p>species</p> <ul style="list-style-type: none"> <li>- Distinguish between gradual evolution and punctuated equilibrium</li> <li>- Describe the characteristics of primates and state how each was originally and adaptation for life in trees</li> <li>- Define the term hominid</li> <li>- Identify the characteristics that distinguish between <i>Homo habilis</i>, <i>Homo erectus</i>, and <i>Homo sapien sapien</i>, and <i>Homo sapien neandertal</i></li> <li>- State several reasons why systems of classification are important</li> <li>- Explain several advantages of using a system of binomial nomenclature</li> <li>- List the levels of classification developed by Linnaeus</li> <li>- Describe a modern technique used to classify organisms</li> <li>- Describe how to create and use a dichotomous key</li> </ul>	<p>Making Cladograms</p> <p>Candy and Creatures Dichotomous Keys</p> <p>Speciation in Galapagos Finches Guided Practice</p>	<p>activity</p>	<p>Assessment Questions #1-5</p>
<p>5.3 Explain how evolution through natural selection can result in changes in biodiversity through the increase or decrease of genetic diversity from a population.</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:</p> <p><b>WSL #</b> (Writing Standard for literacy:</p>	<ul style="list-style-type: none"> <li>- Describe how mutations influence genetic equilibrium</li> <li>-Describe how nonrandom mating and migration can affect allele frequencies</li> <li>-Discuss interactions between genes and the environment over many generations can cause changes in allele frequencies</li> <li>-Compare and contrast Lamarck’s Hypotheses and Darwin’s Theory of Evolution</li> <li>-Identify the role of variation and natural selection in Darwin’s theory of evolution</li> </ul>	<p>Fork &amp; Beans Natural Selection Lab</p> <p>Simulating Natural Selection</p> <p>Evolution By Natural Selection</p> <p>Modeling a Gene Pool Lab</p> <p>Fishy Frequencies: A Hardy-Weinberg Population Genetics Simulation</p> <p>“Populations Evolve, Individuals Don’t!” Guided Notes</p> <p>MCAS Practice Questions</p>	<p>Graphic Organizer</p> <p>Drawing/Coloring Diagrams</p> <p>Interactive Investigation – Lab activity</p>	<p>Text Book, Ch. 16: Section 1 Assessment Questions #1-4</p> <p>Text Book, Ch. 16: Section 2 Assessment Questions #1-4</p> <p>Text Book, Ch. 16: Section 3 Assessment Questions #1-4</p> <p>Evolution Unit Test, ch 15, 16, 18</p>

		Lamarck vs. Darwin dueling theories Comparison.		
RSL # (reading standard for literacy)				
1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.				
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.				
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.				
<i>Craft and Structure</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> .				
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> ).				
<b>6.</b> 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.				
<i>Integration of Knowledge and Ideas</i>				
<b>7.</b> 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.				
<b>8.</b> 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.				
<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.				
<i>Range of Reading and Level of Text Complexity</i>				
<b>10.</b> By the end of grade 10, read				

<p>and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.</p> <p>WSL # (Writing Standard for literacy)</p> <ol style="list-style-type: none"><li>1. Write arguments focused on <i>discipline-specific content</i>.<ol style="list-style-type: none"><li>a. 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>b. 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>c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships</li></ol></li></ol>				
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<p>between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.</p> <p>d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.</p> <p>e. Provide a concluding statement or section that follows from or supports the argument presented. <b>2.</b> Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <p><b>2.</b> Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <p>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</p>				
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<p>to aiding comprehension.</p> <ul style="list-style-type: none"><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</li></ul>				
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<p>supports the information or explanation presented (e.g., articulating implications or the significance of the topic).</p> <p><b>4.</b> Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p> <p><b>5.</b> 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.</p> <p><b>6.</b> 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.</p> <p><b>9.</b> Draw evidence from informational texts to support analysis, reflection, and research.</p>				
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**Unit: Ecology**

Essential Questions

1. What different levels of organization does an ecologist study?
2. What methods are used to study ecology?
3. Where does the energy for life processes come from?
4. How does energy flow through living systems?
5. How efficient is the transfer of energy among organisms in an ecosystem?
6. How does matter move among the living and non-living parts of an ecosystem?
7. How are nutrients important in living systems?
8. What is the greenhouse effect?
9. How does it maintain the biosphere's temperature range?
10. What are Earth's three main climate zones?
11. How do biotic and abiotic factors influence an ecosystem?
12. What interactions occur within communities?
13. What is ecological succession?
14. What are unique characteristics of the world's biomes?
15. What are the major factors that govern aquatic ecosystems?
16. What are the two types of freshwater ecosystems?
17. What are the characteristics of different marine zones?
18. What characteristics are used to describe a population?
19. What factors affect population size?
20. What are exponential and logistic growths?
21. What factors limit population growth?
22. How has the size of the human population changed over time?
23. Why does population vary so much?
24. What type of human activities can affect the biosphere?

Framework Standard	Content/Skills	Resources	Instructional Strategies	Assessments
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<p>6.1 Explain how birth, death, immigration, and emigration influence population size.</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:</p> <p><b>WSL #</b> (Writing Standard for literacy:</p>	<p>-Explain why populations do not reach their biotic potential</p> <p>-Discuss the relationship between growth rate and carrying capacity</p> <p>-List several factors that affect population size</p> <p>-Name several density-independent and density-dependent factors that limit population growth</p>	<p>Oh, Deer! Activity</p> <p>Ecology PowerPoint</p> <p>Nature a Trickster: A Tale of Mice, Acorns and the Tick Season from Hell</p>	<p>Game</p> <p>Draw &amp; color diagrams</p> <p>Graphing Activity</p>	<p>Text Book, Ch. 16: Section 1 Assessment Questions #1-4</p> <p>Text Book, Ch. 5: Section 1 Assessment Questions #1-6</p> <p>Text Book, Ch. 5: Section 2 Assessment Questions #1-5</p> <p>Ecology Unit Test</p>
<p>6.2 Analyze changes in population size and biodiversity (speciation and extinction) that result from the following: natural causes, changes in climate, human activity, and the introduction of invasive, non-native species.</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:</p> <p><b>WSL #</b> (Writing Standard for literacy:</p>	<p>-Contrast the growth rates of populations that have undergone demographic transition with those of populations that have not</p> <p>-Explain how human activities endanger natural resources</p>	<p>Cane Toad Movie and Article</p>		<p>Text Book, Ch. 4: Section 1 Assessment Questions #1-4</p> <p>Text Book, Ch. 5: Section 3 Assessment Questions #1-5</p> <p>Text Book, Ch. 6: Section 2 Assessment Questions #2, 4</p> <p>Ecology Unit Test</p>
<p>6.3 Use a food web to identify and distinguish producers, consumers, and decomposers, and explain the transfer of energy</p>	<p>-Describe the characteristics of an ecosystem</p> <p>-Identify the roles of organisms in an ecosystem</p>	<p>“What is a Food Pyramid? “ Activity – Vortek, Snive &amp; Kluge</p> <p>Hands on Activity Rule of Ten</p>		<p>Text Book, Ch. 3: Section 1 Assessment Questions #1-4</p> <p>Text Book, Ch. 3: Section 1</p>

<p>through trophic levels. Describe how relationships among organisms (predation, parasitism, competition, commensalisms, and mutualism) add to the complexity of biological communities.</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:</p> <p><b>WSL #</b> (Writing Standard for literacy:</p>	<p>-Diagram the feeding levels in food chains and food webs          -Explain how a pyramid can be used to represent energy flow in a food web          -Give examples of symbiosis          -Explain how prey-predator relationship help to regulate population growth</p>	<p>MCAS Open Response WAC: Food Webs</p> <p>MCAS Open Response WAC: Symbiotic Relationships</p> <p>Food Chain Analysis</p> <p>Food web coloring key</p> <p>Pictionary Ecology Game</p> <p>Ecology Quiz packet</p>		<p>Assessment Questions #1-4</p> <p>Text Book, Ch. 4: Section 2          Assessment Questions #1-4          Text Book, Ch. 4: Section3          Assessment Questions #1-4</p> <p>Text Book, Ch. 4: Section 4          Assessment Questions #1-5</p> <p>Ecology Unit Test</p>
<p>6.4 Explain how water, carbon, and nitrogen cycle between abiotic resources and organic matter in an ecosystem and how oxygen cycles through photosynthesis and respiration.</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:</p> <p><b>WSL #</b> (Writing Standard for literacy:</p>	<p>-Describe how the supply of fresh water in the biosphere is maintained          -Explain how carbon and oxygen are recycled between organisms and the atmosphere          -Give examples of the forms of nitrogen produced during the nitrogen cycle</p>	<p>Traveling Carbon Cycle Passport Game</p> <p>Traveling Nitrogen Cycle Passport Game</p> <p>Water Cycle Game, with pollutant option</p> <p>Water cycle fill in the blank, cross word and word find</p> <p>Cycles power point</p> <p>Nutrient Cycles PowerPoint</p> <p>Cycles coloring sheets</p>	<p>Games</p>	<p>Text Book, Ch. 3: Section 3          Assessment Questions #1-4</p> <p>Ecology Unit Test</p>
<p>RSL # (reading standard for literacy</p>				

<p>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.</p> <p>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.</p> <p><i>Craft and Structure</i></p> <p>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>.</p> <p>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>).</p> <p>Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate</p>				
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<p>information expressed visually or mathematically (e.g., in an equation) into words.        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.        By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.</p>				
<p>WSL # (Writing Standard for literacy)</p> <p><b>4.</b> Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p> <p><b>5.</b> 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.</p> <p><b>9.</b> Draw evidence from informational texts to support analysis, reflection, and</p>				

research.				
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**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 scientific articles, advertisements, or media stories.	Lamarck vs. Darwin dueling theories Comparison.	See 5.3	
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 2b 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; -Collecting data or evidence in an 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>	Reaction rate lab Lung Capacity Heart Rate and exercise lab Mendel Genetics Challenge Problems	See 4.4 See 4.3 See 4.2 See 3.4	

## 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                   |

<p>9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</p>	<p>9. 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.</p>	<p>other sources of information.          9. 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.</p>
<p><i>Range of Reading and Level of Text Complexity</i></p>		
<p>10. By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.</p>	<p>10. By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.</p>	<p>10. By the end of grade 12, read and comprehend science/technical texts in the grades 11–CCR text complexity band independently and proficiently.</p>

## 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:
<p><i>Text Types and Purposes</i></p>		
<p>1. Write arguments focused on <i>discipline-specific content</i>.</p> <ul style="list-style-type: none"> <li>a. 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>b. 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>c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.</li> <li>d. Establish and maintain a formal style.</li> <li>e. Provide a concluding statement or section</li> </ul>	<p>1. Write arguments focused on <i>discipline-specific content</i>.</p> <ul style="list-style-type: none"> <li>a. 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>b. 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>c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships</li> </ul>	<p>1. Write arguments focused on <i>discipline-specific content</i>.</p> <ul style="list-style-type: none"> <li>a. 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>b. 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> </ul>

**Grades 6–8 students:**

that follows from and supports the argument presented.

**Grades 9–10 students:**

- between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
- d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
- e. Provide a concluding statement or section that follows from or supports the argument presented.

**Grades 11–12 students:**

- c. 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.
- d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
- e. Provide a concluding statement or section that follows from or supports the argument presented.

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:**

*Text Types and Purposes (continued)*

- 2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
  - 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.
  - b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
  - c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
  - d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

- 2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
  - 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.
  - 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.
  - 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.

- 2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
  - 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.
  - 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.
  - c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the

**Grades 6–8 students:**

- e. Establish and maintain a formal style and objective tone.
- f. Provide a concluding statement or section that follows from and supports the information or explanation presented.

**Grades 9–10 students:**

- 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.
- 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.
- 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).

**Grades 11–12 students:**

- relationships among complex ideas and concepts.
- 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.
- 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).

3. (See note; not applicable as a separate requirement)

3. (See note; not applicable as a separate requirement)

3. (See note; not applicable as a separate requirement)

**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:**

*Production and Distribution of Writing*

- 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.
- 6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas

- 4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, 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, publish, and update individual or shared writing products, taking advantage of

- 4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, 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, publish, and update individual or shared writing products in response to ongoing

clearly and efficiently.	technology's capacity to link to other information and to display information flexibly and dynamically.	feedback, including new arguments or information.
<b>Research to Build and Present Knowledge</b>		
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 format for citation.	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, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
9. Draw evidence from informational texts to support analysis, reflection, and research.	9. Draw evidence from informational texts to support analysis, reflection, and research.	9. Draw evidence from informational texts to support analysis, reflection, and research.
<b>Range of Writing</b>		
10. 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.	10. 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.	10. 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.