

**Southern Regional High School  
Manahawkin, New Jersey**

**Course of Study**

**For**

**Automotive Technology II  
8540**

Submitted By:  
Tom Ackers

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# **Southern Regional High School District Course of Study**

Department \_\_\_\_\_ Applied Technology

**Course Title:      Automotive Technology II**

## **Essential Questions of the Course:**

1. What are the 11 systems of the automobile and how does each system work – both individually and together?
2. How do you troubleshoot each system and what process is used to perform proper repairs?
3. What effect does the automobile and automotive repair have on the environment?
4. What safety procedures are used in the auto shop?

## **Assessments:**

1. Students will complete a vocabulary assignment for each unit to measure their understanding of each area.
2. Students will complete textbook/workbook assignments for each unit to measure their understanding of each subject area.
3. Students will complete hands-on assignments designed to allow each student to apply the concepts learned in the written work.
4. Students will complete unit tests, mid-term and final exams.

## Unit of Study

**Unit Title: Auto Shop Safety**

### Essential Questions of the Unit:

1. What are the proper safety procedures used while working in the auto shop?
2. How do these procedures relate to other areas?

### Assessments:

1. Students will complete a vocabulary assignment and a quiz to demonstrate knowledge of safety rules and practices.
2. Individually, students will demonstrate safe operation of the tools and equipment in the auto shop.

### **Content:**

- |   |   |
|---|---|
| <p>A Shop Safety General Rules</p> <ol style="list-style-type: none"><li>1. Attitude</li><li>2. Clothing</li></ol> <p>B Tools &amp; Equipment</p> <ol style="list-style-type: none"><li>1. Hand tools</li><li>2. Electric tools</li><li>3. Air tools</li><li>4. Tire machine</li><li>5. Tire balancer</li><li>6. Brake and drum lathe</li><li>7. Pressure washer</li><li>8. Bead blaster</li><li>9. Jacks and lifts</li></ol> | <p>C Fluids &amp; chemicals</p> <ol style="list-style-type: none"><li>1. fluids</li><li>2. chemicals<ol style="list-style-type: none"><li>a. usage</li><li>b. spills</li><li>c. hazards</li></ol></li></ol> <p>D Fire safety</p> <ol style="list-style-type: none"><li>1. prevention</li><li>2. suppression</li></ol> |
|---|---|

### **Skills:**

- Identify an unsafe condition and take necessary action to correct the problem.
- Demonstrate the ability to work safely in the auto shop.

### **Purpose / Rationale of the Unit:**

This unit in auto shop safety exposes the student to the proper procedures to be used while working in the auto shop. Students will learn how to properly use the tools, equipment, and chemicals that are common to an auto shop. These safety procedures are the foundation for all activities in the auto shop.

## **New Jersey Core Curriculum Content Standards:**

### **8.1 COMPUTER AND INFORMATION LITERACY**

B. Application of Productivity Tools – 3,4,5,6,7,10,11

### **8.2 TECHNOLOGY EDUCATION**

A. Nature and Impact of Technology - 1

B. Design Process and Impact Assessment – 2,3,5

C. Systems in the Designed World – 3

### **9.1 CAREER AND TECHNICAL EDUCATION**

A. Career Awareness and Planning - 5

B. Employability Skills - 4

### **9.2 CONSUMER, FAMILY, AND LIFE SKILLS**

A. Critical Thinking – 1,3

C. Interpersonal Communication – 3,4,5

F. Safety – 1,2,3,4,5,6

**(For descriptive narrative, see Appendix)**

**Time Frame of Unit:** 1 week (safety is reinforced throughout the year).

### **Instructional Activities:**

- Lecture
- Video
- Demonstration lessons
- Workbook assignments
- Hands-on activities

### **Materials and Resources:**

- Textbook – *Modern Automotive Technology*
- Vocabulary handout
- Video
- Shop tools and equipment

## Unit of Study

**Unit Title: Electronics and Electrical Systems**

### Essential Questions of the Unit:

1. What components make up the electrical/electronics system of the automobile?
2. What are the proper procedure to troubleshoot and repair the electrical/electronics system?

### Assessments:

1. Students will be able to identify and describe the operation of the components that make up the electrical system.
2. Through a series of worksheets and hands-on assignments, students will demonstrate the ability to troubleshoot and repair the electrical system.

## **Content:**

- I Automotive Batteries
  - A. Types and Construction
    - 1. wet
    - 2. jell
    - 3. servicing and testing
- II Automotive Wiring
  - A. Wire Gauge
  - B. Connections
    - 1. crimp
    - 2. soldered
- III Wiring Diagrams
  - A. Symbols
  - B. Color codes
  - C. Tracing wires
- IV Starting and Charging Systems
  - A. Starting System
    - 1. types of starters
    - 2. servicing and testing
  - B. Charging Systems
    - 1. alternators
    - 2. regulators
    - 3. servicing and testing
- V Lighting
  - A. Headlamps
    - 1. sealed beam
    - 2. halogen bulbs
    - 3. projection beam
  - B. Servicing Bulbs
    - 1. troubleshooting
    - 2. replacement
- VI Accessories
  - A. Power Windows
  - B. Power Seats
  - C. Audio
  - D. Alarms
  - E. Miscellaneous

## **Skills:**

- Reading comprehension
- Problem solving
- Demonstration of proper use of electrical test and repair equipment
- Demonstration of understanding of automotive electrical systems
- Workplace safety

## **Purpose / Rationale of the Unit:**

This unit will help the student become familiar with the design, operation and repair of the automotive electrical system. Because electronics control a majority of the functions in a modern automobile, this unit will provide a foundation for all other areas.

## **New Jersey Core Curriculum Content Standards:**

### **8.1 COMPUTER AND INFORMATION LITERACY**

B. Application of Productivity Tools – 3,4,5,6,7,10,11

### **8.2 TECHNOLOGY EDUCATION**

- A. Nature and Impact of Technology - 1
- B. Design Process and Impact Assessment – 2,3,5
- C. Systems in the Designed World – 2,3

### **9.1 CAREER AND TECHNICAL EDUCATION**

- A. Career Awareness and Planning - 5
- B. Employability Skills - 4

### **9.2 CONSUMER, FAMILY, AND LIFE SKILLS**

- A. Critical Thinking
- C. Interpersonal Communication – 2,3,4
- F. Safety – 1,2,3,4,5,6

**(For descriptive narrative, see Appendix)**

**Time Frame of Unit:** 8-10 weeks

### **Instructional Activities:**

Students will complete workbook, hands-on activities and quizzes for each area.

### **Materials and Resources:**

- Textbook and worksheets
- Shop vehicles
- Hand and power tools
- Electronic test equipment

## Unit of Study

**Unit Title: Engine Performance**

### Essential Questions of the Unit:

1. What are the components that make up an automobile engine?
2. What does each of the components do and how do they work together to make an engine work?
3. Identify the systems that are required to make an automotive engine run
4. What are the proper procedures to trouble hoot, test and repair the engine and its control systems?

### Assessments:

1. Students will complete workbook assignments related to each area.
2. Students will develop a vocabulary list for each area..
3. Students will demonstrate proficiency in each area through the completion of hands on assignments.

## Content:

- I Engine Construction
  - A. Engine Bottom End
    - 1. block
    - 2. crankshaft
    - 3. connecting rods
    - 4. pistons
  - B. Engine Top End
    - 1. cylinder head
    - 2. valves
    - 3. valve springs
    - 4. valve train hardware
  - C. Fuel delivery
    - 1. intake manifold
    - 2. carburetors
    - 3. fuel injection
    - 4. fuel pumps
- II Exhaust Systems
  - A. Exhaust Manifolds
    - 1. muffler
    - 2. tailpipes
  - B. Catalytic Converters
- III Ignition Systems
  - A. Electronic Ignition Systems
    - 1. with distributor
    - 2. without distributor
  - B. Spark Plugs
  - C. Ignition Wires
- IV Emission Control Systems
  - A. PVC
  - B. EGR
  - C. Engine Controls
    - 1. temperature
    - 2. air intake
  - D. Exhaust Gas Treatment
- V Computerized Engine Controls
  - A. OBD I
  - B. OBD II
  - C. Codes
    - 1. Setting
    - 2. Retrieving
  - D. Sensors
    - 1. operation
    - 2. troubleshooting
  - E. Scan Tools
    - 1. operation
- VI Driveability and Tune UP
  - A. Diagnostics
    - 1. fuel problems
    - 2. electrical problems
    - 3. mechanical problems

## Skills:

- Reading comprehension
- Problemsolving
- Demonstrating proper use of tools and equipment
- Workplace safety

## **Purpose / Rationale of the Unit:**

This unit will expose students to the design, construction and operation of the internal combustion engine. It will also provide them with the skills to diagnose and repair problems with the engine and engine management systems. The skills learned by the students in this unit will provide a foundation for the rest of this course.

## **New Jersey Core Curriculum Content Standards:**

### **8.1 COMPUTER AND INFORMATION LITERACY**

B. Application of Productivity Tools – 3,4,5,6,7,10,11

### **8.2 TECHNOLOGY EDUCATION**

A. Nature and Impact of Technology - 1

B. Design Process and Impact Assessment – 2,3,5

C. Systems in the Designed World – 2,3

### **9.1 CAREER AND TECHNICAL EDUCATION**

A. Career Awareness and Planning - 5

B. Employability Skills - 4

### **9.2 CONSUMER, FAMILY, AND LIFE SKILLS**

A. Critical Thinking – 1,3

C. Interpersonal Communication – 3,4,5

F. Safety – 1,2,3,4,5,6

**(For descriptive narrative, see Appendix)**

**Time Frame of Unit:** 8-10 weeks

### **Instructional Activities:**

- Lecture
- Workbook assignments
- Shop assignments
- Videos

### **Materials and Resources:**

- Textbook – *Modern Automotive Technology*
- Unit related videos
- Hand tools
- Power tools
- DVM
- Vocabulary
- Scan tools

## Unit of Study

**Unit Title: Automotive Brake Systems**

### Essential Questions of the Unit:

1. What components make up the brake system and how do they work individually and together?
2. How do you diagnose and repair components of the brake system?

### Assessments:

1. Through the use of quizzes and worksheets, students will be able to identify and describe the operation of the components of the brake system.
2. Through the use of hands-on assignments, students will demonstrate competency in diagnosing and repairing components of the brake system.

## Content:

- I Operation
  - A. Hydraulic
    - 1. brake fluid
    - 2. master cylinder
    - 3. wheel cylinders
    - 4. caliper
    - 5. brake lines
  - B. Mechanical
    - 1. brake pedal
    - 2. parking brake
    - 3. hardware
- II Components
  - A. Disc System
    - 1. caliper
    - 2. rotor
  - B. Drum Systems
    - 1. drum
    - 2. hardware
- III Diagnostics and Repair
  - A. Hardware
    - 1. lines and hoses
    - 2. brake fluid
  - B. Disc System
    - 1. rotors
      - a. checking
      - b. resurfacing
    - 2. Calipers
      - a. Inspecting
      - b. Replacing
    - 3. Brake Pads
      - a. Inspecting
      - b. Replacing
  - C. Drum Brake
    - 1. Brake Drums
      - a. Inspect
      - b. Resurface
    - 2. Brake Shoes and Hardware
      - a. Inspect
      - b. Replace
  - D. Brake Booster
    - 1. Operation
    - 2. Diagnosing
  - E. Anti-Lock Systems
    - 1. Operation
    - 2. Inspection
  - F. Brakes/miscellaneous
    - 1. Parking brakes
    - 2. Brake lights
    - 3. Wheel bearings

## Skills:

- Reading comprehension
- Problem solving
- Demonstrating proper use of brake tools and equipment
- Demonstrating an understanding of the automotive brake system
- Workplace safety

### **Purpose / Rationale of the Unit:**

This unit will expose students to the operation and repair of the automotive brake system. Upon completion of this unit, the student will be able to diagnose and repair the components of the brake system.

### **New Jersey Core Curriculum Content Standards:**

#### **8.1 COMPUTER AND INFORMATION LITERACY**

B. Application of Productivity Tools – 3,4,5,6,7,10,11

#### **8.2 TECHNOLOGY EDUCATION**

A. Nature and Impact of Technology - 1

B. Design Process and Impact Assessment – 2,3,5

C. Systems in the Designed World – 2,3

#### **9.1 CAREER AND TECHNICAL EDUCATION**

A. Career Awareness and Planning -5

B. Employability Skills - 4

#### **9.2 CONSUMER, FAMILY, AND LIFE SKILLS**

A. Critical Thinking – 1.3

C. Interpersonal Communication – 3,4,5

F. Safety – 1,2,3,4,5,6

(For descriptive narrative, see Appendix)

**Time Frame of Unit:** 8-10 weeks

### **Instructional Activities:**

Students will complete quizzes, workbook assignments and hands-on activities for each unit.

### **Materials and Resources:**

- Textbook and worksheets
- Shop vehicles
- Hand and power tools
- Brake and drum lathe
- Micrometers and calipers

## Unit of Study

**Unit Title: Suspension, Steering and Tires**

### Essential Questions of the Unit:

1. What components make up the steering and suspension system?
2. How do you diagnose and repair the components of the steering and suspension system?
3. How are tires constructed, what are the different types of tires and how do you maintain and service tires?

### Assessments:

1. Through the use of quizzes and worksheets, the students will be able to identify and describe the operation of the components of the steering and suspension system.
2. Through the use of hands-on assignments, the students will be able to demonstrate competency in diagnosing and repairing components of the steering and suspension system.

## **Content:**

- I Suspension Components
  - A. Front Suspension
    - 1. Independent
      - a. short arm/long arm
      - b. strut
      - c. beam
  - B. Rear Suspension
    - 1. Solid axle
    - 2. Independent
    - 3. Beam
  - C. Springs
    - 1. Coil
    - 2. Leaf
    - 3. Torsion bar
    - 4. Air bag
- II Steering Systems
  - A. Linkage type
  - B. Rack and pinion
- III Power Assist Units
  - A. Pumps
    - 1. belts
    - 2. hoses
  - B. Electrical Assist
- IV Four Wheel Steering
- V Tires & Wheels
  - A. Design & Construction
  - B. Repairing

## **Skills:**

- Reading comprehension
- Problem solving
- Demonstrating proper use of tools and equipment
- Demonstrating an understanding of the suspension and steering system
- Workplace safety

### **Purpose / Rationale of the Unit:**

This unit on suspension and steering will provide the students with an understanding of how these systems work and why manufacturers use different designs for different applications. Also, students will learn proper diagnostic and repair procedures.

### **New Jersey Core Curriculum Content Standards:**

#### **8.1 COMPUTER AND INFORMATION LITERACY**

B. Application of Productivity Tools – 3,4,5,6,7,10,11

#### **8.2 TECHNOLOGY EDUCATION**

A. Nature and Impact of Technology - 1

B. Design Process and Impact Assessment – 2,3,5

C. Systems in the Designed World – 2,3

#### **9.1 CAREER AND TECHNICAL EDUCATION**

A. Career Awareness and Planning - 5

B. Employability Skills - 4

#### **9.2 CONSUMER, FAMILY, AND LIFE SKILLS**

A. Critical Thinking – 1,3

C. Interpersonal Communication – 3,4,5

F. Safety – 1,2,3,4,5,6

**(For descriptive narrative, see Appendix)**

**Time Frame of Unit:** 8-10 weeks

### **Instructional Activities:**

Students will complete quizzes, workbook assignments and hands-on activities for each unit.

### **Materials and Resources:**

- Textbook and worksheets
- Shop vehicles
- Hand and power tools

# **New Jersey Core Curriculum Content Standards for Technological Literacy**

## **INTRODUCTION**

### **The Vision**

Technology, any modification of the natural world designed by human beings to solve human problems, enhance human life, or extend human capability, was identified by the United States Department of Labor as an essential workplace competency in a 1992 report called the Secretary's Commission on Achieving Necessary Skills (SCANS). SCANS stated that students should be able to select equipment and tools, apply technology to specific tasks, and maintain and troubleshoot equipment. The Department of Education recognized its importance by including technology in the original cross-content workplace readiness standards. In keeping with today's technological society, technological literacy has been further emphasized by its inclusion as a separate standards area which focuses on both computer and information literacy and technology education.

Technology is evolving at an amazing rate, with both frequent advancements of existing technology and the creation of new technologies. All students must understand and be comfortable with the concepts and application of technology, not only in order to function in today's complex society, but also to become informed and productive adults of tomorrow.

### **Computer and Information Literacy**

Computer and information literacy, which supports skills in information-gathering, information-organizing, and problem solving, has become critical for every student whether college- or workplace-bound. Colleges and employers are now demanding that students and employees possess a broad range of computer and information literacy proficiencies. More and more retail purchasing is being done on-line every year, and all but the most menial of positions now require a significant understanding of computer and information literacy. To ensure that students are computer literate, a separate standard that defines rigorous, in-depth learning has been included. The computer and information literacy standard is designed to be integrated and applied in all of the content areas of the Core Curriculum Content Standards.

### **Technology Education**

The technology education standard was developed to ensure the literacy needed by all students to succeed in a highly technological world. Business and industry has clearly stated the need for technological skills in the workplace of the 21st Century.

This standard is based on the *Standards for Technological Literacy (STL): Content for the Study of Technology (ITEA, 2000)*, developed as part of the National Science Foundation (NSF)/National Aeronautics and Space Administration (NASA) funded by the *Technology for All Americans (TfAA)* project.

A study by DeKlerk has found that students form negative attitudes about the technological world if there are no formal technological experiences during the early school years. This finding is a great concern to New Jersey business and industry. Other cognitive research suggests that "design-based learning" is important. Early studies with design and technology curriculum indicate that students who learn important technological concepts develop positive attitudes about technology, math, science and learning in general. For these reasons, an introduction to technology education, including engineering and technological design, is an essential component of a thorough and efficient K-12 education.

### **Standards and Strands**

There are two technological literacy standards, each of which has a number of lettered strands. The standards and strands include:

#### **8.1 Computer and Information Literacy**

##### **A. Basic Computer Tools and Skills**

- Keyboarding
- Word processing
- Internet usage
- Spreadsheets
- Database concepts and usage
- Publications and presentations

##### **B. Application of Productivity Tools**

- Social Aspects
- Information Access and Research
- Problem Solving

#### **8.2 Technology Education**

##### **A. Nature and Impact of Technology**

##### **B. Design Process and Impact Assessment**

##### **C. Systems in the Designed World**

### **References**

American Library Association and Association for Educational Communications and Technology. (1998), *Information literacy standards for student learning*. Online:

[http://www.ala.org/aaslTemplate.cfm?Section=Information\\_Power&Template=/ContentManagement/ContentDisplay.cfm&ContentID=19937](http://www.ala.org/aaslTemplate.cfm?Section=Information_Power&Template=/ContentManagement/ContentDisplay.cfm&ContentID=19937).

Arizona Department of Education. (2000). *Technology education standards*. Online:  
<http://ade.state.az.us/standards/technology>.

International Society for Technology in Education. (1998). *National educational technology standards for students*. Eugene, OR: Author.

International Society for Technology in Education. (2000). *Standards for technological literacy (STL): Content for the Study of Technology*. Online: [www.iteawww.org](http://www.iteawww.org).

National Business Education Association. (2001). *National standards for business education*. Online: <http://www.nbea.org/curriculum/bes.html>.

**STANDARD 8.1 (COMPUTER AND INFORMATION LITERACY ) ALL STUDENTS WILL USE COMPUTER APPLICATIONS TO GATHER AND ORGANIZE INFORMATION AND TO SOLVE PROBLEMS.**

**Descriptive Statement:** Using computer applications and technology tools students will conduct research, solve problems, improve learning, achieve goals, and produce products and presentations in conjunction with standards in all content areas, including career education and consumer family, and life skills. They will also develop, locate, summarize, organize, synthesize, and evaluate information for lifelong learning.

**Strands and Cumulative Progress Indicators**

**By the end of Grade 4, students will:**

**A. Basic Computer Skills and Tools**

1. Use basic technology vocabulary.
2. Use basic features of an operating system (e.g., accessing programs, identifying and selecting a printer, finding help).
3. Input and access text and data, using appropriate keyboarding techniques or other input devices.
4. Produce a simple finished document using word processing software.
5. Produce and interpret a simple graph or chart by entering and editing data on a prepared spreadsheet template.
6. Create and present a multimedia presentation using appropriate software.
7. Create and maintain files and folders.
8. Use a graphic organizer.
9. Use basic computer icons.

**B. Application of Productivity Tools**

**Social Aspects**

1. Discuss the common uses of computer applications and identify their advantages and disadvantages.
2. Recognize and practice responsible social and ethical behaviors when using technology, and understand the consequences of inappropriate use including:
  - Internet access
  - Copyrighted materials

- On-line library resources
  - Personal security and safety issues
3. Practice appropriate Internet etiquette.
  4. Recognize the ethical and legal implications of plagiarism of copyrighted materials.

### **Information Access and Research**

5. Recognize the need for accessing and using information.
6. Identify and use web browsers, search engines, and directories to obtain information to solve real world problems.
7. Locate specific information by searching a database.
8. Recognize accuracy and/or bias of information.

### **Problem Solving and Decision Making**

9. Solve problems individually and/or collaboratively using computer applications.
10. Identify basic hardware problems and solve simple problems.

**Building upon knowledge and skills gained in preceding grades, by the end of Grade 8, students will:**

#### **A. Basic Computer Skills and Tools**

1. Use appropriate technology vocabulary.
2. Use common features of an operating system (e.g., creating and organizing files and folders).
3. Demonstrate effective input of text and data, using touch keyboarding with proper technique.
4. Input and access data and text efficiently and accurately through proficient use of other input devices, such as the mouse.
5. Create documents with advanced text-formatting and graphics using word processing.
6. Create a file containing customized information by merging documents.
7. Construct a simple spreadsheet, enter data, and interpret the information.
8. Design and produce a basic multimedia project.
9. Plan and create a simple database, define fields, input data, and produce a report using sort and query.
10. Use network resources for storing and retrieving data.
11. Choose appropriate electronic graphic organizers to create, construct, or design a document.

12. Create, organize and manipulate shortcuts.

## **B. Application of Productivity Tools**

### **Social Aspects**

1. Demonstrate an understanding of how changes in technology impact the workplace and society.
2. Exhibit legal and ethical behaviors when using information and technology, and discuss consequences of misuse.
3. Explain the purpose of an Acceptable Use Policy and the consequences of inappropriate use of technology.
4. Describe and practice safe Internet usage.
5. Describe and practice "etiquette" when using the Internet and electronic mail.

### **Information Access and Research**

6. Choose appropriate tools and information resources to support research and solve real world problems, including but not limited to:
  - On-line resources and databases
  - Search engines and subject directories
7. Evaluate the accuracy, relevance, and appropriateness of print and non-print electronic information sources.

### **Problem Solving and Decision Making**

8. Use computer applications to modify information independently and/or collaboratively to solve problems.
9. Identify basic hardware problems and demonstrate the ability to solve common problems.
10. Determine when technology tools are appropriate to solve a problem and make a decision.

**Building upon knowledge and skills gained in preceding grades, by the end of Grade 12, students will:**

## **A. Basic Computer Skills and Tools**

1. Create a multi-page document with citations using word processing software in conjunction with other tools that demonstrates the ability to format, edit, and print.
2. Create documents including a resume and a business letter using professional format.
3. Construct a spreadsheet, enter data, use mathematical or logical functions to manipulate and process data, generate charts and graphs, and interpret the results.

4. Given a database, define fields, input data from multiple records, produce a report using sort and query, and interpret the data.
5. Produce a multimedia project using text, graphics, moving images, and sound.
6. Produce and edit page layouts in different formats using desktop publishing and graphics software.
7. Develop a document or file for inclusion into a website or web page.
8. Discuss and/or demonstrate the capability of emerging technologies and software in the creation of documents or files.
9. Merge information from one document to another.

## **B. Application of Productivity Tools**

### **Social Aspects**

1. Describe the potential and implications of contemporary and emerging computer applications for personal, social, lifelong learning, and workplace needs.
2. Exhibit legal and ethical behaviors when using information and technology, and discuss consequences of misuse.
3. Make informed choices among technology systems, resources, and services in a variety of contexts.
4. Use appropriate language when communicating with diverse audiences using computer and information literacy.

### **Information Access and Research**

5. Select and use specialized databases for advanced research to solve real world problems.
6. Identify new technologies and other organizational tools to use in personal, home, and/or work environments for information retrieval, entry, and presentation.
7. Evaluate information sources for accuracy, relevance, and appropriateness.
8. Compose, send, and organize e-mail messages with and without attachments.

### **Problem-Solving and Decision Making**

9. Create and manipulate information, independently and/or collaboratively, to solve problems and design and develop products.
10. Identify, diagnose, and suggest solutions for non-functioning technology systems.
11. Identify a problem in a content area and formulate a strategy to solve the problem using brainstorming, flowcharting, and appropriate resources.

12. Integrate new information into an existing knowledge base and communicate the results in a project or presentation.

**STANDARD 8.2 (TECHNOLOGY EDUCATION) ALL STUDENTS WILL DEVELOP AN UNDERSTANDING OF THE NATURE AND IMPACT OF TECHNOLOGY, ENGINEERING, TECHNOLOGICAL DESIGN, AND THE DESIGNED WORLD AS THEY RELATE TO THE INDIVIDUAL, SOCIETY, AND THE ENVIRONMENT.**

**Descriptive Statement:** The following indicators are based on the Standards for Technological Literacy (STL, 2000) and support the National Academy of Engineering's (2002) call for students to gain technological literacy. Students will be expected to understand the various facets of technology and the design process. They will analyze and evaluate design options and then apply the design process to solve problems. A systems perspective is employed to emphasize the interconnectedness of all knowledge and the impact of technology and technological change. Students will be expected to use technology as it applies to physical systems, biological systems, and information and communication systems. The intent at the elementary and middle school levels is that all students develop technological literacy and are prepared for the option of further study in the field of technology education. At the elementary level, the foundation for technology education is found in the science standards, particularly standards 5.2 and 5.4.

### **Strands and Cumulative Progress Indicators**

**By the end of Grade 4, students will:**

**A. Nature and Impact of Technology**

Refer to Science Standards 5.2 and 5.4.

**B. Design Process and Impact Assessment**

Refer to Science Standards 5.2 and 5.4.

**C. Systems in the Designed World**

Refer to Science Standards 5.2 and 5.4.

**Building upon knowledge and skills gained in the preceding grades, by the end of Grade 8, students will:**

**A. Nature and Impact of Technology**

1. Describe the nature of technology and the consequences of technological activity.
2. Describe how components of a technological product, system, or environment interact.
3. Describe how one technological innovation can be applied to solve another human problem that enhances human life or extends human capability.
4. Describe how technological activity has an affect on economic development, political actions, and cultural change.

5. Explain the cultural and societal effects resulting from the dramatic increases of knowledge and information available today.

### **B. Design Process and Impact Assessment**

1. Demonstrate and explain how the design process is not linear.
2. Use hands on activities to analyze products and systems to determine how the design process was applied to create the solution.
3. Identify a technological problem and use the design process to create an appropriate solution.
4. Describe how variations in resources can affect solutions to a technological problem.
5. Select and safely use appropriate tools and materials in analyzing, designing, modeling or making a technological product, system or environment.

### **C. Systems in the Designed World**

1. Explain technological advances in medical, agricultural, energy and power, information and communication, transportation, manufacturing, and construction technologies.
2. Explain reasons why human-designed systems, products, and environments need to be monitored, maintained, and improved to ensure safety, quality, cost efficiency, and sustainability.
3. Explain the functions and interdependence of subsystems such as waste disposal, water purification, electrical, structural, safety, climatic control, and communication.

**Building upon knowledge and skills gained in preceding grades, by the end of Grade 12, students electing courses in technology education will:**

#### **A. Nature and Impact of Technology**

1. Use appropriate data to discuss the full costs, benefits and trade-offs, and risks related to the use of technologies.
2. Explain how technological development is affected by competition through a variety of management activities associated with planning, organizing, and controlling the enterprise.
3. Provide various examples of how technological developments have shaped human history.

#### **B. Design Process and Impact Assessment**

1. Analyze a given technological product, system, or environment to understand how the engineering design process and design specification limitations influenced the final solution.
2. Evaluate the function, value, and appearance of technological products, systems, and environments from the perspective of the user and the producer.
3. Develop methods for creating possible solutions, modeling and testing solutions, and modifying proposed design in the solution of a technological problem using hands-on activities.

4. Use a computer assisted design (CAD) system in the development of an appropriate design solution.
5. Diagnose a malfunctioning product and system using appropriate critical thinking methods.
6. Create a technological product, system, or environment using given design specifications and constraints by applying design and engineering principles.

### **C. Systems in the Designed World**

1. Explain the life cycle of a product from initial design to reuse, recycling, remanufacture, or final disposal, and its relationship to people, society, and the environment, including conservation and sustainability principles.
2. Analyze the factors that influence design of products, systems, and environments.
3. Compare and contrast the effectiveness of various products, systems, and environments associated with technological activities in energy, transportation, manufacturing, and information and communication.

**New Jersey Core Curriculum Content Standards**  
**for**  
**Career Education and Consumer, Family, and Life Skills**

**INTRODUCTION**

**The Vision**

Rapid societal changes, including innovations in technology, information exchange, and communications, have increased the demand for internationally competitive workers and for an educational system designed to meet that demand. Today's students will be employed through much of the twenty-first century and will, therefore, need increasingly advanced levels of knowledge and skills. To obtain and retain high-wage employment that provides job satisfaction, they will also need to continue to learn throughout their lives. The career education and consumer, family, and life skills standards identify key career development and life skills that students must accomplish in order to achieve continuing success in various life roles related to continuing education, career development, and personal growth.

Members of the business and industry communities have identified vital career and technical education skills. In 1992, the Secretary's Commission on Achieving Necessary Skills (SCANS) identified productive use of resources, interpersonal skills, information, systems, and technology as essential workplace competencies. The SCANS foundation skills include basic skills, personal qualities, and the ability to identify and solve real problems, reason effectively, and apply critical thinking skills.

To compete in this global, information-based economy, students must be able to identify and solve real problems, use appropriate tools, reason effectively, and apply critical thinking skills. The career and technical education and consumer, family, and life skills standards identify key career education and consumer, family, and life skills which can also enhance personal behavior and professional conduct in life and careers. In addition to the SCANS report, the National Career Development Guidelines and National Standards for School Counseling Programs were used as resources. Educators may find these national standards as well as the national standards documents in other areas very useful resources.

**Career and Technical Education**

The career and technical arts standards at the elementary and middle school levels are designed to prepare students for further study at the high school level in career and technical education, formerly known as practical arts. These courses typically include business education, family and consumer sciences, and other courses related to career education and consumer, family, and life skills. In early elementary grades, career and technical education is designed to be integrated with other core content. At the middle and junior high school levels, the standard may be integrated or taught through rotational programs as students work on interdisciplinary projects that develop employability and academic skills. At the high school level, career and technical education programs establish necessary pathways for entering the world of work as well as continuing education, such as college, post-secondary vocational-technical education, specialized certification and/or registered apprenticeships. They also support lifelong learning. These essential elements include preparation for post-secondary pursuits as well as providing an essential foundation in everyday living skills. In essence, career and technical education is the application of life, academic, and occupational skills demonstrated by student-centered experiences in courses related to the sixteen States' Career Clusters supported by state vocational technical directors

from across the country. Career and technical education provides a variety of learning experiences to meet the needs of students having multiple learning styles.

Students interested in more intensive study at the high school level in one of the career clusters may participate in a vocational-technical education program as defined in N.J.A.C. 6A:19, Vocational Technical Education Programs and Standards. The career clusters include: agriculture, food, and natural resources; architecture and construction; arts, audio/video technology and communications; business, management, and administration; education and training; finance; government and public administration; health science; hospitality and tourism; human services; information technology; law, public safety and security; manufacturing; marketing, sales and service; science, technology, engineering, and mathematics; and transportation, distribution, and logistics. A number of vocational student organizations have been created to enhance and support career development. They include:

- DECA/DEX/Distributive Education Clubs of America/Delta Epsilon Chi (marketing education);
- FBLA-PLB/Future Business Leaders of America-Hi Beta Lambda (business/technology education);
- FCCLA/ Family, Career, and Community Leaders of American (family and consumer sciences);
- FFA (agri-business education);
- HOSA /Health Occupations Students of America (trade and industrial education);
- TSA/Technology Student Association(technology education); and
- SKILLSUSA/VICA Vocational Trade and Industrial Student Organization.

#### **Career and technical education programs enable students to:**

- Describe and integrate basic skills, thinking skills, and personal qualities, as defined by the SCANS Report;
- Address self-knowledge, career planning, and employability skills utilizing technology, information, and other resources;
- Enhance academic achievement and motivation for learning;
- Explore career education and planning;
- Acquire necessary employability and interpersonal workplace skills; and
- Pursue specific courses and programs designed to lead to employment or post-secondary\_options in occupations included within the sixteen States' Career Clusters.

#### **Consumer, Family, and Life Skills**

All students need to develop consumer, family, and life skills necessary to be a functioning member of society. All students will develop original thoughts and ideas, think creatively, develop habits of inquiry, and take intellectual and performance risks. They will recognize problems, devise a variety of ways to solve these problems, analyze the potential advantages and disadvantages of each alternative, and evaluate the effectiveness of the method ultimately selected. Students will work collaboratively with a variety of groups and demonstrate trustworthiness, responsibility, respect, fairness, caring, and citizenship. Students will apply the principles of resource management and skills that promote personal and professional well-being. They will also be expected to understand the components of financial education and make economic choices.

## Standards and Strands

There are two career education and consumer, family, and life skills standards, each of which has a number of lettered strands. The standards and strands include:

### 9.1 Career and Technical Education

- A. Career Awareness and Planning
- B. Employability Skills

### 9.2 Consumer, Family, and Life Skills

- A. Critical Thinking
- B. Self-Management
- C. Interpersonal Communication
- D. Character Development and Ethics
- E. Consumer and Personal Finance
- F. Safety

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**STANDARD 9.1: (CAREER AND TECHNICAL EDUCATION) ALL STUDENTS WILL DEVELOP CAREER AWARENESS AND PLANNING, EMPLOYABILITY SKILLS, AND FOUNDATIONAL KNOWLEDGE NECESSARY FOR SUCCESS IN THE WORKPLACE.**

**Descriptive Statement:** All students will explore career opportunities and make informed choices based on aptitudes and interests. Students will identify and pursue career goals, apply communications skills in work-relevant situations, demonstrate the ability to combine ideas or information in new ways, make connections between unrelated ideas, organize and present information, and allocate financial and other resources efficiently and effectively. Students will identify and use various print and non-print resources in the home, school, and community to seek and plan for employment. They will be able to use the job application process, including resumes, forms, and interviews.

Career and technical education, formerly called practical arts, is the application of life, academic, and occupational skills demonstrated by student-centered experiences in courses related to the sixteen States' Career Clusters. The intent at the elementary and middle school levels is to prepare all students for the option of further study in career and technical education at the high school level. These courses typically include business education, family and consumer sciences, and other courses related to careers and life skills. Career and technical education programs establish necessary pathways for secondary vocational-technical education programs, entering the world of work, continuing education (such as college, post secondary vocational-technical education, specialized certification and/or registered apprenticeships), and lifelong learning.

Those students electing courses in career and technical education should demonstrate both teamwork and problem-solving skills through a structured learning experience. This could consist of an experiential, supervised educational activity designed to provide students with exposure to the requirements and responsibilities of specific job titles or job groupings, and to assist them in gaining employment skills and making career and educational choices. The experience may be either paid or unpaid, depending on the type of activities in which the student is involved. Examples include, but are not limited to: apprenticeships, community service, cooperative education, internships, job shadowing, school-based experiences, vocational student organizations, paid employment, and volunteer activities. Structured learning experiences must meet all state and federal child labor laws and regulations.

**Strands and Cumulative Progress Indicators**

**By the end of Grade 4, students will:**

**A. Career Awareness and Planning**

1. Describe various life roles and work-related activities in the home, community, and school.
2. Identify abilities and skills associated with various careers.
3. Identify reasons people work and how work habits impact the quality of one's work.

**B. Employability Skills**

1. Describe and demonstrate the importance of personal and interpersonal skills.
2. Identify positive work habits and attitudes necessary for home, community, and school.

3. Identify reasons for working as part of a team.

**Building upon knowledge and skills gained in preceding grades, by the end of Grade 8, students will:**

**A. Career Awareness and Planning**

1. Demonstrate the ability to distinguish between job, occupation, and career.
2. Outline the steps in the career planning process.
3. Apply research skills to career exploration.
4. Analyze personal interests, abilities, and skills through various measures including self assessments.
5. Explore careers using hands-on real life experiences within the sixteen States' Career Clusters.
6. Develop an individual career plan and include in a portfolio.
7. Plan and conduct a cooperative project that addresses one of the problems faced by the school and/or community.

**B. Employability Skills**

1. Research local and state employment opportunities.
2. Develop an employment package that includes a job application, letter of interest, and resume.
3. Demonstrate job-seeking skills.
4. Describe and demonstrate appropriate work habits and interpersonal skills needed to obtain and retain employment.
5. Compare and contrast possible choices based on identified/perceived strengths, goals, and interests.
6. Identify and develop skills that are transferable from one occupation to another.

**Building upon knowledge and skills gained in preceding grades, by the end of Grade 12, students will:**

**A. Career Awareness/Preparation**

1. Re-evaluate personal interests, abilities, and skills through various measures including self assessments.
2. Evaluate academic and career skills needed in various career clusters.
3. Analyze factors that can impact an individual's career.
4. Review and update their career plan and include the plan in a portfolio.
5. Research current advances in technology that apply to a selected occupational career cluster.

**B. Employability Skills**

1. Assess personal qualities that are needed to obtain and retain a job related to career clusters.

2. Communicate and comprehend written and verbal thoughts, ideas, directions, and information relative to educational and occupational settings.

3. Select and utilize appropriate technology in the design and implementation of teacher-approved projects relevant to occupations and/or higher educational settings.

4. Evaluate the following academic and career skills as they relate to home, school, community, and employment:

- Communication
- Punctuality
- Time management
- Organization
- Decision making
- Goal setting
- Resources allocation
- Fair and equitable competition
- Safety
- Employment application skills
- Teamwork

5. Demonstrate teamwork and leadership skills that include student participation in real world applications of career and technical education skills.

**All students electing further study in career and technical education will also:**

1. Participate in a structured learning experience that demonstrates interpersonal communication, teamwork, and leadership skills.
2. Participate in simulated industry assessments, when and where appropriate.
3. Prepare industry-specific technical reports/projects that incorporate graphic aids, when and where appropriate.
4. Demonstrate occupational health and safety skills related to industry-specific activities.

**STANDARD 9.2 (CONSUMER, FAMILY, AND LIFE SKILLS) ALL STUDENTS WILL DEMONSTRATE CRITICAL LIFE SKILLS IN ORDER TO BE FUNCTIONAL MEMBERS OF SOCIETY.**

**Descriptive Statement:** All students need to develop consumer, family, and life skills necessary to be functioning members of society. All students will develop original thoughts and ideas, think creatively, develop habits of inquiry, and take intellectual and performance risks. They will recognize problems, devise a variety of ways to solve these problems, analyze the potential advantages and disadvantages of

each alternative, and evaluate the effectiveness of the method ultimately selected. Students will understand the components of financial education and make economic choices. Students will demonstrate self-awareness and the ability to respond constructively to criticism and potential conflict. In addition, students will work collaboratively with a variety of groups and demonstrate the essential components of character development and ethics, including trustworthiness, responsibility, respect, fairness, caring, and citizenship. Students apply principles of resource management and skills that promote personal and professional well-being. Wellness, nutrition, child development, and human relationships are an important part of consumer, family, and life skills. However, wellness, nutrition, and human relationship cumulative progress indicators are not listed here as it would duplicate those in Comprehensive Health and Physical Education Standards.

### **Strands and Cumulative Progress Indicators**

**By the end of Grade 4, students will:**

#### **A. Critical Thinking**

1. Recognize and define a problem.
2. Plan and follow steps to make choices and decisions.
3. Identify and access print and non-print resources that can be used to help solve problems.
4. Demonstrate brainstorming skills.

#### **B. Self-Management**

1. Demonstrate an understanding of the relationship between personal behavior and self-image.
2. Recognize and build upon personal strengths.
3. Accept criticism and respond constructively.
4. Recognize personal likes and dislikes.
5. Demonstrate steps to deal with stress and conflict.

#### **C. Interpersonal Communication**

1. Develop positive social skills to interact with others.
2. Select and use language appropriate to the situation.
3. Develop skills for accepting self and others through awareness of different cultures, lifestyles, and attitudes.
4. Practice steps for effective conflict resolution.
5. Work cooperatively with others to accomplish a task.

#### **D. Character Development and Ethics**

1. Demonstrate character traits that are important in day-to-day activities in the home, school, and community such as trust, responsibility, respect, fairness, caring, and citizenship.

2. Conduct a cooperative activity or project that addresses a character trait.
3. Identify ethical behaviors in the home, school, and community.
4. Explain a person's responsibility to obey the laws and rules.

#### **E. Consumer and Personal Finance**

1. Demonstrate a basic understanding of the value of money.
2. Identify various sources of money for personal spending.
3. Explore the relationship among wants, needs, and resources.
4. Understand that prices of goods and services can be compared to make decisions about purchases.
5. Explain how people can improve their ability to earn income by gaining new knowledge, skills, and experiences.
6. Describe how to earn and save money in order to purchase a desired item.

#### **F. Safety**

1. Identify common hazards associated with home, school, and community.
2. Explain how common hazards can be eliminated in the home, school, and community.
3. Describe and demonstrate the safe use of tools and equipment used at home and at school.

**Building upon knowledge and skills gained in preceding grades, by the end of Grade 8, students will:**

#### **A. Critical Thinking**

1. Communicate, analyze data, apply technology, and problem solve.
2. Describe how personal beliefs and attitudes affect decision-making.
3. Identify and assess problems that interfere with attaining goals.
4. Recognize bias, vested interest, stereotyping, and the manipulation and misuse of information.
5. Practice goal setting and decision-making in areas relative to life skills.

#### **B. Self-Management**

1. Develop and implement a personal growth plan that includes short- and long-term goals to enhance development.
2. Demonstrate responsibility for personal actions and contributions to group activities.
3. Explain the need for, and advantages of, lifelong learning.

#### **C. Interpersonal Communication**

1. Demonstrate respect and flexibility in interpersonal and group situations.

2. Organize thoughts to reflect logical thinking and speaking.
3. Work cooperatively with others to solve a problem.
4. Demonstrate appropriate social skills within group activities.
5. Practice the skills necessary to avoid physical and verbal confrontation in individual and group settings.
6. Participate as a member of a team and contribute to group effort.

#### **D. Character Development and Ethics**

1. Explain and demonstrate how character and behavior affects and influences the actions of others in the home, school, and community.
2. Describe and demonstrate appropriate character traits, social skills, and positive attitudes needed for the home, school, community, and workplace.
3. List problems and their causes, effects, and solutions that are faced in the home, school, and/or community.
4. Describe how personal ethics influence decision making.

#### **E. Consumer and Personal Finance Skills**

1. Identify and demonstrate personal finance skills in checkbook maintenance and investing.
2. Construct a simple personal savings/spending plan.
3. Understand that people make financial choices that have costs, benefits, and consequences.
4. Explain the difference in cost between cash and credit purchases.
5. Compare prices of similar items from different sellers.

#### **F. Safety**

1. Demonstrate appropriate safety procedures for hands-on experiences.
2. Demonstrate the use of recommended safety and protective devices.
3. Describe appropriate response procedures for emergency situations.

**Building upon knowledge and skills gained in preceding grades, by the end of Grade 12, students will:**

#### **A. Critical Thinking**

1. Apply communications and data analysis to the problem-solving and decision making processes in a variety of life situations.
2. Describe and apply constructive responses to criticism.
3. Apply the use of symbols, pictures, graphs, objects, and other visual information to a selected project in academic and/or occupational settings.

4. Recognize bias, vested interest, stereotyping, and the manipulation and misuse of information while formulating solutions to problems that interfere with attaining goals.

5. Apply knowledge and skills needed to use various means of transportation within a community.

### **B. Self-Management**

1. Revise and update the personal growth plan to address multiple life roles.

2. Apply project planning and management skills in academic and/or occupational settings.

3. Compare and contrast methods for maximizing personal productivity.

### **C. Interpersonal Communication**

1. Model interpersonal and effective conflict resolution skills.

2. Communicate effectively in a variety of settings with a diverse group of people.

### **D. Character Development and Ethics**

1. Analyze how character influences work performance.

2. Identify and research privileges and duties of citizens in a democratic society.

3. Discuss consequences and sanctions when on-the-job rules and laws are not followed.

4. Compare and contrast a professional code of ethics or code of conduct from various work fields and discuss similarities and differences.

5. Apply a professional code of ethics to a workplace problem or issue.

### **E. Consumer and Personal Finance**

1. Analyze factors that influence gross and net income.

2. Design, implement, and critique a personal financial plan.

3. Discuss how to obtain and maintain credit.

4. Prepare and use skills for budget preparation, making predictions about income and expenditures, income tax preparation, and adjusting spending or expectations based on analysis.

5. Use comparative shopping techniques for the acquisition of goods and services.

6. Analyze the impact of advertising, peer pressure, and living arrangements on personal purchasing decisions.

7. Evaluate the actions a consumer might take in response to excess debt and personal financial status.

8. Analyze the interrelationships between the economic system and consumer actions in a chosen career cluster.

### **F. Safety**

1. Engage in an informed discussion about rules and laws designed to promote safety and health.

2. Describe and demonstrate basic first aid and safety procedures.
3. Analyze the occurrence of workplace hazards.
4. Practice the safe use of tools and equipment.
5. Implement safety procedures in the classroom and workplace, where appropriate.
6. Discuss motor vehicle safety, including but not limited to, New Jersey motor vehicle laws and regulations, methods of defensive driving, and the importance of personal responsibility on public roads/streets.