

**NORTH MONTCO TECHNICAL CAREER CENTER
1265 SUMNEYTOWN PIKE, LANSDALE, PA 19446**

Performance Evaluation/Assessment

Automotive Technology

NATEF Heating & Air Conditioning

Standardized Integration Module (SIM)

Task 3: Heating, Ventilation, and Engine Cooling Systems Diagnosis and Repair

Hours: 19

Date: 9/01/2008

Exit Outcome/Terminal Performance Objective:

- Demonstrate the ability to perform heating, ventilation, and engine cooling system component diagnosis and repair.

Enabling Objectives:

- Explains basic heating, ventilation, and engine cooling system theory.
- Explains basic heating, ventilation, and engine cooling system operation/functionality.
- Explains steps to diagnose a heating, ventilation, and engine cooling system system.
- Identifies basic heating, ventilation, and engine cooling system components.
- Performs basic heating, ventilation, and engine cooling system diagnostics.
- Performs basic heating, ventilation, and engine cooling system repairs.
- Locate correct diagnostic, repair, service & maintenance information using ShopKey.

Mastery: All hands-on tasks must be completed to 100% accuracy and to industry standards.

To achieve Mastery of this task, the student must:

1. Participate in a lecture, view either the PowerPoint presentation or video of the material.
2. Participate in a demonstration of the task.
3. Participate in a guided application of the task.
4. Practice the task without the instructor.
5. Complete task to 100% accuracy.
6. Demonstrate or practice the task with another student.
7. Obtain MACS or ASE Section 609 Refrigerant Recycling and Recovery Certification.

PA Academic Standards/Assessment Anchors/Eligible Content

Science

PA Academic Standard:

3.1.10.A Apply patterns as repeated processes or recurring elements in science and technology.

3.4.10.B Analyze energy sources and transfers of heat.

Assessment Anchor:

S11.A.3.1 Analyze the parts of a simple system, their roles, and their relationships to the system as a whole.

S11.C.2.1 Analyze energy sources and transfer of energy, or conversion of energy.

**NORTH MONTCO TECHNICAL CAREER CENTER
1265 SUMNEYTOWN PIKE, LANSDALE, PA 19446**

Performance Evaluation/Assessment

Eligible Content:

S11.A.3.1.1 Apply systems analysis, showing relationships (e.g., flowcharts, concept maps), input and output, and measurements to explain a system and its parts.

S11.C.2.1.3 Apply the knowledge of conservation of energy to explain common systems (e.g., refrigeration, rocket propulsion, heat pump).

Math

PA Academic Standard:

2.2.11.E Recognize that the degree of precision needed in calculating a number depends on how the results will be used and the instruments used to generate the measure.

2.6.8.A Recognize that the degree of precision needed in calculating a number depends on how the results will be used and the instruments used to generate the measure.

Assessment Anchor:

M11.D.2.2 Simplify expressions involving polynomials.

M11.E.2.1 Use measures of central tendency to describe a set of data.

Eligible Content:

M11.D.2.2.1 Add, subtract and/or multiply polynomial expressions (express answers in simplest form – nothing larger than a binomial multiplied by a trinomial).

M11.E.2.1.1 Calculate or select the appropriate measure of central tendency (mean, mode or median) of a set of data given or represented on a table, line plot or stem-and-leaf plot.

M11.A.2.1.2 Solve problems using direct and inverse proportions.

Language Arts:

PA Academic Standard:

1.1.11.G Demonstrate after reading understanding and interpretation of both fiction and nonfiction text, including public documents.

1.3.11.F Read and respond to fiction and nonfiction including poetry and drama

Assessment Anchor:

R11.A.1.2 Identify and apply word recognition skills.

R11.A.1.3 Make inferences, draw conclusions, and make generalizations based on text.

R11.A.1.6 Identify, describe, and analyze genre of text.

Eligible Content:

R11.A.1.3.1 Make inferences and/or draw conclusions based on information from text.

R11.A.1.3.2 Cite evidence from text to support generalizations.

R11.A.1.6.1 Identify and/or analyze the author's intended purpose of text.

R11.A.1.6.2 Describe and/or analyze examples of text that support the author's intended purpose.

Social Studies:

PA Academic Standard:

7.4.12.A Analyze the impacts of physical systems on people.

Career Education & Work

PA Academic Standard:

13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.

**NORTH MONTCO TECHNICAL CAREER CENTER
1265 SUMNEYTOWN PIKE, LANSDALE, PA 19446**

Performance Evaluation/Assessment

SAFETY NOTICE: In addition to following all North Montco Technical Career Center Automotive Technology Program Safety and MSDS Policies, refer to the specific vehicle's manufacturer's shop manual for complete safety details when performing these tasks.

NOTE: *Safety is not an option!* Although this information is very thorough, it is general and does not fully cover all safety rules, procedures and hazards.

Performance Evaluation

PERFORMANCE CRITERIA	Needs Practice	Satisfactory
Safety glasses must be worn at all times! Read all safety materials provided and observe all safety precautions demonstrated by your instructor.		
Diagnose temperature control problems in the heater/ventilation system; determine necessary action. P-2		
Perform cooling system pressure tests; check coolant condition, inspect and test radiator, cap (pressure/vacuum), coolant recovery tank, and hoses; perform necessary action. P-1		
Inspect engine cooling and heater system hoses and belts; perform necessary action. P-1		
Inspect, test, and replace thermostat and gasket/seal. P-1		
Determine coolant condition and coolant type for vehicle application; drain and recover coolant. P-1		
Flush system; refill system with recommended coolant; bleed system. P-2		
Inspect and test cooling fan, fan clutch, fan shroud, and air dams; perform necessary action. P-1		
Inspect and test electric cooling fan, fan control system and circuits; determine necessary action. P-1		
Inspect and test heater control valve(s); perform necessary action. P-2		
Remove, inspect, and reinstall heater core. P-3		
Complete an Outline, Reading Grid, Summary and "Last-Word" Worksheet packet for Chapters 1-10, 80, 75 and 76 from <i>Modern Automotive Technology</i> .		
Score a 80% or better on <i>Modern Automotive Technology</i> chapter tests 1-10 & 80		
Score a 80% or better on <i>Modern Automotive Technology</i> chapter tests 75 and 76		
Score 80% or better on Math Intro Lessons 1-5& Math Lessons 1, 2, 3, 4, and 5 Homework Sheets.		
Score 80% or better on ASE Practice Test 7		

**NORTH MONTCO TECHNICAL CAREER CENTER
1265 SUMNEYTOWN PIKE, LANSDALE, PA 19446**

Performance Evaluation/Assessment

Earn a passing grade on the AYES Electrical/Electronic Exit Exam A-6		
Obtain Section 609 Refrigerant Recycling & Recovery Certification		

NOTES: