Southern Regional High School
Manahawkin, New Jersey

Course of Study

For

Power Mechanics
8507

Submitted By:
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Southern Regional High School District
Course of Study

Department: Applied Technology

Course Title: Power Mechanics I
Course # 8507

Essential Questions of the Course:

1. How does one power system affect another?
2. Why is safety important in all aspects of mechanical repair?
3. How do you troubleshoot a malfunctioning system?
4. To increase consumer knowledge to a point where students can select, buy, use and maintain the products of industry intelligently.

Assessments:

1. Successful completion of required text and supplemental reading as well as various evaluative devices.
2. Each student will prepare a notebook containing lecture notes, hands-on experiences and instructional sheets. Students will be expected to successfully complete all assignment sheets dealing with power units covered in class.
3. Written tests and quizzes, plus a midterm and final exam.

Unit of Study

Unit Title: Four Cycle Engine

Essential Questions of the Unit:

1. What is taking place in the engine during each stroke of a four cycle engine?
2. Explain how to troubleshoot a float carburetor.
3. How does the MBI magnet cycle operate?
4. Why is the lubrication system an essential part of the engine?
5. How does a forced air cooling system operate in a four stroke engine?
6. Explain the general safety practices of the lab.

Assessments:

- 5 Written quizzes, 4 written tests
- Midterm exam
- Students will demonstrate a series of hand-on problem-based assessments which will address their understanding and ability to troubleshoot engines.
- Weekly progress grids.

Content:

I Identify the 4 cycles
- A. Intake
- B. Compression
- C. Power
- D. Exhaust

o Tool Identification and safety
- E. Hand Tools
  1. open-end wrench
  2. box end wrench
  3. combination wrench
  4. ratchet
  5. T handle
  6. breaker bar
  7. speed wrench
  8. shallow socket
  9. deep socket
  10. extension
  11. allen key
  12. tap and die
  13. flathead screwdriver
  14. Phillips head screwdriver
  15. Ball point hammer
  16. soft face mallet
  17. flat file
  18. slip joint pliers
  19. open end adjustable wrench
  20. torque wrench
      a. use
      b. safety
- B. Measuring Devices
  1. Micrometer
     a. inside
     b. outside
     c. depth gauge
     d. Vernier caliper
        (1) Use
        (2) Reading
            (a) Standard
            (b) Digital
  2. Telescoping gauge
  3. Dial Indicator
  4. Combination square
  5. Small hole gauge

III Basic Engine Parts
- A. 3.5 Hp Briggs & Stratton engine
  1. combustion chamber
  2. spark plugs
  3. cylinder wall
  4. piston
  5. piston rings
  6. piston pin
  7. connecting rod
  8. crank case
  9. crank shaft
  10. connecting rod
  11. cam
  12. valve tappet
  13. valve
  14. valve guide
  15. valve seat
  16. cylinder head
      a. use
      b. repair
      c. maintenance
      d. safety

IV Carburetion
- A. Float carburetor
  1. Parts identification
  2. Troubleshoot
  3. maintenance
- B. Suction carburetor
  1. Parts identification
  2. troubleshoot
  3. maintenance
  4. safety

V Ignition Systems
- A. Basic ignition system operation
  1. MBI magnetic cycle
     a. purpose
     b. troubleshoot
     c. maintenance
     d. safety
- B. Electronic Ignition
- C. (CDI) Capacital Discharge Ignition

VI Lubrication Systems
- A. Principles of Lubrication
  1. friction
  2. _____
  3. rust & corrosion
  4. keeps parts clean
  5. seals engine
  6. cools engine
- B. Types of oil
  1. Oil rating
     a. SAE
     b. API
- C. Lubrication Systems
  1. Splash lubrication
  2. Pressure lubrication
  3. Barrel pumps
  4. Jump lubrication
  5. Oil filter systems
     a. Maintenance
     b. Safety

VII Cooling Systems
- A. Principles of Engine Cooling
- B. Forced Air
- C. Draft Air
- D. Liquid
  1. functions, operation
  2. troubleshoot
  3. maintenance
  4. safety

Purpose / Rationale of the Unit:

The four-cycle engine is an introduction to the basic concept of how an engine works. Tools, safety, working in a shop situation and working with a group, are stressed. Power is introduced on an exploratory level. Technical aspects are explored as they present themselves.

Skills:

- Following directions
- Problem solving
- Demonstrating proper use of tools and equipment
- Identify parts of engine and how it works.
- To develop competency in the use of text and manual materials.
- Develop a knowledge and understanding of the vocabulary of power.

Instructional Activities:

- Hands-on equipment and tools (demos)
- Handouts of unit, overheads, lectures
- Question and answer

Materials and Resources:

- Small gas Engines by Alfred C. Roth
- Briggs & Stratton manual
- Handouts
- Internet: www.howthingswork.com

New Jersey Core Curriculum Content Standards:

8.1 COMPUTER AND INFORMATION LITERACY
- A. Basic Computer Tools and Skills
- B. Application of Productivity Tools

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

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

(For descriptive narrative, see Appendix)

Cross Content Workplace Readiness Standards:

1. **ALL STUFDENTS WILL DEVELOP CAREER PLANNING AND WORKPLACE READINESS SKILLS**
   Indicators 1,2,3,5,7
2. **ALL STUDENTS WILL USE INFORMATION, TECHNOLOGY, AND OTHER TOOLS**
   Indicators 1,2,3,5,6,7,10
3. **ALL STUDENTS WILL USE CRITICAL THINKING, DECISION-MAKING AND PROBLEM-SOLVING SKILLS**
   Indicators 1,2,3,4,7,8,10-15
4. **ALL STUDENTS WILL DEMONSTRATE SELF-MANAGEMENT SKILLS**
   Indicators 2,3,5,7,9,10,11
5. **ALL STUDENTS WILL APPLY SAFETY PRINCIPLES**
   Indicators 1,4-9

Time Frame of Unit: 18 weeks

Unit of Study

Unit Title: Two Cycle Engine and Tecumsech 4 Stroke

Essential Questions of the Unit:

1. Explain the differences between a two cycle engine and a four cycle engine.
2. Explain how an overhead valve system is more efficient than other systems.
3. What are the basic steps in troubleshooting an engine?
4. What type of measures can you do to help prevent engine damage?

Assessments:

- Quizes, tests and final exam.
- Students will demonstrate a series of problem-based assessments which will address their understanding and ability to troubleshoot engines.
- Weekly progress grades.
- Required text reading and questions.

Content:

I Two stroke engine (principles of operation)
- A. Intake into crankcase
- B. Fuel transfer
- C. Ignition- power
- D. Exhaust

II Two stroke engines
- A. Rotary disc valve engine
- B. Reed valve engine
- C. Four-cycle engine vs. two-cycle engines
  1. Advantages
  2. Disadvantages

III Overhead Valve System (Four Stroke)
- A. Principles of operation
- B. Disassembly of overhead valves
- C. Servicing of overhead valves
- D. Installing overhead valves
  1. Advantages and disadvantages of system
  2. Maintenance
  3. Safety

IV Engine Trouble Shooting
- A. Verify the fundamental operating requirements
  1. Proper carburetion
  2. Correct ignition system operation
  3. Adequate Lubrication
  4. Sufficient cooling
  5. Proper compression

- B. Check RPM
  1. Vibra – tach
  2. Stroboscope
  3. Optical tachometer

- C. Test compression
  1. Procedure for compression test.
     a. Run engine until warm
     b. Disconnect all drives to the engine
     c. Open choke and throttle valves
     d. Remove air cleaner
     e. Service information
  2. Equipment
     a. Hand-held compression tester
     b. Screw in compression tester

- D. Service information
  a. Service manual
  b. Service procedures
  c. Exploded views
     (1) Assemble
     (2) Disassemble
  d. Trouble shooting charts.
  e. Tolerances and clearances
  f. Torque specifications

V Preventive Maintenance
- A. Keeping engines clean
  a. Methods for cleaning small engines
  b. Compressed air
  c. Cleaning solvents
  d. scraping

- B. Checking oil level and condition
  1. Method in changing oil
  2. When to change oil
- C. Mixing Oil & fuel (2 cycle)
- D. Air cleaner service
- E. Crankcase breather service
- F. Muffler Service
- G. Winterizing

SKILLS:

- Following directions
- Problem solving
- Demonstrating proper use of tools and equipment
- Identify parts of 2 and 4 cycle engines and how they work
- To develop competency in the use of text and manual materials
- Develop a knowledge and understanding of the vocabulary of power
- To develop a basic knowledge in the steps in troubleshooting an engine.
- To develop an understanding in the differences in 2 and 4 cycle engines
- Identify procedures in preventing engine damage.

Purpose/Rational of the unit:

- The understanding of 2 and 4 cycle engines and their advantages and disadvantages of each.
- To understand there is a systematic approach to servicing and maintaining an engine.
- Technical aspects are explored as they present themselves.

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

9.1 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

(For descriptive narrative, see Appendix)

4.1 NUMBER AND NUMERICAL OPERATIONS

A. Number Sense
B. Numerical Operations
C. Estimation

4.2 GEOMETRY AND MEASUREMENT

A. Geometric Properties
C. Coordinate Geometry
D. Units of Measurement

Time Frame of Unit:

18 Weeks.

Instructional Activities:

- Textbook/workbook assignments
- Handouts
- Overheads
- Hands-on activities assembling and disassembling an engine
- Manual use

Materials and Resources:

Small Gas Engines (textbook) Alfred C. Roth
Small Gas Engines workbook
5 Hp Tecumsech engine
3.5 Hp Briggs & Stratton engine and various other small engines
Tools related to power mechanics

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.

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.

National Business Education Association. (2001). N*ational 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 <u>electing further study</u> 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.