

WAMC Lab Template

Math Concept(s): Measuring an automotive cylinder for volume / displacement/ Wear

Source / Text: CDX

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Attach the following documents:

Lab Instructions Will use micrometers and precision instruments to measure the volume of an automotive cylinder block. Students will work individually and record data on the worksheet.

Student Handout(s) Micrometer worksheet; <https://www.youtube.com/watch?v=iYpzeVNcEG4>

Rubric and/or Assessment Tool ` [Cylinder Volume Rubric.pub](#)

Indicate “SPECIFIC” relationship to Science, Technology, or Engineering. The relationship of the tolerances of a piston and its’ cylinder have a direct bearing on the power producing ability of the engine.

Short Description (Be sure to include where in your instruction this lab takes place):

Students will accurately measure the diameter, volume of the cylinders of and be able to determine if repairs are needed.

Lab Plan

Lab Title: Measuring engine cylinders

Prerequisite skills: Students will be able to read an inside and outside micrometers.

Lab objective: To accurately determine the volume of an automotive engine, to be able to calculate the end size of the cylinders if they are bored oversize. They will be able to determine the amount of wear on an engine as compared to when it was new.

Standards:

Mathematics K–12 Learning Standards: G-GMD

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Standards for Mathematical Practice: Calculating the volume of a cylinders

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K-12 Learning Standards-ELA (Reading, Writing, Speaking & Listening):

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Leadership/21st Century Skills: Students will be able to demonstrate knowledge and skill when using precision measuring tools. Students will use this knowledge to teach Community members, Advisory Members, and fellow students as well as elementary students at Science and STEM Fairs.

21st Century Interdisciplinary themes (Check those that apply to the above activity.)

Global Awareness

Financial/Economic/Business/Entrepreneurial Literacy

Civic Literacy

Health/Safety Literacy

Environmental Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATIONCreativity and Innovation

- Think Creatively
 - Work Creatively with Others
 - Implement Innovations
- Critical Thinking and Problem Solving
- Reason Effectively
 - Use Systems Thinking
 - Make Judgments and Decisions
 - Solve Problems
- Communication and Collaboration
- Communicate Clearly
 - Collaborate with Others

INFORMATION, MEDIA & TECHNOLOGY SKILLSInformation Literacy

- Access and Evaluate Information
- Use and manage Information

Media Literacy

- Analyze Media
- Create Media Products

Information, Communications and Technology (ICT Literacy)

- Apply Technology Effectively

LIFE & CAREER SKILLSFlexibility and Adaptability

- Adapt to Change
- Be Flexible

Initiative and Self-Direction

- Manage Goals and Time
- Work Independently
- Be Self-Directed Learners

Social and Cross-Cultural

- Interact Effectively with Others
- Work Effectively in Diverse Teams

Productivity and Accountability

- Manage Projects
 - Produce Results
- Leadership and Responsibility
- Guide and Lead Others
 - Be Responsible to Others

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Teacher Preparation: (What materials and set-up are required for this lab?)

Materials

- A disassembled 4 cylinder engine, inside and outside micrometers

Set-Up Required:

- Engine should be a bare block with crankshaft and pistons removed.

Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

- Students will be able to teach these skills to others at STEM Fairs, Advisory Meetings and Job Skills Demonstrations.

Cooperative Learning:

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Expectations: Students should be able to determine the extent of wear on an engine in order to recommend needed repairs.

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Timeline: Each student should be able to complete this task in 15 minutes.

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Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab: Mention that it is not necessary to spend time measuring something that is visibly bad.

Career Applications • Repair shops, engine rebuilders, machinist

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Optional or Extension Activities

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