Unit 1: Chemical Interactions

Content Area: **Science**
Course(s): **Science**
Time Period: **Marking Period 1**
Length: **8-10 Weeks**
Status: **Published**

Unit Overview

In this unit, students will develop models in order to describe the atomic structures of simple and extended molecules using information within the Periodic Table of Elements. Students will be able to analyze and interpret data of a substance's properties prior to and after a chemical reaction occurs. Students will be able to model in order to demonstrate the law of conservation of mass. Finally students will design and create a device that can absorb or release thermal energy to demonstrate an endothermic and exothermic reaction.

Three Dimensions

Science and Engineering Practices

SEP.1	Asking Questions and Defining Problems
SEP.2	Developing and Using Models
SEP.3	Planning and Carrying Out Investigations
SEP.4	Analyzing and Interpreting Data
SEP.5	Using Mathematics and Computational Thinking
SEP.6	Constructing Explanations and Designing Solutions
SEP.7	Engaging in Argument from Evidence
SEP.8	Obtaining, Evaluating, and Communicating Information

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter

- Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. (MS-PS1-1)
- Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-2)
- Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). (MS-PS1-1)

PS1.B: Chemical Reactions

- Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the

original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-2),(MS-PS1-5)
- The total number of each type of atom is conserved, and thus the mass does not change. (MS-PS1-5)
- Some chemical reactions release energy, others store energy. (MS-PS1-6)

ETS1.B: Developing Possible Solutions

- A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (secondary to MS-PS1-6)

ETS1.C: Optimizing the Design Solution

- Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of the characteristics may be incorporated into the new design. (secondary to MS-PS1-6)
- The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (secondary to MS-PS1-6)

Crosscutting Concepts

Patterns

- Macroscopic patterns are related to the nature of microscopic and atomic-level structure. (MS-PS1-2)

Scale, Proportion, and Quantity

- Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-PS1-1)

Energy and Matter

- Matter is conserved because atoms are conserved in physical and chemical processes. (MS-PS1-5)
- The transfer of energy can be tracked as energy flows through a designed or natural system. (MS-PS1-6)

Knowledge, Skills, and Assessment

Essential Insights and Understandings/Guiding Questions	Critical Knowledge and Skills	Recommended Activities, Asses
All matter is made up of atoms.	**Matter is all around us and is made of tiny**	**Activity**: Build and draw a scale model to demonstrate size c to other chosen common objects.

How small is the atom? Are atoms made of smaller things?

Who discovered the first atom?

Who discovered the neutron, electron, and proton?

particles known as atoms. These atoms consist of even smaller particles known as sub-atomics: protons, electrons, and neutrons. These sub-atomic particles consist of even smaller particles known as quarks.

Skill; SWBAT...

- demonstrate the ability to draw a scale model of an atom compared to other objects that are larger
- draw model of an atom and its sub-atomic particles, demonstrating that sub-atomic particles are smaller in scale to the atom
- understand the sub-atomic particles are within the atom are the proton(s) and neutron(s), while electron(s) are around the center

A theory in science is a discovery that can be added to over time. The atomic theory discusses the various discoveries throughout history in regards to the atom. It is constantly being added to because of

Informal Assessment: Use various teacher made questions t
observations/questioning/discussions, or have students self-a

Activity: Divide students into small groups. The teacher har
with specific dates through time in which an atomic discover
(Students keep as notes). Each group is assigned a date in tir
After all groups have made a small skit, the class stand in a
reads aloud the dates and the groups freeze as the teacher sna
Teacher prints out the pictures. Students make small poster
created their own Atomic Theory Timeline.

Final Assessment: Students will be assessed on their ability
particles, explain the atomic theory and the causes for advan
discoveries regarding the atomic theory and why they are mo
evidence is there that matter exists? Assessments will consis
questioning/conversations/observations and exit tickets.

	technological advancements within science such as the invention of new microscopes. Skill; SWBAT... • explain what a theory is and how it can change over time when new discoveries are made vs a law that never changes • understand the importance of technological advancements that have aided in the Atomic Theory • know when and who discovered the proton, neutron, and electron.	
Atoms are composed of subatomic particles placed in specific locations. What information does the Periodic Table of Elements contain about the number of sub-atomic particles? How can the number of electrons, protons, and neutrons be determined? What are the locations of the sub-atomic	**The Periodic Table of Elements contains information about elements and its atoms. The information within each element box contains the symbol, atomic number, and atomic mass. This information can be used to determine the elements sub-atomic particle numbers. Each of these particles has a charge. Atoms are held together by charges: protons are positive, electrons are**	**Activity:** Teacher will use a model, presentation, interactives atomic particles. Students will then be given examples of va and numbers of each sub-atomic particle. **Activity:** Using worksheets, communicator boards, or whitel the Bohr model with the correct number of subatomic particl **Activity:** Create an Atom using Mallows. Students will be d specific element on the periodic table. Using their knowledg mallows, toothpicks, and highlighter) they must create a 3-D assesses each group when complete by observing the model, and location of sub-atomic particles. Class does a walk throu

particles?	**negative, and neutrons are neutral. Neutrons and protons are held in the middle of the atom while electrons float around the nucleus in energy levels. A Bohr Model is a model of an atom that shows the correct number of sub-atomic particles and proper placement by using the information on the Periodic Table of Elements.**	**Resource:** Copy of the Periodic Table of Elements (paper or
How can one make a model of an atom with all its sub-atomic particles?	Skill; SWBAT... • determine placement of particles and charges using a Bohr Model of a given element (any element) • determine placement of electrons by creating Lewis Dot Diagrams • model the structure of an atom either through 2-dimensional drawing or 3-dimensional modeling • understand the scale of the sub-atomic particles (electrons are smallest within the nucleus while the neutrons and protons are larger surrounding the nucleus) • determine the correct number of subatomic	**Informal Assessment:** Use teacher made questions to assess observations/questioning/discussions, or have students self-a **Formal Assessment:** Using a teacher made assessment or or Bohr Models using the information found on the periodic tab on how they determined the number for each element. *Note numbers as students will spend too much time drawing electr **Activity:** Students should take notes on the Lewis Dot Diagr and how to determine the number of dots to be placed (group the transition metals Lewis Dot Structures. **Activity/Assessment:** Using communicator boards or small board markers) teacher will ask students to draw the Lewis D students by keeping a log on student progress. The teacher c independence, the teacher can pair students up to do a timed **Activity:** Worksheets developed by teacher, found online, or **Final Assessment:** Students will be assessed on their ability Dot using the Periodic Table of Elements.

	particles of any element on the periodic table	
Atoms interact with one another during a chemical reaction by creating a bond. What occurs when a non-metal interacts with a metal? How can an ionic bond be modeled? what are the characteristics of an ionic compound?	**Atoms interact when they bond with another atom. For example Sodium (Na) and Chlorine (Cl) come together during what is known as an ionic bond and create table salt.** **Atoms want to become stable and fulfill their outer shell known as the octet rule (8 valence electrons). In order to sometimes complete this, atoms may give away their electrons to another atom so all atoms involved are now stable. When two atoms transfer electrons this is called an ionic bond and the product is an ionic compound. Atoms with 5, 6, or 7 valence electrons usually become more stable when this number increases to 8! (octet rule) whereas Atoms with 1, 2, or 3 can lose electrons to become more stable. These numbers match up for example an element with 7 valence electrons will bond with an element that has 1 valence electron.** **When an atom gains or loses (transfers) an electron(s) it becomes an ion. An ion is an atom with a charge.** **An atom that loses an electron becomes**	**Activity:** Students should take notes on the Ionic Bonds and ionic bond is, what elements form ionic bonds according to t valence electron number, description of an ion, and charges an ionic bond and the steps involved. Notes can be taught us notebook, or blackboard. Notes can be guided, taken in stud notebook. **Activity/Assessment:** Using communicator boards or small board markers) teacher will ask students to draw the Lewis D students by keeping a log on student progress. The teacher c independence, the teacher can pair students up to do a timed **Activity:** Worksheets developed by teacher, found online, or **Activity:** Gizmo Ionic Bonds https://www.explorelearning.com/index.cfm?ResourceID=51 Students will simulate ionic bonds between a variety of meta nonmetal atom, and transfer electrons from one to the other. electrons on charge, and rearrange the atoms to represent the nonmetal atoms can be added to the screen, and the resulting complete a step by step guide on how to manipulate the onlir charts, develop hypothesis, and answer questions. Can be dc Teacher can set up each class and students use a code to be a completion. Extension/ assessment is done at the end and tea

positive because it got rid of a negative electron and an atom that gains an electron becomes negative. Ionic Bonds have specific characteristics such as good conductors when dissolved, brittle, crystal like shape, and have a high melting point. They conduct because the electrons are free to flow from one atom to another. An ionic bond occurs between a metal and a non-metal.

Skill; SWBAT

- demonstrate how an ionic bond is formed by modeling between two or more given elements using Lewis Dot Diagrams, circles, arrows, and ionic formulas with charges
- know that an ionic bond occurs between two atoms by the transfer of electrons and be able to provide an example
- understand and model that a substance can conduct electricity when dissolved in water is

	determined to be ionic because electrons are moving (free to flow) from one atom to another.	
What occurs when a non-metal reacts with a non-metal? How can an covalent bond be modeled? What are the characteristics of an covalent compound?	**Sometimes instead of transferring electrons, atoms share their valence electron(s) with one another. A bond in which atoms or a group of atoms share electron(s) is a covalent bond. This type of bond occurs between a non-metal and a non-metal. In order to model this, a Lewis Dot Diagram is drawn for the element(s) or group of elements. In place of two dots within a circle, a straight line can be drawn to signify a bond or sharing of two electrons. Wherever the sharing occurs, a circle is drawn around them to signify a bond of sharing. Covalent bonds can include a single, double, or triple bond. The number of bonds can be determined by the number of valence electrons needed to become stable. For example, Nitrogen has 5 valence electrons, therefore it will form a triple bond with another atom so each atom has 8 valence electrons. Unlike ionic compounds, covalent compounds are not good conductors of**	**Activity:** Students should take notes on the Covalent Bonds covalent bond is, what elements form covalent bonds accord and valence electron number. Must include examples on hov involved. Notes can be taught using PPT, Google Slides, Pre Notes can be guided, taken in students in own notebook/bin **Activity/Assessment:** Using communicator boards or small board markers) teacher will ask students to draw the Lewis D students by keeping a log on student progress. The teacher c independence, the teacher can pair students up to do a timed **Activity:** Worksheets developed by teacher, found online, or **Activity:** Worksheet practice on covalent and ionic bonds us **Assessment:** In a one on one setting, informally teacher asse rubric to clarify areas of weakness and area for improvement assess and are allowed to ask questions regarding materials c covalent bonds. **Activity for Covalent and Ionic Compounds:** Shedding Li (https://ctemsscience.wikispaces.com/file/view/Lab%3B+Sh Students are divided into lab groups. Each lab group must m provided. Using this they will test various substances to dete compounds. Teacher must provide substances and additiona aware, label them by letter or unknowns. Students compare r conclude questions can be done as a class, lab groups, or ind

	electricity when dissolved and they have low melting points. Skill; SWBAT • demonstrate how a covalent bond is formed by modeling between two or more given elements using Lewis Dot Diagrams, circles with two dots to represent sharing or a straight line between the atom or group of atoms • know that a covalent bond occurs between two atoms by the sharing of electrons • understand and model that a substance cannot conduct electricity when dissolved in water is determined to be covalent because electrons are not moving (free to flow) from one atom to another.	
What occurs when a metal reacts with a metal or another atom of the same metal?	**When a metal interacts with another metal or the same metal it creates a metallic bond. A metallic bond is a bond between two metals of the same kind or different. Examples**	**Activity:** Students should take notes on the Metallic Bonds bond, examples, and visual drawing of what is looks like (lar taught using PPT, Google Slides, Prezi, whiteboard, smart-n taken in students in own notebook/binder, or interactive scie **Formal Assessment:** Students should be given an assessmer

	can be Copper to Copper or Copper to Tin which creates Bronze. Unlike in ionic or covalent bonds, electrons are free to flow between the metal ions and the large positive metal ion. There is sharing, but no transferring of electrons within this type of bond. Metallic compounds are very good conductors of heat and electricity, are malleable, have luster, and are ductile. Skill; SWBAT: • explain and model that a metallic bond occurs when two or more atoms of the same elements or different elements react	understanding of how to model Bohr and Lewis Dot, Ionic a characteristics of each type of bond.
Chemical Reactions Occur When Matter is Altered What occurs when a chemical reaction takes place within a system that are observable? What occurs during a chemical reaction in	**Matter can be described by using physical and chemical properties and physical and chemical changes. Physical properties are characteristics that can be observed without changing the substance into another substance. A chemical property is a characteristic of a substance that describes its ability to change into other substances. A physical change is any change that alters the form or**	**Activity**: Provide students with various pictures, whcih can b describe the physical and chemical properties within them. I **Activity:** Students should take notes on observing a chemica examples from teacher with discussion of examples in real li Notes can be taught using PPT, Google Slides, Prezi, whiteb be guided, taken in students in own notebook/binder, or inter **Activity:** Provide students with a worksheet and examples w marshmallow, heating metal, melting ice, and etc. Students v changes, be it chemical or physical to determine if a chemica

terms of matter?	**appearance of a substance, but does not make the substance into another whereas a chemical change occurs when bonds are broken or new bonds are made, creating a totally new substance. During an exothermic reaction, energy is released in the form of heat whereas during an endothermic reaction energy is absorbed.**	**Activity:** Students or the teacher demonstrate the following a reactions (elephant toothpaste, calcium chloride and water, n
How can a chemical reaction be controlled?		**Assessment:** Teacher made assessment on properties, chang examples from real world, visuals, and charts.
		Activity: Students should take notes on the law of conservat equation. Notes can be taught using PPT, Google Slides, Pre Notes can be guided, taken in students in own notebook/bin
		Informal Assessment: Provide various example problems o or whiteboards to demonstrate.
	Skill; SWBAT: • provide evidence for chemical reactions that includes property changes that can be observed • describe how matter changes be it a new substance or not • be able to determine if a chemical reaction occurred • determine the difference between an exothermic and endothermic reaction	**Activity:** Various worksheets, interacitves, and etc. based on conservation of mass (balancing a chemical equation). *Note student academics. Provide small group based on levels and
		Activity: Once balancing chemical equations has been maste as synthesis, decomposition, or replacement. Use puzzle pie each, then relate it to chemical compounds.
		Formal Assessment: Teacher made assessment on the law o
		Activity: Intro lab can be chosen by teacher. Example could temperatures to decide what temperature the reaction occurs model the lab, or have groups perform at the different tempe
		Activity: Students should take notes on how one can contro PPT, Google Slides, Prezi, whiteboard, smart-notebook, or b in own notebook/binder, or interactive science notebook.
	During a chemical reaction, atoms are rearranged in new ways thus creating a new substance. In order to model this, chemical reactions are written as a chemical equation. Chemical	**Activity:** Rates of chemical reaction lab may vary based on s the following - vinegar and baking soda, elephant toothpaste their results.
		Informal Assessment: Oral questioning throughout lesson a

equations use formulas and other symbols instead of words to summarize a reaction. The reactants are placed at the beginning of the equation with the products at the end. The use of the Periodic Table is needed to create compounds and determine ratios in order to create the chemical equation.

discussions with daily assessments.

Formal Assessment: Teacher made assessment on chemical

Skills; SWBAT:

- explain what is contained within a chemical equation and where all parts are placed
- model the conservation of mass
- classify chemical reactions/equations

A chemical reaction requires a certain amount of activation energy to get started. Activation energy is the minimum amount of energy needed to start a chemical reaction. The rate of a chemical reaction is dependent of many factors besides the compounds within, such as surface area, temperature, concentration, catalysts, and inhibitors. If these are

	altered, chemical reactions can occur at a faster or slower rate. Skill; SWBAT: • control a chemical reaction based on given information • explain various factors that contribute to controlling a chemical reaction	
Solutions can be descibed based on their characteristics and elemental properties which can be tested. How can a solution, colloid, and suspension be described? What are the parts of each? How can we measure concentration and solubility? How can acids and bases be described?	**Mixtures can be described as a solution, which contains a solvent and solute, a colloid, or a suspension. Each of these vary in chemical properties and physical properties. A solute can lower the freezing point within a solution and raise the boiling point.** Skill; SWBAT: • describe the characteristics of solutions, colloids, and suspensions with examples • demonstrate how solutes affect the freezing point and boiling point of a solvent • model calculating concentration	**Activity:** Students should take notes on solutes, colloids, an Google Slides, Prezi, whiteboard, smart-notebook, or blackb own notebook/binder, or interactive science notebook. **Activity:** Scatter Light lab with solutes, solutions, and colloi **Activity**: Design an experiment demonstrating how the mass This actiity may vary based on teacher and student populatic **Activity:** Speedy solutions lab with salt water and controllin **Activity:** Calculating Concentration problems. Teacher choi interactive. This activity should be leveled based on student' **Activity:** Acid or Base Wanted poster. Students choose or ar poster based on rubric. **Activity:** Acid and Base Stations. Utilize various worksheet webquests, and other materials determined by teacher and st indicator with various samples for students and fluorescence labs determined by teacher.
	Substances can be	

classified as an acid or a base based on their chemical makeup and location on the pH scale. Acids and bases have properties opposite of one another. To determine if a substance is an acid or base, specific chemical tests can be performed, pH paper, or use of litmus paper. Many common real world items are acids and bases that are used everyday by humans. Skill; SWBAT: • describe the properties of acids and bases • find common uses for acids and bases in the real world	**Activity:** Glencoe Virtual Solubility Lab **Formal Assessment:** Teacher made assessment on acids and higher order thinking.	

Suggested Resources

Periodic Table of Elements Resources

- http://www.ptable.com/
- http://www.chemicalelements.com/

Bohr Model Resources

- http://highered.mheducation.com/olcweb/cgi/pluginpop.cgi?it=swf::800::600::/sites/dl/free/0072482621/59229/Bohr_Nav.swf::The%20Bohr%20Atom
- http://science.sbcc.edu/physics/flash/siliconsolarcell/bohratom.swf
- https://phet.colorado.edu/en/simulation/build-an-atom
- http://www.ck12.org/physics/Bohr-Model-of-the-Atom/

Lewis Dot Resources

- http://www.mholthouse.org/ps/Chem/psws0203a.pdf
- http://www.ck12.org/assessment/tools/geometry-tool/plix.html?eId=SCI.CHE.261.2&questionId=53e163375aa41334ea6a6e3c&artifactID=1995819&backUrl=http://www.ck12.org/search/?q=lewis%20dot&referrer=top_nav&autoComplete=false#interactive
- http://chemsite.lsrhs.net/bonding/flashLewis.html

Ionic Bonds:

- http://www.ck12.org/section/Ionic-Bonds-%3A%3Aof%3A%3A-Chemical-Bonding-%3A%3Aof%3A%3A-CK-12-Physical-Science-For-Middle-School/
- https://www.youtube.com/watch?v=900dXBWgx3Y
- https://www.youtube.com/watch?v=zpaHPXVR8WU
- http://www.houstonisd.org/cms/lib2/TX01001591/Centricity/Domain/9728/Ionic%20Bonding%20Worksheet-1.pdf
- http://sciencespot.net/Media/chbondionic.pdf

Covalent Bonds:

- http://www.ck12.org/chemistry/Covalent-Bonding/
- https://www.youtube.com/watch?v=0mUncUj55FI
- http://www.ck12.org/search/?q=covalent%20bond&referrer=top_nav&autoComplete=false

Covalent and Ionic:

- http://www.wlhs.wlwv.k12.or.us/cms/lib8/OR01001812/Centricity/Domain/1318/ChemicalBondingWksht.pdf

Metallic Bonds

- http://www.ck12.org/section/Metallic-Bonds/
- http://study.com/academy/lesson/what-is-a-metallic-bond-definition-properties-examples.html
- https://www.youtube.com/watch?v=S08qdOTd0w0

Chemical Reactions

- https://www.youtube.com/watch?v=37pir0ej_SE
- http://www.ck12.org/chemistry/Chemical-Reaction-Overview/
- http://www.ck12.org/chemistry/Exothermic-and-Endothermic-Processes/

Solutions

- http://www.edinformatics.com/math_science/solutions_suspensions_colloids.htm
- http://www.ck12.org/book/CK-12-Chemistry-Intermediate/section/15.3/
- https://www.youtube.com/watch?v=XEAiLm2zuvc
- http://www.chem4kids.com/files/matter_solution.html
- https://phet.colorado.edu/en/simulation/concentration
- http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS15/PS15.html

Acids and Bases

- https://phet.colorado.edu/en/simulation/legacy/acid-base-solutions
- http://www.glencoe.com/sites/common_assets/science/virtual_labs/E22/E22.html
- http://www.ck12.org/biology/Acids-and-Bases-in-Biology/
- http://www.bbc.co.uk/bitesize/ks3/science/chemical_material_behaviour/acids_bases_metals/activity/
- http://www.harcourtschool.com/activity/acids/

Technology Integration

- Ck-12 Flexbook
- Chromebooks
- i-Pads
- Cellular Devices
- internet
- SmartBoard
- Google Docs
- Google Apps
- Google Classroom
- quizlet

Differentiation

Differentiation for special education:

- General modifications may include:
    - Modifications & accommodations as listed in the student's IEP
    - Assign a peer to help keep student on task
    - Modified or reduced assignments
    - Reduce length of assignment for different mode of delivery

    - Increase one-to-one time
    - Working contract between you and student at risk
    - Prioritize tasks
    - Think in concrete terms and provide hands-on-tasks
    - Position student near helping peer or have quick access to teacher
    - Anticipate where needs will be
    - Break tests down in smaller increments
- Content specific modifications may include:
    - leveled sheets and stations for law of conservation of mass and bonding

Differentiation for ELL's:

- General modifications may include:
    - Strategy groups
    - Teacher conferences
    - Graphic organizers
    - Modification plan
    - Collaboration with ELL Teacher
- Content specific vocabulary important for ELL students to understand include: electron, proton, neutron, element, compound, periodic table, ionic, covalent, metallic, reaction, reactant, product, yield, exothermic, endothermic, solution, colloid, suspension, solute, solvent, acid, base, conductivity, and neutralization

Differentiation to extend learning for gifted students may include:

- **Balancing Chemical Equations Extensions** (high school leveled) Students will be challenged with high school level balancing problems.
- **Microcosm and Macrocosm** Students will research the terms and explain how this belief is shown in the work of the two scientists.
- **Disproving Dalton** Students will identify incorrect statements and correct them based on knowledge.
- **Quarks** Students will research the quark via a medium of their choosing.
- **Element Geography** Students create a map of the locations of various elements.
- **Atomic Model** Students will build an atomic model of a higher number using various materials.
- **Isolation of Aluminum** Students research how aluminum is isolated.
- **Elements in the Human Body** Students create a 3D model of the human body and research the elements within the body.
- **Research Project on New Elements Discovered** Students will research one of the new elements discovered in 2015 and present to the class.
- **Acid and Base Digestion** Students will design a model of how digestion occurs throughout the body for acid and base.

21st Century Skills

CRP.K-12.CRP1.1	Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.
CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP3.1	Career-ready individuals understand the relationship between personal health, workplace performance and personal well-being; they act on that understanding to regularly practice healthy diet, exercise and mental health activities. Career-ready individuals also take regular action to contribute to their personal financial well-being, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP5.1	Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.
CRP.K-12.CRP6.1	Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
CRP.K-12.CRP7.1	Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP9.1	Career-ready individuals consistently act in ways that align personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in

	every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others' action, attitudes and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morals and organizational culture.
CRP.K-12.CRP10.1	Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.
CRP.K-12.CRP11.1	Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.
CRP.K-12.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
CRP.K-12.CRP12.1	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.