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Outboard Marine Engine Mechanics

2006 Mississippi Curriculum Framework

Secondary Outboard Marine Engine Mechanics

(Program CIP: 47.0692 – Outboard Engine Mechanics I)

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Workplace Skills for the 21st Century	Secretary's Commission on Achieving Necessary Skills
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Foreword

Secondary vocational-technical education programs in Mississippi are faced with many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, Mississippi Code of 1972, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, ch. 487, §14; Laws, 1991, ch. 423, §1; Laws, 1992, ch. 519, §4 eff. from and after July 1, 1992; Carl D. Perkins Vocational Education Act III, 1998; and No Child Left Behind Act of 2001).

Each secondary vocational-technical course consists of a series of instructional units which focus on a common theme. All units have been written using a common format which includes the following components:

- Unit Number and Title
- Suggested Time on Task - An estimated number of clock hours of instruction that should be required to teach the competencies and objectives of the unit. A minimum of 140 hours of instruction is required for each Carnegie unit credit. The curriculum framework should account for approximately 75-80 percent of the time in the course.
- Competencies and Suggested Objectives
  - A competency represents a general concept or performance that students are expected to master as a requirement for satisfactorily completing a unit. Students will be expected to receive instruction on all competencies.
  - The suggested objectives represent the enabling and supporting knowledge and performances that will indicate mastery of the competency at the course level.
- Suggested Teaching Strategies - This section of each unit indicates strategies that can be used to enable students to master each competency. Emphasis has been placed on strategies which reflect active learning methodologies. Teachers should feel free to modify or enhance these suggestions based on needs of their students and resources available in order to provide optimum learning experiences for their students.
- Suggested Assessment Strategies - This section indicates strategies that can be used to measure student mastery. Examples of suggested strategies could include rubrics, class participation, reflection, and journaling. Again, teachers should feel free to modify or enhance these suggested assessment strategies based on local needs and resources.

- Integrated Academic Topics, Workplace Skills, Technology Standards, and Occupational Standards - This section identifies related academic topics as required in the Subject Area Assessment Program (SATP) in Algebra I, Biology I, English II, and U. S. History from 1877, which are integrated into the content of the unit. It also identifies the general workplace skills as identified in the Secretary's Commission on Achieving Necessary Skills (SCANS) report as being critical for all workers in the 21st Century. In addition, national technology standards and occupational skills standards associated with the competencies and suggested objectives for the unit are also identified.
- References - A list of suggested references is provided for each unit. The list includes some of the primary instructional resources that may be used to teach the competencies and suggested objectives. Again, these resources are suggested and the list may be modified or enhanced based on needs and abilities of students and on available resources.

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Program Description

Outboard Marine Engine Mechanics is an instructional program that provides students with basic skills related to the care, service, and repair of outboard marine engines. Students receive instruction related to safety, tools and equipment, fasteners, measurement, engine identification, basic electrical, engine principles and design cooling systems, lubrication systems, fuel and carburetor systems, shop management, mechanical remote control assembly, propeller and trim, mechanical gearcase, advanced fuel systems, advanced carburetion, ignition systems, and engine overhaul. The program also prepares students for advanced study at the postsecondary level in Marine Engine Mechanics (Gasoline). This program was written to include the Equipment & Engine Training Council's Standards for 2- & 4-Stroke Gasoline Engines.

Industry standards are based on the *Equipment & Engine Training Council, OPE Category 1, 2- and 4-Stroke Cycle Gasoline Engine Standards*.

Course Outline

Outboard Marine Engine Mechanics I
Course CIP Code: 47.0692

Course Description: Outboard Marine Engine Mechanics I provides students with an introduction to outboard marine engines. The course includes instruction in safety, tools and equipment, fasteners, measurement, basic engine principles, maintenance, and inspection. (2-2 1/2 Carnegie units, depending upon time spent in the course)

Unit	Title	Hours
1	Safety and Orientation	10
2	Leadership and Personal Development	10
3	Tools and Equipment	15
4	Fasteners	10
5	Measurement	15
6	Engine Identification and Inspection	15
7	Basic Engine Principles and Design	25
8	Basic Electricity	15
9	Ignition Systems	15
10	Lubrication Systems	15
11	Cooling Systems	15
12	Fuel Systems (Carburetor-Type)	22
13	Special Topics in Outboard Marine Engine Mechanics I (ongoing)	22

Outboard Marine Engine Mechanics II
Course CIP Code: 47.0694

Course Description: Outboard Marine Engine Mechanics II is the exit course for the program. Students receive instruction in safety, auxiliary engine systems, mechanical remote control assemblies, propeller and trim tab systems, gearcases, advanced fuel and carburetion, advanced ignition systems, engine overhaul, and employment skills. (2-2 1/2 Carnegie units, depending upon time spent in the course)

Unit	Title	Hours
1	Safety and Orientation (Review and Reinforcement)	8
2	Advanced Leadership	10
3	Auxiliary Engine Systems	15
4	Mechanical Remote Control Assembly	12
5	Propeller and Trim Tab Systems	12
6	Mechanical Gearcase	22
7	Advanced Fuel and Carburetion	30
8	Advanced Ignition Systems	30
9	Overhaul of Two-Stroke Cycle Engine	32
10	Employability Skills	12
11	Special Topics in Outboard Marine Engine Mechanics II (ongoing)	22

Outboard Marine Engine Mechanics I
Unit 1: Safety and Orientation **(10 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Explain vocational policies, procedures, and requirements. a. Describe vocational policies. b. Describe school attendance policies. c. Describe the student handbook. d. Describe grading procedures used in the school.	**Teaching:** • Present local program and vocational/career technical center policies and procedures. • Students will read the handbook to become aware of what is expected of them in relation to the policies and procedures of the school. This will include grading procedures, attendance, dress code, academic requirements, discipline, and transportation regulations. Students will work together in pairs. A student with a higher reading ability will team up with a student with a lower reading ability to get a better understanding of the school's program policies and procedures. Have students submit a written report on rules and regulations. **Assessment:** • Assess student orientation, policy, and procedure knowledge through instructor observations and written unit test. File completed test to document student mastery of the school and program policies and procedures. • The report will be evaluated for clarity and content using the Written Report Evaluation in Appendix E.
2. Apply safety practices used in outboard marine engine mechanics. a. Define terms associated with safety. b. Describe and apply rules for personal and general shop safety. c. Describe state eye safety law. d. Associate the colors of the safety code with their correct application.	**Teaching:** • Identify, discuss, and demonstrate terms, rules, and procedures related to shop/lab and industry safety. • Required written tests will follow each section of guidelines for safety rules and procedures. • Provide the students with a list of terms and have them define the terms. Pair the students to quiz each other on the definitions in preparation for a written exam. • Use the guidelines provided for personal

	safety (i.e., clothing, jewelry, hair, eyes, and ears). Divide the students into pairs and assign each pair one of the guidelines. Each pair will demonstrate the "do's and don'ts" of the guideline. • Explain and illustrate the colors of the safety code and their application. • Have an industry speaker present to the class the necessity of safety in the work environment. The students will write a summary of the presentation. • NOTE: SAFETY IS TO BE TAUGHT AS AN ONGOING PART OF THE COURSE THROUGHOUT THE YEAR. **Assessment:** • Student participation will be monitored by the instructor and the written exam will be graded. The student must achieve 100% accuracy. • The "do's and don'ts" exercise will be critiqued with a peer review. • The summary of the speaker's presentation will be critiqued using the Written Report Evaluation in Appendix E.
3. Explain procedures for working with and disposing of hazardous materials according to OSHA regulations. a. Define terms associated with hazardous materials. b. Identify categories of hazardous materials commonly found in outboard marine engine shops. c. Identify signal words or symbols such as "Caution," "Warning," and "Danger" that indicate the severity of a hazard. d. Describe methods for reducing hazardous waste. e. Identify general procedures for storing hazardous materials and wastes. f. Identify and describe the informational sections found on a Material Safety Data Sheet which provide guidelines for creating a safe work environment.	**Teaching:** • Provide students with a list of terms associated with hazardous materials including carcinogens, batteries, acids, flammables, and radioactive materials. Have the students define the terms through the use of printed material and Internet searches. • Provide students with a list of the classes (Class 1-9) and signal words or symbols related to hazardous materials including Class 2 Gases, Class 3 Flammable Liquids, and Class 8 Corrosives. Divide the students into pairs or groups; assign each group a class. The group will research information to include first aid procedures, safety equipment, MSDS requirements, and storing materials. The pairs or groups will present the information to the rest of the class. Using the information from their research, the pairs or groups will develop scenarios of

g. Describe general first aid procedures in case of an accident involving hazardous materials. h. Identify safety equipment to be used with hazardous materials. i. Describe steps to follow in handling spills and waste disposal. j. Identify agencies to be contacted in case of an accident or for more information on hazardous materials.	hazards and accidents. The pairs or groups will swap scenarios, develop a prevention plan and a treatment program, and present the plan to the rest of the class. **Assessment:** • Assessment will be teacher observation, student participation, a written test, and the Presentation Evaluation in Appendix E.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

EETC 100 Small Engine Fundamentals

Academic Standards

A1 Recognize, classify, and use real numbers and their properties.
A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.
E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.

WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools

SUGGESTED REFERENCES

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Outboard Marine Engine Mechanics I
Unit 2: Leadership and Personal Development **(10 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Develop leadership in a vocational student organization (VSO). a. State procedures of leadership. b. Describe the leadership purposes of a VSO.	**Teaching:** • Discuss the role of a team member and leader. Assign the students roles within a team and have them role-play a situation in which there is a conflict which must be resolved. Utilize the lessons from SkillsUSA or other resources to provide additional training. • Describe the vocational student organization associated with the program, and provide an overview of opportunities to participate in leadership activities, community service projects, and competitive events. • Have students work in pairs to explore the VSO website and develop a slide presentation (may use PowerPoint if available) that includes the motto, creed, emblem, colors, theme, and history of the organization. • Have students participate in local officer elections modeled after the election process. Have officers campaign and prepare posters and a speech. Have members vote by secret ballot. • Have students plan a ceremony to install officers and induct members. • Have students work in teams to develop club goals and service projects for the year. • Have each student select and participate in a competitive event appropriate to his or her skills, aptitudes, and abilities. **Assessment:** • Assess the role-play using a checklist for documentation. Use the Role-play or Skit Rubric located in Appendix E. • Lessons from SkillsUSA and other resources should be assessed according to the recommended resource guide.

2. Identify personal traits and characteristics of an effective leader. a. Identify desirable personal qualities. b. Identify desirable characteristics of the personal work ethic.	**Teaching:** • Discuss and explain desirable and undesirable personal qualities and characteristics of the personal work ethic. Give examples of how these characteristics are used in dealing with the public and in the workplace. • Divide students into groups. Give each group a different scenario involving serving the public, communicating with employees, and personal work ethic where desirable characteristics were lacking. Have each group re-write the scenario to include the desired characteristics and select a spokesperson to explain their scenario to the class. Following each presentation, lead the class to discuss and evaluate the solutions presented by each group. • Have students keep a weekly journal (typed if technology is available) of their experiences dealing with others in the public or in the workplace throughout the year. Have students identify the behavior and characteristics that are present or that are lacking. **Assessment**: • Monitor group work. • Grade group scenarios according to content. • Grade journals according to content and grammar.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

None

Academic Standards

A1 Recognize, classify, and use real numbers and their properties.
A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.

A3 Simplify algebraic expressions, solve and graph equations, inequalities and systems in one and two variables.
A4 Explore and communicate the characteristics and operations of polynomials.
A5 Utilize various formulas in problem-solving situations.
A6 Communicate using the language of algebra.
A7 Interpret and apply slope as a rate of change.
A8 Analyze data and apply concepts of probability.
B1 Utilize critical thinking and scientific problem solving in designing and performing biological research and experimentation.
B2 Investigate the biochemical basis of life.
B3 Investigate cell structures, functions, and methods of reproduction.
B4 Investigate the transfer of energy from the sun to living systems.
B5 Investigate the principles, mechanisms, and methodology of classical and molecular genetics.
B6 Investigate concepts of natural selection as they relate to diversity of life.
B7 Investigate the interdependence and interactions that occur within an ecosystem.
E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
E6 Explore cultural contributions to the history of the English language and its literature.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.
H1 Explain how geography, economics, and politics have influenced the historical development of the United States in the global community.
H2 Describe the impact of science and technology on the historical development of the United States in the global community.
H3 Describe the relationship of people, places, and environments through time.
H4 Demonstrate the ability to use social studies tools (e.g., timelines, maps, globes, resources, graphs, a compass, technology, etc.).
H5 Analyze the contributions of Americans to the ongoing democratic process to include civic responsibilities.

Workplace Skills for the 21st Century

WP1 Allocates resources (time, money, materials and facilities, and human resources).
WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP5 Selects, applies, and maintains/troubleshoots technology.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

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Outboard Marine Engine Mechanics I
Unit 3: Tools and Equipment **(15 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Demonstrate the safe application and use of hand tools, power equipment, computers, and software. a. Identify and demonstrate the safe use of hand and power tools needed for maintenance and repair of outboard marine engines. b. Describe and demonstrate procedures concerning the maintenance of hand and power tools. c. Demonstrate the use of computer equipment and software for parts identification and estimation of repair costs.	**Teaching:** • The instructor will review supply catalogs and self-made pictures of hand and power tools that students will use in the program. • The instructor will discuss and demonstrate safety procedures, proper use, maintenance, and storage of hand and power tools to include compressed air and pneumatic tools, impact wrenches, side grinders, and electrical drills. The student will demonstrate safety procedures, proper use, maintenance, and storage of hand and power tools. A specific task will be assigned to a group of students. The group will make a list of the proper tools that will be required to complete the task and present their decisions to the class. • The instructor will explain and demonstrate the use of software for the specific area of instruction. Students will demonstrate computer skills. **Assessment:** • Give a tool identification test. • A job sheet will be evaluated for the task, and the Presentation Evaluation in Appendix E will be used. • The results from the software test will be printed and evaluated.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

EETC 100	Small Engine Fundamentals
EETC 200	Maintenance
EETC 300	2-Stroke Cycle Gasoline Engine
EETC 400	2-Stroke Cycle Gasoline Engine Overhaul
EETC 500	4-Stroke Cycle Gasoline Engine Diagnosis
EETC 600	4-Stroke Cycle Gasoline Engine Service
EETC 700	Failure Analysis

Academic Standards

A1 Recognize, classify, and use real numbers and their properties.
A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.
E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

WP1 Allocates resources (time, money, materials and facilities, and human resources).
WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues

T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

SUGGESTED REFERENCES

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Outboard Marine Engine Mechanics I
Unit 4: Fasteners **(10 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Identify and describe the use of common fasteners, tools, and procedures for restoring damaged threads. a. Identify common fasteners including nuts, bolts, screws, and locking devices. b. Identify methods used to remove seized nuts and bolts.	**Teaching:** • The instructor will explain and show fasteners using catalogs. The instructor will display several models that the students can view and manipulate. The students will analyze the fasteners, apply the proper fasteners, remove seized nuts and bolts, and present the decisions to the class. **Assessment:** • The activity will be evaluated using the Performance Evaluation in Appendix E.
2. Identify and safely use tools for restoring internal and external threads. a. Restore internal threads to specifications using thread repair device(s). b. Utilize torque wrenches to tighten bolts/nuts to manufacturer's specifications.	**Teaching:** • The instructor will explain and demonstrate how to restore internal threads to specifications using the correct device. The instructor will explain and demonstrate procedures used to tighten bolts/nuts to manufacturer's specifications using torque wrenches. The instructor will display several models that the students can view and manipulate. The students will analyze the threads, select the proper wrench, and restore the threads. **Assessment:** • The activity will be evaluated using the Performance Evaluation in Appendix E.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

EETC 100	Small Engine Fundamentals
EETC 200	Maintenance
EETC 300	2-Stroke Cycle Gasoline Engine
EETC 400	2-Stroke Cycle Gasoline Engine Overhaul
EETC 500	4-Stroke Cycle Gasoline Engine Diagnosis
EETC 600	4-Stroke Cycle Gasoline Engine Service
EETC 700	Failure Analysis

Academic Standards

A1 Recognize, classify, and use real numbers and their properties.
A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.
E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

WP1 Allocates resources (time, money, materials and facilities, and human resources).
WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP5 Selects, applies, and maintains/troubleshoots technology.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts

T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

SUGGESTED REFERENCES

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Outboard Marine Engine Mechanics I
Unit 5: Measurement **(15 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Identify and discuss precision measuring instruments. a. Identify and discuss the use of a vernier caliper. b. Identify and discuss the use of a feeler gauge. c. Identify and discuss the use of a dial indicator. d. Identify and discuss the use of a steel rule.	**Teaching:** • The instructor will identify, explain, and demonstrate the use of precision measuring instruments to include a vernier caliper, feeler gauge, dial indicator, and steel rule. The instructor will display several measuring instruments that the students can view and manipulate. The students will demonstrate the proper usage of these instruments. **Assessment:** • The activity will be evaluated using the Performance Evaluation in Appendix E.
2. Demonstrate the use of precision measuring instruments. a. Use a plain micrometer to measure a given object to within ± .001 inch. b. Use a vernier caliper to measure a given object to within ± .001 inch. c. Use a 6" rule to measure a given object within 1/16".	**Teaching:** • The instructor will identify and explain the use of precision measuring instruments to include a plain micrometer, vernier caliper, and 6" rule. The students will practice using the tool to accurately measure given items. • The instructor will give a worksheet on measurement. • The instructor will demonstrate how to measure a given item using a variety of measuring instruments. The student will measure given items and record the answers. **Assessment:** • Assessment will be teacher observation. • The student will measure given items and record on a job sheet for a grade. • The worksheets will be graded.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

EETC 100 Small Engine Fundamentals
EETC 200 Maintenance
EETC 300 2-Stroke Cycle Gasoline Engine
EETC 400 2-Stroke Cycle Gasoline Engine Overhaul
EETC 500 4-Stroke Cycle Gasoline Engine Diagnosis

EETC 600 4-Stroke Cycle Gasoline Engine Service
EETC 700 Failure Analysis

Academic Standards

A1 Recognize, classify, and use real numbers and their properties.
A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.
A5 Utilize various formulas in problem-solving situations.
A7 Interpret and apply slope as a rate of change.
A8 Analyze data and apply concepts of probability.
E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

WP1 Allocates resources (time, money, materials and facilities, and human resources).
WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

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Outboard Marine Engine Mechanics I
Unit 6: Engine Identification and Inspection **(15 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Identify types of outboard marine engines. a. Identify and define terms associated with engine identification and inspection. b. Describe distinguishing characteristics of 2- and 4-stroke cycle engines.	**Teaching:** • Provide a list of terms and have students define them. Discuss the terms and provide a matching activity. • Using cut-a-way models demonstrate the characteristics of a 2- and 4-stroke engines. Have the students discuss the differences between the engines. **Assessment:** • Assessment will be teacher observation, student participation, and graded activity.
2. Identify information on outboard marine engines. a. Collect information from the operator's instructions and/or inspection of the engine. b. Complete an engine identification and inspection form showing manufacturer's specifications. c. Locate manufacturer's specifications for repair/maintenance for specific engine.	**Teaching:** • The instructor will explain how and where to locate information on outboard engines using the text, Internet, manuals, handouts, and actual engines. The student will be assigned to locate specific information using text, Internet, manuals, and handouts for locating and information for an assigned task. • Provide the students with a form and have them complete the necessary information. **Assessment:** • The information will be recorded on the job sheet. Grade the completed form.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

EETC 100 Small Engine Fundamentals

Academic Standards

A1 Recognize, classify, and use real numbers and their properties.
A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.
E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.

E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
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E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
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WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools

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Outboard Marine Engine Mechanics I
Unit 7: Basic Engine Principles and Design **(25 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Explain the principles of operation of an internal combustion engine. a. Define terms associated with basic engine principles and design. b. Describe the parts of a basic internal combustion engine cylinder unit. c. Discuss the sequence of steps by which an internal combustion engine converts chemical energy into rotary motion.	**Teaching:** • Provide students with a list of terms. Have the students define the terms through the use of printed material and Internet searches. • Demonstrate the tear-down of an engine. Discuss throughout the disassembly process the name and function of each part. Provide a display of the major components. Using an activity sheet, the students will identify these components and describe the function of each component. • Discuss the process of converting chemical energy to mechanical energy. Provide the students with a handout. Using the diagram of the 4-stroke cycles, have the students label each cycle as chemical or mechanical energy. **Assessment:** • Assessment will be a teacher observation, student participation, and written test. • The activity sheet will be graded for accuracy. • The diagram will be graded for correctness.
2. Analyze engine horsepower rating. a. Read and interpret an engine label. b. Read and interpret a manufacturer's service manual to analyze engine horsepower rating.	**Teaching:** • Discuss horsepower rating to include location and meaning. Have the students interpret horsepower rating using a model engine. **Assessment:** • Assessment will be teacher observation.
3. Explain the principles of 4-stroke cycle engine operation. a. Define terms associated with the principles of operation of a 4-stroke cycle engine. b. Identify and describe the functions of basic components of a 4-stroke cycle engine. c. Describe the operation of a 4-stroke	**Teaching:** • Provide students with a list of terms. Have the students define the terms through the use of printed material and Internet searches. • Identify the basic components of the 4-stroke cycle engine. Divide the students into pairs or groups. Using materials available in the classroom and from the

cycle engine in relation to each stroke of the cycle. d. Explain the purpose of compressing fuel air mixture. e. Perform compression test.	Internet, the students will prepare a presentation describing the function of each part. This presentation will include a written report and visual representation. • The instructor will explain the purpose of compressing fuel air mixture and demonstrate a compression test. The students will perform a compression test. **Assessment:** • Assessment will be a teacher observation, student participation, and written test. • The presentation will be evaluated using the Presentation Evaluation in Appendix E. • A written test will be administered and graded.
4. Explain the principles of 2-stroke cycle engine operation. a. Define terms associated with the 2-stroke cycle engine to include piston and ported type and reed valve type. b. Identify basic components of a 2-stroke cycle engine. c. Describe the steps in the operation of a 2-stroke cycle. d. Explain the purpose of compressing fuel air mixture. e. Perform compression test.	**Teaching:** • Provide students with a list of terms. Have the students define the terms through the use of printed material and Internet searches. • Identify the basic components of the 2-stroke cycle engine. Using materials available in the classroom and from the Internet, the students will research the function and operation of each part. They will draw a representation of each cycle and label the components of the engine. • The instructor will explain the purpose of compressing fuel air mixture and demonstrate a compression test. The students will perform a compression test. **Assessment:** • Assessment will be a teacher observation, student participation, and written test. • The activity will be assessed by teacher observation and grading the drawing.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

EETC 100 Small Engine Fundamentals

Academic Standards

A1 Recognize, classify, and use real numbers and their properties.
A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.
E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

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WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
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WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues

T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

SUGGESTED REFERENCES

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Outboard Marine Engine Mechanics I
Unit 8: Basic Electricity **(15 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Explain the principles of basic electricity. a. Define terms and components associated with basic electricity to include AC and DC. b. Describe sources of electricity including chemical and magnetic. c. Discuss theory, operation, charging procedures, and storage/disposal of a battery. d. Identify examples of conductors and insulators to include the identification of wire sizes to current loads. e. Identify common electrical symbols used in schematic diagrams. f. Identify fuses and circuit breakers.	**Teaching:** • Using various resources, define and discuss the terms related to electricity. The students will match terms with the definitions. • Discuss the three sources of electricity and have the students describe each of the sources either written or orally. • Explain theory, operation, charging procedures, and storage/disposal of a battery. Have the students demonstrate the charging procedures in the lab. • Discuss the difference between conductors and insulators. Have the students provide uses of each. • Provide students with a handout of common electrical symbols. Using the handout, have the students label sample schematic diagrams. • Provide students with a handout illustrating an example of a series circuit, a parallel circuit, and a series-parallel circuit. Provide the students with a labeling exercise where they have to identify each type of circuit. • The instructor will explain and demonstrate the correct uses of fuses and circuit breakers and have the students demonstrate the use of each. **Assessment:** • The matching activity will be assessed for accuracy. • Assessment will be teacher observation, student participation, and graded diagrams. • The labeling activity will be assessed for accuracy.
2. Describe instruments and perform measurements of electricity. a. Describe instruments used in checking electrical circuits. b. Measure resistance using an	**Teaching:** • Display instruments to students and describe each. Using a visual display, students will correctly identify instruments presented.

ohmmeter in parallel and closed circuits. c. Check continuity of a simple circuit using an ohmmeter or test light. d. Measure amperage in a circuit using an ammeter. e. Check voltage in a circuit using a voltmeter.	• Demonstrate the correct usage of a multimeter to measure resistance, continuity, amperage, and voltage. Students will practice using the multimeter. Students will perform each operation as a performance activity. **Assessment:** • Identification list will be graded for accuracy. • The activity will be evaluated using teacher observation and the Performance Evaluation in Appendix E.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

EETC 100 Small Engine Fundamentals

Academic Standards

A1 Recognize, classify, and use real numbers and their properties.
A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.
A3 Simplify algebraic expressions, solve and graph equations, inequalities and systems in one and two variables.
A5 Utilize various formulas in problem-solving situations.
E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
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E10 Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
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WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP5 Selects, applies, and maintains/troubleshoots technology.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
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T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

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Outboard Marine Engine Mechanics I
Unit 9: Ignition Systems **(15 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Explain the components of an outboard marine engine ignition system. a. Describe the types of ignition systems. b. Compare and contrast components of a battery, magneto, breaker-less, and solid state ignition system (primary and secondary circuits). c. Describe the purpose and operation of ignition system components.	**Teaching:** • List and define the types of ignition systems. Have the students match the definitions with the types of ignition systems on an activity sheet. • Provide students with a handout describing the components of each type of ignition system. Students will be given an example of various types of motors and will match the type of ignition system with each motor. • Show a video to describe the purpose and operation of ignition system components. Have the students write a brief report on the video content. **Assessment:** • Assessment will be teacher observation, student participation, and graded activity sheet. • The report will be evaluated using the Written Report Evaluation in Appendix E.
2. Service and test outboard marine engine ignition systems according to manufacturer's specifications. a. Remove, service, and/or replace sparkplugs. b. Remove and replace contact points and condenser. c. Test and adjust a solid state ignition system.	**Teaching:** • Following a teacher demonstration of the procedures, the students will perform the removal, service, and/or replacement of sparkplugs. • Following a teacher demonstration of the procedures, the students will perform the removal and replacement of contact points and condenser. • Following a teacher demonstration of the procedures, the students will test and adjust a solid state ignition system. **Assessment:** • The activity will be evaluated using the Performance Evaluation in Appendix E.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

EETC 100 Small Engine Fundamentals

EETC 200 Maintenance

Academic Standards

A1 Recognize, classify, and use real numbers and their properties.
A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.
E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.
H1 Explain how geography, economics, and politics have influenced the historical development of the United States in the global community.
H2 Describe the impact of science and technology on the historical development of the United States in the global community.
H3 Describe the relationship of people, places, and environments through time.
H4 Demonstrate the ability to use social studies tools (e.g., timelines, maps, globes, resources, graphs, a compass, technology, etc.).
H5 Analyze the contributions of Americans to the ongoing democratic process to include civic responsibilities.

Workplace Skills for the 21st Century

WP1 Allocates resources (time, money, materials and facilities, and human resources).
WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP5 Selects, applies, and maintains/troubleshoots technology.

WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

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Outboard Marine Engine Mechanics I
Unit 10: Lubrication Systems **(15 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Explain the principles of lubrication and engine oils. a. Define terms related to lubrication systems. b. Describe the functions of engine oil. c. Describe the characteristics of appropriate engine oil. d. Describe factors to consider in selection and use of oils for best engine performance.	**Teaching:** • Using various resources, define and discuss the terms related to lubrication. The students will match terms with the definitions. • Discuss the characteristics and functions of engine oil. Show a video and have students answer questions concerning video and discussion content. • Discuss the factors to consider in the selection and use of oils. Assign students a specific model of engine. They will prepare a form that includes the brand of oil which meets manufacturer's specifications, oil change intervals, climatic temperature range, etc. **Assessment:** • The matching activity will be assessed for accuracy. • The video activity will be assessed for accuracy. • The form will be assessed for accuracy.
2. Perform lubrication services on outboard marine engines. a. Change engine oil and filter (if present). b. Service a crankcase breather according to manufacturer's specifications. c. Mix lubricant and fuel for a 2-stroke cycle engine according to manufacturer's specifications.	**Teaching:** • Demonstrate how to change engine oil and filter (if present) including replacement or cleaning of oil filter according to manufacturer's specifications. The students will change the engine oil and filter. • Demonstrate how to service a crankcase breather according to manufacturer's specifications. The students will service a crankcase breather. • Demonstrate how to mix lubricant and fuel for a 2-stroke cycle engine according to manufacturer's specifications. The students will mix lubricant and fuel for a 2-stroke cycle engine. **Assessment:** • The activity will be evaluated using the Performance Evaluation in Appendix E.

3. Apply procedures for preparing an outboard marine engine for storage according to manufacturer's specifications. a. Explain the procedures for storing. b. Prepare an outboard marine engine for storage.	**Teaching:** • Explain and demonstrate how to prepare a small engine for storage according to manufacturer's specifications. The students will prepare a small engine for storage. **Assessment:** • The activity will be evaluated using the Performance Evaluation in Appendix E.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

EETC 100 Small Engine Fundamentals
EETC 200 Maintenance
EETC 300 2-Stroke Cycle Gasoline Engine

Academic Standards

A1 Recognize, classify, and use real numbers and their properties.
A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.
E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

WP1 Allocates resources (time, money, materials and facilities, and human resources).
WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP5 Selects, applies, and maintains/troubleshoots technology.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

SUGGESTED REFERENCES

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Outboard Marine Engine Mechanics I
Unit 11: Cooling Systems **(15 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Define terms and safety procedures associated with service of an air-cooled system. a. Define terms associated with air-cooled cooling system. b. Discuss safety precautions when working with cooling systems. c. Identify the components of an air-cooled system. d. Demonstrate the cleaning and replacement of system parts according to manufacturer's specifications.	**Teaching:** • Using various resources, define and discuss the terms related to air-cooled cooling system. The students will match terms with the definitions. • Discuss safety precautions required when working with an air-cooled system. The students will write a paragraph explaining the safety precautions. • Discuss components of an air-cooled engine cooling system. Provide the students with a list of the components and have them determine the function of each component. • Demonstrate procedures to remove, clean, and replace air cooling system parts according to manufacturer's specifications. The students will remove, clean, and replace air cooling system parts. **Assessment:** • The matching activity will be graded for accuracy. • Use the Written Report Evaluation in Appendix E to evaluate the paragraph. • The activity will be evaluated using the Performance Evaluation in Appendix E.
2. Service a water-cooled outboard engine system. a. Identify the parts of a water-cooled outboard engine cooling system. b. Inspect and service a water-cooled outboard engine cooling system.	**Teaching:** • Discuss the parts of a water-cooled engine cooling system. Provide the students with a list of the components and have them determine the function of each component. • Demonstrate procedures to inspect and service a water-cooled engine cooling system. The student will inspect and service a water-cooled engine cooling system. **Assessment:** • The activity will be evaluated using the Performance Evaluation in Appendix E.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

EETC 100	Small Engine Fundamentals
EETC 200	Maintenance
EETC 300	2-Stroke Cycle Gasoline Engine

Academic Standards

A1	Recognize, classify, and use real numbers and their properties.
A2	Recognize, create, extend, and apply patterns, relations, and functions and their applications.
E1	Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2	Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3	Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4	Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5	Complete oral and written presentations which exhibit interaction and consensus within a group.
E7	Discover the power and effect of language by reading and listening to selections from various literary genres.
E8	Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9	Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10	Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

WP1	Allocates resources (time, money, materials and facilities, and human resources).
WP2	Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
WP3	Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4	Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP5	Selects, applies, and maintains/troubleshoots technology.
WP6	Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.

WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

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Outboard Marine Engine Mechanics I
Unit 12: Fuel Systems (Carburetor-Type) **(22 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Identify fuel and fuel systems used in outboard marine engines. a. Describe benefits of using unleaded fuel in most new small gas engines. b. Identify the components of a typical carburetor-type fuel system. c. Identify the different types of fuel filters. d. Identify the parts of a float-type carburetor. e. Describe functions of the carburetor.	**Teaching:** • Discuss the benefits of using unleaded fuel in most new small gas engines. Have the students use the Internet to search and compare the benefits of using unleaded fuel compared to leaded fuel. Have the students write a one-page paper describing their research findings. • Discuss components of a carburetor-type fuel system. Provide the students with a list of the components and have them determine the function of each component. • List and define the types of fuel filters. Have the students match the definitions with the types of fuel filters on an activity sheet. • Display parts of a float-type carburetor and discuss the different parts. Using a visual presentation, have the students match the parts with their names. • Have the students research the functions of the carburetor using materials in the classroom and Internet. The students will write a report and present either in written or oral form. **Assessment:** • The reports will be evaluated using the Written Report Evaluation in Appendix E. • The presentation will be evaluated using the Presentation Report Evaluation in Appendix E.
2. Remove, service, replace, and adjust a float-type carburetor. a. Disassemble, clean, inspect, reassemble, and adjust a Mercury-style float-type carburetor. b. Disassemble, clean, inspect, reassemble, and adjust an OMC style float-type carburetor. c. Re-assemble and pressure test carburetor.	**Teaching:** • Demonstrate procedures to service a Mercury-style and an OMC-style float-type carburetor according to manufacturer's specifications. This should include disassembly, cleaning, inspection, reassembly, and making adjustments. The students will service both types of float-type carburetors.

d. Run, test, and adjust engine.	**Assessment:** • The activity will be evaluated using the Performance Evaluation in Appendix E.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

EETC 100 Small Engine Fundamentals
EETC 200 Maintenance

Academic Standards

A1 Recognize, classify, and use real numbers and their properties.
A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.
E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

WP1 Allocates resources (time, money, materials and facilities, and human resources).
WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.

WP5 Selects, applies, and maintains/troubleshoots technology.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

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Outboard Marine Engine Mechanics I
Unit 13: Special Topics in Outboard Marine Engine Mechanics I (ongoing) (22 hours)

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Investigate new and emerging technologies, practices, trends, and issues associated with outboard marine engine mechanics. a. Prepare a report on a new and emerging technology associated with outboard marine engine mechanics. b. Prepare a report on a current trend or issue associated with outboard marine engine mechanics.	**Teaching:** • Discuss new and emerging technologies, practices, trends, and issues associated with the field, using videos and a PowerPoint presentation if available. Discuss how developments throughout history have impacted how people live and work. • Have students work in groups and use the Internet and current publications to research one new and emerging technology, practice, trend, or issue. Have students use this research to develop an idea for a new product and prepare and deliver a presentation in order to sell the idea to a company (the class). Students may prepare brochures, posters, and handouts using appropriate technology tools (if available) to distribute during the presentation (may use PowerPoint). • Have each student select the one product that he or she thinks is most likely to be successful in the market and prepare a brief report explaining the impact of the product on the field. **Assessment:** • Monitor group work to ensure that each member participates in research, idea development, and presentation preparation. • Evaluate each group's presentation for content, clarity, presentation, visual aids, and length using the Presentation Evaluation in Appendix E. • Evaluate each student's report using the Written Report Evaluation in Appendix E.
2. Complete school-to-careers activities related to outboard marine engine mechanics. a. Participate in a school-to-careers activity (shadowing, mentoring, career fair, etc.) related to outboard	**Teaching:** • Explain educational and career opportunities that will be available to students after they complete the program. • Have students use career software, such as Choices, to measure their aptitudes and

marine engine mechanics. b. Investigate educational opportunities related to outboard marine engine mechanics at the postsecondary level. c. Describe the role of trade organizations, associations, and unions as related to outboard marine engine mechanics. d. Describe national standards and certification/licensing procedures related to outboard marine engine mechanics.	abilities for particular careers. • Have each student select a career in a field related to the course and use the *Occupational Outlook Handbook* (book or website), Internet, and other resources to research job titles, educational and skill requirements, expected job growth, and entry-level salaries. Have each student report the findings in a two-page report. • Have students work in groups and use the Internet, college catalogs, industry publications, and other information to research a list of careers for which they will be qualified upon program completion and postsecondary educational opportunities that will be available to them. Have each group orally present their findings to the class. • Explain and lead a class discussion about the role of trade organizations, associations, and unions as related to outboard marine engine mechanics. Have the students search the Internet to locate trade organizations and associations related to the field. Have each student make a list of organizations and associations, etc. • Explain the importance of obtaining a national certification in the field. Discuss and identify the Equipment & Engine Training Council (EETC) as a means of obtaining a national certification. Have the students search the Internet to locate the EETC's Web site and identify the certification requirements for the 2- and 4-stoke gasoline engine. Have students develop a list of the requirements. **Assessment:** • Monitor group work throughout the unit to ensure that each member participates. • Evaluate the career and educational opportunities presentation for content and delivery. • Evaluate the career report for content and grammar using the Written Report Evaluation in Appendix E.

	• Evaluate the list of organizations and associations for accuracy. • Evaluate the list of certification requirements for accuracy.
3. Demonstrate related academic skills and workplace skills associated with outboard marine engine mechanics. a. Complete a cooperative project (paper, presentation, or demonstration) associated with an academic subject and outboard marine engine mechanics. b. Practice human relations skills (team participation, client/customer service, leadership, negotiation, working with culturally diverse groups, etc.) related to outboard marine engine mechanics. c. Research work ethics and employer expectations of employees in outboard marine engine mechanics. d. Investigate the concepts of quality assurance as related to outboard marine engine mechanics.	**Teaching:** • Explain and lead a class discussion on the importance of academic and workplace skills. Have students brainstorm to develop a list of important academic and workplace skills. Compare the student development list to the lists in this document and discuss any differences. Assign each student a cooperative project associated with an academic subject. The project may be a paper, presentation, or demonstration. Work with the academic teacher. • Explain and lead a class discussion on the importance of good human relation skills as related to outboard marine engine. List desirable characteristics important for an outboard marine engine technician to possess. Give examples of how these characteristics are used in dealing with the public and in the workplace. Identify and discuss work ethics and employer expectations. • Lead a discussion about the concept of quality assurance. Explain how important quality is to the customer and the impact that it can have on a business. Have the students brainstorm to define quality and develop a list of important points to remember about quality as related to the program. • Divide students into groups. Give each group a different scenario involving serving the public, communicating with employees, and personal work ethic where desirable characteristics were lacking. Have each group re-write the scenario to include the desired characteristics and select a spokesperson to explain their scenario to the class. Following each presentation, lead the class to discuss and evaluate the solutions presented by each

	group. • Have students keep a weekly journal (typed if technology is available) of their experiences dealing with others in the public or in the workplace throughout the year. Have students identify the behavior and characteristics that are present or that are lacking. **Assessment**: • Monitor group work. • Evaluate the list developed for accuracy. • Provide a grade on the integrated academic assignment. • Grade group scenarios according to content. • Continue to assess each student's employability skills throughout the year.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

None

Academic Standards

E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

WP1 Allocates resources (time, money, materials and facilities, and human resources).
WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP5 Selects, applies, and maintains/troubleshoots technology.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

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Outboard Marine Engine Mechanics II
Unit 1: Safety and Orientation (Review and Reinforcement) (8 hours)

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Review and explain vocational policies, procedures, and requirements. a. Describe grading procedures used in the school. b. Describe vocational policies. c. Describe school attendance policies. d. Describe the student handbook.	**Teaching:** • Review and present local program and vocational/career technical center policies and procedures. • Students will read the handbook to become aware of what is expected of them in relation to the policies and procedures of the school. This will include dress code, attendance, academic requirements, discipline, grading procedures, and transportation regulations. Students will work together in pairs. A student with a higher reading ability will team up with a student with a lower reading ability to get a better understanding of the school's program policies and procedures. Have student submit a written report on rules and regulations. **Assessment:** • Assess student orientation, policy, and procedure knowledge through instructor observations and written unit test. File completed test to document student mastery of the school and program policies and procedures. • The report will be evaluated for clarity and content using the Written Report Evaluation in Appendix E.
2. Review and apply safety laws and standards used in outboard marine engine mechanics. a. Define terms associated with safety including accident, safety, first aid, hazardous materials, and OSHA. b. Apply rules for personal and general shop safety related to outboard marine engine mechanics. c. Describe state eye safety law, including appropriate times for wearing safety glasses. d. Associate the colors of the safety	**Teaching:** • Review, identify, discuss, and demonstrate terms, rules, and procedures related to shop/lab and industry safety. • Required written tests will follow each section of guidelines for safety rules and procedures. • Provide the students with a list of terms and have them define the terms. Pair the students to quiz each other on the definitions in preparation for a written exam. • Use the guidelines provided for personal

code with their correct application including red, green, yellow, black, white, orange, and blue.	safety (i.e., clothing, jewelry, hair, eyes, and ears). Divide the students into pairs and assign each pair one of the guidelines. Each pair will demonstrate the "do's and don'ts" of the guideline. • Explain and illustrate the colors of the safety code and their application. • Have an industry speaker present to the class the necessity of safety in the work environment. The students will write a summary of the presentation. • NOTE: SAFETY IS TO BE TAUGHT AS AN ONGOING PART OF THE COURSE THROUGHOUT THE YEAR. **Assessment:** • Student participation will be monitored by the instructor and the written exam will be graded. The student must achieve 100% accuracy. • The "do's and don'ts" exercise will be critiqued with a peer review. • The summary of the speaker's presentation will be evaluated using the Written Report Evaluation in Appendix E.
3. Review and explain procedures for working with and disposing of hazardous materials according to OSHA regulations. a. Define terms associated with hazardous materials. b. Identify categories of hazardous materials commonly found in outboard marine engine shops. c. Identify signal words or symbols such as "Caution," "Warning," and "Danger" that indicate the severity of a hazard. d. Describe methods for reducing hazardous waste. e. Identify general procedures for storing hazardous materials and wastes. f. Identify and describe the informational sections found on a Material Safety Data Sheet which provide guidelines for creating a safe	**Teaching:** • Review by providing students with a list of terms associated with hazardous materials including carcinogens, batteries, acids, flammables, and radioactive materials. Have the students define the terms through the use of printed material and Internet searches. • Provide students with a list of the classes (Class 1-9) and signal words or symbols related to hazardous materials including Class 2 Gases, Class 3 Flammable Liquids, and Class 8 Corrosives. Divide the students into pairs or groups; assign each group a class. The group will research information to include first aid procedures, safety equipment, MSDS requirements, and storing materials. The pairs or groups will present the information to the rest of the class. Using the information from their research, the pairs or groups will develop scenarios of

work environment. g. Describe general first aid procedures in case of an accident involving hazardous materials. h. Identify safety equipment to be used with hazardous materials including protection for eyes, respiratory system, body, and hands. i. Describe steps to follow in handling spills and waste disposal. j. Identify agencies to be contacted in case of an accident or for more information on hazardous materials.	hazards and accidents. The pairs or groups will swap scenarios, develop a prevention plan and a treatment program, and present the plan to the rest of the class. **Assessment:** • Assessment will be teacher observation, student participation, written test, and the Performance Evaluation in Appendix E.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

EETC 100 Small Engine Fundamentals

Academic Standards

A1 Recognize, classify, and use real numbers and their properties.
A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.
A3 Simplify algebraic expressions, solve and graph equations, inequalities and systems in one and two variables.
A4 Explore and communicate the characteristics and operations of polynomials.
A5 Utilize various formulas in problem-solving situations.
A6 Communicate using the language of algebra.
A7 Interpret and apply slope as a rate of change.
A8 Analyze data and apply concepts of probability.
B1 Utilize critical thinking and scientific problem solving in designing and performing biological research and experimentation.
B2 Investigate the biochemical basis of life.
B3 Investigate cell structures, functions, and methods of reproduction.
B4 Investigate the transfer of energy from the sun to living systems.
B5 Investigate the principles, mechanisms, and methodology of classical and molecular genetics.
B6 Investigate concepts of natural selection as they relate to diversity of life.
B7 Investigate the interdependence and interactions that occur within an ecosystem.
E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.

E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
E6 Explore cultural contributions to the history of the English language and its literature.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.
H1 Explain how geography, economics, and politics have influenced the historical development of the United States in the global community.
H2 Describe the impact of science and technology on the historical development of the United States in the global community.
H3 Describe the relationship of people, places, and environments through time.
H4 Demonstrate the ability to use social studies tools (e.g., timelines, maps, globes, resources, graphs, a compass, technology, etc.).
H5 Analyze the contributions of Americans to the ongoing democratic process to include civic responsibilities.

Workplace Skills for the 21st Century

WP1 Allocates resources (time, money, materials and facilities, and human resources).
WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP5 Selects, applies, and maintains/troubleshoots technology.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts

T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

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Outboard Marine Engine Mechanics II
Unit 2: Advanced Leadership **(10 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Develop advanced leadership in a vocational student organization (VSO). a. State procedures of leadership. b. Describe the leadership purposes of a VSO.	**Teaching:** • Review and discuss the role of a team member and leader. Assign the students roles within a team and have them role-play a situation in which there is a conflict which must be resolved. Utilize the lessons from SkillsUSA or other resources to provide additional training. **Assessment:** • Assess the role-play using a checklist for documentation. Use the Role-Play or Skit Rubric located in Appendix E. • Lessons from SkillsUSA and other resources should be assessed according to the recommended resource guide.
2. Identify personal traits and characteristics. a. Identify desirable personal traits. b. Identify desirable characteristics of the personal work ethic.	**Teaching:** • Review and discuss and explain desirable and undesirable personal qualities and characteristics of the personal work ethic. Give examples of how these characteristics are used in dealing with the public and in the workplace. • Divide students into groups. Give each group a different scenario involving serving the public, communicating with employees, and personal work ethic where desirable characteristics were lacking. Have each group re-write the scenario to include the desired characteristics and select a spokesperson to explain their scenario to the class. Following each presentation, lead the class to discuss and evaluate the solutions presented by each group. • Have students keep a weekly journal (typed if technology is available) of their experiences dealing with others in the public or in the workplace throughout the year. Have students identify the behavior and characteristics that are present or that are lacking.

	Assessment: • Monitor group work. • Grade group scenarios according to content. • Grade journals according to content and grammar.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

None

Academic Standards

A1 Recognize, classify, and use real numbers and their properties.
A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.
A3 Simplify algebraic expressions, solve and graph equations, inequalities and systems in one and two variables.
A4 Explore and communicate the characteristics and operations of polynomials.
A5 Utilize various formulas in problem-solving situations.
A6 Communicate using the language of algebra.
A7 Interpret and apply slope as a rate of change.
A8 Analyze data and apply concepts of probability.
B1 Utilize critical thinking and scientific problem solving in designing and performing biological research and experimentation.
B2 Investigate the biochemical basis of life.
B3 Investigate cell structures, functions, and methods of reproduction.
B4 Investigate the transfer of energy from the sun to living systems.
B5 Investigate the principles, mechanisms, and methodology of classical and molecular genetics.
B6 Investigate concepts of natural selection as they relate to diversity of life.
B7 Investigate the interdependence and interactions that occur within an ecosystem.
E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5 Complete oral and written presentations which exhibit interaction and consensus within a group.

E6 Explore cultural contributions to the history of the English language and its literature.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.
H1 Explain how geography, economics, and politics have influenced the historical development of the United States in the global community.
H2 Describe the impact of science and technology on the historical development of the United States in the global community.
H3 Describe the relationship of people, places, and environments through time.
H4 Demonstrate the ability to use social studies tools (e.g., timelines, maps, globes, resources, graphs, a compass, technology, etc.).
H5 Analyze the contributions of Americans to the ongoing democratic process to include civic responsibilities.

Workplace Skills for the 21st Century

WP1 Allocates resources (time, money, materials and facilities, and human resources).
WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP5 Selects, applies, and maintains/troubleshoots technology.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

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Outboard Marine Engine Mechanics II
Unit 3: Auxiliary Engine Systems **(15 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Explain the components of outboard marine engine charging system. a. Identify components of the charging system and state the function(s) of each. b. Identify the parts of an alternator charging system.	**Teaching:** • Discuss and display components of the charging system to include an alternator and state the function(s) of each, including generator or alternator, regulator, and ammeter. Have the student match the name and function of the visual display. **Assessment:** • The matching activity will be graded for accuracy.
2. Service an outboard marine engine charging system. a. Remove, check, and replace charging system components according to manufacturer's specifications.	**Teaching:** • Demonstrate removing, checking, and replacing an alternator. Have the students perform an exercise to remove, check, and replace an alternator according to manufacturer's specifications. **Assessment:** • The activity will be evaluated using the Performance Evaluation in Appendix E.
3. Explain the components of outboard marine engine starting systems. a. Describe the types of starting systems. b. Identify the components of a mechanical starting system and state the function of each. c. Identify the components of a DC starting system and state the function of each.	**Teaching:** • Describe the types of starting systems using visual representation and text information. Divide the students into pairs or groups and have them discuss the advantages and disadvantages of each system. Each pair or group will present a summary of the discussion to the class. • Discuss components of a mechanical starting system. Provide the students with a list of the components and have them determine the function of each component. • Provide a display of the major components of a DC starting system. Using an activity sheet and available resources, the students will identify these components and describe the function of each component. **Assessment:** • Assessment will include teacher observation, student participation, and the

	Presentation Evaluation in Appendix E.
4. Test/service outboard marine engine starting systems according to manufacturer's specifications. a. Remove, test/service, and replace a DC starter. b. Replace a starter rewind spring. c. Service a mechanical starter.	**Teaching:** • Demonstrate procedures to remove, test/service, and replace a DC starter according to manufacturer's specifications. The student will perform removal, test/service, and replace a DC starter. • Demonstrate procedures to replace a starter rewind spring according to manufacturer's specifications. The student will replace a starter rewind spring. • Demonstrate procedures to service a mechanical starter according to manufacturer's specifications. The student will service the mechanical starter. **Assessment:** • The activity will be evaluated using the Performance Evaluation in Appendix E.
5. Test/service the electrical power trim and tilt system. a. Identify the parts of the electrical power trim and tilt system. b. Disassemble, inspect, and reassemble an electrical power trim and tilt system.	**Teaching:** • Identify the parts while demonstrating procedures to disassemble, inspect, and reassemble the electrical power trim and tilt system according to manufacturer's specifications. The student will identify the parts while demonstrating the procedures to disassemble, inspect, and reassemble the electrical power tram and tile system according to manufacturer's specifications. **Assessment:** • The activity will be evaluated using the Performance Evaluation in Appendix E.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

EETC 100	Small Engine Fundamentals
EETC 200	Maintenance
EETC 300	2-Stroke Cycle Gasoline Engine
EETC 500	4-Stroke Cycle Gasoline Engine Diagnosis
EETC 600	4-Stroke Cycle Gasoline Engine Service

Academic Standards

A1 Recognize, classify, and use real numbers and their properties.
A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.
E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

WP1 Allocates resources (time, money, materials and facilities, and human resources).
WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP5 Selects, applies, and maintains/troubleshoots technology.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts

T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

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Outboard Marine Engine Mechanics II
Unit 4: Mechanical Remote Control Assembly **(12 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Identify the components of a mechanical remote control assembly. a. Identify the parts of the remote control assembly. b. Discuss their functions.	**Teaching:** • Discuss and identify the components of a mechanical remote control assembly. Discuss the function of each part. Have students develop a list of the components and write the function of each component. **Assessment:** • Assess the list for accuracy of content.
2. Service the components of a mechanical remote control assembly. a. Disassemble, inspect, and reassemble a mechanical remote control assembly. b. Install and adjust shift and throttle control cables.	**Teaching:** • Demonstrate the procedures to disassemble, inspect, and reassemble a remote control assembly according to manufacturer's specifications to include installing and adjusting the shift and throttle control cables. The student will demonstrate the procedures to disassemble, inspect, and reassemble a remote control assembly according to manufacturer's specifications. **Assessment:** • The activity will be evaluated using the Performance Evaluation in Appendix E.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

EETC 100 Small Engine Fundamentals
EETC 200 Maintenance
EETC 300 2-Stroke Cycle Gasoline Engine
EETC 500 4-Stroke Cycle Gasoline Engine Diagnosis
EETC 600 4-Stroke Cycle Gasoline Engine Service

Academic Standards

A1 Recognize, classify, and use real numbers and their properties.
A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.
E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.

E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

WP1 Allocates resources (time, money, materials and facilities, and human resources).
WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP5 Selects, applies, and maintains/troubleshoots technology.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

SUGGESTED REFERENCES

Briggs & Stratton, & Landon, D. (2003). *Small engine care & repair: A step-by-step guide to maintaining your small engine.* Chanhassen, MN: Creative Publishing International.

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Outboard Marine Engine Mechanics II
Unit 5: Propeller and Trim Tab Systems **(12 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Match the correct propeller to a given boat and motor. a. Identify the parts of a propeller and trim tab and discuss their functions. b. Identify the different types of materials used in constructing propellers and describe their properties. c. Match correct propeller pitch to a given boat and motor. d. Discuss the purposes of a trim tab.	**Teaching:** • The instructor will identify the parts of a propeller and trim tab and discuss the functions of each. The instructor will identify and discuss the different types of materials used in constructing propellers and will identify the correct propeller pitch to a given boat. The instructor will discuss the purposes of a trim tab. The student will label the parts of a propeller and trim tab on a worksheet and write the functions of each. The student will write a one-page paper describing the different types of propellers and the types of materials used to make each. Given a specific type of boat, the student will identify the correct propeller pitch. The student will explain the purpose of a trim tab in a written paragraph. **Assessment:** • Grade the label sheet for accuracy. • Use the Written Report Evaluation in Appendix E to evaluate the paper. • Use the Written Report Evaluation in Appendix E to evaluate the paragraph.
2. Remove, inspect, and install a propeller assembly. a. Remove, inspect, and install a trim tab. b. Discuss the functions of shear pins and clip clutches.	**Teaching:** • Demonstrate the procedures to remove, inspect, and install a propeller assembly according to manufacturer's specifications. The student will demonstrate the procedures to remove, inspect, and install a propeller assembly according to manufacturer's specifications. • Explain the functions of shear pins and clip clutches. The student will write a paragraph describing the functions. **Assessment:** • The activity will be evaluated using the Performance Evaluation in Appendix E. • Use the Written Report Evaluation in Appendix E to evaluate the paragraph.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

None

Academic Standards

A1 Recognize, classify, and use real numbers and their properties.
A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.
A7 Interpret and apply slope as a rate of change.
E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

WP1 Allocates resources (time, money, materials and facilities, and human resources).
WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP5 Selects, applies, and maintains/troubleshoots technology.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.

WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

SUGGESTED REFERENCES

Briggs & Stratton, & Landon, D. (2003). *Small engine care & repair: A step-by-step guide to maintaining your small engine.* Chanhassen, MN: Creative Publishing International.

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Outboard Marine Engine Mechanics II
Unit 6: Mechanical Gearcase **(22 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Identify and discuss parts of a gearcase. a. Identify the parts. b. Describe the functions.	**Teaching:** • The instructor will identify the parts of a gearcase and discuss the functions. The student will label the parts of a gearcase on a worksheet and write the functions. **Assessment:** • Grade the worksheet for accuracy.
2. Perform basic service on a mechanical gearcase. a. Disassemble, inspect and service, and reassemble. b. Perform routine service on a mechanical gearbox.	**Teaching:** • Demonstrate the procedures to disassemble, inspect and service, and reassemble a mechanical gearcase according to manufacturer's specifications. The instructor will demonstrate the procedures for routine service on a mechanical gearcase. The student will demonstrate the procedures to remove, inspect, install, and service a mechanical gearcase according to manufacturer's specifications. **Assessment:** • The activity will be evaluated using the Performance Evaluation in Appendix E.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

EETC 100 Small Engine Fundamentals
EETC 200 Maintenance
EETC 300 2-Stroke Cycle Gasoline Engine
EETC 500 4-Stroke Cycle Gasoline Engine Diagnosis
EETC 600 4-Stroke Cycle Gasoline Engine Service

Academic Standards

A1 Recognize, classify, and use real numbers and their properties.
A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.
E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.

E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

WP1 Allocates resources (time, money, materials and facilities, and human resources).
WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP5 Selects, applies, and maintains/troubleshoots technology.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

SUGGESTED REFERENCES

Briggs & Stratton, & Landon, D. (2003). *Small engine care & repair: A step-by-step guide to maintaining your small engine.* Chanhassen, MN: Creative Publishing International.

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Outboard Marine Engine Mechanics II
Unit 7: Advanced Fuel and Carburetion **(30 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Identify and explain the typical fuel and carburetion systems. a. Identify terms. b. Explain the mixture of fuel. c. Compare and contrast the differences between carburetor and fuel injection systems.	**Teaching:** • Identify, list, and define the terms associated with the typical fuel and carburetion system. Have the students match the definitions of terms with the term on an activity sheet. • Explain, lead a class discussion, and demonstrate the mixture of fuel for outboard marine engines. Discuss why the fuel is mixed and the ratios. Have the students demonstrate mixing fuel for an engine in the correct proportions. • Identify and discuss the difference between a carburetor and fuel injection system. Review the functions of a carburetor and fuel injection system highlighting the differences. Have the students write a one-page paper on the difference between the carburetor and fuel injection systems. **Assessment:** • Grade the matching sheet for accuracy. • The activity will be evaluated using the Performance Evaluation in Appendix E. • Use the Written Report Evaluation in Appendix E to evaluate the one-page paper.
2. Service and analyze the fuel and carburetion systems. a. Describe fuel system problems which can cause loss of performance in an outboard marine engine. b. Disassemble, inspect and service, and reassemble a vacuum fuel system. c. Describe the operation of a venturi in a carburetor. d. Remove, disassemble, inspect service, reassemble, install, and adjust a carburetor. e. Analyze an engine to determine fuel system problems.	**Teaching:** • Identify, explain, and discuss fuel system problems which can cause loss of performance. Have the students analyze a case study involving a fuel system to determine the problem. • Discuss and demonstrate the disassembly, inspection, servicing, and reassembly of a vacuum fuel system. Have students demonstrate the disassembly, inspection, servicing, and reassembly of a vacuum fuel system. • Explain and discuss the operation of a venture in a carburetor. Have the students write a paragraph discussing the operation

	of a venture in a carburetor. • Discuss and demonstrate the removal, disassembly, inspection, servicing and reassembly, installing, and adjusting a carburetor. Have students demonstrate the task. • Provide an engine with a fuel system problem and have the students to determine the problem. **Assessment:** • Evaluate the analysis of the case study using the Case Study Assessment Rubric in Appendix E. • The activity will be evaluated using the Performance Evaluation in Appendix E. • Evaluate the paragraph using the Written Report Evaluation in Appendix E.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

EETC 100	Small Engine Fundamentals
EETC 200	Maintenance
EETC 300	2-Stroke Cycle Gasoline Engine
EETC 400	2-Stroke Cycle Gasoline Engine Overhaul
EETC 500	4-Stroke Cycle Gasoline Engine Diagnosis
EETC 600	4-Stroke Cycle Gasoline Engine Service
EETC 700	Failure Analysis

Academic Standards

A1	Recognize, classify, and use real numbers and their properties.
A2	Recognize, create, extend, and apply patterns, relations, and functions and their applications.
E1	Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2	Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3	Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4	Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.

E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

WP1 Allocates resources (time, money, materials and facilities, and human resources).
WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP5 Selects, applies, and maintains/troubleshoots technology.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

SUGGESTED REFERENCES

Briggs & Stratton, & Landon, D. (2003). *Small engine care & repair: A step-by-step guide to maintaining your small engine*. Chanhassen, MN: Creative Publishing International.

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Outboard Marine Engine Mechanics II
Unit 8: Advanced Ignition Systems **(30 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Explain the various ignition systems. a. Identify terms associated with various ignition systems. b. Explain the operating principles. c. Explain safety precautions.	**Teaching:** • Identify, list, and define the terms associated with ignition systems. Have the students match the definitions of terms with the terms on an activity sheet. • Explain, lead a class discussion, and demonstrate how ignition systems operate. Have the students demonstrate the operation of ignition systems. • Identify, explain, and demonstrate safety precautions used when working with ignition systems. Have the students write a one-page paper on safety precautions to be used when working with ignition systems. **Assessment:** • Grade the matching sheet for accuracy. • The activity will be evaluated using the Performance Evaluation in Appendix E. • Use the Written Report Evaluation in Appendix E to evaluate the one-page paper.
2. Analyze ignition systems to determine problems. a. Troubleshoot an OMC capacitor discharge ignition system. b. Troubleshoot a Mercury alternator driven ignition (ADI) system.	**Teaching:** • Identify, explain, and discuss ignition systems which can occur. Have the students analyze a case study involving an ignition system to determine the problem. • Discuss and demonstrate the disassembly, inspection, servicing, and reassembly of an OMC capacitor discharge ignition system. Have students demonstrate the disassembly, inspection, servicing, and reassembly of an OMC capacitor discharge ignition system. • Discuss and demonstrate the disassembly, inspection, servicing, and reassembly of a Mercury alternator driven ignition (ADI) system. Have students demonstrate the disassembly, inspection, servicing, and reassembly of a Mercury alternator driven ignition (ADI) system. • Provide an engine with an ignition system

	problem and have the students to determine the problem. **Assessment:** • Evaluate the analysis of the case study using the Case Study Assessment Rubric in Appendix E. • The activity will be evaluated using the Performance Evaluation in Appendix E.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

EETC 100	Small Engine Fundamentals
EETC 200	Maintenance
EETC 300	2-Stroke Cycle Gasoline Engine
EETC 400	2-Stroke Cycle Gasoline Engine Overhaul
EETC 500	4-Stroke Cycle Gasoline Engine Diagnosis
EETC 600	4-Stroke Cycle Gasoline Engine Service
EETC 700	Failure Analysis

Academic Standards

A1	Recognize, classify, and use real numbers and their properties.
A2	Recognize, create, extend, and apply patterns, relations, and functions and their applications.
E1	Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2	Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3	Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4	Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5	Complete oral and written presentations which exhibit interaction and consensus within a group.
E7	Discover the power and effect of language by reading and listening to selections from various literary genres.
E8	Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9	Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10	Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

WP1 Allocates resources (time, money, materials and facilities, and human resources).
WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP5 Selects, applies, and maintains/troubleshoots technology.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

SUGGESTED REFERENCES

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Outboard Marine Engine Mechanics II
Unit 9: Overhaul of Two-Stroke Cycle Engine **(32 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Describe the parts of a 2-stroke cycle engine. a. Identify terms/parts of the piston and connecting rod assembly. b. Identify terms/parts of the 2-stroke cycle crankshaft assembly. c. Explain causes of engine problems in 2-stroke cycle engines.	**Teaching:** • Provide students with a list of terms and definitions relating to parts and overhaul. Discuss these terms. Divide students into pairs to practice quiz each other prior to a written test. • Display the parts of a piston and connecting rod assembly. Using a visual presentation, have the students match the parts with their names. • Display the parts of the crankshaft assembly. Using a visual presentation, have the students match the parts with their names. • Students will read information from text and other resources and discuss causes of engine problems. Students will be given a quiz following the discussion. **Assessment:** • Assessment will be teacher observation, student participation, and graded activity.
2. Inspect and overhaul various 2-stroke cycle engines to manufacturer's specifications. a. Disassemble, inspect, and overhaul a 2-stroke cycle engine. b. Reassemble a 2-stroke cycle engine. c. Replace a short block assembly on a 2-stroke cycle engine. d. Run and test engine.	**Teaching:** • Demonstrate procedures to disassemble, inspect, and overhaul a 2-stroke cycle engine according to manufacturer's specifications. Students will disassemble, inspect, and overhaul a 2-stroke cycle engine. • Demonstrate procedures to reassemble a 2-stroke cycle engine according to manufacturer's specifications. Students will reassemble a 2-stroke cycle engine. • Demonstrate procedures to replace a short block assembly on a 2-stroke cycle engine according to manufacturer's specifications. Students will replace a short block assembly on a 2-stroke cycle engine. • Have students run and test the engine. **Assessment:** • Assessment will be teacher observation, student participation, and Performance Rubric in Appendix E.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

EETC 100	Small Engine Fundamentals
EETC 200	Maintenance
EETC 300	2-Stroke Cycle Gasoline Engine
EETC 400	2-Stroke Cycle Gasoline Engine Overhaul
EETC 500	4-Stroke Cycle Gasoline Engine Diagnosis
EETC 600	4-Stroke Cycle Gasoline Engine Service
EETC 700	Failure Analysis

Academic Standards

A1	Recognize, classify, and use real numbers and their properties.
A2	Recognize, create, extend, and apply patterns, relations, and functions and their applications.
E1	Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2	Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3	Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4	Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5	Complete oral and written presentations which exhibit interaction and consensus within a group.
E7	Discover the power and effect of language by reading and listening to selections from various literary genres.
E8	Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9	Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10	Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

WP1	Allocates resources (time, money, materials and facilities, and human resources).
WP2	Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.
WP3	Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.

WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP5 Selects, applies, and maintains/troubleshoots technology.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

SUGGESTED REFERENCES

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Outboard Marine Engine Mechanics II
Unit 10: Employability Skills **(12 hours)**

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Prepare for employment. a. Prepare a résumé. b. Complete a job application form. c. Explain procedures for job interviews using correct job etiquette. d. Demonstrate the role of an applicant in a job interview using correct interview procedures. e. Describe job interview etiquette.	**Teaching:** • Identify and discuss the importance of employability skills. • Discuss how to locate a job. • Have students develop a report (typed if technology is available) of the job outlook and current opportunities available in the field. Students may use the resources at the Career Center (Career Futures software) or search newspapers, professional journals, the Internet, and other relevant. • Explain the importance of the application process, and identify the differences in a job application and a résumé. Discuss the importance of completing a job application and résumé correctly. Include neatness, spelling, grammar, punctuation, and hand-written versus typed. • Have students complete a job application and develop a résumé. • Discuss the importance of the job interview and describe appropriate and non-appropriate interview techniques. • Divide students into teams of two and have them complete a mock interview with one team member as the interviewer and the other as the interviewee, or ask Advisory Committee members to interview students. • Define ethics and etiquette as well as related terms, and discuss their importance in the workplace. Include honesty, confidentiality, integrity, punctuality, commitment, accountability, dependability, cooperation, willingness to learn, and proper notice of resignation. • Have a local business owner speak to the class about qualities that an employer looks for in an applicant. Have each student follow up with a summary of what he or she learned.

	• Have each student research and complete a written report on unethical activities performed recently by large companies and the impact on employees and customers. Describe human relations skills in the workplace, including attitude, behaviors, common manners and courtesies, and accepting criticism. **Assessment:** • Evaluate the job opportunities report for content and grammar using the Written Report Evaluation in Appendix E. • Evaluate the job application and résumé for content and neatness using the Résumé Rubric in Appendix E. • Evaluate the interview process using the Presentation Evaluation in Appendix E. • Evaluate the report on unethical behaviors using the Written Report Evaluation in Appendix E. • Monitor for participation in role-play activity using the Role Play or Skit Rubric in Appendix E. • Continue to assess each student's employability skills throughout the year.
2. Apply principles of customer relations in the outboard marine engine mechanics shop. a. Communicate with customer and/or supervisor. b. Complete customer work order form.	**Teaching:** • Briefly discuss the importance of communication and the components of listening and answering questions. • Have students research listening and speaking skills in books and Web sites. Lead students in a discussion about their research. • Pair students and have them sit back-to-back with a flat surface in front of each student. Give each student an identical set of Lego® or other building blocks, and instruct the students that they cannot look at the other's work or ask each other questions at any time. Have one student build a structure and then give the partner oral instructions to build an identical structure. Compare the structures. (You could also have students draw pictures with crayons.) Repeat the exercise and allow students to ask questions as they

	receive instructions. • Have students work in small groups to analyze the communication process and discuss errors made by the student giving instructions. • Have each student choose a good listening or speaking skill and discuss/demonstrate that skill before the class. • Explain the importance of a customer work order form. Provide examples. Demonstrate how to correctly complete a form. Have students complete various forms. **Assessment:** • Compare the structures constructed by each student for accuracy reflective of good communication. • Monitor each student's participation in group discussions. • Evaluate each student's discussion/demonstration of a skill. • Evaluate the work order forms for accuracy and readability.
3. Apply procedures of shop management in the outboard marine engine mechanics shop. a. Utilize parts identification media. b. Complete work records to account for parts and labor. c. Prepare customer bill/receipt.	**Teaching:** • Demonstrate how to utilize parts identification media including parts manuals, microfiche, and computerized parts identification systems. Provide the students with a practice worksheet to be followed by a written test. • Assist students to maintain work records to account for parts and labor including verification of completed standard work order forms to indicate the major repairs made, parts used, and time taken. Provide students with scenario's to complete work records and have them put them in a portfolio. • Discuss product liability guidelines and ANSI Standards. Provide the students with a replacement part. They are to locate the liability guidelines, show the teacher where they are, read them, and summarize the guidelines. • Demonstrate how to prepare customer bill/receipt so that the completed product is

	legible, is free of mathematical error, and accurately reflects the transaction including service performed, parts repaired or replaced, labor, sales tax, and total cost. Provide the student with a billing scenario and have them correctly complete the bill/receipt form. **Assessment:** • Assessment will be teacher observation, student participation, and graded activity.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

None

Academic Standards

E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

WP1 Allocates resources (time, money, materials and facilities, and human resources).
WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.

WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.
WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.
WP5 Selects, applies, and maintains/troubleshoots technology.
WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.
WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.
WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

National Educational Technology Standards for Students

T1 Basic operations and concepts
T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

SUGGESTED REFERENCES

Biays, J. S., & Wershoven, C. (2004). *Along these lines: Writing sentences and paragraphs*. Upper Saddle River, NJ: Prentice Hall.

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Outboard Marine Engine Mechanics II
Unit 11: Special Topics in Outboard Marine Engine Mechanics II (ongoing) (22 hours)

Competencies and Suggested Objectives	Suggested Strategies for Competencies
1. Review and investigate careers and educational opportunities, new and emerging technologies, trends, and issues associated with outboard marine engine mechanics. a. Prepare a report on career and continuing educational opportunities using the Internet and/or other computerized databases (Career Center and Choices). b. Prepare a report on a new and emerging technology associated with outboard marine engine mechanics. c. Prepare a report on a current trend or issue associated with outboard marine engine mechanics.	**Teaching:** • Review and discuss new and emerging technologies, practices, trends, and issues associated with the field, using videos and a PowerPoint presentation if available. Discuss how developments throughout history have impacted how people live and work. • Have students work in groups and use the Internet and current publications to research one new and emerging technology, practice, trend, or issue. • Have students use this research to develop an idea for a new product and prepare and deliver a presentation in order to sell the idea to a company (the class). Students may prepare brochures, posters, and handouts. (using appropriate technology tools if available) to distribute during the presentation (may use PowerPoint). • Have each student select the one product that he or she thinks is most likely to be successful in the market and prepare a brief report explaining the impact of the product on the field. **Assessment:** • Monitor group work to ensure that each member participates in research, idea development, and presentation preparation. • Evaluate each group's presentation for content, clarity, presentation, visual aids, and length using the Presentation Evaluation in Appendix E. • Evaluate each student's report for content as well as grammar and organization using the Written Report Evaluation in Appendix E.
2. Complete school-to-careers activities related to outboard marine engine mechanics. a. Participate in a school-to-careers activity (shadowing, mentoring,	**Teaching:** • Review and explain educational and career opportunities that will be available to students after they complete the program. • Have students use career software, such as

career fair, etc.) related to outboard marine engine mechanics. b. Investigate educational opportunities related to outboard marine engine mechanics at the postsecondary level. c. Describe national standards and certification/licensing procedures related to outboard marine engine mechanics. d. Describe the role of trade organizations, associations, and unions as related to outboard marine engine mechanics.	Choices, to measure their aptitudes and abilities for particular careers. • Have students work in groups and use the Internet, college catalogs, industry publications, and other information to research a list of careers for which they will be qualified upon program completion and postsecondary educational opportunities that will be available to them. Have each group orally present their findings to the class. • Have each student select a career in a field related to the course and use the *Occupational Outlook Handbook* (book or Web site), Internet, and other resources to research job titles, educational and skill requirements, expected job growth, and entry-level salaries. Have each student report the findings in a two-page report. • Have each student use the Internet or newspapers to choose a job for which they are qualified and revise their résumé and cover letter to apply for the selected job. • Describe national standards/licensing procedures related to the program. Have students use the Internet to search for licensing organizations and prepare a one-page paper on how to become certified or licensed. • Discuss the role of trade organizations, associations, and unions as related to the program. Have students research to determine organizations that are available. Have students make a list of the organizations and identify the name of the organization, the purpose or mission, how to become a member, the benefits, etc. **Assessment:** • Monitor group work throughout the unit to ensure that each member participates. • Evaluate the career and educational opportunities presentation using the Presentation Evaluation in Appendix E. • Evaluate the career report using the Written Report Evaluation in Appendix E. • Evaluate the list of organizations for

	accuracy of content.
3. Demonstrate related academic skills and workplace skills associated with outboard marine engine mechanics. a. Complete a cooperative project (paper, presentation, or demonstration) associated with an academic subject and outboard marine engine mechanics. b. Practice human relations skills (team participation, client/customer service, leadership, negotiation, working with culturally diverse groups, etc.) related to outboard marine engine mechanics. c. Research work ethics and employer expectations of employees in outboard marine engine mechanics. d. Investigate the concepts of quality assurance as related to outboard marine engine mechanics.	**Teaching:** • Review the importance of academic and workplace skills. Have students brainstorm to develop a list of important academic and workplace skills. Compare the student development list to the lists in this document and discuss any differences. Assign each student a cooperative project associated with an academic subject. The project may be a paper, presentation, or demonstration. Work with the academic teacher. • Review and lead a class discussion on the importance of good human relation skills as related to outboard marine engine. List desirable characteristics important for an outboard marine engine technician to possess. Give examples of how these characteristics are used in dealing with the public and in the workplace. Identify and discuss work ethics and employer expectations. • Review the concept of quality assurance. Explain how important quality is to the customer and the impact that it can have on a business. Have the students brainstorm to define quality and develop a list of important points to remember about quality as related to the program. • Divide students into groups. Give each group a different scenario involving serving the public, communicating with employees, and personal work ethic where desirable characteristics were lacking. Have each group re-write the scenario to include the desired characteristics and select a spokesperson to explain their scenario to the class. Following each presentation, lead the class to discuss and evaluate the solutions presented by each group. • Have students keep a weekly journal (typed if technology is available) of their experiences dealing with others in the public or in the workplace throughout the

	year. Have students identify the behavior and characteristics that are present or that are lacking. **Assessment**: • Monitor group work. • Evaluate the list developed for accuracy. • Provide a grade on the integrated academic assignment. • Grade group scenarios according to content. • Continue to assess each student's employability skills throughout the year.
4. Examine trends and changes related to outboard marine engine mechanics and global economic factors. a. Define and discuss the concept of global economics and competition. b. Describe global economic factors and competition as related to outboard marine engine mechanics. c. Identify regions and other countries which compete in outboard marine engine mechanics.	**Teaching:** • Define and discuss global economics and competition as related to the program. Have student's research global economics and competition in the outboard marine industry and write a one-page paper on the topic to include regions and other countries which compete in the industry. **Assessment:** • Use the Written Report Evaluation in Appendix E to evaluate the paper.

STANDARDS

Equipment & Engine Training Council 2- & 4-Stroke Gasoline Engine Standards

None

Academic Standards

A1 Recognize, classify, and use real numbers and their properties.
A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.
E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.

E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
E10 Use language and critical thinking strategies to serve as tools for learning.

Workplace Skills for the 21st Century

WP1 Allocates resources (time, money, materials and facilities, and human resources).
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National Educational Technology Standards for Students

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T2 Social, ethical, and human issues
T3 Technology productivity tools
T4 Technology communications tools
T5 Technology research tools
T6 Technology problem-solving and decision-making tools

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Recommended Tools and Equipment

CAPITALIZED ITEMS

1. Air compressor with regulator, lines, and hoses (1)
2. Computer with operating software with multimedia kit (1)
3. Drill press (1)
4. Floor hoist, 3 ton (1)
5. Floor jack (1)
6. Outboard marine engines (various sizes and models) (6)
7. Outboard test tank with exhaust system (1)
8. Printer (1)
9. Stands, marine engine (5)
10. Welder, oxyacetylene (1)
11. Work benches (5)

NON-CAPITALIZED ITEMS

1. Battery charger/booster (1)
2. Bead blaster part cleaner (1)
3. Brushes, wire (5)
4. Cables, battery jumper (1)
5. Caliper (1)
6. Chisel, cold (1)
7. Compressors, piston ring (5)
8. Creeper, floor (1)
9. Dial indicator set (1)
10. Drills, portable (2)
11 Dynamometer (1)
12. Expanders, piston ring (2)
13. File sets, assorted (5)
14. File, metric thread (1)
15. File, standard thread (1)
16. Flashlights with gooseneck adapter (2)
17. Gage, breaker plunger (1)
18. Gages, compression (5)
19. Gage, cylinder dial (1)
20. Gages, feeler (5)
21. Gages, plug (for a given engine) (5)
22. Gear case vacuum pump (1)
23. Gear case pressure pump (1)
24. Gear case stands (2)
25. Glaze breaker (1)
26. Grease gun (hand operated, cartridge) (1)
27. Grinder, portable with wire brush (1)
28. Hacksaws (3)

29. Hammers, ball peen (5)
30. Hammers, brass (5)
31. Heat gun (1)
32. Holders, flywheel (5)
33. Hone, cylinder (1)
34. Impact tool, set (1)
35. Jack stands (4)
36. Key, metric hex (1)
37. Lamp, 12 V test (1)
38. Light, timing (1)
39. Lights, trouble (2)
40. Magnet with handle (1)
41. Micrometer set, assorted sizes (1)
42. Multimeters (digital, VOM) (3)
43. Nut driver, set (1)
44. Pilot set (for a given engine) (1)
45. Pliers, assorted (5)
46. Pliers, retaining ring (convertible type) (2)
47. Pliers, lock grip (5)
48. Press, arbor (1)
49. Press, hydraulic (1)
50. Puller set, bearing (1)
51. Pullers, flywheel (5)
52. Punch set, metal (assorted) (1)
53. Reamer sets (for a given engine) (5)
54. Reamer, ridge (1)
55. Rulers, steel (2)
56. Scrapers, gasket (5)
57. Screw, extractor set (1)
58. Screwdriver sets (assorted, flat blade) (5)
59. Screwdriver sets (assorted, Phillips) (5)
60. Screwdriver sets, carburetor jet (small) (2 in set) (5)
61. Service carts (5)
62. Soldering iron (1)
63. Special tools for power head and lower unit service (1 set)
64. Starter, rewind crank (1)
65. Stud remover (1)
66. Tachometers, mechanical direct reading (5)
67. Tap and die set, SAE (1)
68. Tap and die set, metric (1)
69. Terminal lifter, battery (1)
70. Terminal cleaners, battery (2)
71. Tester, c.d. ignition (1)
72. Tester, diode (1)
73. Tester, ignition (M-80) (1)
74. Testers, spark (5)

75. Testers, coil and condenser (5)
76. Vises, swivel base (5)
77. Washer, parts (1)
78. Wrench, air impact (1/2") (1)
79. Wrenches, adjustable (5)
80. Wrenches, ignition (5)
81. Wrench sets, Allen (5)
82. Wrench sets, combination (5)
83. Wrench sets, socket, 1/4" drive (5)
84. Wrench sets, socket, 3/8" drive (5)
85. Wrench sets, socket, 1/2" drive (2)
86. Wrenches, spark plug (5)
87. Wrenches, torque (foot/lbs.) (5)
88. Wrenches, torque (inch/lbs.) (5)

RECOMMENDED INSTRUCTIONAL AIDS

Teacher should have access to:

1. Scientific calculator (1)
2. Cart, AV (for overhead projector) (1)
3. Cart, AV (for TV-VCR) (1)
4. Projector, overhead (1)
5. TV-VCR (1)
6. Video out (microcomputer to TV monitor) (1)
7. Video/audio data projector (1)
8. Laptop computer (1)
9. Digital camera
10. Interactive display board

Student Competency Profile for Outboard Marine Engine Mechanics I

Student:_____

This record is intended to serve as a method of noting student achievement of the competencies in each unit. Noted in parentheses beside each unit is the cluster competency from the MS-CPAS. This form may be duplicated for each student and serve as a cumulative record of competencies achieved in the course.

As an alternative to the use of this form, you may note competency achievement by attaching a report showing comparable results for each student. Please indicate that you are using this alternative report by checking here. _____

Unit 1: Safety and Orientation

_____1. Explain vocational policies, procedures, and requirements.
_____2. Apply safety practices used in outboard marine engine mechanics.
_____3. Explain procedures for working with and disposing of hazardous materials according to OSHA regulations.

Unit 2: Leadership and Personal Development

_____1. Develop leadership in a vocational student organization (VSO).
_____2. Identify personal traits and characteristics of an effective leader.

Unit 3: Tools and Equipment

_____1. Demonstrate the safe application and use of hand tools, power equipment, computers, and software.

Unit 4: Fasteners

_____1. Identify and describe the use of common fasteners, tools, and procedures for restoring damaged threads.
_____2. Identify and safely use tools for restoring internal and external threads.

Unit 5: Measurement

_____1. Identify and discuss precision measuring instruments.
_____2. Demonstrate the use of precision measuring instruments.

Unit 6: Engine Identification and Inspection

_____1. Identify types of outboard marine engines.
_____2. Identify information on outboard marine engines.

Unit 7: Basic Engine Principles and Design

_____1. Explain the principles of operation of an internal combustion engine.
_____2. Analyze engine horsepower rating.
_____3. Explain the principles of 4-stroke cycle engine operation.
_____4. Explain the principles of 2-stroke cycle engine operation.

Unit 8: Basic Electricity

_____1. Explain the principles of basic electricity.
_____2. Describe instruments and perform measurements of electricity.

Unit 9: Ignition Systems

_____1. Explain the components of an outboard marine engine ignition system.
_____2. Service and test outboard marine engine ignition systems according to manufacturer's specifications.

Unit 10: Lubrication Systems

_____1. Explain the principles of lubrication and engine oils.
_____2. Perform lubrication services on outboard marine engines.
_____3. Apply procedures for preparing an outboard marine engine for storage according to manufacturer's specifications.

Unit 11: Cooling Systems

_____1. Define terms and safety procedures associated with service of an air-cooled system.
_____2. Service a water-cooled outboard engine system.

Unit 12: Fuel Systems (Carburetor-Type)

_____1. Identify fuel and fuel systems used in outboard marine engines.
_____2. Remove, service, replace, and adjust a float-type carburetor.

Unit 13: Special Topics in Outboard Marine Engine Mechanics I (ongoing)

_____1. Investigate new and emerging technologies, practices, trends, and issues associated with outboard marine engine mechanics.
_____2. Complete school-to-careers activities related to outboard marine engine mechanics.
_____3. Demonstrate related academic skills and workplace skills associated with outboard marine engine mechanics.

Student Competency Profile for Outboard Marine Engine Mechanics II

Student:_____

This record is intended to serve as a method of noting student achievement of the competencies in each unit. Noted in parentheses beside each unit is the cluster competency from the MS-CPAS. This form may be duplicated for each student and serve as a cumulative record of competencies achieved in the course.

As an alternative to the use of this form, you may note competency achievement by attaching a report showing comparable results for each student. Please indicate that you are using this alternative report by checking here. _____

Unit 1: Safety and Orientation (Review and Reinforcement)

_____1. Review and explain vocational policies, procedures, and requirements.
_____2. Review and apply safety laws and standards used in outboard marine engine mechanics.
_____3. Review and explain procedures for working with and disposing of hazardous materials according to OSHA regulations.

Unit 2: Advanced Leadership

_____1. Develop advanced leadership in a vocational student organization (VSO).
_____2. Identify personal traits and characteristics.

Unit 3: Auxiliary Engine Systems

_____1. Explain the components of outboard marine engine charging system.
_____2. Service an outboard marine engine charging system.
_____3. Explain the components of outboard marine engine starting systems.
_____4. Test/service outboard marine engine starting systems according to manufacturer's specifications.
_____5. Test/service the electrical power trim and tilt system.

Unit 4: Mechanical Remote Control Assembly

_____1. Identify the components of a mechanical remote control assembly.
_____2. Service the components of a mechanical remote control assembly.

Unit 5: Propeller and Trim Tab Systems

_____1. Match the correct propeller to a given boat and motor.
_____2. Remove, inspect, and install a propeller assembly.

Unit 6: Mechanical Gearcase

_____1. Identify and discuss parts of a gearcase.
_____2. Perform basic service on a mechanical gearcase.

Unit 7: Advanced Fuel and Carburetion

_____1. Identify and explain the typical fuel and carburetion systems.
_____2. Service and analyze the fuel and carburetion systems.

Unit 8: Advanced Ignition Systems

_____1. Explain the various ignition systems.
_____2. Analyze ignition systems to determine problems.

Unit 9: Overhaul of Two-Stroke Cycle Engine

_____1. Describe the parts of a 2-stroke cycle engine.
_____2. Inspect and overhaul various 2-stroke cycle engines to manufacturer's specifications.

Unit 10: Employability Skills

_____1. Prepare for employment.
_____2. Apply principles of customer relations in the outboard marine engine mechanics shop.
_____3. Apply procedures of shop management in the outboard marine engine mechanics shop.

Unit 11: Special Topics in Outboard Marine Engine Mechanics II (ongoing)

_____1. Review and investigate careers and educational opportunities, new and emerging technologies, trends, and issues associated with outboard marine engine mechanics.
_____2. Complete school-to-careers activities related to outboard marine engine mechanics.
_____3. Demonstrate related academic skills and workplace skills associated with outboard marine engine mechanics.
_____4. Examine trends and changes related to outboard marine engine mechanics and global economic factors.

Appendix A: Equipment & Engine Training Council, OPE Category 1, 2- and 4-Stroke Cycle Gasoline Engine Standards[1]

EETC 100	Small Engine Fundamentals	
	101	Engine Identification
	102	Two Stroke Cycle Engine
	103	Four Stroke Cycle Engine
	104	Engine Components
EETC 200	Maintenance	
	201	Lubrication Fundamentals
	202	Lubrication – Engine Maintenance
EETC 300	2-Stroke Cycle Gasoline Engine	
	301	Test a 2-Stroke
EETC 400	2-Stroke Cycle Gasoline Engine Overhaul	
EETC 500	4-Stroke Cycle Gasoline Engine Diagnosis	
EETC 600	4-Stroke Cycle Gasoline Engine Service	
EETC 700	Failure Analysis	

[1] Equipment & Engine Training Council. (2003). *Program assessment manual for power equipment technology*. Hartland, WI: Author.

Appendix B: Academic Standards

Algebra I[2]

Competencies and Suggested Objective(s)

A1 Recognize, classify, and use real numbers and their properties.
- a. Describe the real number system using a diagram to show the relationships of component sets of numbers that compose the set of real numbers.
- b. Model properties and equivalence relationships of real numbers.
- c. Demonstrate and apply properties of real numbers to algebraic expressions.
- d. Perform basic operations on square roots excluding rationalizing denominators.

A2 Recognize, create, extend, and apply patterns, relations, and functions and their applications.
- a. Analyze relationships between two variables, identify domain and range, and determine whether a relation is a function.
- b. Explain and illustrate how change in one variable may result in a change in another variable.
- c. Determine the rule that describes a pattern and determine the pattern given the rule.
- d. Apply patterns to graphs and use appropriate technology.

A3 Simplify algebraic expressions, solve and graph equations, inequalities and systems in one and two variables.
- a. Solve, check, and graph linear equations and inequalities in one variable, including rational coefficients.
- b. Graph and check linear equations and inequalities in two variables.
- c. Solve and graph absolute value equations and inequalities in one variable.
- d. Use algebraic and graphical methods to solve systems of linear equations and inequalities.
- e. Translate problem-solving situations into algebraic sentences and determine solutions.

A4 Explore and communicate the characteristics and operations of polynomials.
- a. Classify polynomials and determine the degree.
- b. Add, subtract, multiply, and divide polynomial expressions.
- c. Factor polynomials using algebraic methods and geometric models.
- d. Investigate and apply real-number solutions to quadratic equations algebraically and graphically.
- e. Use convincing arguments to justify unfactorable polynomials.
- f. Apply polynomial operations to problems involving perimeter and area.

A5 Utilize various formulas in problem-solving situations.
- a. Evaluate and apply formulas (e.g., circumference, perimeter, area, volume, Pythagorean Theorem, interest, distance, rate, and time).
- b. Reinforce formulas experimentally to verify solutions.

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[2] *Mississippi mathematics framework—Algebra I*. (2003). Retrieved September 10, 2003, from http://marcopolo.mde.k12.ms.us/frameworks/mathematics/ma_algebra_i.html

c. Given a literal equation, solve for any variable of degree one.
d. Using the appropriate formula, determine the length, midpoint, and slope of a segment in a coordinate plane.
e. Use formulas (e.g., point-slope and slope-intercept) to write equations of lines.

A6 Communicate using the language of algebra.
a. Recognize and demonstrate the appropriate use of terms, symbols, and notations.
b. Distinguish between linear and non-linear equations.
c. Translate between verbal expressions and algebraic expressions.
d. Apply the operations of addition, subtraction, and scalar multiplication to matrices.
e. Use scientific notation to solve problems.
f. Use appropriate algebraic language to justify solutions and processes used in solving problems.

A7 Interpret and apply slope as a rate of change.
a. Define slope as a rate of change using algebraic and geometric representations.
b. Interpret and apply slope as a rate of change in problem-solving situations.
c. Use ratio and proportion to solve problems including direct variation (y=kx).
d. Apply the concept of slope to parallel and perpendicular lines.

A8 Analyze data and apply concepts of probability.
a. Collect, organize, graph, and interpret data sets, draw conclusions, and make predictions from the analysis of data.
b. Define event and sample spaces and apply to simple probability problems.
c. Use counting techniques, permutations, and combinations to solve probability problems.

Biology I[3]

Competencies and Suggested Objective(s)

B1 Utilize critical thinking and scientific problem solving in designing and performing biological research and experimentation.
a. Demonstrate the proper use and care for scientific equipment used in biology.
b. Observe and practice safe procedures in the classroom and laboratory.
c. Apply the components of scientific processes and methods in the classroom and laboratory investigations.
d. Communicate results of scientific investigations in oral, written, and graphic form.

B2 Investigate the biochemical basis of life.
a. Identify the characteristics of living things.
b. Describe and differentiate between covalent and ionic bonds using examples of each.
c. Describe the unique bonding and characteristics of water that makes it an essential component of living systems.

[3] *Mississippi science framework—Biology I*. (2003). Retrieved September 10, 2003, from http://marcopolo.mde.k12.ms.us/frameworks/science/sci_biology_I.html

d. Classify solutions using the pH scale and relate the importance of pH to organism survival.
e. Compare the structure, properties and functions of carbohydrates, lipids, proteins and nucleic acids in living organisms.
f. Explain how enzymes work and identify factors that can affect enzyme action.

B3 Investigate cell structures, functions, and methods of reproduction.
a. Differentiate between prokaryotic and eukaryotic cells.
b. Distinguish between plant and animal (eukaryotic) cell structures.
c. Identify and describe the structure and basic functions of the major eukaryotic organelles.
d. Describe the way in which cells are organized in multicellular organisms.
e. Relate cell membrane structure to its function in passive and active transport.
f. Describe the main events in the cell cycle and cell mitosis including differences in plant and animal cell divisions.
g. Relate the importance of meiosis to sexual reproduction and the maintenance of chromosome number.
h. Identify and distinguish among forms of asexual and sexual reproduction.

B4 Investigate the transfer of energy from the sun to living systems.
a. Describe the structure of ATP and its importance in life processes.
b. Examine, compare, and contrast the basic processes of photosynthesis and cellular respiration.
c. Compare and contrast aerobic and anaerobic respiration.

B5 Investigate the principles, mechanisms, and methodology of classical and molecular genetics.
a. Compare and contrast the molecular structures of DNA and RNA as they relate to replication, transcription, and translation.
b. Identify and illustrate how changes in DNA cause mutations and evaluate the significance of these changes.
c. Analyze the applications of DNA technology (forensics, medicine, agriculture).
d. Discuss the significant contributions of well-known scientists to the historical progression of classical and molecular genetics.
e. Apply genetic principles to solve simple inheritance problems including monohybrid crosses, sex linkage, multiple alleles, incomplete dominance, and codominance.
f. Examine inheritance patterns using current technology (gel electrophoresis, pedigrees, karyotypes).

B6 Investigate concepts of natural selection as they relate to diversity of life.
a. Analyze how organisms are classified into a hierarchy of groups and subgroups based on similarities and differences.
b. Identify characteristics of kingdoms including monerans, protists, fungi, plants and animals.
c. Differentiate among major divisions of the plant and animal kingdoms (vascular/non-vascular; vertebrate/invertebrate).
d. Compare the structures and functions of viruses and bacteria relating their impact on other living organisms.

e. Identify evidence of change in species using fossils, DNA sequences, anatomical and physiological similarities, and embryology.
f. Analyze the results of natural selection in speciation, diversity, adaptation, behavior and extinction.

B7 Investigate the interdependence and interactions that occur within an ecosystem.
a. Analyze the flow of energy and matter through various cycles including carbon, oxygen, nitrogen and water cycles.
b. Interpret interactions among organisms in an ecosystem (producer/consumer/decomposer, predator/prey, symbiotic relationships and competitive relationships).
c. Compare variations, tolerances, and adaptations of plants and animals in major biomes.
d. Investigate and explain the transfer of energy in an ecosystem including food chains, food webs, and food pyramids.
e. Examine long and short-term changes to the environment as a result of natural events and human actions.

English II[4]

Competencies and Suggested Objective(s)

E1 Produce writing which reflects increasing proficiency through planning, writing, revising, and editing and which is specific to audience and purpose.
a. Produce individual and/or group compositions and/or projects to persuade, tell a story, describe, create an effect, explain or justify an action or event, inform, entertain, etc.
b. Produce writing typically used in the workplace such as social, business, and technical correspondence; explanation of procedures; status reports; research findings; narratives for graphs; justification of decisions, actions, or expenses; etc.
c. Write a response, reaction, interpretation, analysis, summary, etc., of literature, other reading matter, or orally presented material.
d. Revise to ensure effective introductions, details, wording, topic sentences, and conclusions.

E2 Communicate ideas for a variety of school and other life situations through listening, speaking, and reading aloud.
a. Listen to determine the main idea and supporting details, to distinguish fact from opinion, and to determine a speaker's purpose or bias.
b. Speak with appropriate intonation, articulation, gestures, and facial expression.
c. Speak effectively to explain and justify ideas to peers, to inform, to summarize, to persuade, to entertain, to describe, etc.

E3 Read, evaluate, and use print, non-print, and technological sources to research issues and problems, to present information, and to complete projects.
a. Read, view, and listen to distinguish fact from opinions and to recognize persuasive and manipulative techniques.

[4] *Mississippi language arts framework—English II*. (2003). Retrieved September 10, 2003, from http://marcopolo.mde.k12.ms.us/frameworks/language_arts/la_10.html

b. Access both print and non-print sources to produce an I-Search paper, research paper, or project.
c. Use computers and audio-visual technology to access and organize information for purposes such as résumés, career search projects, and analytical writings, etc.
d. Use reference sources, indices, electronic card catalog, and appropriate research procedures to gather and synthesize information.

E4 Work individually and as a member of a team to analyze and interpret information, to make decisions, to solve problems, and to reflect, using increasingly complex and abstract thinking.
a. Interact with peers to examine real world and literary issues and ideas.
b. Show growth in critical thinking, leadership skills, consensus building, and self-confidence by assuming a role in a group, negotiating compromise, and reflecting on individual or group work.

E5 Complete oral and written presentations which exhibit interaction and consensus within a group.
a. Share, critique, and evaluate works in progress and completed works through a process approach.
b. Communicate effectively in a group to present completed projects and/or compositions.
c. Edit oral and written presentations to reflect correct grammar, usage, and mechanics.

E6 Explore cultural contributions to the history of the English language and its literature.
a. Explore a variety of works from various historical periods, geographical locations, and cultures, recognizing their influence on language and literature.
b. Identify instances of dialectal differences which create stereotypes, perceptions, and identities.
c. Recognize root words, prefixes, suffixes, and cognates.
d. Relate how vocabulary and spelling have changed over time.

E7 Discover the power and effect of language by reading and listening to selections from various literary genres.
a. Listen to and read aloud selected works to recognize and respond to the rhythm and power of language to convey a message.
b. Read aloud with fluency and expression.
c. Analyze the stylistic devices, such as alliteration, assonance, word order, rhyme, onomatopoeia, etc., that make a passage achieve a certain effect.
d. Demonstrate how the use of language can confuse or inform, repel or persuade, or inspire or enrage.
e. Analyze how grammatical structure or style helps to create a certain effect.

E8 Read, discuss, analyze, and evaluate literature from various genres and other written material.
a. Read and explore increasingly complete works, both classic and contemporary, for oral discussion and written analysis.
b. Read, discuss, and interpret literature to make connections to life.
c. Read from a variety of genres to understand how the literary elements contribute to the overall quality of the work.

d. Identify qualities in increasingly complex literature that have produced a lasting impact on society.
e. Read for enjoyment, appreciation, and comprehension of plot, style, vocabulary, etc.

E9 Sustain progress toward fluent control of grammar, mechanics, and usage of standard English in the context of writing and speaking.
a. Infuse the study of grammar and vocabulary into written and oral communication.
b. Demonstrate, in the context of their own writing, proficient use of the conventions of standard English, including, but not limited to, the following: complete sentences, subject-verb agreement, plurals, spellings, homophones, possessives, verb forms, punctuation, capitalization, pronouns, pronoun-antecedent agreement, parallel structure, and dangling and misplaced modifiers.
c. Give oral presentations to reinforce the use of standard English.
d. Employ increasingly proficient editing skills to identify and solve problems in grammar, usage, and structure.

E10 Use language and critical thinking strategies to serve as tools for learning.
a. Use language to facilitate continuous learning, to record observations, to clarify thought, to synthesize information, and to analyze and evaluate language.
b. Interpret visual material orally and in writing.

U. S. History from 1877[5]

Competencies and Suggested Objective(s)

H1 Explain how geography, economics, and politics have influenced the historical development of the United States in the global community.
a. Apply economic concepts and reasoning when evaluating historical and contemporary social developments and issues (e.g., gold standard, free coinage of silver, tariff issue, laissez faire, deficit spending, etc.).
b. Explain the emergence of modern America from a domestic perspective (e.g., frontier experience, Industrial Revolution and organized labor, reform movements of Populism and Progressivism, Women's Movement, Civil Rights Movement, the New Deal, etc.).
c. Explain the changing role of the United States in world affairs since 1877 through wars, conflicts, and foreign policy (e.g., Spanish-American War, Korean conflict, containment policy, etc.).
d. Trace the expansion of the United States and its acquisition of territory from 1877 (e.g., expansionism and imperialism).

H2 Describe the impact of science and technology on the historical development of the United States in the global community.
a. Analyze the impact of inventions on the United States (e.g., telephone, light bulb, etc.).
b. Examine the continuing impact of the Industrial Revolution on the development of our nation (e.g., mass production, computer operations, etc.).

[5] *Mississippi social studies framework—U.S. History from 1877*. (2003). Retrieved September 10, 2003, from http://marcopolo.mde.k12.ms.us/frameworks/social_studies/ss_us_history.html

c. Describe the effects of transportation and communication advances since 1877.

H3 Describe the relationship of people, places, and environments through time.

a. Analyze human migration patterns since 1877 (e.g., rural to urban, the Great Migration, etc.).

b. Analyze how changing human, physical, geographic characteristics can alter a regional landscape (e.g., urbanization, Dust Bowl, etc.).

H4 Demonstrate the ability to use social studies tools (e.g., timelines, maps, globes, resources, graphs, a compass, technology, etc.).

a. Interpret special purpose maps, primary/secondary sources, and political cartoons.

b. Analyze technological information on graphs, charts, and timelines.

c. Locate areas of international conflict (e.g., Caribbean, Southeast Asia, Europe, etc.).

H5 Analyze the contributions of Americans to the ongoing democratic process to include civic responsibilities.

a. Examine various reform movements (e.g., Civil Rights, Women's Movement, etc.).

b. Examine the government's role in various movements (e.g., arbitration, 26th Amendment, etc.).

c. Examine the role of government in the preservation of citizens' rights (e.g., 19th Amendment, Civil Rights Act of 1964).

d. Examine individuals' duties and responsibilities in a democratic society (e.g., voting, volunteerism, etc.).

Appendix C: Workplace Skills for the 21st Century[6]

WP1 Allocates resources (time, money, materials and facilities, and human resources).

WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.

WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.

WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.

WP5 Selects, applies, and maintains/troubleshoots technology.

WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.

WP7 Basic Skills: Employs basic academic skills including reading, writing, arithmetic and mathematics, speaking, and listening.

WP8 Personal Qualities: Practices work ethics related to individual responsibility, integrity, honesty, and personal management.

[6] *Secretary's commission on achieving necessary skills*. Retrieved July 13, 2004, from http://wdr.doleta.gov/SCANS/

Appendix D: National Educational Technology Standards for Students[7]

T1 Basic operations and concepts
- Students demonstrate a sound understanding of the nature and operation of technology systems.
- Students are proficient in the use of technology.

T2 Social, ethical, and human issues
- Students understand the ethical, cultural, and societal issues related to technology.
- Students practice responsible use of technology systems, information, and software.
- Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity.

T3 Technology productivity tools
- Students use technology tools to enhance learning, increase productivity, and promote creativity.
- Students use productivity tools to collaborate in constructing technology-enhanced models, prepare publications, and produce other creative works.

T4 Technology communications tools
- Students use telecommunications to collaborate, publish, and interact with peers, experts, and other audiences.
- Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.

T5 Technology research tools
- Students use technology to locate, evaluate, and collect information from a variety of sources.
- Students use technology tools to process data and report results.
- Students evaluate and select new information resources and technological innovations based on the appropriateness for specific tasks.

T6 Technology problem-solving and decision-making tools
- Students use technology resources for solving problems and making informed decisions.
- Students employ technology in the development of strategies for solving problems in the real world.

[7] International Society for Technology in Education. (2000). *National educational technology standards for students (NETS).* Retrieved July 13, 2004, from http://www.iste.org/

Appendix E: Evaluations and Rubrics for Outboard Marine Engine Mechanics

WRITTEN REPORT EVALUATION

_____/16 Preparation
_____/28 Organization
_____/24 Thoroughness
_____/19 Extra Materials
_____/13 Final Report

Preparation:

1. _____/2 Information written (neatly)
2. _____/2 Sources used listed
3. _____/5 Worked every day (did not waste time)
4. _____/5 Has all materials ready for use
5. _____/2 Cooperative

Organization

1. _____/2 Report in a logical order
2. _____/2 Interesting manner
3. _____/20 Notebook check
4. _____/2 Understanding of topic
5. _____/2 Spelling and sentence structure (do not copy from books)

Thoroughness

1. _____/5 Main points given
2. _____/5 Details to explain given
3. _____/5 Information presented clearly
4. _____/4 More than one source used
5. _____/5 Extra materials are appropriate

Extra Materials

1. _____/2 Neatness
2. _____/7 Creativity
3. _____/2 Dramatic value
4. _____/3 Useful
5. _____/5 Correctness

Final Report

1. _____/3 Written clearly
2. _____/2 Organized
3. _____/2 Sources documented correctly
4. _____/2 Spelling
5. _____/2 Grammar
6. _____/2 Neatness

_____/100 Total points earned

PRESENTATION EVALUATION

_____/16 Preparation
_____/28 Organization
_____/24 Thoroughness
_____/19 Extra Materials
_____/13 Actual Presentation

Preparation:

1. _____/2 Information written (neatly)
2. _____/2 Sources used listed
3. _____/5 Worked every day (did not waste time)
4. _____/5 Has all materials ready for use
5. _____/2 Cooperative

Organization

1. _____/2 Report in a logical order
2. _____/2 Interesting manner
3. _____/20 Notebook check
4. _____/2 Understanding of topic
5. _____/2 Spelling and sentence structure (do not copy from books)

Thoroughness

1. _____/5 Main points given
2. _____/5 Details to explain given
3. _____/5 Information presented clearly
4. _____/4 More than one source used
5. _____/5 Extra materials are appropriate

Extra Materials

1. _____/2 Neatness
2. _____/7 Creativity
3. _____/2 Dramatic value
4. _____/3 Useful
5. _____/5 Correctness

Actual Presentation

1. _____/3 Speaks clearly and distinctly
2. _____/2 Uses extra materials effectively
3. _____/2 Posture
4. _____/2 Pronounces all words correctly
5. _____/2 Organized in thought
6. _____/2 Rate

_____/100 Total points earned

Role-Play or Skit Rubric

	Excellent 4 Points	Good 3 Points	Average 2 Points	Needs Improvement 1 Point	Total
Accuracy	All information was accurate	Almost all information was accurate	Most information was accurate	Very little information was accurate	
Role	Excellent character development; student contributed in a significant manner	Good character development; student contributed in a cooperative manner	Fair character development; student may have contributed	Little or no character development; student did not contribute much at all	
Knowledge Gained	Can clearly explain several ways in which his/her character "saw" things differently than other characters and can explain why	Can clearly explain several ways in which his/her character "saw" things differently than other characters	Can clearly explain one way in which his/her character "saw" things differently than other characters	Cannot explain any way in which his/her character "saw" things differently than other characters	
Props	Used several props and showed considerable creativity	Used 1 or 2 appropriate props that made the presentation better	Used 1 or 2 props that made the presentation better	Used no props to make the presentation better	
Required Elements	Included more information than required	Included all required information	Included most required information	Included less information than required	

Résumé Rubric

	Excellent 25 Points	Well Done 20 Points	Meets Standards 15 Points	Beginning 10 Points	No Evidence 0 Points	Score
Format	Résumé contains name, address, objective, education, experience, and references. All words spelled correctly	Contains at least 6 of the criteria, no more than two spelling errors	Contains at least 5 of the criteria, no more than four spelling errors	Contains minimal information, more than four spelling errors	Assignment was not submitted	
Education	Education includes all schools attended, graduation dates, diploma/degree awarded, and major field of study	Education includes three of the criteria	Education includes two of the criteria	Education includes one of the criteria	Assignment was not submitted	
Experience	Experience includes internships, entry level jobs, current position	Experience includes two of the criteria	Experience includes one of the criteria	Experience includes current position only	Assignment was not submitted	
Factual	Contains factual names and dates, is believable	Résumé is fairly believable with factual names or dates	Résumé has unrealistic dates or names	Résumé is unrealistic and contains conflicting information	Assignment was not submitted	

Performance Rubric

Student Name _____ Date _____

Task to be performed_____

	Possible Points	Points Awarded
Safety Personal safety (glasses, clothing, etc.) Safe use of tool Safely performs the task	25	
Performance of the Task Follows the task instructions Performs the task efficiently Performs the task satisfactorily	50	
Lab Maintenance Area clean-up (clean and tidy) Area organization (before, during and after the task)	25	
Total	100	

Comments for deductions:

Instructor's Signature_____

Case Study Assessment Rubric

	Excellent **4 Points**	**Accomplished** **3 Points**	**Needs Improvement** **2 Points**	**Unsatisfactory** **1 Point**
Comprehension	Shows complete understanding of the issues, and grasps implications beyond the immediate issue	Asks for more details to clarify understanding of the issue	Shows partial understanding of the issue but does not ask for clarification	Resists attempts to get clarification
Strategizing	Develops realistic strategies that would provide a satisfactory conclusion	Chooses appropriate strategies that may satisfy	Shows evidence of strategy that may or may not satisfy	Needs assistance to choose a strategy
Innovation	Devises more than one resolution to the problem	Offers a solution	Offers a solution with a limited point of view	Shows some understanding of the problem
Communications	Convincingly communicates resolution	Explains solution so others can understand	Conveys an opinion	Unsure of how to explain