



**Teaching Guide**

**For**

**Anti-Septic**

**Module**

**Illinois Career & Technical Education  
Math and Science Curriculum Project**

**2009**

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### **Business/Industry/Government Partner(s)**

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## Scenario Focus

### Overview of Module

Anti-Septic is a problem-based learning project in which students will be responsible for filling unused septic tanks to make way for a new sewer system in the Town of Lexington. Students will conduct research through the internet and interviews via phone, email, and/or in person to determine various facts about Lexington, septic tanks and the filling process, and different environmental concerns. Students should learn lessons about real-world data. In particular students should realize that it is difficult to find exact calculations and data and that estimation and assumptions are sometimes necessary evils when doing research. Students should also learn several methods for doing research and realize that sometimes a phone call or email to a professional could result in more specialized information than simply surfing the internet. Student success will be measured by observation throughout the project and will culminate with a presentation that will be evaluated in several areas using the attached rubric. Students will work on this project for 3-4 days initially, and then receive 1-2 days a week for 2 more weeks to compile information, make contacts, and ultimately prepare their presentation. In between these work days class will progress as usual focusing on the current unit.

**Primary Career Cluster:** Agriculture, Food & Natural Resources

**Primary Career Pathway:** Environmental Service Systems

### Related Occupations:

Environmental Compliance-Assurance Manager  
Environmental Sampling and Analysis Scientist/Technician  
Hazardous Materials Handler  
Hazardous Materials Technician  
Health and Safety Sanitarian  
Pollution Prevention and Control Technician  
Recycler  
Solid Waste Technician

**Recommended Subject Areas:** Environmental Science, Mathematics, and Computer Science

## **Scenario Problem Statement**

Background Information: Lexington currently does not have a city sewer system or a wastewater treatment plant. As a result each home and business has its own septic system. To comply with state mandates, Lexington is in the process of designing a sewer system to facilitate the needs of the community. One of the stipulations of the state is that each septic tank be drained of sewage and then refilled to prevent cave-ins or unsafe conditions. Our project is three-fold:

1. Estimate the total volume of septic space to be filled within the city limits.
2. Research for suitable "fill material" to refill the empty septic tanks.
3. Locate potential suppliers and estimate cost to transport "fill material" to Lexington.

Problem Statement: Your job as a city manager is to develop a cost effective method of filling existing septic tanks, while also complying with state mandates, for the residents of Lexington. Your method will be presented in a power point presentation to the mayor of Lexington.

## **Cluster Knowledge and Skills and Performance Elements**

- Select the appropriate tool to perform a given task.
- Understand the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- Examine required regulations to maintain/improve safety, health and environmental management systems.
- Determine, analyze and present solutions for different environmental issues.
- Learn economic principles in order to apply them to natural resource systems (i.e., supply, demand and profit).
- Apply skills with computer software to accomplish a variety of business activities.
- Access the Internet and use e-mail to demonstrate the ability to network and interface with technology.
- Examine new technologies to project their impact in the global market of technology.
- Apply critical thinking skills and decision-making to exhibit qualifications for entering a career.

## **Illinois Learning Standards**

### **Math Standards:**

6.B.4 Select and use appropriate arithmetic operations in practical situations including calculating wages after taxes, developing a budget and balancing a checkbook.

6.C.4 Determine whether exact values or approximations are appropriate (e.g., bid a job, determine gas mileage for a trip).

6.D.4 Solve problems involving recipes or mixtures, financial calculations, and geometric similarity using ratios, proportions, and percents

7.A.4a Apply units and scales to describe and compare numerical data and physical objects.

7.A.4b Apply formulas in a wide variety of theoretical and practical real-world measurement applications involving perimeter, area, volume, angle, time, temperature, mass, speed, distance, density and monetary values.

7.B.5 Estimate perimeter, area, volume, and capacity of irregular shapes, regions and solids and explain the reasoning supporting the estimate.

7.C.4b Interpret scale drawings and models using maps and blueprints.

10.A.5 Construct a statistics-based presentation, individually and as members of a team, to communicate and justify the results of a project.

### **Language Arts Standards:**

4.B.5a Deliver planned and impromptu oral presentations, as individuals and members of a group, conveying results of research, projects or literature studies to a variety of audiences (e.g., peers, community, business/industry, local organizations) using appropriate visual aids and available technology.

5.A.5b Research, design and present a project to an academic, business or school community audience on a topic selected from among contemporary issues.

5.C.4b Produce oral presentations and written documents using supportive research and incorporating contemporary technology.

5.C.5a Using contemporary technology, create a research presentation or prepare a documentary related to academic, technical or occupational topics and present the findings in oral or multimedia formats.

What I Want Students to Know	What I Want Students to be Able to Do
<ul style="list-style-type: none"> <li>• Different types of septic tanks and their properties</li> <li>• Safety precautions and environmental standards governing the filling of septic tanks</li> <li>• Occupation and skills required to perform this task</li> <li>• Community and commercial involvement necessary to fill septic tanks in an efficient manner</li> </ul>	<ul style="list-style-type: none"> <li>• Calculate volume</li> <li>• Perform conversions</li> <li>• Perform unit analysis</li> <li>• Research current septic system in Lexington, IL and estimate total number of residential and commercial septic tanks</li> <li>• Research and analyze alternative fill materials for septic tanks</li> <li>• Determine cost effective approaches to obtaining fill material</li> <li>• Determine areas of concern when filling septic tanks</li> <li>• Recommend the most cost-effective and environmentally friendly approach to filling a septic tank</li> <li>• Present recommendations in a formal/professional setting</li> </ul>

### Objectives

- Students will be able to calculate volume.
- Students will research current septic system in Lexington, IL and estimate total number of residential and commercial septic tanks
- Students will research and analyze alternative fill materials for septic tanks
- Students will determine cost effective approaches to obtaining fill material
- Students will determine areas of concern when filling septic tanks
- Students will recommend the most cost-effective and environmentally friendly approach to filling a septic tank
- Students will present recommendations in a formal/professional setting

### Measurement Criteria

1. End result of total average volume calculation is correct and includes additional calculations for individual septic tank volume, differences in septic tank style, and estimated number of septic tanks.
2. Researched three logical options for fill material considering cost, environmental regulations, transportation and availability, and possible storage location.

3. Fill material selected represented the most cost effective and environmentally friendly means for filling the septic tanks.
4. Recommended at least four possibilities for further study.
5. Presentation showcased the information with visual aids and/or handouts.
  - The presentation met the 7 requirements of effective business presentations:
    - Evidence of preparedness and practice
    - Started on time
    - Dressed appropriately
    - Showed enthusiasm and confidence
    - Maintained eye contact, showed friendliness and respect
    - Spoke slowly and distinctly without grammatical errors or slang
    - Welcomed questions and answered completely;
    - Accepted reactions without being defensive.
    - Met time requirements (not including question & answer session)
6. All problem notes and calculations (including the PBL Introduction, Problem Analysis Worksheet, and three focus questions) are organized and turned in at the end of the presentation.

### **Teacher Notes**

This module was developed with upperclassmen/motivated juniors and seniors in mind. Teachers may want to provide more guidance to students, using worksheets or directed research techniques. If a business partner is unable to provide information on septic tanks, it may be necessary to inform students through a video or lecture based presentation. Teachers may want to involve students in an introductory problem that allows them to familiarize themselves with problem-based learning and successful techniques that will assist them in solving one of these problems.

### **Time required to complete Problem (Estimated):**

10-12 school days (44 minute periods) = around 8-10 hours

### **Module Support Materials Summary**

Computer access to Internet

Presentation software and equipment

Scientific calculators

"How Sewer and Septic Systems Work" - Dirty Jobs: Septic Tank Technician  
Video Clip (<http://home.howstuffworks.com/sewer2.htm>)

Transportation to and from business site

Speaker on septic systems

<b>Lesson 1</b>	<b>Introduce Students to Problem Based Learning (optional)</b>	
<b>Time Estimate:</b> 1 class period		
<b>Objectives</b>		
<ol style="list-style-type: none"> <li>1. Students will be able to calculate volume.</li> <li>2. Students will experience problem based learning on a small scale.</li> </ol>		
<b>Materials &amp; Resources</b>		
<ul style="list-style-type: none"> <li>• Handout 1, "Planning a Garden Path"</li> <li>• Computer lab with access to the Internet</li> <li>• "How Sewer and Septic Systems Work" - Dirty Jobs: Septic Tank Technician Video Clip (<a href="http://home.howstuffworks.com/sewer2.htm">http://home.howstuffworks.com/sewer2.htm</a>)</li> </ul>		
<b>Agenda</b>		
<b>Step</b>	<b>Minutes</b>	<b>Activity</b>
1	10	-Discuss personal problem based learning experiences and explain what problem based learning is and what it will entail. If necessary, discuss rationale for problem based learning.
2	30	-Split students into small groups -Distribute Handout 1, "Planning a Garden Path" -Allow time for students to complete Handout 1.
3	10	-Discuss results of activity and skills necessary to answer the question.
4	5	-Show "Dirty Jobs: Septic Tank Technician" Video Clip and hint that their actual problem will revolve around this information.

## Introduction to Problem Based Learning: Planning a Garden Path

*You are planning to create a secondary garden path that runs through the garden in your backyard. Answer the following questions and complete the following tasks in order to create the "best" path for your yard.*

### 1. Calculate the Volume

*Assume that the path you are creating is rectangular path that goes from one end of your garden to the other end. Given the following measurements, calculate the volume of the path. SHOW ALL WORK.*

**Depth: about 2 inches**

**Width: 3 feet**

**Length: 6 yards**

### 2. Material Options

*Use online resources to research 3 possible materials you could use to create the path. Consider the following criteria when selecting materials: cost, durability, and aesthetics. Complete the following chart. Remember to record the website where you obtained the information.*

MATERIAL	WEBSITE/STORE	COST per ?	DURABILITY	AESTHETICS

### 3. Which Material is Best

*Choose the best of your three materials based on the material with the LEAST COST, HIGHEST DURABILITY, and the BEST AESTHETICS for your garden.*

<b>Lesson 2</b>		<b>Field Trip or Presentation by speaker on Septic Systems</b>
<b>Time Estimate:</b> 2 hours		
<b>Objectives</b>		
1. Students will understand how a septic system functions.		
<b>Materials &amp; Resources</b>		
<ul style="list-style-type: none"> <li>• Handout 2, Memo from Business Partner</li> <li>• Transportation to and from site for field trip</li> <li>• Speaker on septic systems</li> </ul>		
<b>Agenda</b>		
<i>Step</i>	<i>Minutes</i>	<i>Activity</i>
1	30	-Travel to site for field trip
2	5	-Introductions of speaker to students
3	25	-Distribute Handout 2 and have speaker present problem
4	20	-On site visit to septic system
5	10	-Allow time for questions and answers
6	30	-Return to school



## MEMO

FROM: *Bob Kohlhase, Farnsworth Group*  
TO: *Students of Ridgeview High School*  
RE: *Anti-Septic*

The town of Lexington has approached us to devise a solution to its maintenance needs. Lexington currently does not have a city sewer system or a wastewater treatment plant. As a result each home and business has its own septic system. To comply with state mandates, Lexington is in the process of designing a sewer system to facilitate the needs of the community. One of the stipulations of the state is that each septic tank be drained of sewage and then refilled to prevent cave-ins or unsafe conditions. Our project is three-fold:

1. Estimate the total volume of septic space to be filled within the city limits.
2. Research three possible "fill materials" that will be suitable for refilling the empty septic tanks.
3. Locate potential suppliers and estimate cost to transport "fill material" to Lexington.

Your job as a city manager is to develop a cost effective method of filling existing septic tanks, while also complying with state mandates, for the residents of Lexington. Please be prepared to discuss your findings in an oral presentation at our next operations meeting.

<b>Lesson 3</b>		<b>Develop and Focus Research</b>
<b>Time Estimate:</b> 45 minutes		
<b>Objectives</b>		
<ol style="list-style-type: none"> <li>1. Students will define and explain the variables involved in the problem.</li> <li>2. Students determine common terms to research for the problem.</li> <li>3. Students will create a list of topics and questions that must be researched in order to effectively solve this problem.</li> </ol>		
<b>Materials &amp; Resources</b>		
<ul style="list-style-type: none"> <li>• Handout 3, Problem Analysis Worksheet</li> <li>• Handout 4, Brainstorm" Worksheet</li> <li>• Computer and digital projector to record list of topics and terms generated by class.</li> </ul>		
<b>Agenda</b>		
<b><i>Step</i></b>	<b><i>Minutes</i></b>	<b><i>Activity</i></b>
1	5	-Discuss previous day's field trip
2	20	-Distribute Handout 3 and have students complete in groups. -Distribute Handout 4 and conduct small group discussions to brainstorm ideas and terms using "Brainstorm" worksheet.
3	20	-Conduct a collaborative discussion as a class and compile a list of ideas and terms for next lesson's research

### Problem Analysis Worksheet

*Your job as a city manager is to develop a cost effective method of filling existing septic tanks, while also complying with state mandates, for the residents of Lexington.*

What do you know?	What do you need to know?

1. What will your team need to do to complete this task?

2. What materials will your team need to complete this task?

*Use this back of this page to record ideas that are discussed in class.*



<b>Lesson 4</b>		<b>Conduct Research</b>
<b>Time Estimate:</b> 3 class periods		
<b>Objectives</b>		
<ol style="list-style-type: none"> <li>1. Students will gather information based on terms and ideas from lesson three.</li> <li>2. Students will research at least one focus question each period and provide a detailed write up on their findings.</li> </ol>		
<b>Materials &amp; Resources</b>		
<ul style="list-style-type: none"> <li>• Handout 5, Rubric for Project</li> <li>• Computer lab with internet access</li> </ul>		
<b>Agenda</b>		
<b><i>Step</i></b>	<b><i>Minutes</i></b>	<b><i>Activity</i></b>
1	5	<ul style="list-style-type: none"> <li>-Specify research goals for the day and introduce focus question.</li> <li>- Distribute Handout 5, Rubric for Project</li> <li>-Explain what will be expected by the end of the project, using the final rubric (Rubric 1) as a guide.</li> </ul>
2	135	-Allow time for students to conduct research

### Grading Score Sheet for Anti-Septic

Criteria	Scoring				
	0	1	3	5	6
1. End result of total average volume calculation is correct and includes additional calculations for individual septic tank volume, differences in septic tank style, and estimated number of septic tanks.	No evidence of calculation is present.	Little or no work is shown to justify calculation or calculation is incorrect.	Calculations are correct and include some additional calculations. Most work is shown.	Calculations are correct and include almost all additional calculations. Some work is shown, and most is easy to follow..	Calculations are correct and include all additional calculations. All work is shown and easy to follow..
2. First option researched considering cost, environmental regulations, transportation and availability, and possible storage location.	No evidence of option researched.	Option is researched, but only one variable is considered.	Option is researched and two-three variables are considered.	Option is researched and all required variables are considered.	Option is researched and all required variables, as well as some additional variables, are considered.
3. Second option researched considering cost, environmental regulations, transportation and availability, and possible storage location.	No evidence of option researched.	Option is researched, but only one variable is considered.	Option is researched and two-three variables are considered.	Option is researched and all required variables are considered.	Option is researched and all required variables, as well as some additional variables, are considered.
4. Third option researched considering cost, environmental regulations, transportation and availability, and possible storage location.	No evidence of option researched.	Option is researched, but only one variable is considered.	Option is researched and two-three variables are considered.	Option is researched and all required variables are considered.	Option is researched and all required variables, as well as some additional variables, are considered.
5. Fill material selected represented the most cost effective and environmentally friendly means for filling the septic tanks.	No fill material is recommended.	One fill material is recommended with little justification or logic.	One fill material is recommended with some justification, but needs for explanation.	One fill material is recommended with appropriate justification.	One fill material is recommended with fool proof reasoning and logic.
6. Recommended at least four possibilities for further study.	No possibilities listed for further study.	One possibility listed for further study.	Two possibilities listed for further study.	Three possibilities listed for further study.	Four or more possibilities listed for further study.
7. All problem notes and calculations (including the PBL Introduction, Problem Analysis Worksheet, and three focus questions) are organized and turned in at the end of the presentation.	No materials were turned in..	Few materials were turned in and /or greatly lacked organization.	Some materials were turned in and were mostly organized.	All materials were turned in and were organized.	All materials were turned in and organization and presentation were impeccable.
8. All group members contributed and worked together during this process.	Group members did not work together	Group members seldom worked together.	Group members sometimes worked together.	Group members usually worked together.	Group members always worked together.
<b>Total Score</b>					<b>___/48</b>

Scoring Legend: 0 - Poor      1.- Below Average      3 - Average      5 - Above Average      6 - Excellent

<b>Lesson 5</b>	<b>PowerPoint Presentation Preparation</b>	
<b>Time Estimate:</b> 4 class periods		
<b>Objectives</b>		
1. Students will develop a presentation that summarizes their analysis of the collected data, outlines areas of concern, communicates information gathered during research, and recommends a strategy to fill septic tanks in a cost-effective manner.		
<b>Materials &amp; Resources</b>		
<ul style="list-style-type: none"> <li>• Handout 6, Rubric for Presentation</li> <li>• Computers with Internet access</li> <li>• Presentation software and equipment (projector &amp; computer)</li> </ul>		
<b>Agenda</b>		
<b><i>Step</i></b>	<b><i>Minutes</i></b>	<b><i>Activity</i></b>
1	5	-Distribute Handout 6, Rubric for Presentation -Review the presentation requirements
2	175	Allow time for students to develop their presentations

## PRESENTATION RUBRIC

<b>Evaluating Student Presentations<sup>1</sup></b>					
	<b>Poor 1</b>	<b>Fair 2</b>	<b>Acceptable 3</b>	<b>Exceeds Acceptable 4</b>	<b>Total points</b>
<b>Organization (Sequence)</b>	Audience cannot understand presentation because there is no sequence of information.	Audience has difficulty following presentation because student jumps around.	Student presents information in logical sequence which audience can follow.	Student presents information in logical, interesting sequence which audience can follow.	
<b>Subject Knowledge (Questions)</b>	Student does not have grasp of information; student cannot answer questions about subject.	Student is uncomfortable with information and is able to answer only rudimentary questions.	Student is at ease with expected answers to all questions, but fails to elaborate.	Student demonstrates full knowledge (more than required) by answering all class questions with explanations and elaboration.	
<b>Graphics</b>	Student uses superfluous graphics or no graphics	Student occasionally uses graphics that rarely support text and presentation.	Student's graphics relate to text and presentation.	Student's graphics explain and reinforce screen text and presentation.	
<b>Mechanics (Spelling and Grammar)</b>	Student's presentation has four or more spelling errors and/or grammatical errors.	Presentation has three misspellings and/or grammatical errors.	Presentation has no more than two misspellings and/or grammatical errors.	Presentation has no misspellings or grammatical errors.	
<b>Eye Contact</b>	Student reads all of report with no eye contact.	Student occasionally uses eye contact, but still reads most of report.	Student maintains eye contact most of the time but frequently returns to notes.	Student maintains eye contact with audience, seldom returning to notes.	
<b>Elocution</b>	Student mumbles, incorrectly pronounces terms, and speaks too quietly for students in the back of class to hear.	Student's voice is low. Student incorrectly pronounces terms. Audience members have difficulty hearing presentation.	Student's voice is clear. Student pronounces most words correctly. Most audience members can hear presentation.	Student uses a clear voice and correct, precise pronunciation of terms so that all audience members can hear presentation.	
				<b>Total Points:</b>	<b>/28</b>

<sup>1</sup> Adapted from Evaluating Student Presentations, Information Technology Evaluation Services, NC Department of Public Instruction

<b>Lesson 6</b>		<b>Presentations to Business Partner</b>
<b>Time Estimate:</b> 3 hours		
<b>Objectives</b>		
1. Student groups will present a 5 to 7 minute presentation in a professional manner.		
<b>Materials &amp; Resources</b>		
<ul style="list-style-type: none"> <li>• Handout 6, Rubric for Presentations</li> <li>• Presentation software and equipment (projector &amp; computer)</li> </ul>		
<b>Agenda</b>		
<b>Step</b>	<b>Minutes</b>	<b>Activity</b>
1	110	-Students give Presentations to business Partner
2	30	-Allow time for Questions and Answers
3	10	-Discuss Student evaluations and debrief their thoughts on the module.

# Teacher

## Assessment Material

# FINAL EVALUATION

## Problem Statement to be Solved

Your job as a city manager is to develop a cost effective method of filling existing septic tanks, while also complying with state mandates, for the residents of Lexington. Your method will be presented in a power point presentation to the mayor of Lexington.

## Final Evaluation Criteria

1. End result of total average volume calculation is correct and includes additional calculations for individual septic tank volume, differences in septic tank style, and estimated number of septic tanks.
2. Researched three logical options for fill material considering cost, environmental regulations, transportation and availability, and possible storage location.
3. Fill material selected represented the most cost effective and environmentally friendly means for filling the septic tanks.
4. Recommended at least four possibilities for further study.
5. Presentation showcased the information with visual aids and/or handouts.
6. The presentation met the 7 requirements of effective business presentations:
  - Evidence of preparedness and practice
  - Started on time
  - Dressed appropriately
  - Showed enthusiasm and confidence
  - Maintained eye contact, showed friendliness and respect
  - Spoke slowly and distinctly without grammatical errors or slang
  - Welcomed questions and answered completely;
  - Accepted reactions without being defensive.
  - Met time requirements (not including question & answer session)
7. All problem notes and calculations (including the PBL Introduction, Problem Analysis Worksheet, and three focus questions) are organized and turned in at the end of the presentation.

## Final Evaluation Scoring Guide or Rubric (Rubric 1 - Anti-Septic)

<i>Grading Score Sheet for Anti-Septic</i>					
Criteria	Scoring				
	0	1	3	5	6
1. End result of total average volume calculation is correct and includes additional calculations for individual septic tank volume, differences in septic tank style, and estimated number of septic tanks.	<i>No evidence of calculation is present.</i>	<i>Little or no work is shown to justify calculation or calculation is incorrect.</i>	<i>Calculations are correct and include some additional calculations. Most work is shown.</i>	<i>Calculations are correct and include almost all additional calculations. Some work is shown, and most is easy to follow..</i>	<i>Calculations are correct and include all additional calculations. All work is shown and easy to follow..</i>
2. First option researched considering cost, environmental regulations, transportation and availability, and possible storage location.	<i>No evidence of option researched.</i>	<i>Option is researched, but only one variable is considered.</i>	<i>Option is researched and two-three variables are considered.</i>	<i>Option is researched and all required variables are considered.</i>	<i>Option is researched and all required variables, as well as some additional variables, are considered.</i>
3. Second option researched considering cost, environmental regulations, transportation and availability, and possible storage location.	<i>No evidence of option researched.</i>	<i>Option is researched, but only one variable is considered.</i>	<i>Option is researched and two-three variables are considered.</i>	<i>Option is researched and all required variables are considered.</i>	<i>Option is researched and all required variables, as well as some additional variables, are considered.</i>
4. Third option researched considering cost, environmental regulations, transportation and availability, and possible storage location.	<i>No evidence of option researched.</i>	<i>Option is researched, but only one variable is considered.</i>	<i>Option is researched and two-three variables are considered.</i>	<i>Option is researched and all required variables are considered.</i>	<i>Option is researched and all required variables, as well as some additional variables, are considered.</i>
5. Fill material selected represented the most cost effective and environmentally friendly means for filling the septic tanks.	<i>No fill material is recommended.</i>	<i>One fill material is recommended with little justification or logic.</i>	<i>One fill material is recommended with some justification, but needs for explanation.</i>	<i>One fill material is recommended with appropriate justification.</i>	<i>One fill material is recommended with fool proof reasoning and logic.</i>
6. Recommended at least four possibilities for further study.	<i>No possibilities listed for further study.</i>	<i>One possibility listed for further study.</i>	<i>Two possibilities listed for further study.</i>	<i>Three possibilities listed for further study.</i>	<i>Four or more possibilities listed for further study.</i>
7. All problem notes and calculations (including the PBL Introduction, Problem Analysis Worksheet, and three focus questions) are organized and turned in at the end of the presentation.	<i>No materials were turned in..</i>	<i>Few materials were turned in and /or greatly lacked organization.</i>	<i>Some materials were turned in and were mostly organized.</i>	<i>All materials were turned in and were organized.</i>	<i>All materials were turned in and organization and presentation were impeccable.</i>
8. All group members contributed and worked together during this process.	<i>Group members did not work together</i>	<i>Group members seldom worked together.</i>	<i>Group members sometimes worked together.</i>	<i>Group members usually worked together.</i>	<i>Group members always worked together.</i>
<b>Total Score</b>					<b>___/48</b>

### Scoring Legend:

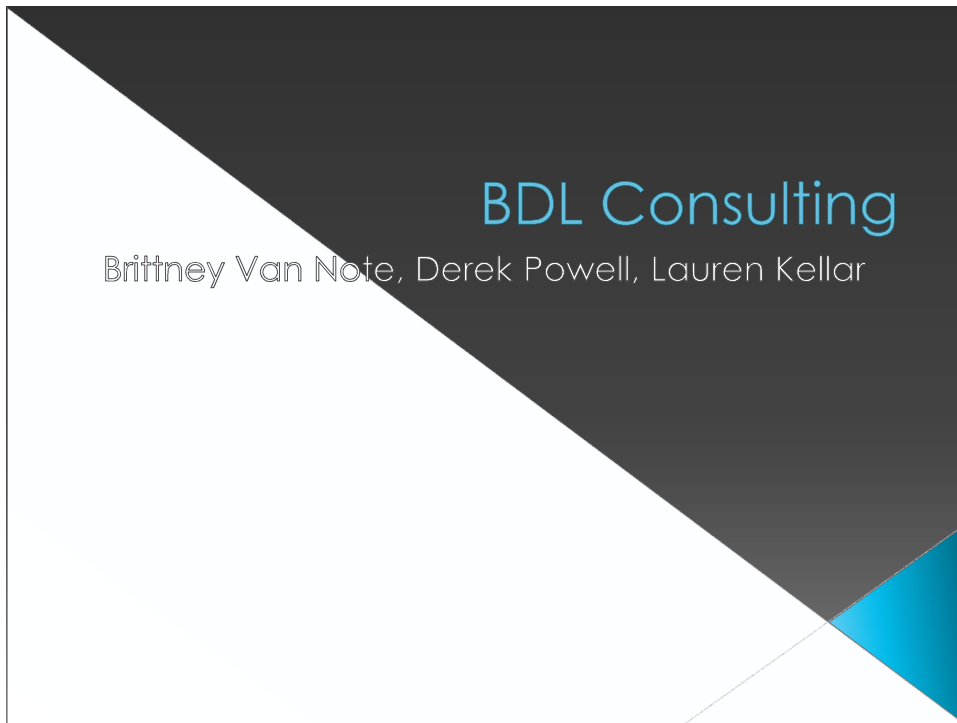
0 - Poor      1.- Below Average    3 - Average    5 - Above Average    6 - Excellent

## PRESENTATION RUBRIC (Rubric 2 - Anti-Septic)

	<b>Evaluating Student Presentations<sup>2</sup></b>				
	<b>Poor 1</b>	<b>Fair 2</b>	<b>Acceptable 3</b>	<b>Exceeds Acceptable 4</b>	<b>Total points</b>
<b>Organization (Sequence)</b>	Audience cannot understand presentation because there is no sequence of information.	Audience has difficulty following presentation because student jumps around.	Student presents information in logical sequence which audience can follow.	Student presents information in logical, interesting sequence which audience can follow.	
<b>Subject Knowledge (Questions)</b>	Student does not have grasp of information; student cannot answer questions about subject.	Student is uncomfortable with information and is able to answer only rudimentary questions.	Student is at ease with expected answers to all questions, but fails to elaborate.	Student demonstrates full knowledge (more than required) by answering all class questions with explanations and elaboration.	
<b>Graphics</b>	Student uses superfluous graphics or no graphics	Student occasionally uses graphics that rarely support text and presentation.	Student's graphics relate to text and presentation.	Student's graphics explain and reinforce screen text and presentation.	
<b>Mechanics (Spelling and Grammar)</b>	Student's presentation has four or more spelling errors and/or grammatical errors.	Presentation has three misspellings and/or grammatical errors.	Presentation has no more than two misspellings and/or grammatical errors.	Presentation has no misspellings or grammatical errors.	
<b>Eye Contact</b>	Student reads all of report with no eye contact.	Student occasionally uses eye contact, but still reads most of report.	Student maintains eye contact most of the time but frequently returns to notes.	Student maintains eye contact with audience, seldom returning to notes.	
<b>Elocution</b>	Student mumbles, incorrectly pronounces terms, and speaks too quietly for students in the back of class to hear.	Student's voice is low. Student incorrectly pronounces terms. Audience members have difficulty hearing presentation.	Student's voice is clear. Student pronounces most words correctly. Most audience members can hear presentation.	Student uses a clear voice and correct, precise pronunciation of terms so that all audience members can hear presentation.	
<b>Time Management</b>	Student is extremely over or extremely under the set time requirement.	Student is somewhat over or somewhat under the set time requirement.	Student is barely over or barely under the set time requirement.	Student is almost exactly at the set time requirement.	
				<b>Total Points:</b>	<b>/28</b>

<sup>2</sup> Adapted from Evaluating Student Presentations, Information Technology Evaluation Services, NC Department of Public Instruction

## Example of Acceptable Student Solution



Double-Click Presentation to view.

# APPENDIX

# Glossary of Terms

## **Septic Tank**

An underground sedimentation tank in which sewage is retained for a short period while it is decomposed and purified by bacterial action

(<http://education.yahoo.com/reference/encyclopedia/entry?id=42901>)

## **Septic System**

The combination of a septic tank, the septic drain field, and the associated piping

([http://en.wikipedia.org/wiki/Septic\\_drain\\_field](http://en.wikipedia.org/wiki/Septic_drain_field))

## **Sewer**

An artificial, usually underground conduit for carrying off sewage or rainwater.

(<http://education.yahoo.com/reference/dictionary/entry/sewer>)

## **Drain Field (Leach Field)**

A series of perforated pipes buried in trenches that allow the liquid from a septic tank to leak out in order to remove contaminants and impurities from the liquid.

([http://en.wikipedia.org/wiki/Septic\\_drain\\_field](http://en.wikipedia.org/wiki/Septic_drain_field))

## **Passive System**

A system designed to optimize the process by design, not mechanical action, allowing only time, gravity, ambient temperature, and the shape of the container to control the process.

(<http://oikos.com/library/compostingtoilet/>)

## Additional Resource Information

1. How does a septic system work?

Teachers can use the video clip and information provided by this site to introduce the project and assist with some basic information about septic systems.

([www.home.howstuffworks.com\(sewer2.htm\)](http://www.home.howstuffworks.com/sewer2.htm))

2. What environmental laws and regulations must we consider before filling a septic tank?

Teachers may visit the website set up by the Environmental Protection Agency to uncover a variety of environmental regulations.

([www.epa.gov](http://www.epa.gov))

Sample Septic Questions for Use in Module or as a pre-test or post-test

<http://www.act.org/workkeys/assess/math/index.html>

You are preparing to tile the floor of a rectangular room that is  $15\frac{1}{2}$  feet by  $18\frac{1}{2}$  feet in size. The tiles you plan to use are square, measuring 12 inches on each side, and are sold in boxes that contain enough tile to cover 25 square feet. How many boxes of tiles must you order to complete the job?

- A. 11
- B. 12
- C. 34
- D. 59
- E. 287

The farm where you just started working has a vertical cylindrical oil tank that is 2.5 feet across on the inside. The depth of the oil in the tank is 2 feet. If 1 cubic foot of space holds 7.48 gallons, about how many gallons of oil are left in the tank?

- A. 37
- B. 59
- C. 73
- D. 230
- E. 294

<http://www.actstudent.org/sampletest/index.html>

A rectangle is twice as long as it is wide. If the width of the rectangle is 3 inches, what is the rectangle's area, in square inches?

- F.** 6
- G.** 9
- H.** 12
- J.** 15
- K.** 18

A box of cereal contains  $18\frac{3}{4}$  cups of cereal. At most, how many persons can you serve from this box of cereal if each serving must be at least  $\frac{3}{4}$  cup?

- A.** 14
- B.** 18
- C.** 19
- D.** 24
- E.** 25

There are  $n$  students in a class. If, among those students,  $p\%$  play at least 1 musical instrument, which of the following general expressions represents the number of students who play NO musical instrument?

- A.**  $np$
- B.**  $.01np$
- C.**  $\frac{(100-p)n}{100}$
- D.**  $\frac{(1-p)n}{.01}$
- E.**  $100(1-p)n$

A rock group gets 30% of the money from sales of their newest compact disc. That 30% is split equally among the 5 group members. If the disc generates \$1,000,000 in sales, how much does one group member receive?

- F.** \$ 30,000
- G.** \$ 50,000
- H.** \$ 60,000
- J.** \$200,000
- K.** \$300,000

If 60% of the weight of a 2,200-pound car should be supported by the rear tires, how many pounds should be supported by the rear tires?

- A.** 120
- B.** 600
- C.** 1,200
- D.** 1,320
- E.** 1,600

<http://www.act.org/compass/sample/prealg.html>

Ben is making wooden toys for the next arts and crafts sale. Each toy costs Ben \$1.80 to make. If he sells the toys for \$3.00 each, how many will he have to sell to make a profit of exactly \$36.00 ?

- A.** 12
- B.** 20
- C.** 30
- D.** 60
- E.** 108

How many yards of material from a 24-yard length of cloth remain after 3 pieces, each  $3\frac{1}{2}$  yards long, and 5 pieces, each  $2\frac{1}{4}$  yards long, are removed?

- A.**  $2\frac{1}{4}$
- B.**  $4\frac{1}{4}$
- C.**  $4\frac{5}{6}$
- D.**  $10\frac{1}{4}$
- E.**  $10\frac{5}{6}$

Phillip charged \$400 worth of goods on his credit card. On his first bill, he was not charged any interest, and he made a payment of \$20. He then charged another \$18 worth of goods. On his second bill a month later, he was charged 2% interest on his entire unpaid balance. How much interest was Phillip charged on his second bill?

- A.** \$8.76
- B.** \$7.96
- C.** \$7.60
- D.** \$7.24
- E.** \$6.63

<http://www.bement.k12.il.us/math/workkeys.html#Level%203>

You use 3 gallons of concentrated cleaner to mix 10 gallons of usable solution. How much concentrated cleaner should be used to make 30 gallons of usable solution?

- A)  $3\frac{1}{3}$  gallons
- B)  $8\frac{1}{2}$  gallons
- C) 10 gallons

- D) 5 gallons
- E) 9 gallons

If it takes 2 yards of interfacing to make 4 suits, how many yards of interfacing should it take to make 20 suits? Calculate the result.

You are the new maintenance person for the local school and need to calculate how much wax will be required for the cafeteria floor based on its square footage. The cafeteria is 120 feet by 45 feet. What is the square footage you should use to figure the amount of wax needed for the cafeteria floor?

You have been asked to ship a package that weighs 41 pounds; however, the freight company wants to know the weight in kilograms. What is the closest approximation of the package's weight in kilograms?

In your job at a company that makes bowling balls, you are doing a quick check of how much plastic resin has been used this week by the machine that molds the balls. Each ball is a sphere with a radius of 4 inches (the finger holes are drilled out after the ball has been molded). Production records show that 1,200 balls were made this week. Ignoring waste, about how many cubic feet of resin were used in the machine this week?