Department of Fine, Practical, and Performing Arts

Introduction to Industrial Arts

Developed by: Mike Tirrito

Supported by: Dr. James Riley, K-12 Coordinator of Fine Performing and Practical Arts

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Course Description

Introduction to Industrial Arts will provide a hands-on opportunity for students to develop a foundational understanding of woodworking, metalworking, and practical electricity. Emphasis is placed on real-world application of industrial arts on our everyday lives in the 21st Century. This course requires students to recognize and apply a variety of techniques and operations to ensure an understanding of basic principles in each discipline and their practical applications. Students will develop and build skills through practical application of course content by way of hands-on activities, demonstrations, classroom discussions, and individual and/or group projects.

Scope and Sequence

Month	
September MP 1	-Personal and Environmental Safety
October MP 1	-Tools, Adhesives, and Fasteners -Measurement
November MP 2	Home Repair and Maintenance
December MP 2	Home Repair and Maintenance
January MP 3	Home Repair and Maintenance

February MP 3	Machine Repair and Maintenance
March MP 3	Machine Repair and Maintenance
April MP 4	Automotive Repair and Maintenance
May MP 4	Automotive Repair and Maintenance
June MP 4	Extended Product Features/ Exam Review

Unit 1

Personal and Environmental Safety

Summary and Rationale

Safety has measurable costs, both to operate its functions and to pay for its failures. The disruption of continuous operations to deal with accidents and investigate them affects many others. Failure to produce good safety results reflects negatively on almost all organizations in one way or another. The very fact that we're all human beings and care about other human beings is a strong rationale for safety excellence.

Seeing what can and has happened to people in industrial accidents is heart-wrenching and tends to bring out the altruism in fellow workers and leaders. A call to action that uses such rationale tends to reach the hearts as well as the minds. Since human beings react emotionally before they react intellectually, this can be a very powerful approach to increase engagement.

The first unit will introduce students to personal and environmental safety. Through exploration and practice, students will develop work habits that promote safety in a potentially hazardous environment by learning proper procedures for cleaning up various types of residential and industrial based accidents such as: broken glass, various fluid spills, sawdust/debris management, and first aid.

Recommended Pacing

3 weeks
continued exploration throughout the year

Standards

9.2 CAREER AWARENESS, EXPLORATION, AND PREPARATION

9.2.12.C.1	Review career goals and determine steps necessary for attainment
9.2.12.C.3	Identify transferable career skills and design alternate career plans.
21st Century Career and Life - 9.3 ARCHITECTURE & CONSTRUCTION CAREER CLUSTER	
9.3.12.AC.	Use vocabulary, symbols and formulas common to architecture and construction.
9.3.12.AC.2	Use architecture and construction skills to create and manage a project.
9.3.12.AC.3	Comply with regulations and applicable codes to establish and manage a legal and safe workplace.
9.3.12.AC-CST.3	Implement testing and inspection procedures to ensure successful completion of a construction project.
9.3.12.AC-CST.4	Apply scheduling practices to ensure the successful completion of a construction project.
9.3.12.AC-CST.5	Apply practices and procedures required to maintain jobsite safety.
9.3.12.AC-CST.6	Manage relationships with internal and external parties to successfully complete construction projects.
9.3.12.AC-CST.7	Compare and contrast the building systems and components required for a construction project.
9.3.12.AC-CST.8	Demonstrate the construction crafts required for each phase of a construction project.
9.3.12.AC-CST.9	Safely use and maintain appropriate tools, machinery, equipment and resources to accomplish construction project goals.
Integration of Technology	
8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.

Instructional Focus

Enduring Understandings:	**Essential Questions:**

● Every person is responsible for his/her own safety and the safety of others. ● Quality of tools and equipment impacts safety and longevity. ● Skilled and safe use of materials, equipment, and tools will result in a safe working environment for you and others.	● Who are the rules, processes, and procedures designed to protect? ● Why is appropriate behavior critical to one's safety and well being? ● What safety precautions do I have to follow? ● How do you insure safe working conditions?
Evidence of Learning (Assessments)	
● Quizzes/Tests ● Projects ● Oral Presentations ● Writing Assignments ● Participation	
Objectives (SLO)	
Students will know: ● Work habits and procedures that promote safety. ● Potential hazards when working with ladders, tools, electrified devices, and chemicals ● the use of various types of safety equipment ● potential hazards in the home and grounds	Students will be able to: ● Demonstrate proper use of: saftey glasses, protective clothing, ear protection, etc. ● Summarize environmental safety (work area) ● Maintain a clean work area ● Work independently and in small groups without creating a distracting environment ● Demonstrate proper/improper use of tools ● Read and follow manuals ● Demonstrate cord and equipment safety ● Summarize dull or broken tool safety ● Demonstrate proper ladder uses for various ladder types ● Perform basic first aid (treating a cut or burn)
Suggested Resources/Technology Tools	
INSTRUCTIONAL SUPPORT MATERIALS ● Brochures and handouts ● www.howstuffworks.com ● www.diynetwork.com ● Building Trade Videos ● Home Time Series (several topics) SUGGESTED INSTRUCTIONAL STRATEGIES	

- Cooperative learning
- Guest speakers representing various trades and government inspectors
- Individualized instruction
- Comparative cost analysis between independent repair and professional services
- Demonstrate the analysis process involved in repairs
- Demonstrate the correct use of trade-specific tools in construction, transportation, and manufacturing repairs

21ST CENTURY LIFE AND CAREER STANDARDS

Please select all standards that apply to this unit of study:

- ❑ **Act as a responsible and contributing citizen and employee.**
- ❑ **Apply appropriate academic and technical skills.**
- ❑ **Attend to personal health and financial well being.**
- ❑ **Communicate clearly and effectively and with reason.**
- ❑ Consider the environmental social and economics impacts of decisions.
- ❑ **Demonstrate creativity and innovation.**
- ❑ Employ valid and reliable research strategies.
- ❑ **Utilize critical thinking to make sense of problems and persevere in solving them.**
- ❑ Model integrity, ethical leadership, and effective management.
- ❑ Plan education and career paths aligned to personal goals.
- ❑ **Use technology to enhance productivity.**
- ❑ Work productively in teams while using cultural global competence.

Suggestions on integrating these standards can be found at: http://www.state.nj.us/education/cccs/2014/career/9.pdf

Unit 2

Tools, Adhesives, and Fasteners

Summary and Rationale

The second unit will introduce the students to a variety of hand and power tools that all people should know how to use. Students will learn the proper names, usage, and instances for which each tool can be used. The students will become familiar with a variety of hand tools including but not limited to hammers/mallets, screwdrivers, saws, pliers and wrenches, and will also learn several hand power tools such as air compressors, electric drills, hand sanders, rotary tool and/or angle grinder. Students will also learn about different forms of tape and mechanical fasteners. Students will work on coarse and fine motor skills during the unit. The proper identification of tools and their correct usage is paramount to the rest of the instructional units. Being able to communicate the needs of a worker can expedite or halt production of a product.

Recommended Pacing

2 weeks
continued exploration of specialized tools throughout the year

Standards

21st Century Career and Life - 9.3 ARCHITECTURE & CONSTRUCTION CAREER CLUSTER	
9.3.12.AC.1	Use vocabulary, symbols and formulas common to architecture and construction.
9.3.12.AC.6	Read, interpret and use technical drawings, documents and specifications to plan a project.
9.3.12.AC-DES.2	Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues.
21st Century Career and Life- 9.3 MANUFACTURING CAREER CLUSTER	
9.3.MN-PPD.1	Produce quality products that meet manufacturing standards and exceed customer satisfaction.
21st Century Career and Life - 9.3 SCIENCE, TECHNOLOGY, ENGINEERING & MATHEMATICS CAREER CLUSTER	
9.3.ST-SM.1	Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.
Integration of Technology	
8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.

Instructional Focus

● **Enduring Understandings:**	● **Essential Questions:**
● Every person is responsible for his/her own safety and the safety of others. ● Skilled and safe use of materials, equipment and tools will result in a safe working environment for you. ● Properly maintaining tools and equipment aids in safe and effective use. ● Selection and use of the proper tools will make a repair job quicker, easier, and safer.	● Why do I need to be aware of safety in the lab? ● Why is it important to use tools for their specific purpose? ● What are the potential dangers in misusing tools, power tools and equipment? ● How do you ensure safe working conditions? ● Why is it important to recognize the difference between knowing and assuming you know how to correctly use tools and equipment?

Evidence of Learning (Assessments)

Successful completion of:

- Quizzes/Tests
- Projects
- Oral presentation on equipment operation and maintenance
- Writing assignments
- Teacher observation of group activity
- Participation
- Peer evaluation
- Self evaluation

Objectives (SLO)

Students will know:

- Potential hazards when working with hand and power tools.
- the proper use of various types of equipment
- The proper maintenance of various types of equipment.

Students will be able to:

- Demonstrate proper use of hand tools:
  - Various hammers and mallets
  - Various screwdrivers
  - chisel
  - files and rasps
  - Various saws
  - Various wrenches
- Demonstrate proper use of power hand tools.
  - Electric drills
  - Sanders
  - Angle grinders
  - Rotary tools
  - pneumatic tools
- Demonstrate proper maintenance techniques for all tools and equipment identified above
  - cleaning
  - sharpening
  - lubricating
  - storing
  - repairing

Suggested Resources/Technology Tools

INSTRUCTIONAL SUPPORT MATERIALS

- Brochure handouts on the use and maintenance of tools and equipment
- Snap-On Tools Safety and Usage Videos
- Hand and power tool safety videos
  - www.webworldinc.com
  - www.osha.gov/SLTC/handpowertools

SUGGESTED INSTRUCTIONAL STRATEGIES

- Classroom discussion
- Cooperative learning
- Oral presentation
- Group presentations
- Internet research

- Independent reading
- Demonstrations
- Hands-on learning and guided practice

21ST CENTURY LIFE AND CAREER STANDARDS

Please select all standards that apply to this unit of study:

- ❑ **Act as a responsible and contributing citizen and employee.**
- ❑ **Apply appropriate academic and technical skills.**
- ❑ Attend to personal health and financial well being.
- ❑ **Communicate clearly and effectively and with reason.**
- ❑ **Consider the environmental social and economics impacts of decisions.**
- ❑ **Demonstrate creativity and innovation.**
- ❑ Employ valid and reliable research strategies.
- ❑ **Utilize critical thinking to make sense of problems and persevere in solving them.**
- ❑ Model integrity, ethical leadership, and effective management.
- ❑ **Plan education and career paths aligned to personal goals.**
- ❑ Use technology to enhance productivity.
- ❑ **Work productively in teams while using cultural global competence.**

Suggestions on integrating these standards can be found at: http://www.state.nj.us/education/cccs/2014/career/9.pdf

Unit 3

Measurement

Summary and Rationale

Measurement is the process of determining the ratio of a physical quantity, such as a length, time, or temperature (our focus being on length). Measurements are expressed with numbers, allowing the logic, precision and power of mathematics to be brought to bear on the study of nature. Measurement is the foundation on which we build STEM-literacy. Measurement may seem like a small part of the overall learning process, but in a world evermore dependent on the STEM industries, measurement has become as foundational as reading, writing, and arithmetic.

Recommended Pacing

2 weeks - skills to be honed throughout school year

Standards

21st Century Career and Life - 9.3
ARCHITECTURE & CONSTRUCTION CAREER CLUSTER

9.3.12.AC.1	Use vocabulary, symbols and formulas common to architecture and construction.
9.3.12.AC.6	Read, interpret and use technical drawings, documents and specifications to plan a project.
9.3.12.AC-DES.2	Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues.
21st Century Career and Life- 9.3 MANUFACTURING CAREER CLUSTER	
9.3.MN-PPD.1	Produce quality products that meet manufacturing standards and exceed customer satisfaction.
21st Century Career and Life - 9.3 SCIENCE, TECHNOLOGY, ENGINEERING & MATHEMATICS CAREER CLUSTER	
9.3.ST-SM.1	Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.
Interdisciplinary Connections	
Mathematics	
4.9.3	Recognize the need for a uniform unit of measure.
4.9.6	Understand and incorporate estimation and repeated measures in measurement activities.
4.9.9	Determine the degree of accuracy needed in a given situation and choose units accordingly.
4.9.13	Convert measurement units from one form to another, and carry out calculations that involve various units of measurement.
4.9.19	Choose appropriate techniques and tools to measure quantities in order to achieve specified degrees of precision, accuracy, and error (or tolerance) of measurements.
Integration of Technology	
8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.

Instructional Focus

● **Enduring Understandings:**	● **Essential Questions:**
● Students will understand the history of measurements. ● Students will understand dating back beyond the Roman Empire, the need to know how	● What is measurement? ● What is a measurement system? ● How many systems of measurement are there? ● What do measurement tools look like and how are

far, how long, how deep and how much something could hold was information people needed to accomplish many tasks. ● Students will understand throughout time, people created and improved on the methods and tools used to measure, making them more and more exact. ● Students will understand precision and consistency are essential to the process of manufacturing.	they used? ● What role does measurement have in manufacturing? ● Is the Metric System better than the English System?

Evidence of Learning (Assessments)

Successful completion of:

- Quizzes/Tests
- Projects
- Oral presentation on equipment operation and maintenance
- Writing assignments
- Teacher observation of group activity
- Participation
- Peer evaluation
- Self evaluation

- **Objectives (SLO)**

Students will know:	Students will be able to:
● how to measure and use drafting tools (ruler, tape measure, framing square, caliper, protractor, compass) ● safely select and use the appropriate hand tool for the requested job	● use a ruler to 1/16" tolerance ● use calipers to measure to 1/1000" tolerance ● layout lines, arcs and angles on material ● successfully complete measurement quiz

Suggested Resources/Technology Tools

- Calculator
- Various Smartphone apps including But not limited to:
  - Unit converter
  - Bubble Level
  - Ruler

21ST CENTURY LIFE AND CAREER STANDARDS

Please select all standards that apply to this unit of study:

- ❑ Act as a responsible and contributing citizen and employee.
- ❑ **Apply appropriate academic and technical skills.**
- ❑ Attend to personal health and financial well being.
- ❑ **Communicate clearly and effectively and with reason.**
- ❑ Consider the environmental social and economics impacts of decisions.
- ❑ **Demonstrate creativity and innovation.**
- ❑ Employ valid and reliable research strategies.
- ❑ **Utilize critical thinking to make sense of problems and persevere in solving them.**

- ❑ Model integrity, ethical leadership, and effective management.
- ❑ Plan education and career paths aligned to personal goals.
- ❑ **Use technology to enhance productivity.**
- ❑ Work productively in teams while using cultural global competence.

Suggestions on integrating these standards can be found at: http://www.state.nj.us/education/cccs/2014/career/9.pdf

Unit 4

Home Repair and Maintenance

Summary and Rationale

This unit will afford students the opportunity to troubleshoot problems that are commonly found at home. From skills as simple as locating studs and hanging pictures to more complex such as tilework and plumbing, these experiences will expose the student to the trades, professions, and career opportunities related to the maintenance and repair of all structures and systems that are common to daily living. Through exposure, demonstration, and hands-on experiences, the student will become a better educated consumer, will become more self-sufficient, and less dependent on the use of costly outside service providers, and will gain the knowledge of the structure and various systems that need repair and maintenance. This unit will introduce students to the anatomy of an interior wall, plumbing, HVAC, and electrical components that may be located in them. The unit will introduce and reinforce hand tool skills that and adhesives that were learned previously.

Recommended Pacing

8 weeks

Standards

9.2 CAREER AWARENESS, EXPLORATION, AND PREPARATION	
9.2.12.C.1	Review career goals and determine steps necessary for attainment
9.2.12.C.3	Identify transferable career skills and design alternate career plans.
21st Century Career and Life - 9.3 ARCHITECTURE & CONSTRUCTION CAREER CLUSTER	
9.3.12.AC.	Use vocabulary, symbols and formulas common to architecture and construction.
9.3.12.AC.2	Use architecture and construction skills to create and manage a project.

9.3.12.AC.3	Comply with regulations and applicable codes to establish and manage a legal and safe workplace.
9.3.12.AC-CST.3	Implement testing and inspection procedures to ensure successful completion of a construction project.
9.3.12.AC-CST.4	Apply scheduling practices to ensure the successful completion of a construction project.
9.3.12.AC-CST.5	Apply practices and procedures required to maintain jobsite safety.
9.3.12.AC-CST.6	Manage relationships with internal and external parties to successfully complete construction projects.
9.3.12.AC-CST.7	Compare and contrast the building systems and components required for a construction project.
9.3.12.AC-CST.8	Demonstrate the construction crafts required for each phase of a construction project.
9.3.12.AC-CST.9	Safely use and maintain appropriate tools, machinery, equipment and resources to accomplish construction project goals.
Integration of Technology	
8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.
8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
8.1.12.A.4	Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.

Instructional Focus

Enduring Understandings:	**Essential Questions:**
● The ability to correctly utilize tools is essential for a successful homeowner. ● Engineering and safety must be considered in home design and repair. ● There are many finishing touches which go into building and designing homes. ● After analysis of factors such as safety, personal ability to complete the work at a professional level, timeline concerns, and a cost analysis, an owner may decide to consult	● Is it better to repair or replace a broken component? ● Is the repair or replacement justified by the cost? ● Will the quality of materials used impact the outcome and longevity of the repair? ● How is safety considered in building a home? ● How are decisions related to plumbing important? ● What might limit your ability to perform a repair yourself? ● How do the elements of the “Repair System” help dictate when is it necessary to seek the help of a

a professional. ● Completing your own home repairs can save you time and money. ● Maintaining and updating your home will increase its functional use and value. ● The difference between knowing and assuming you know can result in very costly mistakes and possible injuries. ● Decisions on repairs versus replacements should be based on the variety and cost of materials, time constraints, and component availability. ● Through investigation and practice, you can successfully complete many household repairs.	professional? ● How are personal preferences related to the finishing touches on homes? ● What are the advantages and disadvantages of performing your own home repairs?

Evidence of Learning (Assessments)

- Quizzes/Tests
- Projects
- Oral Presentations
- Writing Assignments
- Participation

Objectives (SLO)

Students will know:	Students will be able to:
● Elements of the Repair System ● the anatomy of an interior wall. ● there are several methods for affixing something a wall. ● the procedure for laying out a tile pattern. ● the procedure for repairing and repainting a damaged wall. ● common forms of plumbing clogs and appropriate options for unclogging them. ● common methods for locating a leaky pipe	● describe the elements of the "Repair System" ● explain when a given task requires a professional ● identify parts of an interior wall. ● locate a stud using a stud finder. ● hang a picture hook. ● mark and cut tile with simple tools. ● cut tile with a rotary tool, electric drill, and/or angle grinder. ● calculate the amount of tile required to complete a job. ● layout tile floor/backsplash. ● repair a dent/small hole in drywall. ● repair a crack/patch hole in drywall. ● repair a large section of drywall. ● prime/paint drywall patch. ● Locate a leak in a pipe/plumbing fixture. ● Unclog, repair, and replace faulty plumbing. ● Remove a broken lightbulb from an electrical socket.

Suggested Resources/Technology Tools

INSTRUCTIONAL SUPPORT MATERIALS

- Brochures and handouts

- Home Improvement Websources:
  - www.howstuffworks.com
  - www.diynetwork.com
  - www.homedepot.com
  - www.lowes.com
  - www.buildinggreen.com
  - www.benmoore.com
  - www.electrical-safety.org
  - www.theplumber.com
  - www.b4ubuild.com
  - www.hometime.com

SUGGESTED INSTRUCTIONAL STRATEGIES

- Classroom discussion
- Cooperative learning
- Oral/Group Presentations
- Guest speakers representing various trades and government inspectors
- Individualized instruction
- Comparative cost analysis between independent repair and professional services
- Demonstrate the analysis process involved in repairs
- Demonstrate the correct use of trade-specific tools in construction, transportation, and manufacturing repairs

21ST CENTURY LIFE AND CAREER STANDARDS

Please select all standards that apply to this unit of study:

- ❑ Act as a responsible and contributing citizen and employee.
- ❑ **Apply appropriate academic and technical skills.**
- ❑ Attend to personal health and financial well being.
- ❑ **Communicate clearly and effectively and with reason.**
- ❑ Consider the environmental social and economics impacts of decisions.
- ❑ **Demonstrate creativity and innovation.**
- ❑ Employ valid and reliable research strategies.
- ❑ **Utilize critical thinking to make sense of problems and persevere in solving them.**
- ❑ Model integrity, ethical leadership, and effective management.
- ❑ **Plan education and career paths aligned to personal goals.**
- ❑ **Use technology to enhance productivity.**
- ❑ Work productively in teams while using cultural global competence.

Suggestions on integrating these standards can be found at: http://www.state.nj.us/education/cccs/2014/career/9.pdf

Unit 5

Machine Repair and Maintenance

Summary and Rationale

The third unit will afford students the opportunity to troubleshoot problems that are commonly found at home. From skills as simple as locating studs and hanging pictures to more complex such as tilework and plumbing, these are minor problems that the students will undoubtedly come across in their lifetime and can be a hefty expense to hire a professional. This unit will introduce students to the anatomy of an interior wall, plumbing, HVAC, and electrical components that may be located in them. The unit will introduce and reinforce hand tool skills that and adhesives that were learned previously.

Recommended Pacing

8 weeks

Standards

9.2 CAREER AWARENESS, EXPLORATION, AND PREPARATION	
9.2.12.C.1	Review career goals and determine steps necessary for attainment
9.2.12.C.3	Identify transferable career skills and design alternate career plans.
21st Century Career and Life- 9.3 MANUFACTURING CAREER CLUSTER	
9.3.MN-LOG.3	Develop a safety inspection process to assure a healthy and safe manufacturing facility.
9.3.MN-MIR.3	Diagnose equipment problems and effectively repair manufacturing equipment.
9.3.MN-MIR.5	Implement a preventative maintenance schedule to maintain manufacturing equipment, tools and workstations.
QUALITY ASSURANCE (MN-QA)	
9.3.MN-QA.3	Coordinate work teams to create a product that meets quality assurance standards.
9.3.MN-QA.5	Perform safety inspections and training to ensure a safe and healthy workplace.
9.3.MN-QA.7	Identify inspection processes that ensure products meet specifications.
21st Century Career and Life - 9.3 SCIENCE, TECHNOLOGY, ENGINEERING & MATHEMATICS CAREER CLUSTER	

SCIENCE, TECHNOLOGY, ENGINEERING & MATHEMATICS (ST)	
9.3.ST.6	Demonstrate technical skills needed in a chosen STEM field.
ENGINEERING & TECHNOLOGY CAREER PATHWAY (ST-ET)	
9.3.ST-ET.3	Apply processes and concepts for the use of technological tools in STEM.
9.3.ST-ET.5	Apply the knowledge learned in STEM to solve problems.
TRANSPORTATION, DISTRIBUTION & LOGISTICS CAREER CLUSTER	
9.3.12.TD-MTN.1	Develop preventative maintenance plans and systems to keep facility and mobile equpiment inventory in operation.
9.3.12.TD-MTN.1	Design ways to improve facility and equipment system performance.
Integration of Technology	
8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.

Instructional Focus

Enduring Understandings:	**Essential Questions:**
● An understanding of how various appliances and machines function makes you an informed consumer in both replacement and repair situations. ● The difference between knowing and assuming you know can result in very costly mistakes and possible injuries. ● Through investigation and practice, you can successfully complete many household repairs. ● Selection and use of the proper tools will make a repair job quicker, easier, and safer.	● Why would you do your own home repairs? ● What observations can be made to determine what repairs are required on a particular item? ● Why is routine maintenance vital to the longevity of a product? ● When is replacement a more viable option than repair?

Evidence of Learning (Assessments)

- Quizzes/Tests
- Projects
- Oral Presentations

- Writing Assignments
- Participation

Objectives (SLO)

Students will know:

- Elements of the Repair System
- the anatomy of an interior wall.
- there are several methods for affixing something a wall.
- the procedure for laying out a tile pattern.
- the procedure for repairing and repainting a damaged wall.
- common forms of plumbing clogs and appropriate options for unclogging them.
- common methods for locating a leaky pipe

Students will be able to:

- Evaluate the repair needs of common home appliances.
  - small kitchen appliances
  - lamps/lighting
  - hair drier
  - power tools
  - switches and plugs
  - other
  - telephone/internet lines
  - home entertainment
- Identify the repair needs of common home machinery, both gas and electric.
  - lawn mower
  - weed whacker
  - leaf blower
  - snow blower
  - hedge trimmer
  - pressure washer
  - air compressor
  - basic automotive maintenance
  - vacuum cleaner
  - humidifier

Suggested Resources/Technology Tools

INSTRUCTIONAL SUPPORT MATERIALS

- Brochures and handouts
- Home Improvement Websources:
  - www.howstuffworks.com
  - www.diynetwork.com
  - www.homedepot.com
  - www.lowes.com
  - www.buildinggreen.com
  - www.benmoore.com
  - www.electrical-safety.org
  - www.theplumber.com
  - www.b4ubuild.com
  - www.hometime.com

SUGGESTED INSTRUCTIONAL STRATEGIES

- Classroom discussion
- Cooperative learning
- Oral/Group Presentations
- Guest speakers representing various trades and government inspectors
- Individualized instruction

- Comparative cost analysis between independent repair and professional services
- Demonstrate the analysis process involved in repairs
- Demonstrate the correct use of trade-specific tools in construction, transportation, and manufacturing repairs

21ST CENTURY LIFE AND CAREER STANDARDS

Please select all standards that apply to this unit of study:

- ❑ Act as a responsible and contributing citizen and employee.
- ❑ **Apply appropriate academic and technical skills.**
- ❑ Attend to personal health and financial well being.
- ❑ **Communicate clearly and effectively and with reason.**
- ❑ Consider the environmental social and economics impacts of decisions.
- ❑ **Demonstrate creativity and innovation.**
- ❑ Employ valid and reliable research strategies.
- ❑ Utilize critical thinking to make sense of problems and persevere in solving them.
- ❑ Model integrity, ethical leadership, and effective management.
- ❑ Plan education and career paths aligned to personal goals.
- ❑ **Use technology to enhance productivity.**
- ❑ Work productively in teams while using cultural global competence.

Suggestions on integrating these standards can be found at: http://www.state.nj.us/education/cccs/2014/career/9.pdf

Unit 6

Automotive Repair and Maintenance

Summary and Rationale

This unit will afford students the opportunity to troubleshoot problems that are commonly found with any automobile. From learning how to read tire pressure,fixing a flat, or refilling fluids these are invaluable skills that From skills as simple as locating studs and hanging pictures to more complex such as tilework and plumbing, these are minor problems that the students will undoubtedly come across in their lifetime and can be a hefty expense to hire a professional. This unit will introduce students to the anatomy of an interior wall, plumbing, HVAC, and electrical components that may be located in them. The unit will introduce and reinforce hand tool skills that and adhesives that were learned previously.

Recommended Pacing

8 weeks

Standards

9.2 CAREER AWARENESS, EXPLORATION, AND PREPARATION	
9.2.12.C.1	Review career goals and determine steps necessary for attainment
9.2.12.C.3	Identify transferable career skills and design alternate career plans.
21st Century Career and Life- 9.3 MANUFACTURING CAREER CLUSTER	
9.3.MN-LOG.3	Develop a safety inspection process to assure a healthy and safe manufacturing facility.
9.3.MN-MIR.3	Diagnose equipment problems and effectively repair manufacturing equipment.
9.3.MN-MIR.5	Implement a preventative maintenance schedule to maintain manufacturing equipment, tools and workstations.
QUALITY ASSURANCE (MN-QA)	
9.3.MN-QA.3	Coordinate work teams to create a product that meets quality assurance standards.
9.3.MN-QA.5	Perform safety inspections and training to ensure a safe and healthy workplace.
9.3.MN-QA.7	Identify inspection processes that ensure products meet specifications.
21st Century Career and Life - 9.3 SCIENCE, TECHNOLOGY, ENGINEERING & MATHEMATICS CAREER CLUSTER	
SCIENCE, TECHNOLOGY, ENGINEERING & MATHEMATICS (ST)	
9.3.ST.6	Demonstrate technical skills needed in a chosen STEM field.
ENGINEERING & TECHNOLOGY CAREER PATHWAY (ST-ET)	

9.3.ST-ET.3	Apply processes and concepts for the use of technological tools in STEM.
9.3.ST-ET.5	Apply the knowledge learned in STEM to solve problems.
TRANSPORTATION, DISTRIBUTION & LOGISTICS CAREER CLUSTER	
9.3.12.TD-MTN.1	Develop preventative maintenance plans and systems to keep facility and mobile equpiment inventory in operation.
9.3.12.TD-MTN.1	Design ways to improve facility and equipment system performance.
Integration of Technology	
8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.
8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
8.1.12.A.4	Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.

Instructional Focus

Enduring Understandings:	**Essential Questions:**
● An understanding of how various appliances and machines function makes you an informed consumer in both replacement and repair situations. ● The difference between knowing and assuming you know can result in very costly mistakes and possible injuries. ● Through investigation and practice, you can successfully complete many automotive repairs. ● Selection and use of the proper tools will make a repair job quicker, easier, and safer. ● Regular car maintenance and driver preparation can help solve or prevent roadside emergencies or common vehicle problems in an efficient and safe manner.	● How can learning about your own car benefit the driver / owner? ● What observations can be made to determine problem areas before your car leaves you stranded? ● Why is routine maintenance vital to the longevity of a product? ● How does automotive technology impact society? The environment? ● What should you do during a “roadside” emergency? ● How much “work” can I safely perform on my own car safely? ● When is a tow necessary?

Evidence of Learning (Assessments)

- Quizzes/Tests
- Projects
- Oral Presentations
- Writing Assignments
- Participation

Objectives (SLO)

Students will know:	Students will be able to:
● There are several different methods for lifting and supporting a car. ● Common equipment found in an emergency roadside kit. ● Common vehicle problems. ● Common console display indicators. ● Where to find roadside assistance. ● When it is safe to drive a vehicle, where can it be worked on, and/or when it should be towed.	● Identify, select, and use basic hand tools in shop environment. ● Assemble an emergency roadside kit. ● Complete an automotive visual safety check. ● Properly inflate tires. ● Locate a tire puncture. ● Complete a spare tire change using only "roadside" tools. ● Check/replace low fluid levels. ● Check car battery voltage using a multimeter. ● Utilize jumper cables/battery charger unit to jump start/recharge a depleted battery. ● Replace a car battery.

Suggested Resources/Technology Tools

INSTRUCTIONAL SUPPORT MATERIALS

- Brochures and handouts
- Home Improvement Websources:
  - www.howstuffworks.com
  - www.diynetwork.com
  - http://www.nxtbook.com/mercury/autocare/CarCareguide/index.php#/4
  - http://www.carcare.org/diy/car-tips-and-videos
  - http://www.carcare.org/car-care-resource/car-care-tips/
  - http://www.carcare.org/car-care-resource/vehicle-systems-overview/
  - http://www.autozone.com/repairinfo/repairInfoLanding.jsp

SUGGESTED INSTRUCTIONAL STRATEGIES

- Classroom discussion
- Cooperative learning
- Oral/Group Presentations
- Guest speakers representing various trades and government inspectors
- Individualized instruction
- Comparative cost analysis between independent repair and professional services
- Demonstrate the analysis process involved in repairs
- Demonstrate the correct use of trade-specific tools in construction, transportation, and manufacturing repairs

21ST CENTURY LIFE AND CAREER STANDARDS

Please select all standards that apply to this unit of study:

- ❑ Act as a responsible and contributing citizen and employee.
- ❑ **Apply appropriate academic and technical skills.**
- ❑ Attend to personal health and financial well being.
- ❑ **Communicate clearly and effectively and with reason.**
- ❑ Consider the environmental social and economics impacts of decisions.
- ❑ **Demonstrate creativity and innovation.**
- ❑ Employ valid and reliable research strategies.
- ❑ **Utilize critical thinking to make sense of problems and persevere in solving them.**
- ❑ Model integrity, ethical leadership, and effective management.
- ❑ **Plan education and career paths aligned to personal goals.**
- ❑ **Use technology to enhance productivity.**
- ❑ Work productively in teams while using cultural global competence.

Suggestions on integrating these standards can be found at: http://www.state.nj.us/education/cccs/2014/career/9.pdf