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# triangle trilage

background

## Background:

Sustainability is commonly defined as: “Meeting the needs of current generations without compromising the needs of future generations.”

In order to determine if something is sustainable, three elements must be considered: economics, environment, and social equity. These are known as the “three Es”.

- Economic – factors or criteria might be, but are not limited to, jobs, cost, human hours, etc.
- Environment – factors or criteria might be, but are not limited to, air quality, water quality, open space, safety, etc.
- Social equity – factors or criteria might be, but are not limited to, diverse populations, number of people positively impacted, increased lifestyle efficiency, etc.



goal

## Goal:

Students will apply the concepts of economics, environment, and social equity to relevant decisions and will increase their knowledge of sustainability.

objectives

## Objectives:

*Students will...*

- Draw conclusions
- Identify the concepts of sustainability
- Do Internet research to collect data
- Use data to make a balanced decision
- Rationalize their decisions
- Understand the perspectives of others
- Develop criteria to quantify their decisions
- Become familiar with the Sustainable Decision Grid



Time Required: One – 45 to 60 minute class period

materials

## Materials (for a class of 30):

- Information and data on tap and bottled water, which students will use to rate their criteria
- Sidewalk chalk
- 30 copies of Triangle Triage – Student Sheet
- Overhead projector
- Overhead transparency of Triangle Triage – Overhead Triangles
- Overhead markers

Standards Met: S2, S7, LA3, LA6,  
LA12, GM1, M2, DA1, R3



## Prep

- Using sidewalk chalk, draw two large decision grid triangles on an outdoor concrete surface. See the Triangle Triage – Student Sheet for an example.
- If you don't have access to an outdoor space for this activity, use an overhead projector with transparencies of the decision grid or use masking tape on the floor in your classroom.
- Do Internet research on tap water versus bottled water (many sites) and run off several articles as research material for the students or have the students do their own research and bring it for the day of the activity. Listed to the right are some potential sources to begin your research.

### Bottled Water Websites

- **FDA (Regulates Bottled Water)**  
*[www.cfsan.fda.gov/~lrd/bot-h2o.html#oview](http://www.cfsan.fda.gov/~lrd/bot-h2o.html#oview)*
- **Natural Resources Defense Council**  
*[www.nrdc.org/water/drinking/qbw.asp](http://www.nrdc.org/water/drinking/qbw.asp)*
- **Article from FDA Consumer Magazine, July-August 2002**  
*[www.fda.gov/fdac/features/2002/402\\_h2o.html](http://www.fda.gov/fdac/features/2002/402_h2o.html)*

# PROC

#### Tap Water Websites

- EPA (Regulates Tap Water)  
*[www.epa.gov/OW/index.html](http://www.epa.gov/OW/index.html)*
- Natural Resources Defense Council  
*[www.nrdc.org/water/drinking/uscities/contents.asp](http://www.nrdc.org/water/drinking/uscities/contents.asp)*
- Article from FDA Consumer Magazine, July-August 2002  
*[www.fda.gov/fdac/features/2002/402\\_h2o.html](http://www.fda.gov/fdac/features/2002/402_h2o.html)*

#### Combination Sites

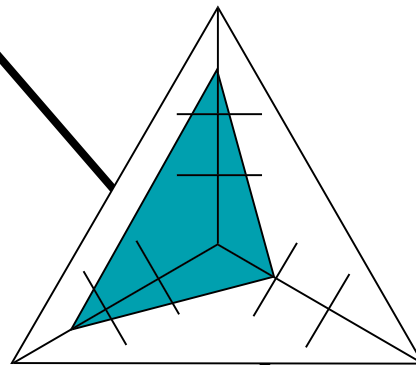
- Article from Water Quality and Health  
*[www.waterandhealth.org/newsletter/new/summer-2002/bottled.html](http://www.waterandhealth.org/newsletter/new/summer-2002/bottled.html)*
- The News & Observer (2007)  
*[www.newsobserver.com/354/story/259192.html](http://www.newsobserver.com/354/story/259192.html)*
- Deseret News (Salt Lake City), Jul 16, 2007  
*[http://findarticles.com/p/articles/mi\\_qn4188/is\\_20070716/ai\\_n19370314](http://findarticles.com/p/articles/mi_qn4188/is_20070716/ai_n19370314)*

edure

### *In Class*

- Split class into two groups of 15. Within these groups there should be three subgroups – five students for environment, five for social equity, and five for economics (the three ‘Es’).
- Project on overhead Triangle Triage – Overhead Triangles.
- Explain to the students that they will be using these triangles as part of a graphic tool for making decisions involving two or more possible choices, in this case, the choice to use bottled or tap water.
- Have each subgroup list at least two criteria relating to their assigned ‘E’ that they feel are important when selecting a source of drinking water. There is room for three criteria in each ‘E’ on the decision grid on the Triangle Triage – Student Sheet.
- After they have determined their criteria, assign half of the class (three subgroups, one of each of the ‘Es’) to rate the sustainability of selecting bottled water for their drinking water source and the other half of the class selecting tap water for their drinking water source.
- Pass out data information for both types of water or have the students take out their research.
- Using the scale provided for rating criteria, have each ‘E’ subgroup group rate their criteria in relation to the information they have received or the opinions that they may have in relation to the type of water that was assigned to them.
- Have each subgroup support their rating by listing pertinent data or information.
- After all criteria have been rated and the supporting data has been listed, have each subgroup calculate the average in their ‘E’ category.
- Reach consensus within each ‘E’ subgroup on where one representative should stand on the large graphic triangle using their averages.
- Have each person standing on the triangle explain why they are standing on their number by explaining their criteria, information, and/or opinions.
- Groups should plot these numbers on the decision triangles on their Triangle Triage – Student Sheets.
- Once all explanations have been given for both triangles, wrap a string around the three students standing on each triangle, constructing a triangle within each of the two triangles.

- Have everyone else for that type of water stand inside this inner triangle for shading. You should have two triangles that look something like the graphic to the right.
- Return to the classroom and have each student complete both triangles and calculate the area of the decision grid that has been shaded by using the mathematical formula:  $\text{Area} = 1/2$  the base multiplied by the height ( $\text{Area} = 1/2bh$ ).
- Discuss which type of water appears to be the most sustainable (the one with the largest area).
- If time allows, switch groups and evaluate the two types of water again, changing the type of water assigned to each group. Debrief and discuss differences. Are the results the same when different groups evaluated the same type of water? Why or why not? Does having different criteria affect the sustainability rating? If so, how would you remedy this situation?
- When finished, students should be shown that they have just paraphrased the three aspects of sustainability – environment, social equity and economics.
- Have the students finish the questions on their Triangle Triage – Student Sheet for homework if necessary.

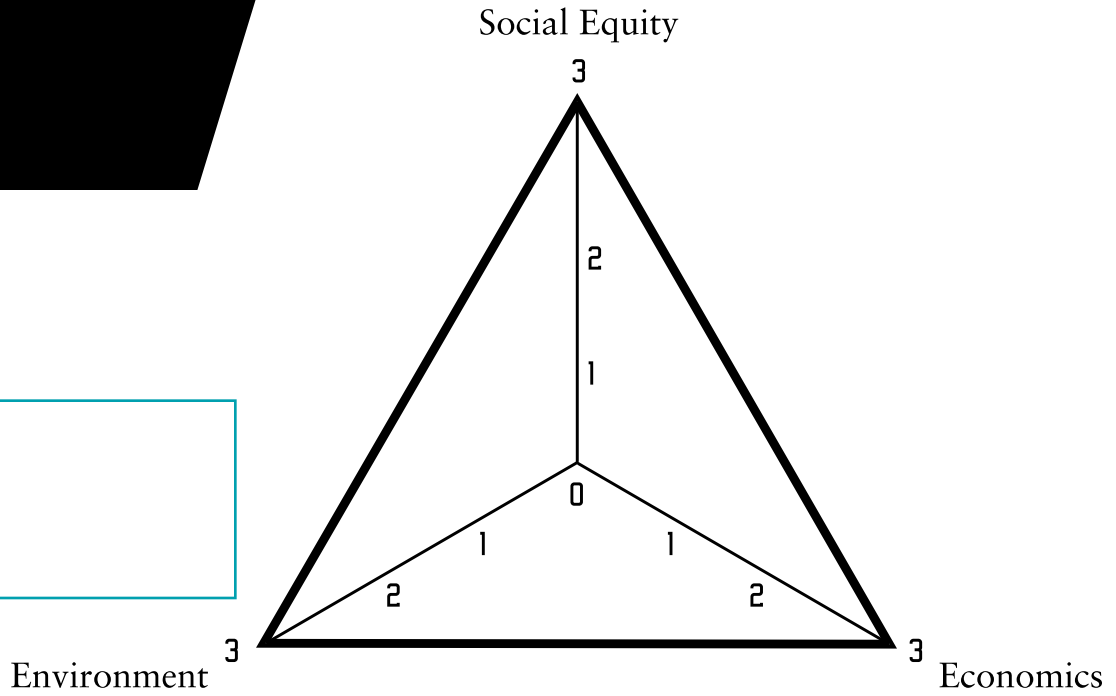


### *Assessment*

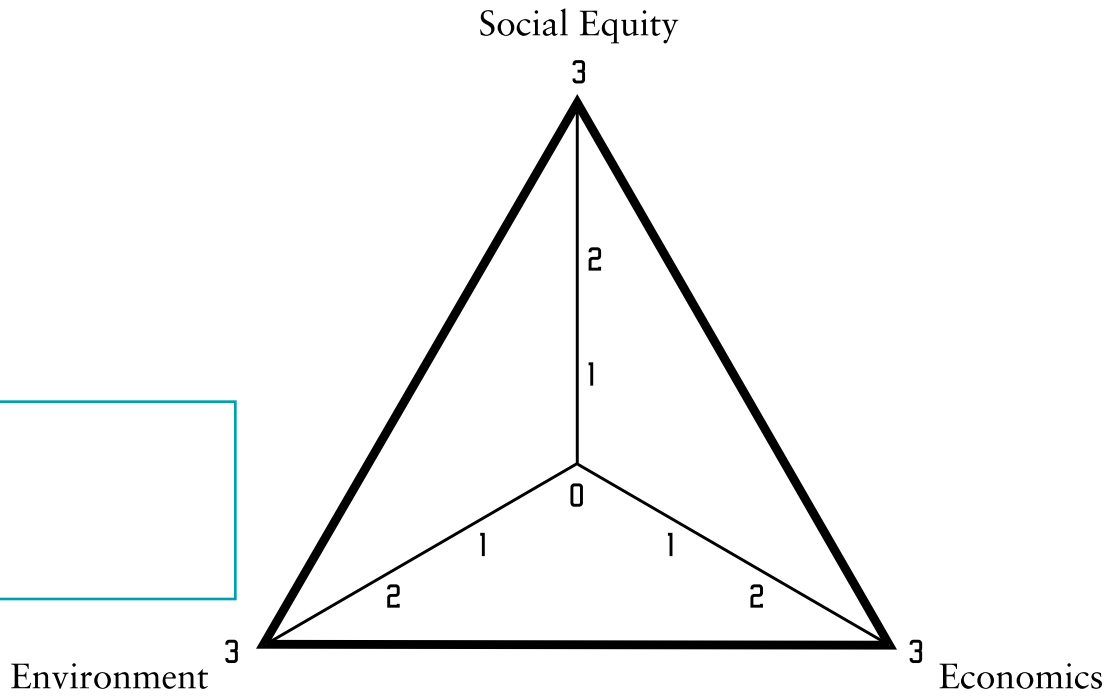
- Participation in class demonstration
- Successful completion of Triangle Triage – Student Sheet

# overhead triangles

**Bottled**  
Area of Triangle =



**Tap**  
Area of Triangle =



# Student Sheet

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Directions: Complete the decision grid for the topic discussed in class today.

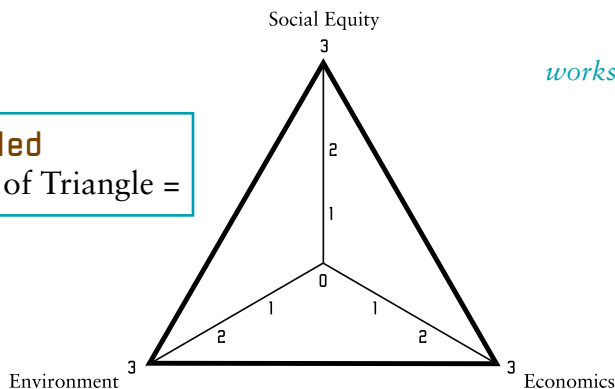
Rating Scale:

- 3 - Meets all or nearly all of the criterion
- 2 - Meets most of the criterion
- 1 - Meets some of the criterion
- 0 - Meets little, if any of the criterion

Topic: Determine the most sustainable type of water

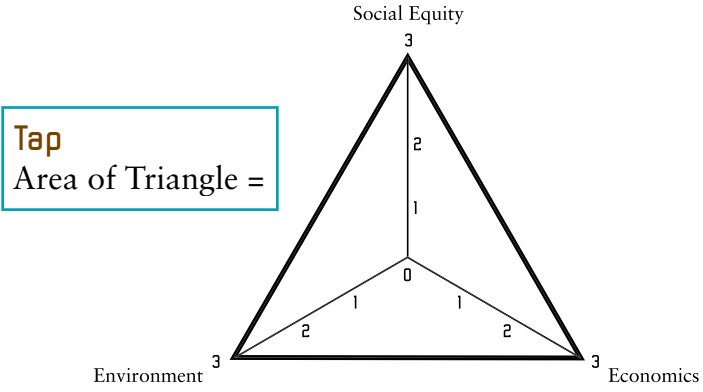
	Bottled	Supporting Data
<b>Environment</b>		
Criteria	Ratings	
<b>Average Rating:</b>		
<b>Social Equity</b>		
<b>Average Rating:</b>		
<b>Economics</b>		
<b>Average Rating:</b>		

**Bottled**  
Area of Triangle =



*worksheet continued on next page*

	Tap	Supporting Data
<b>Environment</b>		
Criteria	Ratings	
<b>Average Rating:</b>		
<b>Social Equity</b>		
<b>Average Rating:</b>		
<b>Economics</b>		
<b>Average Rating:</b>		



How to find the *perimeter* of a triangle: sum of all three of the sides. *All measurements should be in mm.*

1. What is the perimeter of the original, blank triangle on the decision grid?

2. What is the perimeter of your colored triangle on the decision grid?

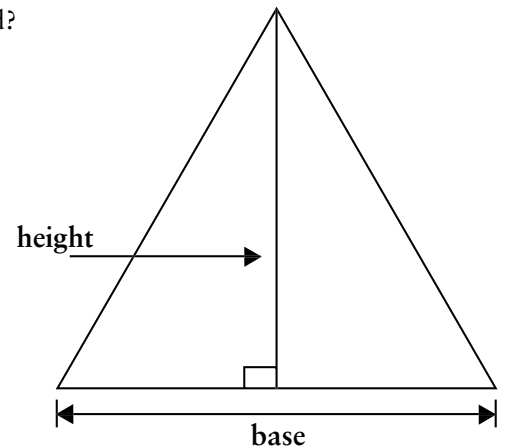


The area of a figure measures the size of the region enclosed by the figure.

*How to find the area of a triangle:* multiply one-half the base times the height.

3. What is the area of the original, blank triangle on your decision grid?

4. What is the area of your colored triangle on the decision grid?



5. What is the difference between the perimeter of the original triangle and the perimeter of your colored triangle on the decision grid?

6. What is the difference between the area of the original triangle and the area of your colored triangle on the decision grid?