

MECHANICAL TECHNOLOGY STANDARDS



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BUSINESS AND INDUSTRY VALIDATION

All CTE standards developed through the Nevada Department of Education are validated by business and industry through one or more of the following processes: (1) the standards are developed by a team consisting of business and industry representatives; or (2) a separate review panel was coordinated with industry experts to ensure the standards include the proper content; or (3) the adoption of nationally-recognized standards endorsed by business and industry.

The Mechanical Technology standards were validated through a complete review by an industry panel.

PROJECT COORDINATOR

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INTRODUCTION

The standards in this document are designed to clearly state what the student should know and be able to do upon completion of an advanced high school Mechanical Technology program. These standards are designed for a three-credit course sequence that prepares the student for a technical assessment directly aligned to the standards.

These exit-level standards are designed for the student to complete all standards through their completion of a program of study. These standards are intended to guide curriculum objectives for a program of study.

The standards are organized as follows:

Content Standards are general statements that identify major areas of knowledge, understanding, and the skills students are expected to learn in key subject and career areas by the end of the program.

Performance Standards follow each content standard. Performance standards identify the more specific components of each content standard and define the expected abilities of students within each content standard.

Performance Indicators are very specific criteria statements for determining whether a student meets the performance standard. Performance indicators may also be used as learning outcomes, which teachers can identify as they plan their program learning objectives.

The crosswalk and alignment section of the document shows where the performance indicators support the English Language Arts and the Mathematics Common Core State Standards, and the Nevada State Science Standards. Where correlation with an academic standard exists, students in the Mechanical Technology program perform learning activities that support, either directly or indirectly, achievement of one or more Common Core State Standards.

All students are encouraged to participate in the career and technical student organization (CTSO) that relates to their program area. CTSOs are co-curricular national associations that directly enforce learning in the CTE classroom through curriculum resources, competitive events, and leadership development. CTSOs provide students the ability to apply academic and technical knowledge, develop communication and teamwork skills, and cultivate leadership skills to ensure college and career readiness.

The Employability Skills for Career Readiness identify the “soft skills” needed to be successful in all careers, and must be taught as an integrated component of all CTE course sequences. These standards are available in a separate document.

The **Standards Reference Code** is only used to identify or align performance indicators listed in the standards to daily lesson plans, curriculum documents, or national standards.

Program Name	Standards Reference Code
Mechanical Technology	MET

Example: MET.2.3.4

Standards	Content Standard	Performance Standard	Performance Indicator
Mechanical Technology	2	3	4

CONTENT STANDARD 1.0 : IDENTIFY LAB ORGANIZATION AND SAFETY PROCEDURES

PERFORMANCE STANDARD 1.1 : DEMONSTRATE GENERAL LAB SAFETY RULES AND PROCEDURES

- | | |
|--------|---|
| 1.1.1 | Describe general shop safety rules and procedures |
| 1.1.2 | Demonstrate knowledge of OSHA and its role in workplace safety |
| 1.1.3 | Comply with the required use of personal protective equipment (PPE) during lab/shop activities |
| 1.1.4 | Utilize safe procedures for handling of tools and equipment |
| 1.1.5 | Operate lab equipment according to safety guidelines |
| 1.1.6 | Identify and use proper lifting procedures and proper use of support equipment |
| 1.1.7 | Utilize proper ventilation procedures for working within the lab/shop area |
| 1.1.8 | Identify marked safety areas |
| 1.1.9 | Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment |
| 1.1.10 | Identify the location and use of eye wash stations |
| 1.1.11 | Identify the location of the posted evacuation routes |
| 1.1.12 | Identify and wear appropriate clothing for lab/shop activities |
| 1.1.13 | Secure hair and jewelry for lab/shop activities |
| 1.1.14 | Demonstrate knowledge of the safety aspects of high voltage circuits |
| 1.1.15 | Locate and interpret material safety data sheets (MSDS) |
| 1.1.16 | Prepare time or job cards, reports or records |
| 1.1.17 | Perform housekeeping duties |
| 1.1.18 | Follow verbal instructions to complete work assignments |
| 1.1.19 | Follow written instructions to complete work assignments |

PERFORMANCE STANDARD 1.2 : IDENTIFY AND UTILIZE HAND TOOLS

- | | |
|-------|--|
| 1.2.1 | Identify hand tools and their appropriate usage |
| 1.2.2 | Identify standard and metric designation |
| 1.2.3 | Demonstrate the proper techniques when using hand tools |
| 1.2.4 | Demonstrate safe handling and use of appropriate tools |
| 1.2.5 | Demonstrate proper cleaning, storage, and maintenance of tools |

PERFORMANCE STANDARD 1.3 : IDENTIFY AND UTILIZE POWER TOOLS AND EQUIPMENT

- | | |
|-------|--|
| 1.3.1 | Identify power tools and their appropriate usage |
| 1.3.2 | Identify equipment and their appropriate usage |
| 1.3.3 | Demonstrate the proper techniques when using power tools and equipment |
| 1.3.4 | Demonstrate safe handling and use of appropriate power tools and equipment |
| 1.3.5 | Demonstrate proper cleaning, storage, and maintenance of power tools and equipment |

CONTENT STANDARD 2.0 : APPLY FUNDAMENTAL PRINT READING, MEASURING, AND SKETCHING TECHNIQUES

PERFORMANCE STANDARD 2.1 : DEMONSTRATE PRINT READING PRACTICES

- | | |
|-------|--|
| 2.1.1 | Interpret basic elements of a technical drawing (i.e., title block information, dimensions, line types) |
| 2.1.2 | Identify industry standard symbols (i.e., hydraulic, pneumatic, electrical, welding, mechanical) |
| 2.1.3 | Prepare a materials list from a technical drawing |
| 2.1.4 | Describe various types of drawings (i.e., part, assembly, pictorial, orthographic, isometric, schematic) |
| 2.1.5 | Understand dimensioning, sectional drawings, fasteners, tables, charts, and assembly drawings |

PERFORMANCE STANDARD 2.2 : DEMONSTRATE MEASURING AND SCALING TECHNIQUES

- | | |
|-------|--|
| 2.2.1 | Identify industry standard units of measure |
| 2.2.2 | Convert between customary (i.e., SAE, Imperial) and metric systems |
| 2.2.3 | Determine appropriate engineering and metric scales |
| 2.2.4 | Measure and calculate speed, distance, object size, area, and volume |
| 2.2.5 | Determine and apply the equivalence between fractions and decimals |
| 2.2.6 | Demonstrate proper use of precision measuring tools (i.e., micrometer, dial-indicator, dial-caliper) |

PERFORMANCE STANDARD 2.3 : DEMONSTRATE FREEHAND TECHNICAL SKETCHING TECHNIQUES

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|-------|--|
| 2.3.1 | Prepare freehand and field sketches |
| 2.3.2 | Identify appropriate proportions |
| 2.3.3 | Create schematic diagrams using proper symbols |
| 2.3.4 | Annotate sketches legibly |

CONTENT STANDARD 3.0 : APPLY FUNDAMENTAL ENERGY PRINCIPLES**PERFORMANCE STANDARD 3.1 : IDENTIFY ENERGY FORMS**

- | | |
|-------|---|
| 3.1.1 | Define energy |
| 3.1.2 | Categorize types of energy into major forms: thermal, radiant, nuclear, chemical, electrical, mechanical, and fluid |
| 3.1.3 | Identify units used to measure energy |
| 3.1.4 | Analyze and apply data and measurements to solve problems and interpret documents |
| 3.1.5 | Calculate unit conversions between common energy measurements |
| 3.1.6 | Classify energy resources as non-renewable or renewable energy |
| 3.1.7 | Classify energy resources as potential or kinetic energy |

PERFORMANCE STANDARD 3.2 : COMPARE NON-RENEWABLE AND RENEWABLE ENERGY SOURCES

- | | |
|-------|---|
| 3.2.1 | Define non-renewable and renewable energy |
| 3.2.2 | Identify forms of non-renewable and renewable energy |
| 3.2.3 | Research non-renewable and renewable energy sources |
| 3.2.4 | Calculate non-renewable and renewable energy including unit conversions |
| 3.2.5 | Analyze the environmental impact of non-renewable and renewable energy |
| 3.2.6 | Assess energy efficiency and conservation |

PERFORMANCE STANDARD 3.3 : DISTINGUISH POTENTIAL AND KINETIC ENERGY

- | | |
|-------|--|
| 3.3.1 | Define potential and kinetic energy |
| 3.3.2 | Identify forms of potential and kinetic energy |
| 3.3.3 | Research energy conversions (i.e., potential to kinetic) |
| 3.3.4 | Calculate potential and kinetic energy, including unit conversions |

PERFORMANCE STANDARD 3.4 : IDENTIFY THERMODYNAMICS

- | | |
|-------|---|
| 3.4.1 | Define thermodynamics |
| 3.4.2 | Utilize industry standard terminology |
| 3.4.3 | Identify the common units of measurement |
| 3.4.4 | Apply the Laws of Thermodynamics |
| 3.4.5 | Demonstrate the concepts of heat transfer (i.e., conduction, convection, radiation) |

CONTENT STANDARD 4.0 : APPLY FUNDAMENTAL POWER SYSTEM PRINCIPLES**PERFORMANCE STANDARD 4.1 : IDENTIFY POWER SYSTEMS**

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|-------|---|
| 4.1.1 | Define terms used in power systems (e.g., power, work, horsepower, watts) |
| 4.1.2 | Identify the basic power systems |
| 4.1.3 | List the basic elements of power systems |
| 4.1.4 | Summarize the advantages and disadvantages of various forms of power |
| 4.1.5 | Calculate the efficiency of power systems and conversion devices |
| 4.1.6 | Demonstrate the use of an energy conversion device |

PERFORMANCE STANDARD 4.2 : IDENTIFY AND UTILIZE BASIC MECHANICAL SYSTEMS

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|-------|---|
| 4.2.1 | Locate and explain examples of the six simple machines, their attributes and components |
| 4.2.2 | Measure forces and distances related to mechanisms |
| 4.2.3 | Determine efficiency in a mechanical system |
| 4.2.4 | Calculate mechanical advantage |
| 4.2.5 | Measure torque and use it to calculate power |
| 4.2.6 | Design, construct, and test various basic mechanical systems |

PERFORMANCE STANDARD 4.3 : IDENTIFY AND UTILIZE ADVANCED MECHANICAL SYSTEMS

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|--------|--|
| 4.3.1 | Identify and explain the differences between gasoline engines and diesel engines |
| 4.3.2 | Identify and explain electrical motor systems and motor controls by application |
| 4.3.3 | Identify and utilize all safety procedures for advanced mechanical systems |
| 4.3.4 | Identify, inspect, and repair engine assembly for fuel, oil, coolant, and other leaks |
| 4.3.5 | Identify, inspect, and repair drivetrain assemblies for leakage at external seals, gaskets, and bushings |
| 4.3.6 | Identify, inspect, and repair suspension and steering systems for leaks |
| 4.3.7 | Identify, inspect, and repair braking systems |
| 4.3.8 | Identify, inspect, and repair mechanical power transmissions |
| 4.3.9 | Examine the relationship between bearings, couplings, and gear drives |
| 4.3.10 | Explain belt drive concepts, v-belt operation, belt tensioning, and belt tension measurement |
| 4.3.11 | Explain chain drive concepts, chain tensioning, and chain tension measurement |
| 4.3.12 | Demonstrate chain and belt tensioning procedures |

PERFORMANCE STANDARD 4.4 : IDENTIFY AND UTILIZE BASIC FLUID SYSTEMS

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|-------|--|
| 4.4.1 | Define fluid systems (e.g., hydraulic, pneumatic, vacuum) |
| 4.4.2 | Identify and define the components of fluid systems |
| 4.4.3 | Compare and contrast hydraulic and pneumatic systems |
| 4.4.4 | Identify the advantages and disadvantages of using fluid power systems |
| 4.4.5 | Explain the difference between gauge pressure and absolute pressure |
| 4.4.6 | Discuss the safety concerns of working with liquids and gases under pressure |
| 4.4.7 | Calculate mechanical advantage using Pascal's law |
| 4.4.8 | Calculate values in a pneumatic system, using the ideal gas laws |
| 4.4.9 | Design, construct, and test various fluid systems |

PERFORMANCE STANDARD 4.5 : IDENTIFY AND UTILIZE BASIC ELECTRICAL SYSTEMS

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|--------|---|
| 4.5.1 | Define AC and DC electrical systems and terminology |
| 4.5.2 | Discuss the safety concerns of working with electricity |
| 4.5.3 | Describe the principles of generation, transmission, distribution, and storage of electricity |
| 4.5.4 | Identify the advantages and disadvantages of using electrical systems |
| 4.5.5 | Compute values of current, resistance, and voltage using Ohm's Law |
| 4.5.6 | Identify series, parallel and series-parallel (combination) circuits |
| 4.5.7 | Solve series and parallel circuits using basic laws of electricity including Kirchhoff's laws |
| 4.5.8 | Introduce single-phase and three-phase AC power |
| 4.5.9 | Analyze the laws, principles, and types of electricity to utilize, repair, and maintain equipment used in an industrial environment |
| 4.5.10 | Construct and test simple electrical circuits from a schematic |

CONTENT STANDARD 5.0 : IDENTIFY AND APPLY MANUFACTURING PROCESSES**PERFORMANCE STANDARD 5.1 : IDENTIFY MATERIAL PROPERTIES AND SCIENCE**

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| 5.1.1 | Identify the major material families used in manufacturing |
| 5.1.2 | Differentiate between the various types of material properties and their applications |
| 5.1.3 | Discuss the impact of material usage on the environment |
| 5.1.4 | Explain how production is affected by of the availability, quality and quantity of resources |
| 5.1.5 | Differentiate among a raw material standard stock and finished products |

PERFORMANCE STANDARD 5.2 : IDENTIFY MANUFACTURING PROCESSES

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|-------|--|
| 5.2.1 | Identify and describe the five major manufacturing processes (i.e., forming, separating, fabricating, conditioning, and finishing) |
| 5.2.2 | Discuss the impact of manufacturing processes on the environment |
| 5.2.3 | Describe Lean manufacturing and explain its importance |

PERFORMANCE STANDARD 5.3 : APPLY MANUFACTURING PROCESSES

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|-------|--|
| 5.3.1 | Demonstrate cutting methods of metals and plastics |
| 5.3.2 | Demonstrate drilling methods of metals and plastics |
| 5.3.3 | Demonstrate grinding methods of metals |
| 5.3.4 | Demonstrate finishing methods of metals and plastics |

PERFORMANCE STANDARD 5.4 : IDENTIFY FASTENERS

- | | |
|-------|---|
| 5.4.1 | Identify various fastening methods (e.g., rivets, welds, adhesive, screws, seams, etc.) |
| 5.4.2 | Categorize fastening methods by appropriate applications |
| 5.4.3 | Demonstrate fastening methods on various materials |

PERFORMANCE STANDARD 5.5 : DEMONSTRATE SAFE AND PROPER TECHNIQUES IN SHIELDED METAL ARCH WELDING (SMAW)

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|-------|--|
| 5.5.1 | Perform safety inspections of SMAW equipment and accessories |
| 5.5.2 | Make minor external repairs to SMAW equipment and accessories |
| 5.5.3 | Set up and operate SMAW equipment on carbon steel |
| 5.5.4 | Produce fillet and groove welds on carbon steel |
| 5.5.5 | Produce three AWS standard welds in the flat and horizontal position |

PERFORMANCE STANDARD 5.6 : DEMONSTRATE SAFE AND PROPER TECHNIQUES IN GAS METAL ARCH WELDING (GMAW)	
5.6.1	Perform safety inspections of GMAW equipment and accessories
5.6.2	Make minor external repairs to GMAW equipment and accessories
5.6.3	Set up and operate GMAW equipment on carbon steel
5.6.4	Produce fillet and groove welds on carbon steel
5.6.5	Produce three AWS standard welds in the flat and horizontal position
PERFORMANCE STANDARD 5.7 : DEMONSTRATE SAFE AND PROPER TECHNIQUES IN OXY-FUEL GAS CUTTING (OFC)	
5.7.1	Perform safety inspections of OFC equipment and accessories
5.7.2	Make minor external repairs to OFC equipment and accessories
5.7.3	Sets up for OFC operations on carbon steel
5.7.4	Operate OFC equipment on carbon steel
5.7.5	Perform straight, square edge cutting operations in the flat position on carbon steel
5.7.6	Perform shape, square edge cutting operations in the flat position on carbon steel
PERFORMANCE STANDARD 5.8 : DEMONSTRATE SAFE AND PROPER TECHNIQUES IN PLASMA ARC CUTTING (PAC)	
5.8.1	Perform safety inspections of PAC equipment and accessories
5.8.2	Make minor external repairs to PAC equipment and accessories
5.8.3	Sets up for PAC operations on carbon steel, austenitic stainless steel, and aluminum
5.8.4	Operate PAC equipment on carbon steel, austenitic stainless steel, and aluminum
5.8.5	Perform straight, square edge cutting operations in the flat position on carbon steel, austenitic stainless steel, and aluminum
5.8.6	Perform shape, square edge cutting operations in the flat position on carbon steel, austenitic stainless steel, and aluminum

CONTENT STANDARD 6.0 : APPLY FUNDAMENTAL ELECTRONIC AND INSTRUMENTATION PRINCIPLES

PERFORMANCE STANDARD 6.1 : DEMONSTRATE ANALOG AND DIGITAL ELECTRONIC PRINCIPLES

- | | |
|---|---|
| <ul style="list-style-type: none"> 6.1.1 6.1.2 6.1.3 6.1.4 6.1.5 6.1.6 6.1.7 6.1.8 6.1.9 6.1.10 6.1.11 6.1.12 6.1.13 | <ul style="list-style-type: none"> Demonstrate safe use of electricity and lab equipment Understand and demonstrate basic electronic theory Identify electronic components and their applications (e.g., resistors, capacitors, inductors, transformers, etc.) Utilize tools and test equipment appropriately Measure electrical characteristics of voltage, current, and resistance in basic electronic circuits using multi-meters and oscilloscopes Verify Ohm's Law and power equations Construct, measure, and analyze simple series, parallel, and series-parallel (combination) circuits Demonstrate appropriate solder and de-solder techniques for electronics and electrical circuits Demonstrate appropriate use of various connectors (e.g., crimp connectors, wire nuts, RJ45, CAT5e, etc.) Construct a simple AC circuit using passive components (i.e., resistors, inductors, capacitors) Construct a simple AC circuit using active components (i.e., diodes, transistors, linear devices) Demonstrate the appropriate use of relays and switches Build electronic circuits utilizing basic TTL logic with AND, OR, NAND, NOR, buffer and inverter chips |
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PERFORMANCE STANDARD 6.2 : DEMONSTRATE CONTROL TECHNOLOGY AND AUTOMATION PRINCIPLES

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|---|--|
| <ul style="list-style-type: none"> 6.2.1 6.2.2 6.2.3 6.2.4 6.2.5 6.2.6 6.2.7 6.2.8 6.2.9 6.2.10 6.2.11 6.2.12 6.2.13 6.2.14 6.2.15 | <ul style="list-style-type: none"> Research the history and fundamentals of automation and control systems Identify applications of control logic Distinguish programmable controllers and PLC components and their functions Interpret programming diagrams Sketch programming diagrams for real world applications Program ladder logic statements to perform a specific task Develop ladder/relay logic application use for a PLC to control industry specific processes Select most appropriate type of circuit logic for each application Understand varying types of hardware used throughout the industry Apply suitable commands for PLC circuits Apply timer and counter principles to industry-related problems Setup and test PLCs Understand and select proper communication drivers to interface with a PLC system Troubleshoot issues with PLCs Perform basic maintenance with PLCs |
|---|--|

PERFORMANCE STANDARD 6.3 : DEMONSTRATE DIAGNOSTIC AND TROUBLESHOOTING PRACTICES

- | | |
|--------|---|
| 6.3.1 | Explain a diagnostic procedure |
| 6.3.2 | Identify the components of a safety procedure checklist |
| 6.3.3 | Utilize all safety procedures necessary before performing a repair (e.g., lock-out/tag-out, etc.) |
| 6.3.4 | Navigate through user software |
| 6.3.5 | Understand and use software instructions offered in user software |
| 6.3.6 | Develop a routine maintenance plan |
| 6.3.7 | Utilize various sources of repair, maintenance, and troubleshooting documentation (e.g., print media, electronic, tech support, local expert) |
| 6.3.8 | Use manufacturer's documentation for troubleshooting |
| 6.3.9 | Utilize diagnostic tools appropriately |
| 6.3.10 | Troubleshoot and repair common problems |

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**CROSSWALKS AND ALIGNMENTS OF
MECHANICAL TECHNOLOGY STANDARDS
AND THE COMMON CORE STATE STANDARDS,
THE NEVADA SCIENCE STANDARDS,
AND THE COMMON CAREER TECHNICAL CORE STANDARDS**

CROSSWALKS (ACADEMIC STANDARDS)

The crosswalk of the Mechanical Technology Standards shows links to the Common Core State Standards for English Language Arts and Mathematics and the Nevada Science Standards. The crosswalk identifies the performance indicators in which the learning objectives in the Mechanical Technology program support academic learning. The performance indicators are grouped according to their content standard and are crosswalked to the English Language Arts and Mathematics Common Core State Standards and the Nevada Science Standards.

ALIGNMENTS (MATHEMATICAL PRACTICES)

In addition to correlation with the Common Core Mathematics Content Standards, many performance indicators support the Common Core Mathematical Practices. The following table illustrates the alignment of the Mechanical Technology Standards Performance Indicators and the Common Core Mathematical Practices. This alignment identifies the performance indicators in which the learning objectives in the Mechanical Technology program support academic learning.

CROSSWALKS (COMMON CAREER TECHNICAL CORE)

The crosswalk of the Mechanical Technology Standards shows links to the Common Career Technical Core. The crosswalk identifies the performance indicators in which the learning objectives in the Mechanical Technology program support the Common Career Technical Core. The Common Career Technical Core defines what students should know and be able to do after completing instruction in a program of study. The Mechanical Technology Standards are crosswalked to the Manufacturing Career Cluster™ and the Maintenance, Installation & Repair Career Pathway.

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**CROSSWALK OF MECHANICAL TECHNOLOGY STANDARDS
AND THE COMMON CORE STATE STANDARDS**

CONTENT STANDARD 1.0: IDENTIFY LAB ORGANIZATION AND SAFETY PROCEDURES

Performance Indicators	Common Core State Standards and Nevada Science Standards
1.1.1	<p>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p> <p>RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p>
1.1.2	<p>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p> <p>English Language Arts: Speaking and Listening Standards SL.11-12.1a Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well reasoned exchange of ideas.</p>
1.1.9	<p>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p>
1.1.15	<p>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects RST.11-12.2 Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.</p> <p>RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p> <p>RST.11-12.5 Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p> <p>WHST.11-12.9 Draw evidence from informational texts to support analysis, reflection, and research.</p>
1.1.16	<p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p>

1.1.18	<p>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p> <p>English Language Arts: Speaking and Listening Standards SL.11-12.1d Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.</p>
1.1.19	<p>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p> <p>RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p>

CONTENT STANDARD 2.0: APPLY FUNDAMENTAL PRINT READING, MEASURING, AND SKETCHING TECHNIQUES

Performance Indicators	Common Core State Standards and Nevada Science Standards
2.1.2	<p>English Language Arts: Reading Standards for Literacy RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p>
2.1.3	<p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.2a Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.</p> <p>WHST.11-12.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p>
2.1.4	<p>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>
2.2.4	<p>Math: Geometry – Geometric Measurement and Dimension G-GMD.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.</p>

CONTENT STANDARD 3.0: APPLY FUNDAMENTAL ENERGY PRINCIPLES

Performance Indicators	Common Core State Standards and Nevada Science Standards
3.1.2	<p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p>
3.1.4	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p>
3.2.3	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>
3.2.5	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>
3.2.6	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>
3.3.3	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>

CONTENT STANDARD 4.0: APPLY FUNDAMENTAL POWER SYSTEM PRINCIPLES

Performance Indicators	Common Core State Standards and Nevada Science Standards
4.1.4	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>
4.2.1	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>
4.2.6	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>
4.3.1	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>
4.3.2	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p>
4.4.3	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>

4.4.5	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>
4.4.6	<p>English Language Arts: Speaking and Listening Standards SL.11-12.2 Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.</p> <p>SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.</p>
4.4.9	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>
4.5.2	<p>English Language Arts: Speaking and Listening Standards SL.11-12.2 Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.</p> <p>SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.</p>
4.5.3	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>
4.5.4	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>

4.5.9	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>
4.5.10	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>

CONTENT STANDARD 5.0: IDENTIFY AND APPLY MANUFACTURING PROCESSES

Performance Indicators	Common Core State Standards and Nevada Science Standards
5.1.2	<p>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.</p>
5.1.3	<p>English Language Arts: Speaking and Listening Standards SL.11-12.2 Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.</p> <p>SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>
5.1.4	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p>
5.1.5	<p>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.</p>
5.2.1	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>
5.2.2	<p>English Language Arts: Speaking and Listening Standards SL.11-12.2 Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.</p> <p>SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.</p>

5.2.3	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>
5.4.2	<p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p>
5.5.1	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>
5.5.2	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>
5.6.1	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>
5.6.2	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>
5.7.1	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>
5.7.2	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>
5.8.1	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>
5.8.2	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>

CONTENT STANDARD 6.0: APPLY FUNDAMENTAL ELECTRONIC AND INSTRUMENTATION PRINCIPLES

Performance Indicators	Common Core State Standards and Nevada Science Standards
6.1.6	<p>Math: Algebra – Creating Equations A-CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.</p> <p>Math: Algebra – Reasoning with Equations and Inequalities A-REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</p> <p>Math: Functions – Linear, Quadratic, and Exponential Models F-LE.5 Interpret the parameters in a linear or exponential function in terms of a context.</p>
6.1.7	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>
6.1.10	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>
6.1.11	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>
6.2.1	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>
6.2.4	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>
6.2.6	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>
6.2.12	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>

6.2.14	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>
6.3.1	<p>English Language Arts: Reading Standards for Literacy RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p>
6.3.3	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>
6.3.8	<p>English Language Arts: Reading Standards for Literacy RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>

**ALIGNMENT OF MECHANICAL TECHNOLOGY STANDARDS
AND THE COMMON CORE MATHEMATICAL PRACTICES**

Common Core Mathematical Practices	Mechanical Technology Performance Indicators
1. Make sense of problems and persevere in solving them.	2.2.4 3.1.4; 3.4.4
2. Reason abstractly and quantitatively.	2.2.4 3.1.4, 3.1.5; 3.2.4; 3.3.4; 3.4.3 4.1.5; 4.2.2, 4.2.4, 4.2.3; 4.4.7, 4.4.8; 4.5.5, 4.5.7 6.1.6
3. Construct viable arguments and critique the reasoning of others.	3.1.4; 3.2.6 4.2.3; 4.5.7 6.1.6, 6.1.7
4. Model with mathematics.	3.1.4; 3.2.6; 3.4.4
5. Use appropriate tools strategically.	2.2.3, 2.2.4, 2.2.6 4.2.2, 4.2.5 6.1.5, 6.1.7; 6.2.11
6. Attend to precision.	2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.6 3.1.5 4.1.5; 4.2.2, 4.2.5 6.1.5, 6.1.6
7. Look for and make use of structure.	3.1.4 4.1.5
8. Look for and express regularity in repeated reasoning.	

**CROSSWALKS OF MECHANICAL TECHNOLOGY STANDARDS
AND THE COMMON CAREER TECHNICAL CORE**

Manufacturing Career Cluster™ (MN)	Performance Indicators
1. Evaluate the nature and scope of the Manufacturing Career Cluster™ and the role of manufacturing in society and in the economy.	5.1.4; 5.2.2, 5.2.3
2. Analyze and summarize how manufacturing businesses improve performance.	5.2.1, 5.2.3
3. Comply with federal, state and local regulations to ensure worker safety and health and environmental work practices.	1.1.9 – 1.1.19
4. Describe career opportunities and means to achieve those opportunities in each of the Manufacturing Career Pathways.	ESCR.1.2.7
5. Describe government policies and industry standards that apply to manufacturing.	1.1.2
6. Demonstrate workplace knowledge and skills common to manufacturing.	5.1.1 – 5.8.6

Maintenance, Installation, & Repair Career Pathway (MN-MIR)	Performance Indicators
1. Demonstrate maintenance skills and proficient operation of equipment to maximize manufacturing performance.	5.5.1, 5.5.2; 5.6.1, 5.6.2 5.7.1, 5.7.2; 5.8.1, 5.8.2
2. Demonstrate the safe use of manufacturing equipment to ensure a safe and healthy environment.	1.1.1 – 1.1.19 1.2.3, 1.2.4, 1.2.5 1.3.3, 1.3.4, 1.3.5 3.2.5; 6.3.9
3. Diagnose equipment problems and effectively repair manufacturing equipment.	5.5.1, 5.5.2; 5.6.1, 5.6.2 5.7.1, 5.7.2; 5.8.1, 5.8.2
4. Investigate and employ techniques to maximize manufacturing equipment performance.	5.5.3; 5.6.3; 5.7.3 5.8.3
5. Implement a preventative maintenance schedule to maintain manufacturing equipment, tools and workstations.	6.3.6
6. Implement an effective, predictive and preventive manufacturing equipment maintenance program.	6.3.6