

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

**Performance Evaluation/Assessment**

**Automotive Technology**

**NATEF Manual Drive Train and Axles**

**Standardized Integration Module (SIM)**

**Task 5: Ring and Pinion Gears and Differential and Differential Case Assembly Diagnosis and Repair**

**Hours: 11**

**Date: 9/01/2008**

**Exit Outcome/Terminal Performance Objective:**

- Demonstrate the ability to perform ring and pinion gears, differential & differential case assembly diagnosis and repair.

**Enabling Objectives:**

- Explains basic ring and pinion gears and differential assembly theory.
- Explains basic ring and pinion gears and differential assembly operation/functionality.
- Explains steps to diagnose ring and pinion gears and differential assembly problems.
- Identifies basic ring and pinion gears and differential assembly components.
- Performs basic ring and pinion gears and differential case assembly diagnosis.
- Explains steps to repair ring and pinion gears and differential assembly problems.
- Performs basic ring and pinion gears and differential assembly 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.

**PA Academic Standards/Assessment Anchors/Eligible Content**

**Science**

*PA Academic Standard:*

3.1.10.E Describe patterns of change in nature, physical and man made systems.

3.6.10.C Apply physical technologies of structural design, analysis and engineering, personnel relations, financial affairs, structural production, marketing, research and design to real world problems.

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*Assessment Anchor:*

S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.

S11.C.3.1 Use the principles of motion and force to solve real-world challenges.

*Eligible Content:*

S11.A.1.1.4 Explain how specific scientific knowledge or technological design concepts solve practical problems.

S11.C.3.1.5 Calculate the mechanical advantage for moving an object by using a simple machine.

S11.C.3.1.6 Identify elements of simple machines in compound machines.

**Math**

*PA Academic Standard:*

2.3.8.E Describe how a change in linear dimension of an object affects its perimeter, area and volume.

2.8.11.P Analyze a relation to determine whether a direct or inverse variation exists and represent it algebraically and graphically.

*Assessment Anchor:*

M11.B.2.3 Describe how a change in one dimension of a figure (2 or 3 dimensional) affects other measurements of that figure.

M11.A.2.1 Apply ratio and/or proportion in problem-solving situations.

*Eligible Content:*

M11.B.2.3.1 Describe how a change in the linear dimension of a figure affects its perimeter, circumference, area or volume.

M11.A.2.1.1 Solve problems using operations with rational numbers including rates and percents (single and multi-step and multiple procedure operations) (e.g., distance, work and mixture problems, etc.).

**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.

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**Social Studies:**

*PA Academic Standard:*

5.4.12.A Analyze the impact of international economic, technological and cultural developments on the government of the United States

**Career Education & Work**

*PA Academic Standard:*

13.1.11.F Analyze the relationship between career choices and career preparation opportunities

**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**

<b>PERFORMANCE CRITERIA</b>	<b>Needs Practice</b>	<b>Satisfactory</b>
Safety glasses must be worn at all times! Read all safety materials provided and observe all safety precautions demonstrated by your instructor.		
Diagnose noise and vibration concerns; determine necessary action. P-2		
Diagnose fluid leakage concerns; determine necessary action. P-1		
Inspect and replace companion flange and pinion seal; measure companion flange runout. P-2		
Inspect ring gear and measure runout; determine necessary action. P-2		
Remove, inspect, and reinstall drive pinion and ring gear, spacers, sleeves, and bearings. P-2		
Measure and adjust drive pinion depth. P-2		
Measure and adjust drive pinion bearing preload. P-2		
Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup or shim types). P-2		
Check ring and pinion tooth contact patterns; perform necessary action. P-1		
Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case. P-2		

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Reassemble and reinstall differential case assembly; measure runout; determine necessary action. P-2		
Complete an Outline, Reading Grid, Summary and “Last-Word” Worksheet Packet for Chapters 1-10, 80, 53, 54, 55, 56, 59, 60, 61 and 62 in <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 53, 54, 55, 56, 59, 60, 61 and 62		
Score 80% or better on Math Intro Lessons 1-5 & Math Lessons 1 and 4 Homework Sheets.		
Score 80% or better on ASE Practice Test 3		

**NOTES:**