

Wallenpaupack Area School District

COURSE: Vehicle Maintenance/Minor Repair

GRADE LEVEL: 10-12

LENGTH OF COURSE: 90 days/1 semester

TEXT: Small Engine Technology; Motor Automotive Technology

PUBLISHER: Delmar Publishers; Delmar Publishers

COPYRIGHT: 1999; 2003

COURSE DESCRIPTION:

This course provides instruction in maintenance and minor repair of automobiles both old and new. Emphasis will be placed on the following jobs: automobile safety, tools, vehicle maintenance procedures, tire and wheel service, tune-ups, minor testing of vehicle systems and minor repairs.

CURRICULUM WRITING TEAM:

Kevin McCue

DATE OF REVISION:

2007

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Unit: Orientation

Grade Level: 10 - 12

PA Standards: 13.1
13.2
13.3
13.4

Topics:	Skills:
Introduce and Familiarize the students with the course, its objectives, machines and tools	Active listening strategies Drawing inferences Following directions
Activities:	Performance Assessments:
Class Lecture Shop Tour	Teacher Observation Oral/Written Response to questions Self-evaluation

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Unit: Shop Safety

Grade Level: 10 - 12

PA Standards: 13.1
13.2
13.3
13.4

Topics: Rules and Regulations	Skills: Demonstrate knowledge of safety practices in the use of hand tools, power equipment, and in performing job tasks and procedures
Activities: Lecture Shop demonstration View Smart board presentation	Performance Assessments: Written Test

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Unit: Tools

Grade Level: 10 - 12

PA Standards: 13.1
13.2
13.3
13.4

Topics: Explain and demonstrate safe practices and procedure needed in order to properly use basic hand tools and machines within the shop	Skills: Demonstrate knowledge with the use of hand tools, power equipment, and in performing job tasks and procedures
Activities: Lecture Shop demonstration View Smart board presentation	Performance Assessments: Oral Questioning Written Test

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Unit: Welding

Grade Level: 10 - 12

PA Standards: 13.1
13.2
13.3
13.4

Topics: Introduce Basics of Oxyacetylene	Skills: Identify basic safety procedure in welding Recognize the set up of oxyacetylene regulators, tips, pressures Use Mild steel welds, butt, lap, tee, outside corner, inside corner welds Explain advantages of soldering and brazing
Activities: Lecture View Smart board presentation Board demonstrations Open discussion Class debate Guided practice Shop demonstration Supervised shop work Group projects and individual projects Cooperative learning groups Homework	Performance Assessments: Shop Observation Written Test

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Grade Level: 10 - 12

Unit: Welding

PA Standards: 13.1
13.2
13.3
13.4

Topics:	Skills:
Introduce Basics of Arc Welding	Identify basic safety procedure in arc welding Recognize the set up of arc welder Use heavy steel welds, butt, lap, tee, edge, outside corner, inside corner welds Strike an arc Use stringer beads
Activities:	Performance Assessments:
Lecture View Smart board presentation Board demonstrations Open discussion Class debate Guided practice Shop demonstration Supervised shop work Group projects and individual projects Cooperative learning groups Homework	Shop Observation Written Test

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Grade Level: 10 - 12

Unit: Welding

PA Standards: 13.1
13.2
13.3
13.4

Topics:	Skills:
Introduce Basics of Mig Welding	<ul style="list-style-type: none"> Identify basic safety procedure in Mig welding Recognize the set up of Mig welder Use heavy steel welds, butt, lap, tee, edge, outside corner, inside corner welds Identify proper wire length Use spot welding Use the proper gun angle Use stringer beads
Activities:	Performance Assessments:
<ul style="list-style-type: none"> Lecture View Smart board presentation Board demonstrations Open discussion Class debate Guided practice Shop demonstration Supervised shop work Group projects and individual projects Cooperative learning groups Homework 	<ul style="list-style-type: none"> Shop Observation Written Test

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Grade Level: 10 - 12

Unit: Motors

PA Standards: 13.1
13.2
13.3
13.4

Topics:	Skills:
Introduce and understand the basic principles of how engines work	<ul style="list-style-type: none"> Identify the major parts of a motor List parts Recognize the basic understanding of function of parts Identify cylinder block differences Identify the difference between in-line, V, slant, and opposed arrangement Identify the differences between 4, 6, 8, cylinders Identify various problems, diagnosis and services tips and procedures
Activities:	Performance Assessments:
<ul style="list-style-type: none"> Lecture View Smart board presentation Board demonstrations Open discussion Class debate Guided practice Shop demonstration Supervised shop work Group projects and individual projects Cooperative learning groups Homework 	<ul style="list-style-type: none"> Quizzes Oral Questioning Written Test

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Grade Level: 10 - 12

Unit: Motors

PA Standards: 13.1
13.2
13.3
13.4

Topics:	Skills:
<p>Cylinder Head and Valves</p> <ul style="list-style-type: none"> • Combustion Chamber • Intake and Exhaust Valves • Aluminum Cylinder Heads • Resurfacing • Grinding Valves / Reconditioning Guides, Seats • Valve Stem Seals • Assembling Cylinder Heads 	<p>Describe the purpose of an engine's cylinder head, Valve, and related parts</p> <p>Describe the types of combustion chamber shapes found on modern engines</p> <p>Explain the procedures involved in reconditioning</p> <p>Cylinder heads, valve guides, seats, and faces</p> <p>Explain the steps in cylinder head and valve assembly</p> <p>Identify various problems, diagnosis and services tips and procedures</p>
Activities:	Performance Assessments:
<p>Lecture</p> <p>View Smart board presentation</p> <p>Board demonstrations</p> <p>Open discussion</p> <p>Class debate</p> <p>Guided practice</p> <p>Shop demonstration</p> <p>Supervised shop work</p> <p>Group projects and individual projects</p> <p>Cooperative learning groups</p> <p>Homework</p>	<p>Quizzes</p> <p>Oral Questioning</p> <p>Written Test</p>

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Grade Level: 10 - 12

Unit: Motors

PA Standards: 13.1
13.2
13.3
13.4

<p>Topics:</p> <p>Camshafts and Valve Trains</p> <ul style="list-style-type: none"> • Camshafts • Camshafts and Valve Train Inspection • Installing the Camshaft, Cylinder Head and Valve Train • Adjusting Valves • Installing the Timing Components 	<p>Skills:</p> <p>Describe the purpose, operation, and location of Camshaft</p> <p>Identify the parts of the valve train and the purpose of each</p> <p>Inspect the camshaft, valve train, and timing components</p> <p>Describe the four types of camshaft drives</p> <p>Explain the factors involved in camshaft/Crankshaft timing</p> <p>Explain how to adjust valve lash</p>
<p>Activities:</p> <p>Lecture</p> <p>View Smart board presentation</p> <p>Board demonstrations</p> <p>Open discussion</p> <p>Class debate</p> <p>Guided practice</p> <p>Shop demonstration</p> <p>Supervised shop work</p> <p>Group projects and individual projects</p> <p>Cooperative learning groups</p> <p>Homework</p>	<p>Performance Assessments:</p> <p>Quizzes</p> <p>Oral Questioning</p> <p>Written Test</p>

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Grade Level: 10 - 12

Unit: Motors

PA Standards: 13.1
13.2
13.3
13.4

<p>Topics:</p> <p>Lubricating System</p> <ul style="list-style-type: none"> • Purposes of Lube • Parts of System • Engine Oil • Characteristics/Classifications • Synthetics • Greases • Problems, Diagnosis and Service 	<p>Skills:</p> <p>Define the purposes of the lubricating system</p> <p>Identify the contaminants within the engine within the engine that must be removed by the system</p> <p>Analyze the characteristics of lubricating oil</p> <p>Compare the different ways oil can be classified</p> <p>Compare the advantages and disadvantages of synthetic oils</p> <p>Follow the flow of oil through an engine</p> <p>Examine and identify the parts of the system</p> <p>Identify problem, diagnosis and service procedure for the lubricating system</p>
<p>Activities:</p> <p>Lecture</p> <p>View Smart board presentation</p> <p>Board demonstrations</p> <p>Open discussion</p> <p>Class debate</p> <p>Guided practice</p> <p>Shop demonstration</p> <p>Supervised shop work</p> <p>Group projects and individual projects</p> <p>Cooperative learning groups</p> <p>Homework</p>	<p>Performance Assessments:</p> <p>Shop Observation</p> <p>Oral Questioning</p> <p>Quizzes</p> <p>Written Test</p>

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Grade Level: 10 - 12

Unit: Suspensions and Controls

PA Standards: 13.1
13.2
13.3
13.4

<p>Topics:</p> <p>Brake Systems</p> <ul style="list-style-type: none"> • Principles <ul style="list-style-type: none"> ○ Disc/Drum • Components • ABS • Emergency Brake • Problems, Diagnosis and Service 	<p>Skills:</p> <p>Identify the principles of friction, hydraulic circuits, and basic braking system operation</p> <p>State the name and operation of all braking system components</p> <p>Analyze the purpose and purpose and operation of power brakes</p> <p>State the principles of ABS</p> <p>Identify various problems, diagnosis and services tips and procedures</p>
<p>Activities:</p> <p>Lecture</p> <p>View Smart board presentation</p> <p>Board demonstrations</p> <p>Open discussion</p> <p>Class debate</p> <p>Guided practice</p> <p>Shop demonstration</p> <p>Supervised shop work</p> <p>Group projects and individual projects</p> <p>Cooperative learning groups</p> <p>Homework</p>	<p>Performance Assessments:</p> <p>Shop Observation</p> <p>Oral Questioning</p> <p>Quizzes</p> <p>Written Test</p>

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Grade Level: 10 - 12

Unit: Suspensions and Controls

PA Standards: 13.1
13.2
13.3
13.4

<p>Topics:</p> <ul style="list-style-type: none"> Steering Systems <ul style="list-style-type: none"> • Parts and Operation • Front End Geometry and Alignment Power Steering <ul style="list-style-type: none"> • Purpose • Parts Problems, Diagnosis and Service 	<p>Skills:</p> <ul style="list-style-type: none"> Define the parts and operation of standard steering system Examine the operation of the steering gear Define front end geometry including caster, camber, toe, steering axis, turning radius, and four wheel alignment Identify the operation of power steering units and pumps Identify various problems, diagnosis and services tips and procedures
<p>Activities:</p> <ul style="list-style-type: none"> Lecture View Smart board presentation Board demonstrations Open discussion Class debate Guided practice Shop demonstration Supervised shop work Group projects and individual projects Cooperative learning groups Homework 	<p>Performance Assessments:</p> <ul style="list-style-type: none"> Shop Observation Oral Questioning Quizzes Written Test

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Grade Level: 10 - 12

Unit: Suspensions and Controls

PA Standards: 13.1.11
13.2.11
13.3.11
13.4.11

<p>Topics:</p> <p>Suspension</p> <ul style="list-style-type: none"> • Front Suspension • Rear Suspension • Shocks/Struts • Problems, Diagnosis and Service 	<p>Skills:</p> <p>Define the parts and operation of the front suspension system</p> <p>Define the parts and operation of the rear suspension system</p> <p>Analyze the purpose, parts, and operation of different types of shock absorbers</p> <p>Compare struts suspension with other suspension systems, including parts and operation</p> <p>Define the operation of computer-controlled suspension systems</p> <p>Identify the purpose and operation of level controls and air suspension</p> <p>Identify various problems, diagnosis and services tips and procedures</p>
<p>Activities:</p> <p>Lecture</p> <p>View Smart board presentation</p> <p>Board demonstrations</p> <p>Open discussion</p> <p>Class debate</p> <p>Guided practice</p> <p>Shop demonstration</p> <p>Supervised shop work</p> <p>Group projects and individual projects</p> <p>Cooperative learning groups</p> <p>Homework</p>	<p>Performance Assessments:</p> <p>Shop Observation</p> <p>Oral Questioning</p> <p>Quizzes</p> <p>Written Test</p>

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Grade Level: 10 - 12

Unit: Power Transmission Systems

PA Standards: 13.1
13.2
13.3
13.4

<p>Topics:</p> <ul style="list-style-type: none"> Manual Transmission <ul style="list-style-type: none"> • Clutch Systems Design of Transmission Types of Transmission Problems, Diagnosis and Service 	<p>Skills:</p> <ul style="list-style-type: none"> Identify the purpose and operation of the clutch Define the purpose of the standard, or manual, transmission Analyze the purpose of different gear ratios Describe the operation and gear selection of the manual transmission State the purpose and operation of synchronizers
<p>Activities:</p> <ul style="list-style-type: none"> Lecture View Smart board presentation Board demonstrations Open discussion Class debate Guided practice Shop demonstration Supervised shop work Group projects and individual projects Cooperative learning groups Homework 	<p>Performance Assessments:</p> <ul style="list-style-type: none"> Shop Observation Oral Questioning Quizzes Written Test

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Grade Level: 10 - 12

Unit: Power Transmission Systems

PA Standards: 13.1
13.2
13.3
13.4

Topics:	Skills:
<p>Automatic Transmission</p> <ul style="list-style-type: none"> • Purpose of Transmission • Design of Transmission <ul style="list-style-type: none"> ○ Parts • Types of Transmission • Torque converter • Planetary Gears • Clutches, bands, servos • Controls • Hydraulic System <p>Problems, Diagnosis and Service</p>	<p>Identify the purpose and operation of torque converter and lock up system</p> <p>Explain purpose and operation of planetary gear</p> <p>Analyze the different types of clutches and bands used</p> <p>State the purpose and basic operation of hydraulic systems</p> <p>Define the purpose and operation of various standard and computerized control devices</p> <p>Identify various problems, diagnosis and services tips and procedures</p>
Activities:	Performance Assessments:
<p>Lecture</p> <p>View Smart board presentation</p> <p>Board demonstrations</p> <p>Open discussion</p> <p>Class debate</p> <p>Guided practice</p> <p>Shop demonstration</p> <p>Supervised shop work</p> <p>Group projects and individual projects</p> <p>Cooperative learning groups</p> <p>Homework</p>	<p>Shop Observation</p> <p>Oral Questioning</p> <p>Quizzes</p> <p>Written Test</p>

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Grade Level: 10 - 12

Unit: Coolant Systems

PA Standards: 13.1
13.2
13.3
13.4

<p>Topics:</p> <ul style="list-style-type: none"> Purpose of Cooling Systems <ul style="list-style-type: none"> • Types • Characteristics Parts and Operation <ul style="list-style-type: none"> • Water pump • Thermostat • Radiators • Pressure Caps • Fans Problems, Diagnosis and Service 	<p>Skills:</p> <ul style="list-style-type: none"> Identify the purposes of the cooling system Compare the ways in which heat can be transferred Compare the different types of cooling systems Define the characteristics of coolant and antifreeze Describe the operation of water pumps State the purpose and operation of thermostats and pressure caps State the purpose and operation of radiators Compare the operation and design of fans, shrouds and belts Identify various problems, diagnosis and services tips and procedures
<p>Activities:</p> <ul style="list-style-type: none"> Lecture View Smart board presentation Board demonstrations Open discussion Class debate Guided practice Shop demonstration Supervised shop work Group projects and individual projects Cooperative learning groups Homework 	<p>Performance Assessments:</p> <ul style="list-style-type: none"> Shop Observation Oral Questioning Quizzes Written Test

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Grade Level: 10 - 12

Unit: Fuel Systems

PA Standards: 13.1
13.2
13.3
13.4

<p>Topics:</p> <p>Fuel Flow</p> <ul style="list-style-type: none"> • Tank • Pump • Filters • Problems, Diagnosis and Service 	<p>Skills:</p> <p>Identify the total fuel flow Analyze the parts and operation of the fuel tank and fuel metering parts Recognize the parts and operation of mechanical and electrical fuel pumps State the purpose and operation of fuel filters Identify various problems, diagnosis and services tips and procedures</p>
<p>Activities:</p> <p>Lecture View Smart board presentation Board demonstrations Open discussion Class debate Guided practice Shop demonstration Supervised shop work Group projects and individual projects Cooperative learning groups Homework</p>	<p>Performance Assessments:</p> <p>Shop Observation Oral Questioning Quizzes Written Test</p>

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Grade Level: 10 - 12

Unit: Fuel Systems

PA Standards: 13.1
13.2
13.3
13.4

<p>Topics:</p> <p>Carburetor Systems</p> <ul style="list-style-type: none"> • Principles • Types • Problems, Diagnosis and Service 	<p>Skills:</p> <p>Define the basic principles of carburetion Define the different types of vacuum produced from a carburetor Compare the different type of carburetors Analyze carburetor circuits State the design and purpose of common accessories Identify how carburetors are controlled by electronic controls and computers Define differences between open and closed loops Identify various problems, diagnosis and services tips and procedures</p>
<p>Activities:</p> <p>Lecture View Smart board presentation Board demonstrations Open discussion Class debate Guided practice Shop demonstration Supervised shop work Group projects and individual projects Cooperative learning groups Homework</p>	<p>Performance Assessments:</p> <p>Shop Observation Oral Questioning Quizzes Written Test</p>

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Grade Level: 10 - 12

Unit: Fuel Systems

PA Standards: 13.1
13.2
13.3
13.4

<p>Topics:</p> <p>Injection Systems</p> <ul style="list-style-type: none"> • Classification • EFI • Port Injection • Problems, Diagnosis and Service 	<p>Skills:</p> <p>Define the purpose of EFI State the different types of fuel injection systems Analyze throttle body fuel injection Analyze the types of sensors used with computers Analyze port injection systems Describe the operation of the injector nozzles used on high high-pressure systems Identify various problems, diagnosis and services tips and procedures</p>
<p>Activities:</p> <p>Lecture View Smart board presentation Board demonstrations Open discussion Class debate Guided practice Shop demonstration Supervised shop work Group projects and individual projects Cooperative learning groups Homework</p>	<p>Performance Assessments:</p> <p>Shop Observation Oral Questioning Quizzes Written Test</p>

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair

Grade Level: 10 - 12

Unit: Electrical Systems

PA Standards: 13.1
13.2
13.3
13.4

Topics:	Skills:
<ul style="list-style-type: none"> Batteries Ignition Systems Lighting/Fuses Charging Systems Starting Systems Problems, Diagnosing and Service 	<ul style="list-style-type: none"> Identify the purpose of the automotive battery Analyze the internal parts, construction, and operation of the battery, including chemical action Identify the methods used to test and maintain a battery Identify the parts and operation of the conventional ignition system that uses contact points Define operation of the primary and secondary circuit Examine advance mechanisms Identify spark plug design and operation Analyze the electronic spark control systems Define the parts and operation of a distributorless ignition systems Identify the purpose of the charging system State the operation of solid-state electronic and computerized regulation systems Identify purpose of alternators Identify principles of starter motors List the parts of the starter motor and purpose Identify various problems, diagnosis and services tips and procedures
Activities:	Performance Assessments:
<ul style="list-style-type: none"> Lecture View Smart board presentation Board demonstrations Open discussion Class debate Guided practice Shop demonstration Supervised shop work Group projects and individual projects Cooperative learning groups Homework 	<ul style="list-style-type: none"> Shop Observation Oral Questioning Quizzes Written Test

Wallenpaupack Area School District

Course: Vehicle Maintenance/Minor Repair
Unit: Tires/Wheels

Grade Level: 10 - 12

PA Standards: 13.1
 13.2
 13.3
 13.4

<p>Topics:</p> <p>Tire Construction and Characteristics</p> <ul style="list-style-type: none"> • Tube/Tubeless • Radial/Bias • Cords • Tread Design • Sizing • Spare • Wheels and Rims • Problems Diagnosis and Service • Balancing • Inflation 	<p>Skills:</p> <p>Use tire terminology to define how tires are constructed</p> <p>Identify different characteristics of tires</p> <p>Compare different types of tires, including ply, radial, and spare tire</p> <p>Identify how tires are sized</p> <p>Analyze the purpose and operation of wheels and rims</p> <p>Identify various problems, diagnosis and services tips and procedures</p>
<p>Activities:</p> <p>Lecture</p> <p>View Smart board presentation</p> <p>Board demonstrations</p> <p>Open discussion</p> <p>Class debate</p> <p>Guided practice</p> <p>Shop demonstration</p> <p>Supervised shop work</p> <p>Group projects and individual projects</p> <p>Cooperative learning groups</p> <p>Homework</p>	<p>Performance Assessments:</p> <p>Shop Observation</p> <p>Oral Questioning</p> <p>Quizzes</p> <p>Written Test</p>