

# Career & Technical Education (CTE) Standards Revision Project

## Cluster: Transportation, Distribution & Logistics

Pathways: Transportation Operations, Logistics planning & Management, Warehousing & Distribution Operations, Facility & Equipment Maintenance, Transportation Systems, Sales & Service

## Transportation Distribution & Logistics Cluster Overview

The Transportation Distribution & Logistics cluster prepares students for careers and businesses involved in the planning, management, and movement of people, materials and products by road, air, rail and water. Pathways related to professional and technical support for this cluster include: Warehousing & Distribution Operations, Logistic Planning and Management, Facility & Mobile Equipment Maintenance, Sales & Service and Transportation Operations. (Source: [www.careerclusters.org](http://www.careerclusters.org))

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## Standards: Transportation 4

<b>Career Cluster/Cluster Grouping:</b>	<b>Transportation, Distribution and Logistics Career Cluster</b>
<b>Pathway(s):</b>	<b>Facility and Mobile Equipment Maintenance</b>
<b>Prepared Completer Competencies:</b> <ul style="list-style-type: none"> <li>• TRPD.01 Understand and perform facility and mobile equipment maintenance, service and repair in the transportation industry. This includes, but is not limited to, motor vehicles, rail systems, marine applications, and outdoor power equipment.</li> </ul>	
<b>High School Expectations</b>	
<b>Concepts and skills students know include:</b> <ul style="list-style-type: none"> <li>• TRPD.01.01 Develop and manage preventative maintenance plans and systems to keep facility and mobile equipment inventory in operation.</li> </ul>	
<b>Evidence Outcomes - Students can:</b>	<b>21<sup>st</sup> Century Skills and Readiness Competencies</b>
<p>a. Develop preventive maintenance plans and systems to meet business and equipment manufacturer requirements.</p> <p>MAT01.02.a</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c, SCI02.01.c,</p> <p>PWR02.01.d, PWR02.02.c, PWR02.08.a</p>	<b>Academic Content Knowledge Alignment:</b> <p><b>MAT01.02.a - Number Sense, Properties, and Operations:</b></p> <ul style="list-style-type: none"> <li>• Use of number theory arguments to justify relationships involving whole numbers.. <ul style="list-style-type: none"> <li>○ Develop and justify conjectures about relationships involving whole numbers.</li> </ul> </li> </ul> <p><b>MAT03.01.a - Data Analysis, Statistics, and Probability:</b></p> <ul style="list-style-type: none"> <li>• Statistical methods take variability into account, supporting informed decision-making through quantitative studies designed to answer specific questions. <ul style="list-style-type: none"> <li>○ Formulate appropriate research questions that can be answered with statistical analysis.</li> </ul> </li> </ul> <p><b>MAT03.01.b - Data Analysis, Statistics, and Probability:</b></p> <ul style="list-style-type: none"> <li>• Statistical methods take variability into account, supporting informed decision-making through quantitative studies designed to answer specific questions. <ul style="list-style-type: none"> <li>○ Determine appropriate data collection methods to answer a research question.</li> </ul> </li> </ul>

<p>b. Apply strategies used to monitor and evaluate the performance of maintenance plans and systems.</p> <p>MAT01.02.a, MAT03.01.a, MAT03.01.b, MAT03.01.c, MAT03.02.a, MAT03.02. b, MAT03.03.a</p> <p>RWC01.01.c, RWC04.06.d</p> <p>SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c, SCI02.01.c,</p> <p>PWR02.01.d, PWR02.02.c, PWR02.08.a</p>	<p><b>MAT03.01.c - Data Analysis, Statistics, and Probability:</b></p> <ul style="list-style-type: none"> <li>• Statistical methods take variability into account, supporting informed decision-making through quantitative studies designed to answer specific questions. <ul style="list-style-type: none"> <li>○ Explain how data might be analyzed to provide answers to a research question.</li> </ul> </li> </ul> <p><b>MAT03.02.a - Data Analysis, Statistics, and Probability:</b></p> <ul style="list-style-type: none"> <li>• The design of an experiment or sample survey is of critical importance to analyzing the data and drawing conclusions. <ul style="list-style-type: none"> <li>○ Identify the characteristics of a well-designed and well-conducted survey.</li> </ul> </li> </ul> <p><b>MAT03.02.b - Data Analysis, Statistics, and Probability:</b></p> <ul style="list-style-type: none"> <li>• The design of an experiment or sample survey is of critical importance to analyzing the data and drawing conclusions. <ul style="list-style-type: none"> <li>○ Identify the characteristics of a well-designed and well-conducted experiment.</li> </ul> </li> </ul> <p><b>MAT03.02.c - Data Analysis, Statistics, and Probability:</b></p> <ul style="list-style-type: none"> <li>• The design of an experiment or sample survey is of critical importance to analyzing the data and drawing conclusions. <ul style="list-style-type: none"> <li>○ Differentiate between the inferences that can be drawn in experiments versus observational studies.</li> </ul> </li> </ul> <p><b>MAT03.03.a - Data Analysis, Statistics, and Probability:</b></p> <ul style="list-style-type: none"> <li>• Visual displays and summary statistics condense the information in data sets into usable knowledge. <ul style="list-style-type: none"> <li>○ Identify and choose appropriate ways to summarize numerical or categorical data using tables, graphical displays, and numerical summary statistics (describing shape, center and spread) and accounting for outliers when appropriate.</li> </ul> </li> </ul> <p><b>RWC01.01.c - Oral Expression and Listening:</b></p> <ul style="list-style-type: none"> <li>• Effective speaking in formal and informal settings requires appropriate use of methods and audience awareness. <ul style="list-style-type: none"> <li>○ Use examples, illustrations, graphics, quotations, analogies, facts, and statistics to focus and support the content of a presentation.</li> </ul> </li> </ul> <p><b>RWC02.02.c - Reading for All Purposes:</b></p> <ul style="list-style-type: none"> <li>• Interpreting and evaluating complex informational texts require the understanding of rhetoric, critical reading, and analysis skills. <ul style="list-style-type: none"> <li>○ Obtain and use information from text and text features (index, bold or italicized text, subheadings, graphics) to answer questions, perform specific tasks, or identify and solve problems.</li> </ul> </li> </ul>
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**RWC04.06.d-Reading, Writing and Communicating, Research and Reasoning:**

- Collect, evaluate, and analyze information from multiple sources to answer a question, propose solutions or share findings and conclusions.
  - Use a variety of strategies (e.g., technical reading, search engines, direct observation, interview) to collect and organize relevant information.

**SCI01.01.a - Physical Science:**

- Newton's laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations.
  - Gather, analyze and interpret data and create graphs regarding position, velocity and acceleration of moving objects.

**SCI01.01.b - Physical Science:**

- Newton's laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations.
  - Develop, communicate and justify an evidence-based analysis of the forces acting on an object and the resultant acceleration produced by a net force.

**SCI01.01.c - Physical Science:**

- Newton's laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations.
  - Develop, communicate and justify an evidence-based scientific prediction regarding the effects of the action-reaction force pairs on the motion of two interacting objects.

**SCI01.01.e - Physical Science:**

- Newton's laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations.
  - Identify the limitations of Newton's laws in extreme situations.

**SCI01.02.a - Physical Science:**

- Matter has definite structure that determines characteristic physical and chemical properties.
  - Develop, communicate, and justify an evidence-based scientific explanation supporting the current model of an atom.

**SCI01.02.b - Physical Science:**

- Matter has definite structure that determines characteristic physical and chemical properties.
  - Gather, analyze and interpret data on chemical and physical properties of elements such as density, melting point, boiling point, and conductivity.

**SCI01.02.c - Physical Science:**

- Matter has definite structure that determines characteristic physical and chemical properties.
  - Use characteristic physical and chemical properties to develop predictions and supporting claims about elements' positions on the periodic table.

**SCI01.02.d - Physical Science:**

- Matter has definite structure that determines characteristic physical and chemical properties.
  - Develop a model that differentiates atoms and molecules, elements and compounds, and pure substances and mixtures.

**SCI01.03.a - Physical Science:**

- Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy.
  - Recognize, analyze, interpret, and balance chemical equations (synthesis, decomposition, combustion, and replacement) or nuclear equations (fusion and fission).

**SCI01.03.b - Physical Science:**

- Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy.
  - Predict reactants and products for different types of chemical and nuclear reactions.

**SCI01.03.c - Physical Science:**

- Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy.
  - Predict and calculate the amount of products produced in a chemical reaction based on the amount of reactants.

**SCI01.03.d - Physical Science:**

- Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy.
  - Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate the conservation of mass and energy.

**SCI01.05.a - Physical Science:**

- Energy exists in many forms such as mechanical, chemical, electrical, radiant, thermal, and nuclear, that can be quantified and experimentally determined.
  - Develop, communicate, and justify an evidence-based scientific explanation regarding the potential and kinetic nature of mechanical energy.

**SCI01.05.b - Physical Science:**

- Energy exists in many forms such as mechanical, chemical, electrical, radiant, thermal, and nuclear, that can be quantified and experimentally determined.
  - Use appropriate measurements, equations and graphs to gather, analyze, and interpret data on the quantity of energy in a system or an object.

**SCI01.05.c - Physical Science:**

- Energy exists in many forms such as mechanical, chemical, electrical, radiant, thermal, and nuclear, that can be quantified and experimentally determined.
  - Use direct and indirect evidence to develop predictions of the types of energy associated with objects.

**SCI01.05.d - Physical Science:**

- Energy exists in many forms such as mechanical, chemical, electrical, radiant, thermal, and nuclear, that can be quantified and experimentally determined.
  - Identify different energy forms, and calculate their amounts by measuring their defining characteristics.

**SCI01.06.a - Physical Science:**

- When energy changes form, it is neither created nor destroyed; however, because some is necessarily lost as heat, the amount of energy available to do work decreases.
  - Use direct and indirect evidence to develop and support claims about the conservation of energy in a variety of systems, including transformations to heat.

**SCI01.06.b - Physical Science:**

- When energy changes form, it is neither created nor destroyed; however, because some is necessarily lost as heat, the amount of energy available to do work decreases.
  - Evaluate the energy conversion efficiency of a variety of energy transformations.

	<p><b>SCI01.06.c - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• When energy changes form, it is neither created nor destroyed; however, because some is necessarily lost as heat, the amount of energy available to do work decreases. <ul style="list-style-type: none"> <li>○ Describe energy transformations both quantitatively and qualitatively.</li> </ul> </li> </ul> <p><b>SCI02.01.c - Life Science:</b></p> <ul style="list-style-type: none"> <li>• Matter tends to be cycled within an ecosystem, while energy is transformed and eventually exits an ecosystem. <ul style="list-style-type: none"> <li>○ Analyze and interpret data from experiments on ecosystems where matter such as fertilizer has been added or withdrawn such as through drought.</li> </ul> </li> </ul> <p><b>Learning &amp; Behavioral Skills – Post - Secondary &amp; Workplace Readiness:</b></p> <p><b>PWR02.01.d-Postsecondary &amp; Workforce Readiness, Learning and Behavior Skills, Critical Thinking and Problem Solving</b></p> <ul style="list-style-type: none"> <li>• Collect and analyze quantitative and qualitative data and research.</li> </ul> <p><b>PWR02.02.c-Postsecondary &amp; Workforce Readiness, Learning and Behavior Skills, Find and Use Information/Information Technology</b></p> <ul style="list-style-type: none"> <li>• Provide citations for resources.</li> </ul> <p><b>PWR02.08.a-Postsecondary &amp; Workforce Readiness, Learning and Behavior Skills, Communication</b></p> <ul style="list-style-type: none"> <li>• Read, write, listen and speak effectively.</li> </ul>
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<b>High School Expectations</b>	
<b>Concepts and skills students know include:</b>	
<ul style="list-style-type: none"> <li>• TRPD.01.02 Assess, maintain, and improve system performance in order to keep facilities and equipment running at an optimum level of performance.</li> </ul>	
<b>Evidence Outcomes - Students can:</b>	<b>21<sup>st</sup> Century Skills and Readiness Competencies</b>
<p>a. Develop and execute repair plans based upon an assessment of the facility/ equipment inventory.</p> <p>RWC01.01.c, RWC02.02.c, RWC3.01.d, RWC04.06.d,</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c, SCI02.01.c,</p> <p>PWR02.01.a, PWR02.08.a</p> <p>b. Develop plans for improving facilities/ equipment/system performance.</p> <p>RWC03.01.d,</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c,</p> <p>PWR02.01.a, PWR02.08.a</p>	<p><b>Academic Content Knowledge Alignment:</b></p> <p><b>MAT01.02.a - Number Sense, Properties, and Operations:</b></p> <ul style="list-style-type: none"> <li>• Formulate, represent, and use algorithms with real numbers flexibly, accurately, and efficiently. <ul style="list-style-type: none"> <li>○ Use appropriate computation methods that encompass estimation and calculation.</li> </ul> </li> </ul> <p><b>MAT02.04.a - Patterns, Functions, and Algebraic Structures:</b></p> <ul style="list-style-type: none"> <li>• Expressions , equations, and inequalities can be expressed in multiple, equivalent forms . <ul style="list-style-type: none"> <li>○ Perform and justify steps in generating equivalent expressions by identifying properties used including the commutative, associative, inverse, identity, and distributive properties.</li> </ul> </li> </ul> <p><b>MAT02.04.b - Patterns, Functions, and Algebraic Structures:</b></p> <ul style="list-style-type: none"> <li>• Understand equivalent forms of expressions, equations, inequalities, and relations. <ul style="list-style-type: none"> <li>○ Judge the meaning, utility, and reasonableness of the results of symbol manipulations, including those carried out by technology.</li> </ul> </li> </ul> <p><b>MAT04.01.a-Mathematics, Shape, Dimension, and Geometric Relationships:</b></p> <ul style="list-style-type: none"> <li>• Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. <ul style="list-style-type: none"> <li>○ Calculate (or estimate when appropriate) through successive iterations the perimeter and area of a two-dimensional irregular shape.</li> </ul> </li> </ul> <p><b>MAT04.01.b-Mathematics, Shape, Dimension, and Geometric Relationships:</b></p> <ul style="list-style-type: none"> <li>• Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. <ul style="list-style-type: none"> <li>○ Justify, interpret, and apply the use of formulas for the area, surface area, and volume of cones/pyramids, spheres, and cylinders/prisms.</li> </ul> </li> </ul>

<p>c. Execute repair plans for facilities and mobile equipment .  SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e,  SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e,  SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a,  SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b,  SCI01.06.c,</p> <p>RWC01.01.c, RWC02.02.c, RWC04.06.d,</p> <p>PWR02.01.a, PWR02.08.a</p> <p>d. Understand the value and necessity of practicing personal and occupational safety and protecting the environment by using materials and processes in accordance with manufacturer and industry standards.</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e,  SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e,  SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a,  SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b,  SCI01.06.c, SCI02.06.b</p> <p>PWR02.02.a, PWR02.02.b, PWR02.07.d</p> <p>e. Understand the safe and appropriate use of tools, equipment and work process.</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e,  SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e,  SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a,  SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b,  SCI01.06.c,  PWR02.01.d, PWR02.02.c, PWR02.08.a</p>	<p><b>MAT04.01.c-Mathematics, Shape, Dimension, and Geometric Relationships:</b></p> <ul style="list-style-type: none"> <li>• Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. <ul style="list-style-type: none"> <li>○ Solve for unknown quantities of two-dimensional shapes involving area and perimeter and with three-dimensional shapes involving volume and surface area.</li> </ul> </li> </ul> <p><b>MAT04.01.d - Shape, Dimension, and Geometric Relationships:</b></p> <ul style="list-style-type: none"> <li>• Attributes of two- and three-dimensional objects are measurable and can be quantified. <ul style="list-style-type: none"> <li>○ Apply the effect of dimensional change, utilizing appropriate units and scales in problem-solving situations involving perimeter, area, and volume.</li> </ul> </li> </ul> <p><b>MAT04.02.d - Shape, Dimension, and Geometric Relationships:</b></p> <ul style="list-style-type: none"> <li>• Objects in the plane and their parts, attributes, and measurements can be analyzed deductively. <ul style="list-style-type: none"> <li>○ Develop conjectures and solve problems about geometric figures including definitions and properties (congruence, similarity, and symmetry). Justify these conjectures using two-column proofs, paragraph proofs, flow charts, or illustrations.</li> </ul> </li> </ul> <p><b>RWC01.01.c - Oral Expression and Listening:</b></p> <ul style="list-style-type: none"> <li>• Effective speaking in formal and informal settings requires appropriate use of methods and audience awareness. <ul style="list-style-type: none"> <li>○ Use examples, illustrations, graphics, quotations, analogies, facts, and statistics to focus and support the content of a presentation.</li> </ul> </li> </ul> <p><b>RWC02.02.c - Reading for All Purposes:</b></p> <ul style="list-style-type: none"> <li>• Interpreting and evaluating complex informational texts require the understanding of rhetoric, critical reading, and analysis skills. <ul style="list-style-type: none"> <li>○ Obtain and use information from text and text features (index, bold or italicized text, subheadings, graphics) to answer questions, perform specific tasks, or identify and solve problems.</li> </ul> </li> </ul> <p><b>RWC02.06.b - Reading for All purposes:</b></p> <ul style="list-style-type: none"> <li>• Apply understanding of complex organizational text structures and features to reading comprehension. <ul style="list-style-type: none"> <li>○ Use the features of electronic information to communicate, gain information, or research a topic.</li> </ul> </li> </ul>
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<p>f. Understand scientific principles in relation to chemical, mechanical and physical functions for various engine and vehicle systems.</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c, SCI03.06.b</p> <p>PWR01.02.a, PWR01.03.a, PWR01.03.d</p> <p>g. Perform and document maintenance procedures in accordance with the recommendations of the manufacturer.</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c,</p> <p>RWC04.01.c,</p> <p>PWR02.08.a</p> <p>h. Understand the application, operation, maintenance, and diagnosis of engines, including but not limited to two- and four-stroke and supporting subsystems.</p> <p>RWC02.06.b,</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c,</p> <p>PWR01.02.a, PWR01.03.a, PWR01.03.d</p>	<p><b>RWC03.01.d-Reading, Writing and Communicating, Writing and Composition:</b></p> <ul style="list-style-type: none"> <li>• Use a recursive writing process for planning, developing and revising text for a variety of academic, workplace, and literary purposes and audiences. <ul style="list-style-type: none"> <li>○ Write with clear focus, depth, accurate and relevant detail.</li> </ul> </li> </ul> <p><b>RWC04.01.c-Reading, Writing and Communicating, Research and Reasoning:</b></p> <ul style="list-style-type: none"> <li>• Conduct self-designed research that gathers and analyzes information from a variety of sources to answer a question, propose solutions or share findings and conclusions. <ul style="list-style-type: none"> <li>○ Use a variety of strategies (e.g., technical reading, direct observation, interview) to collect relevant information to support the thesis/research question.</li> </ul> </li> </ul> <p><b>RWC04.06.d-Reading, Writing and Communicating, Research and Reasoning.</b></p> <ul style="list-style-type: none"> <li>• Collect, evaluate, and analyze information from multiple sources to answer a question, propose solutions or share findings and conclusions. <ul style="list-style-type: none"> <li>○ Use a variety of strategies (e.g., technical reading, search engines, direct observation, interview) to collect and organize relevant information.</li> </ul> </li> </ul> <p><b>SCI01.01.a - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Newton’s laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations. <ul style="list-style-type: none"> <li>○ Gather, analyze and interpret data and create graphs regarding position, velocity and acceleration of moving objects.</li> </ul> </li> </ul> <p><b>SCI01.01.b - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Newton’s laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations. <ul style="list-style-type: none"> <li>○ Develop, communicate and justify an evidence-based analysis of the forces acting on an object and the resultant acceleration produced by a net force.</li> </ul> </li> </ul> <p><b>SCI01.01.c - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Newton’s laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations. <ul style="list-style-type: none"> <li>○ Develop, communicate and justify an evidence-based scientific prediction regarding the effects of the action-reaction force pairs on the motion of two interacting objects.</li> </ul> </li> </ul>
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<p>i. Understand mechanical and electrical components in relation to industry and manufacturer standards.</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c,</p> <p>PWR01.02.a, PWR01.03.a, PWR01.03.d</p> <p>j. Perform and document repair procedures in accordance with manufacturer recommendations and industry standards.</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c</p> <p>PWR02.08.a</p> <p>k. Demonstrate the effective use of computer based equipment to control electromechanical devices commonly used in diagnostic analysis.</p> <p>MAT01.02.a, MAT02.04.a, MAT02.04.b, MAT04.02.d,</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c, SCI02.06.b</p> <p>PWR02.01.a, PWR02.02.a, PWR02.02.b</p>	<p><b>SCI01.01.d-Science, Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Newton's theories of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion. <ul style="list-style-type: none"> <li>○ Identify and analyze the factors involved when applying Newton's law of universal gravitation to a system of two bodies.</li> </ul> </li> </ul> <p><b>SCI01.01.e-Science, Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Newton's theories of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion.: <ul style="list-style-type: none"> <li>○ Construct free-body diagrams to analyze the forces acting on an object and calculate the acceleration produced by a net force.</li> </ul> </li> </ul> <p><b>SCI01.01.a - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Newton's laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations. <ul style="list-style-type: none"> <li>○ Gather, analyze and interpret data and create graphs regarding position, velocity and acceleration of moving objects.</li> </ul> </li> </ul> <p><b>SCI01.01.b - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Newton's laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations. <ul style="list-style-type: none"> <li>○ Develop, communicate and justify an evidence-based analysis of the forces acting on an object and the resultant acceleration produced by a net force.</li> </ul> </li> </ul> <p><b>SCI01.01.c - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Newton's laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations. <ul style="list-style-type: none"> <li>○ Develop, communicate and justify an evidence-based scientific prediction regarding the effects of the action-reaction force pairs on the motion of two interacting objects.</li> </ul> </li> </ul> <p><b>SCI01.01.d - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Newton's laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations. <ul style="list-style-type: none"> <li>○ Examine the effect of changing masses and distance when applying Newton's law of universal gravitation to a system of two bodies.</li> </ul> </li> </ul>
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<p>I. Use technical vocabulary, technical reports and manuals, electronic systems and related technical data resources to determine repairs and estimates.</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c</p> <p>PWR02.01.a, PWR02.02.a, PWR02.02.b, PWR02.03.a</p> <p>m. Understand structural and nonstructural analysis and damage repair.</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c</p> <p>PWR01.02.a, PWR01.03.d, PWR02.01.a</p> <p>n. Understand the concepts, principles and practices of painting and refinishing various variables.</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c</p> <p>PWR01.02.a, PWR01.03.d, PWR02.01.a</p> <p>o. Understand performance (fuel system) Engine Repair.</p> <p>PWR01.02.a, PWR01.03.a, PWR01.03.d</p> <p>p. Utilized in Engine Rebuilding, Brake System.</p> <p>MAT01.02.a, MAT04.01.a, MAT04.01.b, MAT04.01.c, MAT04.01.d</p> <p>PWR01.02.a, PWR01.03.a, PWR01.03.d</p>	<p><b>SCI01.01.e - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Newton's laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations. <ul style="list-style-type: none"> <li>○ Identify the limitations of Newton's laws in extreme situations.</li> </ul> </li> </ul> <p><b>SCI01.02.a - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Matter has definite structure that determines characteristic physical and chemical properties. <ul style="list-style-type: none"> <li>○ Develop, communicate, and justify an evidence-based scientific explanation supporting the current model of an atom.</li> </ul> </li> </ul> <p><b>SCI01.02.b - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Matter has definite structure that determines characteristic physical and chemical properties. <ul style="list-style-type: none"> <li>○ Gather, analyze and interpret data on chemical and physical properties of elements such as density, melting point, boiling point, and conductivity.</li> </ul> </li> </ul> <p><b>SCI01.02.c - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Matter has definite structure that determines characteristic physical and chemical properties. <ul style="list-style-type: none"> <li>○ Use characteristic physical and chemical properties to develop predictions and supporting claims about elements' positions on the periodic table.</li> </ul> </li> </ul> <p><b>SCI01.02.d - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Matter has definite structure that determines characteristic physical and chemical properties. <ul style="list-style-type: none"> <li>○ Develop a model that differentiates atoms and molecules, elements and compounds, and pure substances and mixtures.</li> </ul> </li> </ul> <p><b>SCI01.02.e-Science, Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Matter has definite structure which determines characteristic physical and chemical properties. <ul style="list-style-type: none"> <li>○ Make inferences based on indirect evidence used to draw conclusions about the structure of an atom and its subatomic particles.</li> </ul> </li> </ul> <p><b>SCI01.03.a - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy. <ul style="list-style-type: none"> <li>○ Recognize, analyze, interpret, and balance chemical equations (synthesis, decomposition, combustion, and replacement) or nuclear equations (fusion and fission).</li> </ul> </li> </ul>
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<p>q. Applies to all areas of Automotive Service &amp; Diagnosis PWR01.02.a, PWR01.03.a, PWR01.03.d</p> <p>r. Utilized in all areas of Automotive. SCI01.01.a, SCI01.01.b PWR01.02.a, PWR01.03.a, PWR01.03.d</p> <p>s. Utilized in Electrical Course. SCI01.01.a, SCI01.01.b PWR01.02.a, PWR01.03.a, PWR01.03.d</p> <p>t. Utilized in Starting Systems Alternators. SCI01.06.a PWR01.02.a, PWR01.03.a, PWR01.03.d</p> <p>u. Demonstrate in Automotive Classes and Labs including training for Skills USA. SCI01.06.a, PWR02.07.f, PWR02.08.a, PWR2.9.d</p> <p>v. Utilized in all areas of automotive; especially when documenting service information on repair orders. SCI01.06.a, PWR01.01.b, PWR01.01.e, PWR01.02.a</p>	<p><b>SCI01.03.b - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy . <ul style="list-style-type: none"> <li>○ Predict reactants and products for different types of chemical and nuclear reactions.</li> </ul> </li> </ul> <p><b>SCI01.03.c - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy. <ul style="list-style-type: none"> <li>○ Predict and calculate the amount of products produced in a chemical reaction based on the amount of reactants.</li> </ul> </li> </ul> <p><b>SCI01.03.d - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy. <ul style="list-style-type: none"> <li>○ Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate the conservation of mass and energy.</li> </ul> </li> </ul> <p><b>SCI01.05.a - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Energy exists in many forms such as mechanical, chemical, electrical, radiant, thermal, and nuclear, that can be quantified and experimentally determined. <ul style="list-style-type: none"> <li>○ Develop, communicate, and justify an evidence-based scientific explanation regarding the potential and kinetic nature of mechanical energy.</li> </ul> </li> </ul> <p><b>SCI01.05.b - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Energy exists in many forms such as mechanical, chemical, electrical, radiant, thermal, and nuclear, that can be quantified and experimentally determined. <ul style="list-style-type: none"> <li>○ Use appropriate measurements, equations and graphs to gather, analyze, and interpret data on the quantity of energy in a system or an object.</li> </ul> </li> </ul> <p><b>SCI01.05.c - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Energy exists in many forms such as mechanical, chemical, electrical, radiant, thermal, and nuclear, that can be quantified and experimentally determined. <ul style="list-style-type: none"> <li>○ Use direct and indirect evidence to develop predictions of the types of energy associated with objects.</li> </ul> </li> </ul> <p><b>SCI01.05.d - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Energy exists in many forms such as mechanical, chemical, electrical, radiant, thermal, and nuclear, that can be quantified and experimentally determined. <ul style="list-style-type: none"> <li>○ Identify different energy forms, and calculate their amounts by measuring their defining characteristics.</li> </ul> </li> </ul>
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	<p><b>SCI01.06.a - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• When energy changes form, it is neither created nor destroyed; however, because some is necessarily lost as heat, the amount of energy available to do work decreases. <ul style="list-style-type: none"> <li>○ Use direct and indirect evidence to develop and support claims about the conservation of energy in a variety of systems, including transformations to heat.</li> </ul> </li> </ul> <p><b>SCI01.06.b - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• When energy changes form, it is neither created nor destroyed; however, because some is necessarily lost as heat, the amount of energy available to do work decreases. <ul style="list-style-type: none"> <li>○ Evaluate the energy conversion efficiency of a variety of energy transformations.</li> </ul> </li> </ul> <p><b>SCI01.06.c - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• When energy changes form, it is neither created nor destroyed; however, because some is necessarily lost as heat, the amount of energy available to do work decreases. <ul style="list-style-type: none"> <li>○ Describe energy transformations both quantitatively and qualitatively.</li> </ul> </li> </ul> <p><b>SCI02.01.c - Life Science:</b></p> <ul style="list-style-type: none"> <li>• Matter tends to be cycled within an ecosystem, while energy is transformed and eventually exits an ecosystem. <ul style="list-style-type: none"> <li>○ Analyze and interpret data from experiments on ecosystems where matter such as fertilizer has been added or withdrawn such as through drought.</li> </ul> </li> </ul> <p><b>SCI02.06.b - Life Science:</b></p> <ul style="list-style-type: none"> <li>• Populations interact with each other, as well as abiotic factors in an ecosystem, establishing a state of dynamic equilibrium. <ul style="list-style-type: none"> <li>○ Analyze and interpret data about the ecological consequences of humans transferring natural resources from their origin to their disposal (e.g., from one reservoir to another) that support claims that the practice is beneficial or risky.</li> </ul> </li> </ul> <p><b>SCI03.06.c - Earth Science:</b></p> <ul style="list-style-type: none"> <li>• The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes. <ul style="list-style-type: none"> <li>○ Evaluate negative and positive consequences of physical and chemical changes on the geosphere.</li> </ul> </li> </ul>
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**Learning & Behavioral Skills – Post - Secondary & Workplace Readiness:**

**PWR01.01.b-Postsecondary & Workforce Readiness, Content Knowledge , Literacy**

- Write clearly and coherently for a variety of purposes and audiences.

**PWR01.01.e-Postsecondary & Workforce Readiness, Content Knowledge , Literacy**

- Employ standard English language properly and fluently in reading, writing, listening, and speaking.

**PWR01.02.a-Postsecondary & Workforce Readiness, Content Knowledge , Mathematical Sciences**

- Think critically, analyze evidence, read graphs, understand logical arguments, detect logical fallacies, test conjectures, evaluate risks, and appreciate the role mathematics plays in the modern world, i.e., be quantitatively literate.

**PWR01.03.a-Postsecondary & Workforce Readiness, Content Knowledge , Science**

- Think scientifically and apply the scientific method to complex systems and phenomena.

**PWR01.03.d-Postsecondary & Workforce Readiness, Content Knowledge , Science**

- Understand the core scientific concepts, principles, laws, and vocabulary, and how scientific knowledge is extended, refined, and revised over time.

**PWR02.01.a-Postsecondary & Workforce Readiness, Learning and Behavior Skills, Critical Thinking and Problem Solving**

- Apply logical reasoning and analytical skills.

**PWR02.01.d-Postsecondary & Workforce Readiness, Learning and Behavior Skills, Critical Thinking and Problem Solving**

- Collect and analyze quantitative and qualitative data and research.

**PWR02.02.a-Postsecondary & Workforce Readiness, Learning and Behavior Skills, Find and Use Information/Information Technology**

- Select, integrate, and apply appropriate technology to access and evaluate new information.

**PWR02.02.b-Postsecondary & Workforce Readiness, Learning and Behavior Skills, Find and Use Information/Information Technology**

- Understand the ethical uses of information.

**PWR02.02.c-Postsecondary & Workforce Readiness, Learning and Behavior Skills, Find and Use Information/Information Technology**

- Provide citations for resources.

**PWR02.03.a-Postsecondary & Workforce Readiness, Learning and Behavior Skills, Creativity and Innovation**

- Demonstrate intellectual curiosity.

**PWR02.07.d-Postsecondary & Workforce Readiness, Learning and Behavior Skills, Personal Responsibility**

- Take responsibility for actions.

**PWR02.07.f-Postsecondary & Workforce Readiness, Learning and Behavior Skills, Personal Responsibility**

- Demonstrate awareness of and evaluate career options.

**PWR02.08.a-Postsecondary & Workforce Readiness, Learning and Behavior Skills, Communication**

- Read, write, listen and speak effectively.

**PWR2.9.d-Postsecondary & Workforce Readiness, Learning and Behavior Skills, Collaboration**

- Use teamwork and leadership skills effectively.

<b>High School Expectations</b>	
<b>Concepts and skills students know include:</b>	
<ul style="list-style-type: none"> <li>• <b>TRPD.01.03 Assess, maintain, and improve system performance in collision repair and refinishing including but not limited to body and frame straightening, estimating, painting, and refinishing a variety of motorized vehicles.</b></li> </ul>	
<b>Evidence Outcomes - Students can:</b>	<b>21<sup>st</sup> Century Skills and Readiness Competencies</b>
<p>a. Understand the value and necessity of practicing personal and occupational safety and environmental effects of collision repair and refinishing practices.</p> <p>MAT01.02.a,</p> <p>All RWC Standards</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c, SCI02.06.b, SCI03.09,d</p> <p>PWR02.02.a, PWR2,2,b, PWR02.07.d</p> <p>b. Understand the safe and appropriate use of tools, equipment and work process.</p> <p>MAT01.02.a,</p> <p>All RWC Standards,</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c,</p> <p>PWR02.01.d, PWR02.02.c, PWR02.08.a</p>	<p><b>Academic Content Knowledge Alignment:</b></p> <p><b>MAT01.02.a - Number Sense, Properties, and Operations:</b></p> <ul style="list-style-type: none"> <li>• Use of number theory arguments to justify relationships involving whole numbers.. <ul style="list-style-type: none"> <li>○ Develop and justify conjectures about relationships involving whole numbers.</li> </ul> </li> </ul> <p><b>MAT02.04.a - Patterns, Functions, and Algebraic Structures:</b></p> <ul style="list-style-type: none"> <li>• Expressions , equations, and inequalities can be expressed in multiple, equivalent forms. <ul style="list-style-type: none"> <li>○ Perform and justify steps in generating equivalent expressions by identifying properties used including the commutative, associative, inverse, identity, and distributive properties.</li> </ul> </li> </ul> <p><b>MAT04.01.b - Shape, Dimension, and Geometric Relationships:</b></p> <ul style="list-style-type: none"> <li>• Attributes of two- and three-dimensional objects are measurable and can be quantified. <ul style="list-style-type: none"> <li>○ Justify, interpret, and apply the use of formulas for the surface area, and volume of cones, pyramids, and spheres including real-world situations.</li> </ul> </li> </ul> <p><b>MAT04.01.c - Shape, Dimension, and Geometric Relationships:</b></p> <ul style="list-style-type: none"> <li>• Attributes of two- and three-dimensional objects are measurable and can be quantified. <ul style="list-style-type: none"> <li>○ Solve for unknown quantities in relationships involving perimeter, area, surface area, and volume.</li> </ul> </li> </ul> <p><b>MAT04.01.d - Shape, Dimension, and Geometric Relationships:</b></p> <ul style="list-style-type: none"> <li>• Attributes of two- and three-dimensional objects are measurable and can be quantified. <ul style="list-style-type: none"> <li>○ Apply the effect of dimensional change, utilizing appropriate units and scales in problem-solving situations involving perimeter, area, and volume.</li> </ul> </li> </ul>

<p>c. Apply measurement systems and the mathematical functions necessary to perform required fabrication, maintenance and operation procedures.</p> <p>MAT02.04.a, MAT04.03.c</p> <p>All RWC Standards</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c</p> <p>PWR01.02.a, PWR01.03.d, PWR02.01.a</p> <p>d. Understand scientific principles in relation to chemical, mechanical, and physical functions and in relation to industry and manufacturer standards.</p> <p>MAT01.02.a</p> <p>All RWC Standards</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c, SCI03.06.c</p> <p>PWR01.02.a, PWR01.03.d, PWR02.01.a</p>	<p><b>MAT04.03.c - Shape, Dimension, and Geometric Relationships:</b></p> <ul style="list-style-type: none"> <li>• Objects in the plane can be transformed, and those transformations can be described and analyzed mathematically. <ul style="list-style-type: none"> <li>○ Develop arguments to establish what remains invariant and what changes after a transformation (reflection, translation, rotation, and dilations). Justify these conjectures using two-column proofs, paragraph proofs, flow charts, and/or illustrations.</li> </ul> </li> </ul> <p><b>All RWC Standards-Attachment 1.</b></p> <p><b>SCI01.01.a - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Newton’s laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations. <ul style="list-style-type: none"> <li>○ Gather, analyze and interpret data and create graphs regarding position, velocity and acceleration of moving objects.</li> </ul> </li> </ul> <p><b>SCI01.01.b - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Newton’s laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations. <ul style="list-style-type: none"> <li>○ Develop, communicate and justify an evidence-based analysis of the forces acting on an object and the resultant acceleration produced by a net force.</li> </ul> </li> </ul> <p><b>SCI01.01.c - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Newton’s laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations. <ul style="list-style-type: none"> <li>○ Develop, communicate and justify an evidence-based scientific prediction regarding the effects of the action-reaction force pairs on the motion of two interacting objects.</li> </ul> </li> </ul> <p><b>SCI01.01.d - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Newton’s laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations. <ul style="list-style-type: none"> <li>○ Examine the effect of changing masses and distance when applying Newton’s law of universal gravitation to a system of two bodies.</li> </ul> </li> </ul>
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<p>e. Perform and document repair procedures in accordance with manufacturer recommendations and industry standards.</p> <p>All RWC Standards</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c,</p> <p>PWR01.01.b, PWR01.01.e, PWR01.02.a</p> <p>f. Understand structural and nonstructural analysis and damage repair.</p> <p>MAT01.02.a, MAT04.01.b, MAT04.01.c, MAT04.01.d</p> <p>All RWC Standards</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c,</p> <p>PWR01.02.a, PWR01.03.d, PWR02.01.a</p> <p>g. Understand mechanical and electrical components in relation to industry and manufacturer standards.</p> <p>MAT01.02.a, MAT04.01.b, MAT04.01.c, MAT04.01.d,</p> <p>All RWC Standards</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c</p> <p>PWR01.02.a, PWR01.03.a, PWR01.03.d</p>	<p><b>SCI01.01.e - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Newton's laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations. <ul style="list-style-type: none"> <li>○ Identify the limitations of Newton's laws in extreme situations.</li> </ul> </li> </ul> <p><b>SCI01.02.a - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Matter has definite structure that determines characteristic physical and chemical properties. <ul style="list-style-type: none"> <li>○ Develop, communicate, and justify an evidence-based scientific explanation supporting the current model of an atom.</li> </ul> </li> </ul> <p><b>SCI01.02.b - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Matter has definite structure that determines characteristic physical and chemical properties. <ul style="list-style-type: none"> <li>○ Gather, analyze and interpret data on chemical and physical properties of elements such as density, melting point, boiling point, and conductivity.</li> </ul> </li> </ul> <p><b>SCI01.02.c - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Matter has definite structure that determines characteristic physical and chemical properties. <ul style="list-style-type: none"> <li>○ Use characteristic physical and chemical properties to develop predictions and supporting claims about elements' positions on the periodic table.</li> </ul> </li> </ul> <p><b>SCI01.02.d - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Matter has definite structure that determines characteristic physical and chemical properties. <ul style="list-style-type: none"> <li>○ Develop a model that differentiates atoms and molecules, elements and compounds, and pure substances and mixtures.</li> </ul> </li> </ul> <p><b>SCI01.02.e - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Matter has definite structure which determines characteristic physical and chemical properties.. <ul style="list-style-type: none"> <li>○ Make inferences based on indirect evidence used to draw conclusions about the structure of an atom and its subatomic particles.</li> </ul> </li> </ul> <p><b>SCI01.03.a - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy. <ul style="list-style-type: none"> <li>○ Recognize, analyze, interpret, and balance chemical equations (synthesis, decomposition, combustion, and replacement) or nuclear equations (fusion and fission).</li> </ul> </li> </ul>
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<p>h. Understand the concepts, principles, and practices of painting and refinishing.</p> <p>MAT01.02.a, MAT04.01.b, MAT04.01.c, MAT04.01.d,</p> <p>All RWC Standards</p> <p>SCI01.01.a, SCI01.01.b, SCI01.01.c, SCI01.01.d, SCI01.01.e, SCI01.02.a, SCI01.02.b, SCI01.02.c, SCI01.02.d, SCI01.02.e, SCI01.03.a, SCI01.03.b, SCI01.03.c, SCI01.03.d, SCI01.05.a, SCI01.05.b, SCI01.05.c, SCI01.05.d, SCI01.06.a, SCI01.06.b, SCI01.06.c</p> <p>PWR01.02.a, PWR01.03.a, PWR01.03.d</p>	<p><b>SCI01.03.b - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy. <ul style="list-style-type: none"> <li>○ Predict reactants and products for different types of chemical and nuclear reactions.</li> </ul> </li> </ul> <p><b>SCI01.03.c - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy. <ul style="list-style-type: none"> <li>○ Predict and calculate the amount of products produced in a chemical reaction based on the amount of reactants.</li> </ul> </li> </ul> <p><b>SCI01.03.d - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy. <ul style="list-style-type: none"> <li>○ Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate the conservation of mass and energy.</li> </ul> </li> </ul> <p><b>SCI01.05.a - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Energy exists in many forms such as mechanical, chemical, electrical, radiant, thermal, and nuclear, that can be quantified and experimentally determined. <ul style="list-style-type: none"> <li>○ Develop, communicate, and justify an evidence-based scientific explanation regarding the potential and kinetic nature of mechanical energy.</li> </ul> </li> </ul> <p><b>SCI01.05.b - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Energy exists in many forms such as mechanical, chemical, electrical, radiant, thermal, and nuclear, that can be quantified and experimentally determined. <ul style="list-style-type: none"> <li>○ Use appropriate measurements, equations and graphs to gather, analyze, and interpret data on the quantity of energy in a system or an object.</li> </ul> </li> </ul> <p><b>SCI01.05.c - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Energy exists in many forms such as mechanical, chemical, electrical, radiant, thermal, and nuclear, that can be quantified and experimentally determined. <ul style="list-style-type: none"> <li>○ Use direct and indirect evidence to develop predictions of the types of energy associated with objects.</li> </ul> </li> </ul> <p><b>SCI01.05.d - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• Energy exists in many forms such as mechanical, chemical, electrical, radiant, thermal, and nuclear, that can be quantified and experimentally determined. <ul style="list-style-type: none"> <li>○ Identify different energy forms, and calculate their amounts by measuring their defining characteristics.</li> </ul> </li> </ul>
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	<p><b>SCI01.06.a - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• When energy changes form, it is neither created nor destroyed; however, because some is necessarily lost as heat, the amount of energy available to do work decreases. <ul style="list-style-type: none"> <li>○ Use direct and indirect evidence to develop and support claims about the conservation of energy in a variety of systems, including transformations to heat.</li> </ul> </li> </ul> <p><b>SCI01.06.b - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• When energy changes form, it is neither created nor destroyed; however, because some is necessarily lost as heat, the amount of energy available to do work decreases. <ul style="list-style-type: none"> <li>○ Evaluate the energy conversion efficiency of a variety of energy transformations.</li> </ul> </li> </ul> <p><b>SCI01.06.c - Physical Science:</b></p> <ul style="list-style-type: none"> <li>• When energy changes form, it is neither created nor destroyed; however, because some is necessarily lost as heat, the amount of energy available to do work decreases. <ul style="list-style-type: none"> <li>○ Describe energy transformations both quantitatively and qualitatively.</li> </ul> </li> </ul> <p><b>SCI02.06.b - Life Science:</b></p> <ul style="list-style-type: none"> <li>• Populations interact with each other, as well as abiotic factors in an ecosystem, establishing a state of dynamic equilibrium.. <ul style="list-style-type: none"> <li>○ Analyze and interpret data about the ecological consequences of humans transferring natural resources from their origin to their disposal (e.g., from one reservoir to another) that support claims that the practice is beneficial or risky.</li> </ul> </li> </ul> <p><b>SCI03.06.c - Earth Science:</b></p> <ul style="list-style-type: none"> <li>• The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes. <ul style="list-style-type: none"> <li>○ Evaluate negative and positive consequences of physical and chemical changes on the geosphere.</li> </ul> </li> </ul> <p><b>SCI03.09.d - Earth Science:</b></p> <ul style="list-style-type: none"> <li>• The atmosphere has a current structure and composition and has evolved over geologic time.. <ul style="list-style-type: none"> <li>○ Evaluate negative and positive impacts on the planet in response to naturally induced and man-made changes in atmospheric component concentrations.</li> </ul> </li> </ul>
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**Learning & Behavioral Skills – Post - Secondary & Workplace Readiness:**

**PWR01.01.b-Postsecondary & Workforce Readiness, Content Knowledge , Literacy**

- Write clearly and coherently for a variety of purposes and audiences.

**PWR01.01.e-Postsecondary & Workforce Readiness, Content Knowledge , Literacy**

- Employ standard English language properly and fluently in reading, writing, listening, and speaking.

**PWR01.02.a-Postsecondary & Workforce Readiness, Content Knowledge , Mathematical Sciences**

- Think critically, analyze evidence, read graphs, understand logical arguments, detect logical fallacies, test conjectures, evaluate risks, and appreciate the role mathematics plays in the modern world, i.e., be quantitatively literate.

**PWR01.03.a-Postsecondary & Workforce Readiness, Content Knowledge , Science**

- Think scientifically and apply the scientific method to complex systems and phenomena.

**PWR01.03.d-Postsecondary & Workforce Readiness, Content Knowledge , Science**

- Understand the core scientific concepts, principles, laws, and vocabulary, and how scientific knowledge is extended, refined, and revised over time.

**PWR02.01.a-Postsecondary & Workforce Readiness, Learning and Behavior Skills, Critical Thinking and Problem Solving**

- Apply logical reasoning and analytical skills.

**PWR02.01.d-Postsecondary & Workforce Readiness, Learning and Behavior Skills, Critical Thinking and Problem Solving**

- Collect and analyze quantitative and qualitative data and research.

**PWR02.02.a-Postsecondary & Workforce Readiness, Learning and Behavior Skills, Find and Use Information/Information Technology**

- Select, integrate, and apply appropriate technology to access and evaluate new information.

**PWR02.02.b-Postsecondary & Workforce Readiness, Learning and Behavior Skills, Find and Use Information/Information Technology**

- Understand the ethical uses of information.

**PWR02.02.c-Postsecondary & Workforce Readiness, Learning and Behavior Skills, Find and Use Information/Information Technology**

- Provide citations for resources.

**PWR02.07.d-Postsecondary & Workforce Readiness, Learning and Behavior Skills, Personal Responsibility**

- Take responsibility for actions.

**PWR02.08.a-Postsecondary & Workforce Readiness, Learning and Behavior Skills, Communication**

- Read, write, listen and speak effectively.

## Attachment 1

*All of the following academic standards apply to all of the transportation standards.*

### **RWC01.02.e - Oral Expression and Listening:**

- Effective collaborative groups accomplish goals.
  - Assume a leadership role in a group that is collaboratively working to accomplish a goal.

### **RWC01.03.a - Oral Expression and Listening:**

- Verbal and nonverbal cues impact the intent of communication.
  - Give informal talks using an appropriate level of formality of verbal language and nonverbal interaction with audience

### **RWC01.03.c - Oral Expression and Listening:**

- Verbal and nonverbal cues impact the intent of communication
  - Deliver oral talks with clear enunciation, vocabulary, and appropriate organization; nonverbal gestures; and tone

### **RWC01.03.d - Oral Expression and Listening:**

- Verbal and nonverbal cues impact the intent of communication.
  - Analyze audience responses to evaluate how effectively the talk or presentation met the purpose

### **RWC01.05.a - Oral Expression and Listening:**

- Content that is gathered carefully and organized well successfully influences an audience.
  - Organize and deliver a presentation that influences a specific audience

### **RWC01.05.b - Oral Expression and Listening:**

- Content that is gathered carefully and organized well successfully influences an audience.
  - Reflect on the content and approach to a presentation.

### **RWC01.05.c - Oral Expression and Listening:**

- Content that is gathered carefully and organized well successfully influences an audience.
  - Select organizational patterns and structures and choose precise vocabulary and rhetorical devices

**RWC01.05.d - Oral Expression and Listening:**

- Content that is gathered carefully and organized well successfully influences an audience.
  - Make decisions about how to establish credibility and enhance appeal to the audience

**RWC01.05.e - Oral Expression and Listening:**

- Content that is gathered carefully and organized well successfully influences an audience.
  - Rehearse the presentation to gain fluency, to adjust tone and modulate volume for emphasis, and to develop poise

**RWC01.05.f - Oral Expression and Listening:**

- Content that is gathered carefully and organized well successfully influences an audience.
  - Use feedback to evaluate and revise the presentation.

**RWC01.06.d - Oral Expression and Listening:**

- Effectively operating in small and large groups to accomplish a goal requires active listening.
  - Facilitate (or lead) a group by developing an agenda designed to accomplish a specified goal.

**RWC01.06.e - Oral Expression and Listening:**

- Effectively operating in small and large groups to accomplish a goal requires active listening.
  - Support others in discussions, activities, and presentations through active listening

**RWC01.07.a - Oral Expression and Listening:**

- Oral presentations require effective preparation strategies.
  - Give formal and informal talks to various audiences for various purposes using appropriate level of formality and rhetorical devices.

**RWC01.07.b - Oral Expression and Listening:**

- Oral presentations require effective preparation strategies.
  - Use verbal and nonverbal techniques to communicate information.

**RWC01.07.c - Oral Expression and Listening:**

- Oral presentations require effective preparation strategies.
  - Define a position and select evidence to support that position.

**RWC01.07.d - Oral Expression and Listening:**

- Oral presentations require effective preparation strategies.
  - Develop a well-organized presentation to defend a position.

**RWC01.07.e - Oral Expression and Listening:**

- Oral presentations require effective preparation strategies.
  - Use effective audience and oral delivery skills to persuade an audience

**RWC01.07.f - Oral Expression and Language Study:**

- Deliver and apply skills in preparing a planned formal and informal oral presentations to various audiences using appropriate communication skills..
  - Use effective audience and oral delivery skills to convince an audience.

**RWC01.07.g - Oral Expression and Language Study:**

- Deliver and apply skills in preparing a planned formal and informal oral presentations to various audiences using appropriate communication skills..
  - Select appropriate technical or specialized language to help the audience understand content of the presentation.

**RWC02.02.a - Reading for All Purposes:**

- Interpreting and evaluating complex informational texts require the understanding of rhetoric, critical reading, and analysis skills.
  - Use reading and note-taking strategies (outlining, mapping systems, skimming, scanning, key word search) to organize information and make connections within and across informational texts.

**RWC02.02.c - Reading for All Purposes:**

- Interpreting and evaluating complex informational texts require the understanding of rhetoric, critical reading, and analysis skills.
  - Obtain and use information from text and text features (index, bold or italicized text, subheadings, graphics) to answer questions, perform specific tasks, or identify and solve problems

**RWC02.02.d - Reading for All Purposes:**

- Interpreting and evaluating complex informational texts require the understanding of rhetoric, critical reading, and analysis skills.
  - Explain and interpret the visual components supporting the text (maps, complex tables and diagrams, and transitional devices, such as use of white space)

**RWC02.05.a - Reading for All Purposes:**

- Literary and historical influences determine the meaning of traditional and contemporary literary texts.
  - Generalize about universal themes, cultural or historical perspectives from multiple texts.

**RWC02.06.a - Reading for All Purposes:**

- The development of new ideas and concepts within informational and persuasive manuscripts.
  - Provide a response to text that expresses an insight (such as an author's perspective or the nature of conflict) or use text-based information to solve a problem not identified in the text (for example, use information from a variety of sources to provide a response to text that expresses an insight)

**RWC02.06.b - Reading for All Purposes:**

- Apply understanding of complex organizational text structures and features to reading comprehension..
  - Use the features of electronic information to communicate, gain information, or research a topic.

**RWC02.12.a - Reading for All Purposes:**

- Interpret relevant details, make inferences and draw conclusions in complex informational texts..
  - Critique author's choice of literary genres to convey a message.

**RWC03.01.a - Writing and Composition:**

- Use a recursive writing process for planning, developing and revising text for a variety of academic, workplace, and literary purposes and audiences..
  - Establish and maintain a text structure appropriate to audience and purpose.

**RWC03.01.b - Writing and Composition:**

- Use a recursive writing process for planning, developing and revising text for a variety of academic, workplace, and literary purposes and audiences..
  - Organize ideas consistent with text structure (e.g., chronology, proposition-support, critique, inductive-deductive) in well- developed paragraphs..

**RWC03.01.c - Writing and Composition:**

- Use a recursive writing process for planning, developing and revising text for a variety of academic, workplace, and literary purposes and audiences..
  - Select and use formal, informal, literary, or technical language appropriate to audience and context..

**RWC03.01.d - Writing and Composition:**

- Use a recursive writing process for planning, developing and revising text for a variety of academic, workplace, and literary purposes and audiences..
  - Write with clear focus, depth, accurate and relevant detail.

**RWC3.02.c-Reading, Writing and Communicating, Writing and Composition:**

- Manipulate the elements and devices of literature to create literary texts that communicate ideas artistically..
  - Use a range of elaboration techniques (i.e., questioning, comparing, connecting, interpreting, analyzing, or describing) to establish a focus. (Technical texts, reading & writing)

**RWC03.02.i - Writing and Composition:**

- Manipulate the elements and devices of literature to create literary texts that communicate ideas artistically..
  - Choose conventional or alternative text structures to achieve intended impact.

**RWC3.03.c-Reading, Writing and Communicating, Writing and Composition:**

- Manipulate the elements and structures of informational text to create persuasive, academic, and technical writing..
  - Address audience needs and anticipate audience questions or misunderstandings.

**RWC03.04.a - Writing and Composition:**

- Stylistic and thematic elements of literary or narrative texts can be refined to engage or entertain an audience..
  - Organize events, details, ideas and reflections or observations strategically to influence the audience's emotions and understanding of the implicit or explicit theme.

**RWC03.04.b - Writing and Composition:**

- Stylistic and thematic elements of literary or narrative texts can be refined to engage or entertain an audience..
  - Write literary and narrative texts using a range of stylistic devices (poetic techniques, figurative language, symbolism, graphic or visual components) to support the presentation of implicit or explicit theme.

**RWC03.04.c - Writing and Composition:**

- Stylistic and thematic elements of literary or narrative texts can be refined to engage or entertain an audience.
  - Enhance the expression of voice, tone, and point of view in a text by strategically using precise diction (considering denotation, connotation, and audience associations); diverse syntax; varied sentence patterns; and punctuation for stylistic effect.

**RWC03.04.d - Writing and Composition:**

- Stylistic and thematic elements of literary or narrative texts can be refined to engage or entertain an audience.
  - Use a range of strategies to evaluate whether the writing is presented in a clear and engaging manner (such as reading the text from the perspective of the intended audience, seeking feedback from a reviewer).

**RWC03.06.a - Writing and Composition.**

- Writing demands ongoing revisions and refinements for grammar, usage, mechanics, and clarity.
  - Apply punctuation correctly and articulate stylistic choices.

**RWC03.08.b - Writing and Composition:**

- Organizational writing patterns inform or persuade an audience.
  - Select and apply the organizational pattern best suited to purpose and audience.

**RWC03.09.a - Writing and Composition:**

- Grammar, language usage, mechanics, and clarity are the basics of ongoing refinements and revisions within the writing process.
  - Apply dashes, colons, and semi-colons to create varied sentences, to emphasize important ideas, and to show relationships among ideas.

**RWC03.09.b - Writing and Composition:**

- Grammar, language usage, mechanics, and clarity are the basics of ongoing refinements and revisions within the writing process.
  - Identify instances where sentences are not grammatically parallel and revise sentences to establish parallelism

**RWC04.01.a - Research and Reasoning:**

- Independent research designs articulate and defend information, conclusions and solutions that address specific contexts and purposes.
  - Define and narrow a topic for self-designed research for a variety of purposes and audiences.

**RWC04.01.b - Research and Reasoning:**

- Independent research designs articulate and defend information, conclusions and solutions that address specific contexts and purposes.
  - Critique research questions of self and others for bias and underlying assumptions.

**RWC04.01.c - Research and Reasoning:**

- Independent research designs articulate and defend information, conclusions and solutions that address specific contexts and purposes.
  - Critique and defend sources and information based on credibility, relevance and appropriateness relative to context and purpose.

**RWC04.01.d - Research and Reasoning:**

- Independent research designs articulate and defend information, conclusions and solutions that address specific contexts and purposes.
  - Design and defend a set of diverse research strategies (e.g. cross referencing bibliographies, creating annotated bibliographies, researching source credentials) to identify information appropriate to the needs of a research question.

**RWC4.03.a-Reading, Writing and Communicating, Research and Reasoning:**

- Apply critical thinking to complex situations and across multiple disciplines.
  - Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking.

**RWC4.04.c-Reading, Writing and Communicating, Research and Reasoning:**

- Understand how the analysis of thinking, assessment of thinking, and intellectual character are integrated to form a complete reasoning process..
  - Understand how to develop a plan and collect information.

**RWC04.05.b - Research and Reasoning:**

- Evaluating quality reasoning includes the value of intellectual character such as humility, empathy, and confidence.
  - Assess strengths and weaknesses of thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic, and precision.

**RWC04.08.a - Research and Reasoning:**

- Informational materials, including electronic sources, need to be collected, evaluated, and analyzed for accuracy, relevance, and effectiveness for answering research questions.
  - Integrate information from different sources to research and complete a project.

**RWC04.09.a - Research and Reasoning:**

- Information from primary and secondary sources is used to establish relevance, significance, and accuracy in answering research questions.
  - Examine materials to determine appropriate primary and secondary sources to use for investigating a question, topic, or issue (e.g., library databases, print and electronic encyclopedia and other reference materials, pamphlets, book excerpts, online and print newspaper and magazine articles, letters to an editor, digital forums, oral records, research summaries, scientific and trade journals).

**RWC04.10.a - Research and Reasoning:**

- Effective problem-solving strategies require high-quality reasoning.
  - Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking.

**RWC04.10.b - Research and Reasoning:**

- Effective problem-solving strategies require high-quality reasoning.
  - Assess strengths and weaknesses of their thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision.

**RWC04.10.c - Research and Reasoning:**

- Effective problem-solving strategies require high-quality reasoning.
  - Implement a purposeful and articulated process to solve a problem.