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

SCI.6-8.SEP.1	Asking Questions and Defining Problems
SCI.6-8.SEP.2	Developing and Using Models
SCI.6-8.SEP.3	Planning and Carrying Out Investigations
SCI.6-8.SEP.4	Analyzing and Interpreting Data
SCI.6-8.SEP.5	Using Mathematics and Computational Thinking
SCI.6-8.SEP.6	Constructing Explanations and Designing Solutions
SCI.6-8.SEP.7	Engaging in Argument from Evidence
SCI.6-8.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?	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	Informal Assessment: Use various teacher made questions to 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 the 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 posters created their own Atomic Theory Timeline.
Who discovered the neutron, electron, and proton?	 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 subatomic 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 	Final Assessment: Students will be assessed on their ability particles, explain the atomic theory and the causes for advandiscoveries regarding the atomic theory and why they are mc evidence is there that matter exists? Assessments will consis questioning/conversations/observations and exit tickets.
	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	

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.

subatomic particles placed in specific locations.

What information does the Periodic Table of Elements contain about the number of subatomic particles? How can the number of electrons, protons, and neutrons be determined? What are the locations of the sub-atomic

Atoms are composed of 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 knowledge 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?

How can one make a model of an atom with all its sub-atomic 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 subatomic particles and proper placement by using the information on the Periodic Table of Elements.

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 2dimensional drawing or 3dimensional modeling
- understand the scale of the subatomic particles (electrons are smallest within the nucleus while the neutrons and protons are larger surrounding the nucleus)
- determine the correct number of subatomic

negative, and neutrons Resource: Copy of the Periodic Table of Elements (paper or **are neutral. Neutrons**

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 electu

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 E 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.Atoms interact when
they bond with anoth
atom. For example
Sodium (Na) and

What occurs when a
non-metal interacts with
a metal? How can an
ionic bond be modeled?known as an ionic bon
and create table salt.Atoms want to becom
stable and fulfill their
outer shell known as
the octet rule (8
valence electrons). In

atom. For example Sodium (Na) and Chlorine (Cl) come together during what is notebook. known as an ionic bond Atoms want to become 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

Atoms interact when they bond with another atom. For example Sodium (Na) and Chlorine (Cl) come together during what is notebook. 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

> Activity/Assessment: Using communicator boards or small board markers) teacher will ask students to draw the Lewis E 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? How can an atoms share their covalent bond be modeled? What are the characteristics of an covalent compound?

Sometimes instead of Activity: Students should take notes on the Covalent Bonds non-metal reacts with a transferring electrons, covalent bond is, what elements form covalent bonds accord and valence electron number. Must include examples on how valence electron(s) with involved. Notes can be taught using PPT, Google Slides, Pre one another. A bond in Notes can be guided, taken in students in own notebook/bind which atoms or a group of atoms share electron(s) is a covalent Activity/Assessment: Using communicator boards or small bond. This type of board markers) teacher will ask students to draw the Lewis E bond occurs between a students by keeping a log on student progress. The teacher c non-metal and a nonindependence, the teacher can pair students up to do a timed metal. In order to model this, a Lewis Dot **Diagram is drawn for** of elements. In place of Activity: Worksheets developed by teacher, found online, or two dots within a circle, a straight line can be drawn to signify Activity: Worksheet practice on covalent and ionic bonds us a bond or sharing of two electrons. Wherever the sharing Assessment: In a one on one setting, informally teacher asse occurs, a circle is rubric to clarify areas of weakness and area for improvement drawn around them to assess and are allowed to ask questions regarding materials c signify a bond of covalent bonds. sharing. Covalent bonds can include a single, double, or triple bond. The number of Activity for Covalent and Ionic Compounds: Shedding Li bonds can be (https://ctemsscience.wikispaces.com/file/view/Lab%3B+Sh determined by the number of valence Students are divided into lab groups. Each lab group must m electrons needed to provided. Using this they will test various substances to dete become stable. For compounds. Teacher must provide substances and additiona example, Nitrogen has aware, label them by letter or unknowns. Students compare r 5 valence electrons. conclude questions can be done as a class, lab groups, or ind 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

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.Activity: Students should take notes on the Metallic Bonds
bond, examples, and visual drawing of what is looks like (lat
taught using PPT, Google Slides, Prezi, whiteboard, smart-ne
taken in students in own notebook/binder, or interactive scien
A metallic bond is a
bond between two
metals of the same kind
or different. ExamplesFormal Assessment: Students should be given an assessment

understanding of how to model Bohr and Lewis Dot, Ionic al characteristics of each type of bond.

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

Chemical Reactions Occur When Matter is Altered	Matter can be described by using physical and chemical	Activity: Provide students with various pictures, which can be describe the physical and chemical properties within them. I
What occurs when a chemical reaction takes place within a system that are observable?	properties and physical and chemical changes. Physical properties are characteristics that can be observed without changing the substance into another substance.	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, white be guided, taken in students in own notebook/binder, or inter
What occurs during a chemical reaction in	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 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	Activity: Students or the teacher demonstrate the following a reactions (elephant toothpaste, calcium chloride and water, n
How can a chemical reaction be controlled?	when bonds are broken or new bonds are made, creating a totally new substance. During	Assessment: Teacher made assessment on properties, changer examples from real world, visuals, and charts.
	an exothermic reaction, energy is released in the form of heat whereas during an endothermic reaction energy is absorbed.	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/bind
		Informal Assessment: Provide various example problems of or whiteboards to demonstrate.
	Skill; SWBAT:	
	• provide evidence for chemical reactions that includes property	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
	 changes that can be observed describe how matter changes be it a new 	Activity: Once balancing chemical equations has been maste as synthesis, decomposition, or replacement. Use puzzle pie each, then relate it to chemical compounds.
	 substance or not be able to determine if a chemical reaction 	Formal Assessment: Teacher made assessment on the law o
	 occurred determine the difference between an exothermic and endothermic 	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 temper
reaction	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	Activity: Rates of chemical reaction lab may vary based on s the following - vinegar and baking soda, elephant toothpaste, their results.
	written as a chemical equation. Chemical	Informal Assessment: Oral questioning throughout lesson a

equations use formulas discussions with daily assessments. 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.

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

classified as an acid or a base based on their chemical makeup and Activity: Glencoe Virtual Solubility Lab location on the pH scale. Acids and bases have properties Formal Assessment: Teacher made assessment on acids and opposite of one higher order thinking. 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

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/007248262 1/59229/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/geometrytool/plix.html?eId=SCI.CHE.261.2&questionId=53e163375aa41334ea6a6e3c&artifactID=1995819&b ackUrl=http://www.ck12.org/search/?q=lewis%20dot&referrer=top_nav&autoComplete=false#interact ive
- <u>http://chemsite.lsrhs.net/bonding/flashLewis.html</u>

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/
- <u>https://www.youtube.com/watch?v=900dXBWgx3Y</u>
- https://www.youtube.com/watch?v=zpaHPXVR8WU
- <u>http://www.houstonisd.org/cms/lib2/TX01001591/Centricity/Domain/9728/Ionic%20Bonding%20Worksheet-1.pdf</u>
- http://sciencespot.net/Media/chbondionic.pdf

Covalent Bonds:

- <u>http://www.ck12.org/chemistry/Covalent-Bonding/</u>
- 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/ChemicalBondingW ksht.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:
 - o Modifications & accommodations as listed in the student's IEP
 - Assign a peer to help keep student on task
 - Modified or reduced assignments
 - o Reduce length of assignment for different mode of delivery

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

Differentiation for ELL's:

- General modifications may include:
 - o Strategy groups
 - Teacher conferences
 - Graphic organizers
 - Modification plan
 - o 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.

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 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.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.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.