

Integrated Project-based Learning: Combining PTE Standards and Academic Standards

Use this template for planning and sharing ideas for projects. This template is based on the 6 A's:

Authenticity Academic Rigor* Applied Learning* Active Exploration* Adult Connections* Assessment*

Project

Title of Project	Engine Displacement
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School	CRTC, Burley High School, Buhl High School
Pathway / Small Learning Community/Academy	Skilled and Technical Sciences, Math
Course Title(s)	Geometry and Automotive Technology
Time Frame	2 weeks

Authenticity

Briefly describe your project. Include the key question and provide an overview of what students do and learn. Tell why the question is meaningful to the students and where one might see a similar question tackled by an adult in the workplace.

Key Question	How do I know what size engine I am working on and how to know what size parts to order?
Overview	Students will first measure all aspects of an engine. Then they will use both formulas to figure cylinder displacement and then total engine displacement.

Vocabulary/Key Terms

List vocabulary words and key terms essential to student understanding.

Volume	Bore
Cylinder	Stroke
Micrometer	Cubic inch displacement
Displacement	
pi	

Active Exploration * Applied Learning * Adult Connections

What classroom-based, community-based, and career-based activities does the project involve? Include a description of the active exploration, applied learning, and adult connections in the project (as needed).

Active Exploration *How does the project engage students in real investigations using a variety of methods, media and sources? What field-based work will students perform? How does student learning and service support active career exploration?* Students will first take apart engines in order to learn and identify the parts and pieces of the engine. Then they will learn how to measure the engines and calculate accurate numbers. Following this step, they will learn the formulas to figure displacement and how to apply the correct formulas

Applied Learning *How do students apply what they have learned and researched to a complex problem (e.g. designing a product, improving a system, creating an exhibit, organizing an event)?* Students will take, use, and figure the engine displacement from their values they acquired and will know if they made a mistake anywhere based on the results.

Adult Connections *Who from the community, workplace, postsecondary and/or industry partnership works with students on the project?* Students can locate and find engine parts based on their figures and measurements. Assigned a job shadow, they can also go to professional machine shops to observe and gather knowledge of applied methods and uses.

Classroom Activities	Community Activities	Career Activities
<p>Have students work on the formula for volume for cylinders</p> <p>Have students learn in their automotive class the displacement formula.</p> <p>Have students learn in math class about how the two formulas correlate.</p>	<p>Students can go to engine machine shops and observe the machining process</p>	<p>Students will be able to compute the displacement formula to make their career become easier.</p> <p>Students will work on job shadowing, preparing questions in advance.</p>

Academic/PTE Rigor

Standards *Use the space below to list the state content standards and PTE industry standards addressed by the project. (A list of the content standards is available at <http://www.sde.idaho.gov/ContentStandards/default.asp>. This page, which includes selected high school level standards, is designed to let you easily create a list of standards you are addressing. You may then copy and paste the list into this template.)*

- G.1.1.1 Understand the meanings of real numbers.
- G.1.3.1 Judge the reasonableness of numerical computations and their results.
- G.2.2.1 Understand and use formulas to calculate the perimeter, circumference, area, surface area, and volume of geometric figures.
- 03.02 TASK: Demonstrate use of precision measuring tools
- 03.05 TASK: Use basic electrical equipment and meters

School to Career Competencies *Please check (x) the competencies addressed by the project*

- Communicate and understand ideas and information
- Collect, analyze and organize information

Academic/PTE Rigor

- [x] Identify and solve problems
- [x] Use technology
- [x] Initiate and complete entire activities
- [x] Act professionally
- [x] Interact with others
- [x] Understand all aspects of an industry
- [x] Take responsibility for career and life choices

Student Goal(s) Once the project begins, ask students to generate one or two personal goals.

Students will be able to derive the cylinder displacement formula from the volume formula for a cylinder with 100% accuracy.

Assessment

How do you and the students know the project is a success? What are your criteria for measuring students' achievement of the disciplinary knowledge and applied learning goals of the project? What evidence do they use to demonstrate their progress? What deliverables do they need to complete prior to the final exhibition? How will students self-assess?

Students will be assessed in a variety of ways. Students will have one on one help while working on assignments, they will have task analysis to show proper steps to get the correct cubic displacement.

Recommended Resources / Sample Products

Software or Materials Needed
(Examples)

Computer, paper, pencil, calculators, micrometer

Teacher-Developed Materials
(Examples of materials that can be shared with other classes. Please attach samples.)

Worksheets (attached at bottom)/book work that are teacher developed for volume formula for cylinders and cylinder displacement formula.

Student-Developed Materials
(Examples of products that can be shared with other classes. Please attach samples.)

Students will work on computing formulas and then they will measure the engine cylinders.

Websites Used
(Examples)

SkillsUSA.org

Final Words
(In a sentence or two, highlight your project's overall value.)

This will be a great project for students to do that will be able to help them with their math and auto skills. Students will be able to compute formulas to be able to figure out the cylinder displacement.

Teacher Tips/Extensions
(Use the first person to share a useful idea that helps with implementation and ensures success. Make it chatty, informal.)

Some students will be able to catch this really quick but others will take forever to understand but once it is understood they will remember it forever

Recommended Resources / Sample Products

Extensions

(List any ideas for students who may want to go deeper into the learning standards.)

Students could then think outside the automotive field and figure out why they need to figure out the volume and report back to class of what they came up with.

Timeline

What sequence of teaching and learning experiences will equip students to develop and demonstrate the PTE standards and the Academic standards?

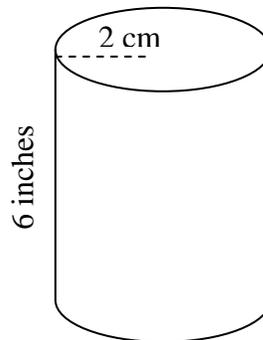
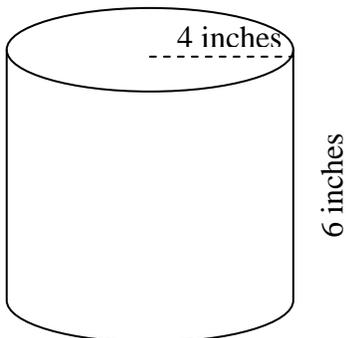
- Approximately 2 weeks to complete the whole process.

(Adapted from the Boston Public Schools Signature Projects.)

Name _____ Period _____ Date _____

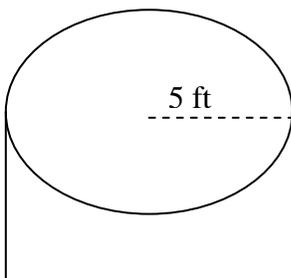
1) Volume = _____

2) Volume = _____



3) Volume = _____

4) Volume = _____



17 ft

