

MODULE MEC1040: ENGINE FUNDAMENTALS

Level: Introductory

Theme: Propulsion Systems

Prerequisite: None

Module Description: Students investigate and describe operating principles, construction and applications of engines.

Module Parameters: Access to engine measuring tools, related resources, engine units.

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • demonstrate safe use of tools, and follow established lab procedures 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • observed performance related to: <ul style="list-style-type: none"> – following established lab procedures – selecting proper tools – demonstrating safe use of tools – recognizing hazards of gasoline and other fuels. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Engine Fundamentals, Part 1, MEC1040-1</i></p> <p><i>Standard</i> <i>Performance rating of 2 on each criteria</i></p>	<p>10</p>
<ul style="list-style-type: none"> • compare operating principles of two- and four-cycle piston engines 	<ul style="list-style-type: none"> • a report comparing the operating principles of the following engine types: <ul style="list-style-type: none"> – two-stroke cycle – four-stroke cycle. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Engine Fundamentals, Part 2, MEC1040-1</i></p> <p><i>Standard</i> <i>Performance rating of 1 or more on each criteria</i></p>	<p>20</p>

MODULE MEC1040: ENGINE FUNDAMENTALS (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • determine the condition of an internal combustion engine • describe the by-products of combustion and their impact on the environment • demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • demonstration of problem-solving skills to determine the condition of a given engine by: <ul style="list-style-type: none"> – using the appropriate resources – determining mechanical condition including compression checks – identifying spark plug voltages and spark timing settings – examining fuel supply to the cylinder – making engine measurements for bore, stroke and displacement. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Engine Fundamentals, Part 3, MEC1040–1</i></p> <p><i>Standard</i> <i>Performance rating of 1 or more on each criteria</i></p> <ul style="list-style-type: none"> • listing/describing combustion by-products and their impact on the environment, including: <ul style="list-style-type: none"> – carbon dioxide – carbon monoxide – oxides of nitrogen – particulates. <p><i>Assessment Tool</i> <i>Task Assessment Checklist: Engine Fundamentals, Part 4, MEC1040–1</i></p> <p><i>Standard</i> <i>Performance rating of 1 or more on each criteria</i></p> <ul style="list-style-type: none"> • observations of individual effort and interpersonal exploration during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and assessment tools noted above</i></p>	<p>60</p> <p>10</p> <p>Integrated throughout</p>

MODULE MEC1040: ENGINE FUNDAMENTALS (continued)

Concept	Specific Learner Expectations	Notes
Health/Safety Hazards	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • demonstrate knowledge of and follow lab safety procedures • describe the hazards associated with: <ul style="list-style-type: none"> – gasoline and other flammable liquids – exhaust gases – hot coolants and liquids. 	
Identification/Function	<ul style="list-style-type: none"> • identify and use measuring tools in both Imperial and metric systems of measurement, such as: <ul style="list-style-type: none"> – steel rule – calipers and dividers – micrometer – dial indicator – torque wrench – pressure gauges – other • identify and use fasteners associated with engines (measurements in both imperial and metric), such as: <ul style="list-style-type: none"> – bolts, studs and nuts – washers – pins – keys – snap rings – machine screws – other • describe the effects of heating a gas in an enclosed space • identify the types of fuels commonly used in combustion engines • describe the by-products of combustion and their effects on personal health and the environment. • describe the difference between an internal and an external combustion engine • identify the type of engines and fuels that are used for air, land, sea and space applications 	

MODULE MEC1040: ENGINE FUNDAMENTALS (continued)

Concept	Specific Learner Expectations	Notes
Identification/ Function (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • identify and label the major parts of a reciprocating engine • demonstrate how reciprocating motion is converted to rotary motion • explain the difference between a two- and a four-stroke cycle engine • explain the purpose of the following support systems: <ul style="list-style-type: none"> – cooling – lubrication – ignition – fuel – exhaust • demonstrate how engines differ according to their: <ul style="list-style-type: none"> – number of cylinders – design – size – make and model – other • appraise the condition of an engine. 	Emphasize purpose only.
Identify/Analyze	<ul style="list-style-type: none"> • locate and use resources related to: <ul style="list-style-type: none"> – service bulletins and repair manuals – engine specifications documentation – parts numbers and assembly procedures. 	
Careers	<ul style="list-style-type: none"> • describe further education, working conditions and career opportunities. 	