

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

Course of Study

For

**Automotive Technology I
8540**

Submitted By:
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Southern Regional High School District

Course of Study

Department Applied Technology

Course Title: Automotive Technology I

Essential Questions of the Course:

1. What are the 11 systems that make up today's Automobile?
2. How do automobile systems work both individually and together?
3. How does the automobile affect our lives, our environment, and our society?
4. Why is preventative service important and what are the procedures to perform those tasks?
5. How does an automotive technician systematically diagnose problems?

Assessments:

Formative: (observation of the following)

- Workplace safety practices
- Interpersonal communication and behavior
- Workplace management (organizational skills / time management)
- Hands on diagnostics and maintenance activities

Summative:

- Quizzes, midterms, and final exams will be based on textbook reading activities, lecture notes, and practical experiences.

Unit of Study

Unit Title: General Shop Safety

Essential Questions of the Unit:

1. What are the hazardous tools and chemicals that can be found in the shop?
2. What proactive measures do we use to prevent injury from these hazards?
3. How do you use the tools which help suppress “out of control” hazards?

Assessments:

Summative - Content knowledge test

Content:

- Chemical handling
- Tool safety
- Fire suppression

Skills:

- Students will be able to handle shop chemicals safely.
- Students will know the locations of all fire extinguishers, fire blankets, eye wash station, and emergency power shut off buttons.

Purpose / Rational of the Unit:

Students must understand the importance of shop hazards, and reactionary measures used to control these hazards.

New Jersey Core Curriculum Content Standards:

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

(For descriptive narrative, see Appendix)

Cross Content Workplace Readiness Standards:

- 5. ALL STUDENTS WILL APPLY SAFETY PRINCIPLES**
Indicators 1-9

Time Frame of Unit: 3 days

Instructional Activities:

- Discussion – Chemical hazards and handling
- Shop tour – locate all hazards and hazard prevention / reaction tools.

Materials and Resources:

- Shop Safety Equipment
- Fire Extinguisher information sheet
- Fire Evacuation review

Unit of Study

Unit Title: Air/Power Tool Safety

Essential Questions of the Unit:

1. What is considered a safe working environment when using electric and air powered tools?
2. What personal protective equipment must be used when working with electric and air powered tools?

Assessments:

Summative - Content knowledge test for each power tool in the shop.

Content:

- Power tool safety general rules
- Air tool safety general rules
- Demonstration and discussions regarding the wire wheel, metal grinder, drill press, brake lathes, and air tools.

Skills:

- Students will know all air and power tool rules.
- Students will be able to use all air and power tools safely

Purpose / Rationale of the Unit:

Students must understand shop hazards, and reactionary measures used to control these hazards. Students should also understand that these safety procedures are cross content, whereas practices can be applied in a variety of other work places.

New Jersey Core Curriculum Content Standards:

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

(For descriptive narrative, see Appendix)

Cross Content Workplace Readiness Standards:

- 5. ALL STUDENTS WILL APPLY SAFETY PRINCIPLES**
Indicators 1,3,4-9

Time Frame of Unit: 2 weeks

Instructional Activities:

- Discussion – Power Tool Safety
- Demonstration – Power Tool Use

Materials and Resources:

- Shop air tools
- Drill press review handout
- Drill press safety test
- Wire wheel review handout
- Wire wheel safety test

Unit of Study

Unit Title: Tool Identification

Essential Questions of the Unit:

1. What are the names of the tools that we use on a daily basis?
2. What is the function of each of these tools?

Assessments:

Summative - Content knowledge test

Content:

- Tool identification and purpose

Skills:

- Students will be able to identify common hand tools.
- Students will know the purpose of the most common hand tools.
- Students will understand the necessity of keeping tools clean and organized.

Purpose / Rationale of the Unit:

Students must understand the importance of shop hazards, and reactionary measures used to control these hazards.

New Jersey Core Curriculum Content Standards:

4.2 GEOMETRY AND MEASUREMENT

- A. Geometric Properties
- B. Transforming Shapes
- C. Coordinate Geometry
- D. Units of Measurement
- E. Measuring Geometric Objects

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

(For descriptive narrative, see Appendix)

Cross Content Workplace Readiness Standards:

- 5. ALL STUDENTS WILL APPLY SAFETY PRINCIPLES**
Indicators 4,5,6

Time Frame of Unit: 3 days

Instructional Activities:

- Discussion – Chemical hazards and handling
- Shop tour – locate all hazards and hazard prevention / reaction tools.

Materials and Resources:

- Shop hand tools
- Automotive technology textbook

Unit of Study

Unit Title: Fluid Identification/Service

Essential Questions of the Unit:

1. What is automotive service?
2. What safety precautions must be considered when handling automotive fluids?
3. What affects do automotive fluids have on our environment?
4. How can fluid identification help diagnose system problems?
5. Why is it important to check automotive system fluid levels?

Assessments:

Summative - Content knowledge test

Content:

- Fluid identification
- Fluid handling safety
- Connecting fluids with automotive systems
- Detecting system damage through fluid leaks

Skills:

- Students will be able to identify the primary automotive fluids by sight and smell.
- Students will be able to check primary system fluid levels.
- Students will be able to handle automotive fluids safely, as well as understand methods of disposal. (environmental concerns)
- Students will begin to identify system damage through automotive fluid leaks

Purpose / Rationale of the Unit:

A great deal of damage, as well as many break downs can be prevented through regular system maintenance and inspection. Drivers should be aware of these processes, as well as develop safe handling and disposal methods.

New Jersey Core Curriculum Content Standards:

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

(For descriptive narrative, see Appendix)

Cross Content Workplace Readiness Standards:

- 3. ALL STUDENTS WILL USE CRITICAL THINKING, DECISION-MAKING AND PROBLEM-SOLVING SKILLS**
Indicator 7
- 5. ALL STUDENTS WILL APPLY SAFETY PRINCIPLES**
Indicators 3-7

Time Frame of Unit: 3 days

Instructional Activities:

- Discussion – fluid hazards and handling – warnings on the back of fluid containers.
- Discussion – chemical disposal – 1 quart of oil is enough to pollute 250,000 gallons of water.
- Fluid identification lab activity – Fluids will be poured into white containers and students will begin to identify them by sight and smell.

Materials and Resources:

- Shop vehicles
- Shop hand tools
- Shop fluids supply
- AllData vehicle database

Unit of Study

Unit Title: Emergency Tire Change/Emergency & Shop Jack Use

Essential Questions of the Unit:

1. What are the various methods used to lift a vehicle?
2. What safety measures are taken to ensure safe vehicle lifting?
3. Why is it necessary to practice emergency roadside service?

Assessments:

Formative – Demonstration of vehicle lifting activities

Content:

- Lift points and body styles
- On board emergency tools
- Road side tire changes
- Hydraulic floor jack use
- Rotary lift use

Skills:

- Students will be able to complete a tire change using stock vehicle tools
- Students will be able to safely lift a vehicle using a hydraulic floor jack
- Students will be able to raise a vehicle off of the ground using a rotary lift.

Purpose / Rationale of the Unit:

It is essential to understand safe vehicle lifting in order to complete a variety of service and repair operations.

New Jersey Core Curriculum Content Standards:

4.2 GEOMETRY AND MEASUREMENT

- A. Geometric Properties
- B. Transforming Shapes
- C. Coordinate Geometry
- D. Units of Measurement
- E. Measuring Geometric Objects

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

(For descriptive narrative, see Appendix)

Cross Content Workplace Readiness Standards:

- 4. ALL STUDENTS WILL DEMONSTRATE SELF-MANAGEMENT SKILLS**
Indicators 2, 5
- 5. ALL STUDENTS WILL APPLY SAFETY PRINCIPLES**
Indicators 3-7

Time Frame of Unit: 1-1/2 weeks

Instructional Activities:

- Lift point manual reference activity
- Tire change demonstration
- Class lift operation demonstrations

Materials and Resources:

- Shop vehicles
- Shop vehicle roadside jacks
- Shop hand tools
- Shop air tools
- AllData vehicle database
- Automotive Technology textbook

Unit of Study

Unit Title: Lubrication System

Essential Questions of the Unit:

1. What is the purpose of the automotive lubrication system?
2. What is the difference between petroleum based, and synthetic motor oil?
3. How can simple lubrication inspection procedures help determine the condition of an engine?
4. How do you service the lubrication system?

Assessments:

Summative - Content knowledge test
Formative – Demonstration of lubrication system service

Content:

- Lubrication system parts identification.
- Lubrication system function
- Lubrication system maintenance
- lubrication system problem diagnostics
- Discussion - common engines with lubrication problems
- Synthetic vs. Petroleum motor oil analysis

Skills:

- Students will be able to complete an oil change
- Students will be able to complete lubrication system diagnostics procedures
- Students will be able to weigh the pro's and con's of petroleum and synthetic oils

Purpose / Rationale of the Unit:

Students must understand the importance of lubrication system service, as well as be capable of completing such service. Lubrication system inspection can also assist in determining the condition of an automobile's engine.

New Jersey Core Curriculum Content Standards:

4.2 GEOMETRY AND MEASUREMENT

- A. Geometric Properties
- B. Transforming Shapes
- C. Coordinate Geometry
- D. Units of Measurement
- E. Measuring Geometric Objects

8.2 TECHNOLOGY EDUCATION

- A. Nature and Impact of Technology
- B. Design Process and Impact Assessment
- C. Systems in the Designed World

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

(For descriptive narrative, see Appendix)

Cross Content Workplace Readiness Standards:

- 1. ALL STUDENTS WILL DEVELOP CAREER PLANNING AND WORKPLACE READINESS SKILLS**
Indicator 10
- 2. ALL STUDENTS WILL USE INFORMATION, TECHNOLOGY, AND OTHER TOOLS**
Indicators 2,6
- 4. ALL STUDENTS WILL DEMONSTRATE SELF-MANAGEMENT SKILLS**
Indicators 2,5

Time Frame of Unit: 2 weeks

Instructional Activities:

- Lubrication system transparencies
- Lubrication system video
- Text chapter readings & questions
- Maintenance & Diagnostics demonstrations
- Hands on service activities

Materials and Resources:

- Rotary lift operation manual, and lift point guide
- Shop vehicles
- Shop hand tools
- AllData vehicle database
- Automotive Technology textbook
- Shop engines
- Oil change specialty tools
- Lubrication tools

Unit of Study

Unit Title: Cooling System

Essential Questions of the Unit:

- What is the purpose of the automotive cooling system?
- What are the cooling system inspection and diagnostics procedures?
- What is the function of each part of the automotive cooling system?
- What are the cooling system maintenance procedures?
- What are the cooling system parts replacement procedures?

Assessments:

Summative - Content knowledge test

Formative – Demonstration of cooling system maintenance, diagnostics, and repair.

Content:

- Cooling system parts identification
- Cooling system function
- Cooling system inspection and maintenance
- Cooling system diagnostics
- Cooling system repair

Skills:

- Students will be able to complete cooling system inspection and service.
- Students will be able to complete cooling system malfunction diagnostics procedures.
- Students will be able to repair cooling system components.

Purpose / Rationale of the Unit:

Students should understand the purpose, and importance of the cooling system. Students should be able to use cooling system diagnostics tools and service / repair the automotive cooling system.

New Jersey Core Curriculum Content Standards:

8.2 TECHNOLOGY EDUCATION

- A. Nature and Impact of Technology
- B. Design Process and Impact Assessment
- C. Systems in the Designed World

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

(For descriptive narrative, see Appendix)

Cross Content Workplace Readiness Standards:

- 2. ALL STUDENTS WILL USE INFORMATION, TECHNOLOGY, AND OTHER TOOLS**
Indicators 2,6
- 4. ALL STUDENTS WILL DEMONSTRATE SELF-MANAGEMENT SKILLS**
Indicators 2,5
- 5. ALL STUDENTS WILL APPLY SAFETY PRINCIPLES**
Indicators 3,4,5,7

Time Frame of Unit: 3 weeks

Instructional Activities:

- Discussion – System function
- Demonstration – System inspection, maintenance, and repair
- Text chapter readings & questions

Materials and Resources:

- Rotary lifts
- Shop vehicles
- Shop hand tools
- AllData vehicle database
- Automotive Technology textbook
- Shop engines
- Cooling system pressure tester
- Cooling system hydrometer
- Coolant recycling tools

Unit of Study

Unit Title: Basic Engine Tune Up

Essential Questions of the Unit:

1. What is included in an engine performance tune up?
2. What is the importance of periodic inspection and service?

Assessments:

Summative - Content knowledge test
Formative – Demonstration of suspension system maintenance, diagnostics, and repair.

Content:

- Spark plug and spark plug wire replacement
- PCV system operation, valve inspection
- Air filter replacement
- Throttle body inspection and cleaning

Skills:

- Students will be able to gap and replace spark plugs.
- Students will be able to inspect and replace a PCV valve.
- Students will be able to inspect and replace an air filter.
- Students will be able to inspect and clean a throttle body.

Purpose / Rationale of the Unit:

Preventative maintenance is critical in maintaining vehicle performance and economy.

New Jersey Core Curriculum Content Standards:

4.2 GEOMETRY AND MEASUREMENT

- A. Geometric Properties
- B. Transforming Shapes
- C. Coordinate Geometry
- D. Units of Measurement
- E. Measuring Geometric Objects

8.2 TECHNOLOGY EDUCATION

- A. Nature and Impact of Technology
- B. Design Process and Impact Assessment
- C. Systems in the Designed World

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

(For descriptive narrative, see Appendix)

Cross Content Workplace Readiness Standards:

10. ALL STUDENTS WILL DEVELOP CAREER PLANNING AND WORKPLACE READINESS SKILLS

Indicators 1-12

11. ALL STUDENTS WILL USE INFORMATION, TECHNOLOGY, AND OTHER TOOLS

Indicators 1-10

4. ALL STUDENTS WILL DEMONSTRATE SELF-MANAGEMENT SKILLS

Indicators 1-11

5. ALL STUDENTS WILL APPLY SAFETY PRINCIPLES

Indicators 1-9

Time Frame of Unit: 2 weeks

Instructional Activities:

- Discussion – system function
- Demonstration – System inspection, maintenance, and repair
- Text chapter readings & questions

Materials and Resources:

- Rotary lifts
- Shop vehicles
- Shop hand tools
- AllData vehicle database
- AllData worksheet
- Automotive Technology textbook
- Shop engines
- Spark plug sockets
- Spark plug boot pliers
- www.fueleconomy.gov (overhead LCD projector)

Unit of Study

Unit Title: Exhaust System

Essential Questions of the Unit:

- What is the function of each part of the automotive exhaust system?
- How is an exhaust system inspected?
- What are the exhaust system parts replacement procedures?

Assessments:

Summative - Content knowledge test

Formative – Demonstration of exhaust system repair.

Content:

- Exhaust system parts & function
- Exhaust problem diagnostics
- Exhaust system repair
- Turbo Chargers

Skills:

- Students will be able to identify exhaust system parts.
- Students will be able to complete exhaust system inspection and diagnostics procedures.
- Students will be able to repair exhaust system components.

Purpose / Rationale of the Unit:

Exhaust systems are prone to rust and wear. Repairs are relatively simple, and can often be done at home with few tools.

New Jersey Core Curriculum Content Standards:

8.2 TECHNOLOGY EDUCATION

- A. Nature and Impact of Technology
- B. Design Process and Impact Assessment
- C. Systems in the Designed World

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

(For descriptive narrative, see Appendix)

Cross Content Workplace Readiness Standards:

- 5. ALL STUDENTS WILL DEVELOP CAREER PLANNING AND WORKPLACE READINESS SKILLS**
Indicator 1
- 6. ALL STUDENTS WILL USE INFORMATION, TECHNOLOGY, AND OTHER TOOLS**
Indicator 2
- 7. ALL STUDENTS WILL USE CRITICAL THINKING, DECISION-MAKING AND PROBLEM-SOLVING SKILLS**
Indicators 1,7
- 8. ALL STUDENTS WILL DEMONSTRATE SELF-MANAGEMENT SKILLS**
Indicators 2,5
- 9. ALL STUDENTS WILL APPLY SAFETY PRINCIPLES**
Indicators 3,4,5,7

Time Frame of Unit: 3 weeks

Instructional Activities:

- Discussion – System function
- Demonstration – System inspection, and repair
- Text chapter readings & questions

Materials and Resources:

- Shop vehicles
- Shop hand tools
- Shop air tools
- AllData vehicle database
- Automotive Technology textbook
- www.howstuffworks.com (overhead LCD projector)
- Rotary lifts

Unit of Study

Unit Title: Tire & Wheel Fundamentals

Essential Questions of the Unit:

- What are the parts of a tire and wheel?
- How are tires sized and rated?
- Why is tire maintenance critical to driver safety?
- How are tires mounted and balanced?

Assessments:

Summative - Content knowledge test

Formative – Completion of tire mounting and balancing activities

Content:

- Wheel Geometry
- Tire construction
- Tire markings
- Tire wear
- Tire rotation
- Wheel bearings
- Tire mounting and balancing
- Puncture repair

Skills:

- Students will be able to identify tire wear
- Students will be able to measure and maintain proper tire pressure
- Students will be able to repair tire punctures
- Students will be able to mount and balance tires
- Students will be able to pack wheel bearings
- Students will be able to identify tire markings
- Students will be able to rotate tires

Purpose / Rationale of the Unit:

One of the leading causes of blow outs is due to improper tire care. Subsequently, drivers should understand how to purchase, and maintain tires properly.

New Jersey Core Curriculum Content Standards:

4.2 GEOMETRY AND MEASUREMENT

- A. Geometric Properties
- B. Transforming Shapes
- C. Coordinate Geometry
- D. Units of Measurement
- E. Measuring Geometric Objects

8.2 TECHNOLOGY EDUCATION

- A. Nature and Impact of Technology
- B. Design Process and Impact Assessment
- C. Systems in the Designed World

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

(For descriptive narrative, see Appendix)

Cross Content Workplace Readiness Standards:

- 3. ALL STUDENTS WILL DEVELOP CAREER PLANNING AND WORKPLACE READINESS SKILLS**
Indicator 1
- 4. ALL STUDENTS WILL USE INFORMATION, TECHNOLOGY, AND OTHER TOOLS**
Indicators 2,6,7,10
- 4. ALL STUDENTS WILL DEMONSTRATE SELF-MANAGEMENT SKILLS**
Indicators 2,5
- 5. ALL STUDENTS WILL APPLY SAFETY PRINCIPLES**
Indicators 3,4,5,7

Time Frame of Unit: 3 weeks

Instructional Activities:

- Text chapter readings & questions
- Maintenance & Diagnostics demonstrations
- Hands on service activities

Materials and Resources:

- Rotary lifts
- Shop vehicles
- Shop hand tools
- Tire mounting machine
- Tire balancing machine
- Tire patch and plug tools
- Automotive Technology textbook

Unit of Study

Unit Title: Suspension System

Essential Questions of the Unit:

1. What is the purpose of each type of automotive suspension system?
2. What are the adverse affects of improperly serviced suspension parts?
3. What are the suspension system inspection and diagnostics procedures?
4. What are the suspension system maintenance procedures?
5. What are the suspension system parts replacement procedures?
6. How does the suspension system control wheel geometry

Assessments:

Summative - Content knowledge test

Formative – Demonstration of suspension system maintenance, diagnostics, and repair.

Content:

- Suspension system parts & function
- Suspension system inspection and maintenance
- Suspension system repair

Skills:

- Students will be able to identify suspension system parts.
- Students will be able to complete suspension system maintenance.
- Students will be able to complete suspension system inspection and diagnostics procedures.
- Students will be able to repair suspension system components.

Purpose / Rationale of the Unit:

Suspension inspection and maintenance can play a critical role in the prevention of automobile break downs and accidents.

New Jersey Core Curriculum Content Standards:

4.2 GEOMETRY AND MEASUREMENT

- A. Geometric Properties
- B. Transforming Shapes
- C. Coordinate Geometry
- D. Units of Measurement
- E. Measuring Geometric Objects

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

(For descriptive narrative, see Appendix)

Cross Content Workplace Readiness Standards:

11. ALL STUDENTS WILL DEVELOP CAREER PLANNING AND WORKPLACE READINESS SKILLS

Indicator 1

12. ALL STUDENTS WILL USE INFORMATION, TECHNOLOGY, AND OTHER TOOLS

Indicator 2

13. ALL STUDENTS WILL USE CRITICAL THINKING, DECISION-MAKING AND PROBLEM-SOLVING SKILLS

Indicators 1,7

14. ALL STUDENTS WILL DEMONSTRATE SELF-MANAGEMENT SKILLS

Indicators 2, 5

15. ALL STUDENTS WILL APPLY SAFETY PRINCIPLES

Indicators 3,4,5,7

Time Frame of Unit: 4 weeks

Instructional Activities:

- Discussion – system function
- Demonstration – System inspection, maintenance, and repair
- Text chapter readings & questions

Materials and Resources:

- AllData (Automotive repair manual database)
- Automotive Technology textbook
- Shop vehicles
- Shop hand tools
- Shop air tools
- Grease guns

Unit of Study

Unit Title: Brake System

Essential Questions of the Unit:

1. What is the function of each part of the automotive brake system?
2. What are the brake system inspection and diagnostics procedures?
3. What are the brake system maintenance procedures?
4. What are the brake system parts replacement procedures?

Assessments:

Summative - Content knowledge test

Formative – Demonstration of brake system maintenance, diagnostics, and repair.

Content:

- Brake system parts & function
- Brake system inspection and maintenance
- Brake problem diagnostics
- Brake system repair

Skills:

- Students will be able to complete brake system maintenance.
- Students will be able to complete brake system inspection and diagnostics procedures.
- Students will be able to repair brake system components.

Purpose / Rationale of the Unit:

Students should understand the importance of a reliable brake system.
Students should be able to service and repair the automotive brake system.

New Jersey Core Curriculum Content Standards:

4.2 GEOMETRY AND MEASUREMENT

- A. Geometric Properties
- B. Transforming Shapes
- C. Coordinate Geometry
- D. Units of Measurement
- E. Measuring Geometric Objects

8.2 TECHNOLOGY EDUCATION

- A. Nature and Impact of Technology
- B. Design Process and Impact Assessment
- C. Systems in the Designed World

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

(For descriptive narrative, see Appendix)

Cross Content Workplace Readiness Standards:

6. ALL STUDENTS WILL DEVELOP CAREER PLANNING AND WORKPLACE READINESS SKILLS

Indicator 1

7. ALL STUDENTS WILL USE INFORMATION, TECHNOLOGY, AND OTHER TOOLS

Indicator 2

8. ALL STUDENTS WILL USE CRITICAL THINKING, DECISION-MAKING AND PROBLEM-SOLVING SKILLS

Indicators 1,7

9. ALL STUDENTS WILL DEMONSTRATE SELF-MANAGEMENT SKILLS

Indicators 2, 5

10. ALL STUDENTS WILL APPLY SAFETY PRINCIPLES

Indicators 3,4,5,7

Time Frame of Unit: 5 weeks

Instructional Activities:

- Discussion – System function
- Demonstration – System inspection, maintenance, and repair
- Text chapter readings & questions

Materials and Resources:

- AllData (Automotive repair manual database)
- Automotive Technology textbook
- Shop vehicles
- Shop hand tools
- Shop air tools
- Brake specialty hand tools
- Disc and drum brake lathes
- Brake size reference manual

Unit of Study

Unit Title: Battery Maintenance & Electronics

Essential Questions of the Unit:

1. What are volts, amps, and ohms?
2. What is a DVOM and how is it used?
3. What is the purpose of the negative ground system on a vehicle?
4. What safety considerations need to be made when handling a car battery?
5. What safety considerations need to be made when charging a car battery?
6. What environmental considerations need to be made when disposing batteries?

Assessments:

Summative - Content knowledge test
Formative – Demonstration of service and testing processes

Content:

- Basic electrical theory
- Basic DVOM use
- Battery testing
- Battery charging.
- Battery jump starting
- Battery maintenance
- Battery disposal
- Fuses / testing and purpose

Skills:

- Students will be able to define volts, amps, and ohms
- Students will be able to measure voltage with a DVOM
- Students will be able to test a car battery
- Students will be able to safely charge a car battery
- Students will be able to safely jumpstart a dead battery
- Students will know how properly handle and dispose car batteries.
- Students will know how to test and replace fuses

Purpose / Rationale of the Unit:

All drivers should understand basic automotive electrical maintenance (battery service, jumping, charging, wiring, and fuse purpose) Students going into the automotive field should be capable of using a DVOM to diagnose automotive electrical problems.

New Jersey Core Curriculum Content Standards:

4.2 GEOMETRY AND MEASUREMENT

- A. Geometric Properties
- B. Transforming Shapes
- C. Coordinate Geometry
- D. Units of Measurement
- E. Measuring Geometric Objects

8.2 TECHNOLOGY EDUCATION

- A. Nature and Impact of Technology
- B. Design Process and Impact Assessment
- C. Systems in the Designed World

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

(For descriptive narrative, see Appendix)

Cross Content Workplace Readiness Standards:

- 6. ALL STUDENTS WILL DEVELOP CAREER PLANNING AND WORKPLACE READINESS SKILLS**
Indicator 1
- 7. ALL STUDENTS WILL USE INFORMATION, TECHNOLOGY, AND OTHER TOOLS**
Indicators 2,6
- 4. ALL STUDENTS WILL DEMONSTRATE SELF-MANAGEMENT SKILLS**
Indicators 2,5
- 5. ALL STUDENTS WILL APPLY SAFETY PRINCIPLES**
Indicators 3,4,5,7

Time Frame of Unit: 4 weeks

Instructional Activities:

- Text chapter readings & questions
- Maintenance & Diagnostics demonstrations
- Hands on service activities

Materials and Resources:

- Snap-on battery tester
- Battery charger
- DVOM
- Battery cleaning equipment
- Shop vehicles
- Shop hand tools
- Automotive Technology textbook

Unit of Study

Unit Title: Transmission Service

Essential Questions of the Unit:

1. What is the function of the transmission?
2. How is a transmission serviced
3. What is the most common service interval for a transmission service?
4. What can happen if a transmission is leaking, or improperly serviced?

Assessments:

Summative - Content knowledge test
Formative – Demonstration of transmission service

Content:

- Transmission parts identification.
- Transmission maintenance procedures
- Transmission inspection
- Transmission diagnostics

Skills:

- Students will be able to complete a transmission flush and filter change.
- Students will be able to complete a transmission inspection
- Students will be able to identify external transmission parts on 2 and 4 wheel drive transmissions.

Purpose / Rationale of the Unit:

Level I students should have a general knowledge of transmission function and service. Students will understand that transmission rebuilding is generally a specialized profession and is not attempted by general service technicians.

New Jersey Core Curriculum Content Standards:

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

(For descriptive narrative, see Appendix)

Cross Content Workplace Readiness Standards:

- 6. ALL STUDENTS WILL DEVELOP CAREER PLANNING AND WORKPLACE READINESS SKILLS**
Indicator 1
- 7. ALL STUDENTS WILL USE INFORMATION, TECHNOLOGY, AND OTHER TOOLS**
Indicators 2,6,7,10
- 4. ALL STUDENTS WILL DEMONSTRATE SELF-MANAGEMENT SKILLS**
Indicators 2,5
- 5. ALL STUDENTS WILL APPLY SAFETY PRINCIPLES**
Indicators 3,4,5,7

Time Frame of Unit: 2 weeks

Instructional Activities:

- Transmission transparencies
- Part identification (2 and 4 wheel drive vehicles on lifts)
- Service procedure demonstrations
- Chapter readings, and questions

Materials and Resources:

- Shop vehicles
- Shop hand tools
- AllData vehicle database
- Automotive Technology textbook
- www.howstuffworks.com (overhead LCD projector)
- Rotary lifts

Unit of Study

Unit Title: Engine Fundamentals

Essential Questions of the Unit:

1. What are the major parts of a typical automotive engine?
2. What is the basic function of the major parts of an automotive engine?
3. What are some alternatives to the common gasoline internal combustion engine “alternative fuels”

Assessments:

Summative - Content knowledge test

Formative – Students will demonstrate the ability to disassemble and reassemble various parts on an internal combustion engine.

Content:

- Engine classification
- Engine operation.
- Engine parts identification
- Engine parts function
- Engine rebuilding
- Alternative fuel engines

Skills:

- Students will be able to identify the parts of an internal combustion engine.
- Students will be able to diagnose common engine problems that can be identified without disassembling an engine.
- Students will understand the difference between gasoline and diesel engines.
- Students will understand the term octane
- Students will understand volumetric efficiency and it's relationship with turbo and super chargers.

Purpose / Rationale of the Unit:

The demand for power and efficiency in today's cars is greater than ever. Students going into the automotive profession need to develop competency in dealing with today's engines as early as possible. Engine problem diagnostics is also relevant to all students as it provides rational behind engine service, and knowledge when bringing an engine to be repaired.

New Jersey Core Curriculum Content Standards:

4.2 GEOMETRY AND MEASUREMENT

- A. Geometric Properties
- B. Transforming Shapes
- C. Coordinate Geometry
- D. Units of Measurement
- E. Measuring Geometric Objects

8.2 TECHNOLOGY EDUCATION

- A. Nature and Impact of Technology
- B. Design Process and Impact Assessment
- C. Systems in the Designed World

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

(For descriptive narrative, see Appendix)

Cross Content Workplace Readiness Standards:

- 1. ALL STUDENTS WILL DEVELOP CAREER PLANNING AND WORKPLACE READINESS SKILLS**
Indicator 1
- 2. ALL STUDENTS WILL USE INFORMATION, TECHNOLOGY, AND OTHER TOOLS**
Indicators 2,6,7,10
- 4. ALL STUDENTS WILL DEMONSTRATE SELF-MANAGEMENT SKILLS**
Indicators 2,5
- 5. ALL STUDENTS WILL APPLY SAFETY PRINCIPLES**
Indicators 3,4,5,7

Time Frame of Unit: 5 weeks

Instructional Activities:

- Engine rebuilding demonstration
- Student engine service work
- Text chapter readings & questions
- Engine performance videos

Materials and Resources:

- Shop vehicles
- Shop engines
- Shop hand tools
- AllData vehicle database
- Automotive Technology textbook
- Rotary lifts

Unit of Study

Unit Title: On-Board Computer Diagnostics

Essential Questions of the Unit:

1. What is the purpose of the on board diagnostics system?
2. What can happen to a vehicle if trouble signals are ignored?
3. How do mechanics interact with on board computers

Assessments:

Summative - Content knowledge test

Formative – Demonstration of suspension system maintenance, diagnostics, and repair.

Content:

- On board computer system
- Diagnostic trouble codes
- Scan tool operation

Skills:

- Students will understand the purpose of an on board computer.
- Students will understand how to determine the existence of a trouble code through the use of a scan tool.
- Students will understand how to obtain additional information about trouble codes in order to solve code inspired problems

Purpose / Rationale of the Unit:

All drivers, in addition to mechanics, should understand the function of the automobile computer system. The understanding of the system, as well as the ability to interact with the system, can save you a great deal of time and money when completing vehicle diagnostics.

New Jersey Core Curriculum Content Standards:

8.2 TECHNOLOGY EDUCATION

- A. Nature and Impact of Technology
- B. Design Process and Impact Assessment
- C. Systems in the Designed World

(For descriptive narrative, see Appendix)

Cross Content Workplace Readiness Standards:

- 1. ALL STUDENTS WILL DEVELOP CAREER PLANNING AND WORKPLACE READINESS SKILLS**
Indicator 1
- 2. ALL STUDENTS WILL USE INFORMATION, TECHNOLOGY, AND OTHER TOOLS**
Indicators 2,6,7,10
- 4. ALL STUDENTS WILL DEMONSTRATE SELF-MANAGEMENT SKILLS**
Indicators 2,5
- 5. ALL STUDENTS WILL APPLY SAFETY PRINCIPLES**
Indicators 3,4,5,7

Time Frame of Unit: 2 weeks

Instructional Activities:

- Discussion – system function
- Demonstration – System interaction
- Text chapter readings & questions

Materials and Resources:

- Diagnostic scan tools
- Shop vehicles
- Shop hand tools
- AllDate vehicle database
- Automotive Technology textbook

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

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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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Wisconsin Department of Public Instruction. (2002) *Wisconsin's model academic standards*. Online: <http://www.dpi.state.wi.us/dpi/standards/index.html>.

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.

STANDARD 4.1 (NUMBER AND NUMERICAL OPERATIONS) ALL STUDENTS WILL DEVELOP NUMBER SENSE AND WILL PERFORM STANDARD NUMERICAL OPERATIONS AND ESTIMATIONS ON ALL TYPES OF NUMBERS IN A VARIETY OF WAYS.

Descriptive Statement: Numbers and arithmetic operations are what most of the general public think about when they think of mathematics; and, even though other areas like geometry, algebra, and data analysis have become increasingly important in recent years, numbers and operations remain at the heart of mathematical teaching and learning. Facility with numbers, the ability to choose the appropriate types of numbers and the appropriate operations for a given situation, and the ability to perform those operations as well as to estimate their results, are all skills that are essential for modern day life.

Number Sense. Number sense is an intuitive feel for numbers and a common sense approach to using them. It is a comfort with what numbers represent that comes from investigating their characteristics and using them in diverse situations. It involves an understanding of how different types of numbers, such as fractions and decimals, are related to each other, and how each can best be used to describe a particular situation. It subsumes the more traditional category of school mathematics curriculum called numeration and thus includes the important concepts of place value, number base, magnitude, and approximation and estimation.

Numerical Operations. Numerical operations are an essential part of the mathematics curriculum, especially in the elementary grades. Students must be able to select and apply various computational methods, including mental math, pencil-and-paper techniques, and the use of calculators. Students must understand how to add, subtract, multiply, and divide whole numbers, fractions, decimals, and other kinds of numbers. With the availability of calculators that perform these operations quickly and accurately, the instructional emphasis now is on understanding the meanings and uses of these operations, and on estimation and mental skills, rather than solely on the development of paper-and-pencil proficiency.

Estimation. Estimation is a process that is used constantly by mathematically capable adults, and one that can be easily mastered by children. It involves an educated guess about a quantity or an intelligent prediction of the outcome of a computation. The growing use of calculators makes it more important than ever that students know when a computed answer is reasonable; the best way to make that determination is through the use of strong estimation skills. Equally important is an awareness of the many situations in which an approximate answer is as good as, or even preferable to, an exact one. Students can learn to make these judgments and use mathematics more powerfully as a result.

Number and operation skills continue to be a critical piece of the school mathematics curriculum and, indeed, a very important part of mathematics. But, there is perhaps a greater need for us to rethink our approach here than to do so for any other curriculum component. An enlightened mathematics program for today's children will empower them to use all of today's tools rather than require them to meet yesterday's expectations.

Strands and Cumulative Progress Indicators

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

A. Number Sense

1. Extend understanding of the number system to all real numbers.
2. Compare and order rational and irrational numbers.
3. Develop conjectures and informal proofs of properties of number systems and sets of numbers.

B. Numerical Operations

1. Extend understanding and use of operations to real numbers and algebraic procedures.
2. Develop, apply, and explain methods for solving problems involving rational and negative exponents.
3. Perform operations on matrices.
 - Addition and subtraction
 - Scalar multiplication
4. Understand and apply the laws of exponents to simplify expressions involving numbers raised to powers.

C. Estimation

1. Recognize the limitations of estimation, assess the amount of error resulting from estimation, and determine whether the error is within acceptable tolerance limits.

STANDARD 4.2 (GEOMETRY AND MEASUREMENT) ALL STUDENTS WILL DEVELOP SPATIAL SENSE AND THE ABILITY TO USE GEOMETRIC PROPERTIES, RELATIONSHIPS, AND MEASUREMENT TO MODEL, DESCRIBE AND ANALYZE PHENOMENA.

Descriptive Statement: Spatial sense is an intuitive feel for shape and space. Geometry and measurement both involve describing the shapes we see all around us in art, nature, and the things we make. Spatial sense, geometric modeling, and measurement can help us to describe and interpret our physical environment and to solve problems.

Geometric Properties. This includes identifying, describing and classifying standard geometric objects, describing and comparing properties of geometric objects, making conjectures concerning them, and using reasoning and proof to verify or refute conjectures and theorems. Also included here are such concepts as symmetry, congruence, and similarity.

Transforming Shapes. Analyzing how various transformations affect geometric objects allows students to enhance their spatial sense. This includes combining shapes to form new ones and

decomposing complex shapes into simpler ones. It includes the standard geometric transformations of translation (slide), reflection (flip), rotation (turn), and dilation (scaling). It also includes using tessellations and fractals to create geometric patterns.

Coordinate Geometry. Coordinate geometry provides an important connection between geometry and algebra. It facilitates the visualization of algebraic relationships, as well as an analytical understanding of geometry.

Units of Measurement. Measurement helps describe our world using numbers. An understanding of how we attach numbers to real-world phenomena, familiarity with common measurement units (e.g., inches, liters, and miles per hour), and a practical knowledge of measurement tools and techniques are critical for students' understanding of the world around them.

Measuring Geometric Objects. This area focuses on applying the knowledge and understandings of units of measurement in order to actually perform measurement. While students will eventually apply formulas, it is important that they develop and apply strategies that derive from their understanding of the attributes. In addition to measuring objects directly, students apply indirect measurement skills, using, for example, similar triangles and trigonometry.

Students of all ages should realize that geometry and measurement are all around them. Through study of these areas and their applications, they should come to better understand and appreciate the role of mathematics in their lives.

Strands and Cumulative Progress Indicators

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

A. Geometric Properties

1. Use geometric models to represent real-world situations and objects and to solve problems using those models (e.g., use Pythagorean Theorem to decide whether an object can fit through a doorway).
2. Draw perspective views of 3D objects on isometric dot paper, given 2D representations (e.g., nets or projective views).
3. Apply the properties of geometric shapes.
 - Parallel lines – transversal, alternate interior angles, corresponding angles
 - Triangles
 - a. Conditions for congruence
 - b. Segment joining midpoints of two sides is parallel to and half the length of the third side

- c. Triangle Inequality
 - Minimal conditions for a shape to be a special quadrilateral
 - Circles – arcs, central and inscribed angles, chords, tangents
 - Self-similarity
- 4. Use reasoning and some form of proof to verify or refute conjectures and theorems.
 - Verification or refutation of proposed proofs
 - Simple proofs involving congruent triangles
 - Counterexamples to incorrect conjectures

B. Transforming Shapes

1. Determine, describe, and draw the effect of a transformation, or a sequence of transformations, on a geometric or algebraic object, and, conversely, determine whether and how one object can be transformed to another by a transformation or a sequence of transformations.
2. Recognize three-dimensional figures obtained through transformations of two-dimensional figures (e.g., cone as rotating an isosceles triangle about an altitude), using software as an aid to visualization.
3. Determine whether two or more given shapes can be used to generate a tessellation.
4. Generate and analyze iterative geometric patterns.
 - Fractals (e.g., Sierpinski's Triangle)
 - Patterns in areas and perimeters of self-similar figures
 - Outcome of extending iterative process indefinitely

C. Coordinate Geometry

1. Use coordinate geometry to represent and verify properties of lines.
 - Distance between two points
 - Midpoint and slope of a line segment
 - Finding the intersection of two lines
 - Lines with the same slope are parallel
 - Lines that are perpendicular have slopes whose product is -1
2. Show position and represent motion in the coordinate plane using vectors.
 - Addition and subtraction of vectors

D. Units of Measurement

1. Understand and use the concept of significant digits.
2. Choose appropriate tools and techniques to achieve the specified degree of precision and error needed in a situation.
 - Degree of accuracy of a given measurement tool
 - Finding the interval in which a computed measure (e.g., area or volume) lies, given the degree of precision of linear measurements

E. Measuring Geometric Objects

1. Use techniques of indirect measurement to represent and solve problems.
 - Similar triangles
 - Pythagorean theorem
 - Right triangle trigonometry (sine, cosine, tangent)
2. Use a variety of strategies to determine perimeter and area of plane figures and surface area and volume of 3D figures.
 - Approximation of area using grids of different sizes
 - Finding which shape has minimal (or maximal) area, perimeter, volume, or surface area under given conditions using graphing calculators, dynamic geometric software, and/or spreadsheets
 - Estimation of area, perimeter, volume, and surface area