WAMC Lab Template

Math Concept(s): Cross Sections

Source / Text: http://www.shodor.org/interactivate/lessons/CrossSections/

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Attach the following documents:

Lab Instructions

Instruct students to go to this website:
http://www.shodor.org/interactivate/activities/CrossSectionFlyer/
Demonstrate how the simulation works. On the left there is a 3D shape. On the right is a visual representation of the cross section on a coordinate plane. Use the sliders and the different shapes to answer the questions on the hand out.

Student Handout(s)

Attached

Rubric and/or Assessment Tool

Check for understanding as students work with simulation. Collect worksheets to check for understanding

Indicate "*SPECIFIC*" relationship to Science, Technology, or Engineering

Ice Cores in Science. Trees cut in logging or environmental science, construction, engineering, MRI, Calculus

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

Students will have already been introduced to Cross sections earlier in the unit. Students will use a simulation to develop a deeper understanding of the different types of cross sections that can be formed in various shapes.

Lab Plan

Lab Title: Cross Sections

- Prerequisite skills: *Geometry:* Students must be able to:
  - identify and describe two-dimensional figures
  - identify and describe three-dimensional objects
- *Algebra:* Students must be able to:
  - work with two-dimensional graphs
- *Technology:* Students must be able to:
  - perform basic mouse manipulations such as point, click, and drag
  - use a browser for experimenting with the activities

Lab objective: Develop a deeper understanding of the Cross Sections of 3D Shapes

Standards:

Mathematics K–12 Learning Standards:

- Geometric Measurement and Dimension
  - Visualize relationships between two-dimensional and three- dimensional objects (G-M&D.4)
- Modeling with Geometry
  - Apply geometric concepts in modeling situations (G-Mod.1)
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Standards for Mathematical Practice:

- MP4 MP5 MP 6 MP 7

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

- CCSS.ELA-LITERACY.W.9-10.2
  CCSS.ELA-LITERACY.W.9-10.2.D
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Leadership/21st Century Skills:

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 INNOVATION

Creativity 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 SKILLS

Information 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 SKILLS

Flexibility 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

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

Materials

- Computers
- Worksheets
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Set-Up Required:

- A copy of the worksheet for every student
- Making sure each student is able to log on to a computer
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Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

- Students will need to be able to effectively use the computer simulation and guide themselves through the lab. Students must be able to manage themselves independently and stay on task.

Cooperative Learning:

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Expectations:

- Every student is working on the activity. If a student finishes early, challenge them to find more shapes in the cross sections. Students are meant to work independently, but may collaborate if they are struggling.

Timeline:

- 1 or 2 days on an introduction to cross sections before this activity

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- Scientists use cross sections to examine ice and tree cores to learn about the past. In engineering and construction they examine cross sections of buildings, blue prints are basically a cross section of a house. An MRI is a cross section of the human body, 3D Printing

Career Applications

- Environmental science, Doctor, Construction, Engineer, Chef

Optional or Extension Activities

- “Flatland” the movie or book.