LAUNCHING LAUDABLE LANDSCAPES

GRADES 9-11
JANET CUNDIFF

TIME ALLOTMENT:

Ten 50-minute class periods shared by two team teachers.

OVERVIEW:

This unit is a culminating activity to a geometry unit involving triangles involving real world problem solving. In the final project students are asked to find or design their own garden plan. A problem to create a landscape design provides lots of opportunity to think creatively about determining the square feet of garden space and hardscape so that the proper number of plants and the correct number of bricks can be ordered. Students will be further excited by the project if the class is able to actually implement one or more of the designs in the school or community environment. Local PTSA volunteers, an environmental science teacher, or Master Gardener could assist in choosing plants appropriate for the area, considering the amount of sun, condition of the soil, and drainage properties, and (of course) based on the measurements given to them by the math class. Presenting their plans to the principal and to the expert class partners helps to make them more responsible for their work because others (outside of our class) will be involved and are depending on them to do a good job. The possibility that their plan may be accepted and implemented makes it more of a competition and a real life challenge.

It has been designed as a team project between the computer literacy teacher(or other computer related elective) and the geometry teacher. Specific tasks need to divided between the two to the satisfaction of the two teachers involved.

SUBJECT MATTER:

Geometry,
Technology/Computer Literacy

LEARNING OBJECTIVES:

The student will:

- Solve a real life problem: Design a garden environment to suit the definition of “formal garden” using geometric figures.
- Measure accurately and draw the design to scale.
- Calculate area and perimeter of a variety of geometric figures.
- Create a presentation to “sell” their idea to the school administration and/or community volunteers.

STANDARDS:

Louisiana Mathematics Content Standards
http://www.louisianaschools.net/conn/standards1.php

STANDARD - Measurement: In problem-solving investigations, students demonstrate an understanding of the concepts, processes, and real-life applications of measurement.

M-1-H (9-12): selecting and using appropriate units, techniques, and tools to measure quantities in order to achieve specified degrees of precision, accuracy, and error (or tolerance) of measurements;

M-3-H (9-12): estimating, computing, and applying physical measurement using suitable units (e.g., calculate perimeter and area of plane figures, surface area and volume of solids presented in real-world situations);

(continued)

LPB
State Farm Companies Foundation
National Teacher Training Institute NTTI
thirteen WNET NEW YORK
Cisco Systems
GE Foundation

STANDARD - Geometry: In problem-solving investigations, students demonstrate an understanding of geometric concepts and applications involving one-, two-, and three-dimensional geometry, and justify their findings.

G-1-H (9-12): identifying, describing, comparing, constructing, and classifying geometric figures in two and three dimensions using technology where appropriate to explore and make conjectures about geometric concepts and figures;

G-4-H (9-12): using inductive reasoning to predict, discover, and apply geometric properties and relationships (e.g., paper constructions, sum of the angles in a polygon);

G-4-M (5-8): constructing two- and three-dimensional models;

G-5-M (5-8): making and testing conjectures about geometric shapes and their properties;

G-7-M (5-8): demonstrating the connection of geometry to the other strands and to real-life situations (e.g., applications of the Pythagorean Theorem).

MEDIA COMPONENTS:

unitedstreaming™ **Videos** http://www.unitedstreaming.com/index.cfm

1. ***The Many-Sided World of Geometry, Program 3: Triangles - Part Three: World of Triangles Review: Triangles*** (01:20) This clip introduces the whole triangle family reviews different ways to describe triangles, and gives handy rules for working with them. Grades: Gr. 6 - Gr. 12

2. ***Mathematical Eye: Working Things Out - Solving Problems in the Real World*** (05:20) Real life problems on the construction site are presented as the students are asked how workers determine the quantity of materials needed to complete their tasks. The program also emphasizes that the four basic operations of adding, subtracting, multiplying, and dividing are all that are needed to solve most problems. Grades: Gr. 4 - Gr. 9

Web sites:

All of the following sites show photos of formal gardens introduced to the students as "inspiration" gardens. They may use one of these designs for their plan or use it as an inspiration to create their own plan.

http://www.honors.uiuc.edu/ealc15097/Resor-Gausebeck/
http://isfahan.apu.ac.uk/persgard/meidan2.html
http://isfahan.apu.ac.uk/persgard/private.html
http://www.tinafreeman.com/italy4.html
http://www.bucks.edu/tylergardens/layout.html Sample of a formal garden plan, complete with identification labels (a key).

http://www.lowes.com/lkn?action=pg&p=Down_to_Earth/GardenPlanner/gardenplansplash.html&m=none#
Online garden planner from Lowe's

MATERIALS:

Per Group of 4

- Computer with Internet connection
- Software: ***Microsoft® Power Point®***

PREP FOR TEACHER:

1. Gather supplies as indicated.
2. Conduct activities as indicated to preview results.
3. Copy student sheets or load them all on the school server for the students to use.
4. Test all websites 24 hours prior to day of use.
5. Download streaming video to school server or teacher computer for easy accessibility.
6. Divide students into teams/groups (4 recommended).
7. Review the **Focus for Media Interaction**: a specific task to complete and/or information to identify during or after viewing of video segments, web site, or other multimedia elements.

INTRODUCTORY ACTIVITY:

Setting the Stage

1. Introduce lesson, discussing concepts covered, materials used, and procedures to complete tasks.
2. Students will use the hot list (Student Sheet #1) to look at the variety of garden plans on the Internet. The teacher will load this on the school server, if possible, allowing the students to click on the hot list themselves, rather than typing in the URLs. **Focus for Media Interaction:** Ask students to look for or generate a definition of "formal garden." What do they think the word "hardscape" means? (maximum 20 minutes)
3. Discuss responses.

LEARNING ACTIVITIES:

1. Divide class into teams of 4. Explain instructions as per student sheet #2. Students will work in groups of 4 to complete the tasks as directed. Students will select one of the gardens as shown or design one of their own. The design must include at least three different shapes, including triangles and five or more separate spaces. One area will have border plants.
2. Teams will:
   - Design and sketch an outline of the planned garden design, indicating what areas are plants, hardscape, and border plants.
   - Design will be drawn to scale to fit an area 20' X 15' on a standard sized piece of poster paper.
   - Calculate the area of each of your spaces, including the hardscape, and the perimeter of the area that will hold the border plants.
   - Plan a presentation to the principal and/or the community volunteers, including a ***Microsoft® Power Point®*** and the poster.
3. Teacher notes – Requirements for presentation are included on the Student Sheet #1.
4. Prior to the calculations phase, present the following clip and discuss the process of finding the area of all figures needed. **Focus for Media Interaction:** How do you calculate how many bricks are in a wall measuring 1 meter by 1 meter? http://www.unitedstreaming.com/index.cfm
   - ***Mathematical Eye: Working Things Out - Solving Problems in the Real World*** (05:20) Stop running clip when the grocery scene starts (at about 4 minutes.
   - Discuss responses
5. This clip may be used as needed for a review of the classification of a variety of triangles. http://www.unitedstreaming.com/index.cfm
   - ***The Many-Sided World of Geometry, Program 3: Triangles - Section A: Definitions and Basic Facts*** (09:35)
   - Discuss responses.

CULMINATING ACTIVITY:

Student groups will present their projects to the principal or designee and community volunteers to determine which project/s will be implemented. Rubric for scoring is included as Student Sheet #3.

CROSS-CURRICULAR EXTENSIONS:

DRAFTING:
- Draw the garden design using **CAD** software.

FAMILY AND CONSUMER SCIENCE:
- How much paint would we need to re-paint the dining room?

INDUSTRIAL ARTS:
- Design and build a dog house using proper formulas to calculate the amount of materials needed.

LANGUAGE ARTS:
- Compare/contrast a formal garden in Japan and in the Western world.

COMMUNITY CONNECTIONS:

- What professional would need to know about triangles or rectangles to complete his/her job?
- How are sports connected to geometry?
- Can you pay your property taxes without someone knowing about the geometry?
- Containers, furniture, buildings are all created of geometric shapes. What shapes are the most popular designs?
- What shapes can you identify in a quilt?
- Find five triangles in this classroom. How are they classified?

STUDENT MATERIALS:

See attached:
- Student Sheet 1: **Hot List of Formal Gardens**
- Student Sheet 2: **Landscape Design Project Group Instructions**
- Student Sheet 3: **Landscape Project Rubric**
- Sample ***Microsoft® Power Point®*** (ppt)

(either printed out or loaded on the school server for access by the students.)

Hot List of Formal Gardens
Student Sheet #1

Use these links to head you in the right direction. You are researching the look of formal gardens and linking this concept to the shapes of triangles. In other words, design and draw your landscape design, both planting design and hardscape in the shape of a variety of triangles. I have listed some links to start you off. Feel free to search for other ideas.

Questions to ponder while searching:

- What is a formal garden?
- What does “hardscape” refer to?

Japanese vs. Western formal gardens http://www.honors.uiuc.edu/ealc15097/Resor-Gausebeck/

The great central square of Isfahan http://isfahan.apu.ac.uk/persgard/meidan2.html
http://isfahan.apu.ac.uk/persgard/private.html

A formal garden in Italy
http://www.tinafreeman.com/italy4.html

The following shows a sample of a formal garden plan, complete with identification labels (a key). You will need to include a key with your drawing with general categories identified (not specific plants).
http://www.bucks.edu/tylergardens/layout.html

The following online garden planner from Lowe’s may be used to produce your draft of the garden. Other software may be used, such as ***Microsoft® Paint®*** or **CAD**.
http://www.lowes.com/lkn?action=pg&p=Down_to_Earth/GardenPlanner/
gardenplansplash.html&m=none#

LANDSCAPE DESIGN PROJECT
GROUP INSTRUCTIONS
Student Sheet #2

Your team will present your plans to the principal and to our community volunteer partners to help them choose which designs to implement. (It is possible to implement them all...) The possibility that your plan may be accepted and implemented makes it a real life challenge! Take it seriously!

THE PROCESS:
Divide your team jobs so that each member has responsibility for the jobs below. Some roles you may choose to use are: Math Wizard, Presenter, Researcher, Artist.

1. Use the links posted or others of your choosing to research the following question: What is a formal garden? Look through the examples given and select one or design your own, using at least three different polygons and five or more separate spaces. One space must include hardscape (such as, wood decking, brick, or stone pathways). One area must use border plants.

2. With the help of your team, design and draw an outline of your planned garden design. Be sure to indicate the hardscape area. The design must be drawn to scale to fit an area 20’ X 15’ and will be completed as large as you can make it on a standard sized piece of poster paper.

3. Calculate the area of each of your spaces, including the hardscape. You must calculate the perimeter for the area requiring border plants. The garden experts will use your calculations to determine how many plants and bricks to buy.

4. After completing your drawing, your team will create a ***Microsoft® Power Point®*** presentation to the principal and the community volunteers to convince them that your plan is the best. You will submit the poster copy of your plan, drawn to scale, as well as completing the ***Microsoft® Power Point®*** presentation.

Be sure to include the following five slides in your presentation, in addition to a title slide and a closing:

1. A picture of your plan: may be drawn on computer (for example, ***Microsoft® Paint®***), an Internet inspiration garden photo, or a photo of an actual garden you are copying.
2. A listing of concepts learned or practiced.
3. Details of the drawing process including tools used.
4. Formulas and calculations that were used to create the plan with results in a table format (You may use two slides here if you need them.)
5. Credits to persons and/or references used.

Landscape Project Rubric

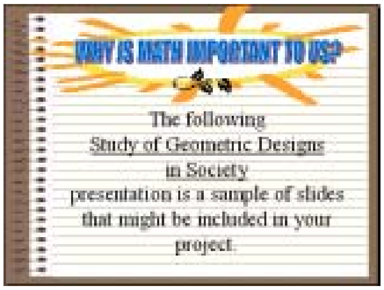
Student Sheet #3

Teacher Name: Janet Cundiff **Student Name** ______________________

CATEGORY	90-100%	85-89%	75-84%	<74%
Mathematical Concepts	Table entries show complete understanding of the mathematical concepts used to solve the problem(s).	Table entries show substantial understanding of the mathematical concepts used to solve the problem(s).	Table entries show some understanding of the mathematical concepts needed to solve the problem(s).	Table entries show very limited understanding of the underlying concepts needed to solve the problem(s) OR is not written.
Mathematical Errors	90-100% of the steps and solutions have no mathematical errors.	Almost all (85-89%) of the steps and solutions have no mathematical errors.	Most (75-84%) of the steps and solutions have no mathematical errors.	More than 75% of the steps and solutions have mathematical errors.
Diagrams and Sketches	Diagrams and/or sketches are clear and greatly add to the reader's understanding of the procedure(s).	Diagrams and/or sketches are clear and easy to understand.	Diagrams and/or sketches are somewhat difficult to understand.	Diagrams and/or sketches are difficult to understand or are not used.
Working with Others	Student was an engaged partner, listening to suggestions of others and working cooperatively throughout lesson.	Student was an engaged partner but had trouble listening to others and/or working cooperatively.	Student cooperated with others, but needed prompting to stay on-task.	Student did not work effectively with others.
Checking	The work has been checked by two classmates and all appropriate corrections made.	The work has been checked by one classmate and all appropriate corrections made.	Work has been checked by one classmate but some corrections were not made.	Work was not checked by classmate OR no corrections were made based on feedback.
Neatness and Organization	The work is presented in a neat, clear, organized fashion that is easy to read.	The work is presented in a neat and organized fashion that is usually easy to read.	The work is presented in an organized fashion but may be hard to read at times.	The work appears sloppy and unorganized. It is hard to know what information goes together.

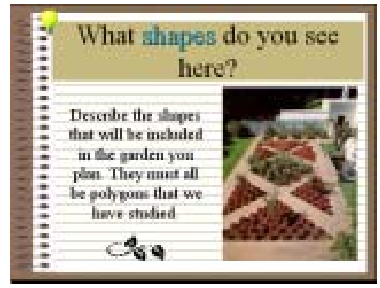
Date Created: 2002-11-12

Sample *Microsoft® Power Point®*:

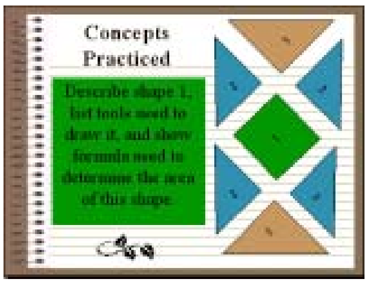


1

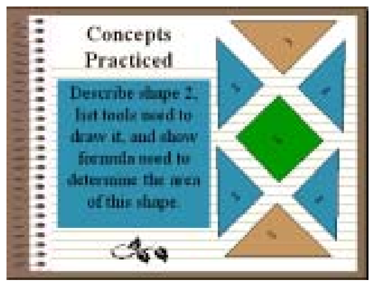
2



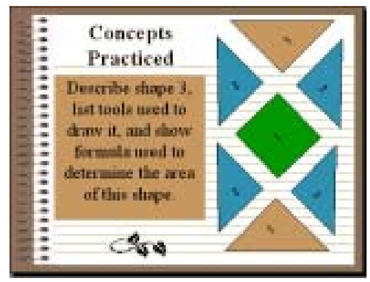
3



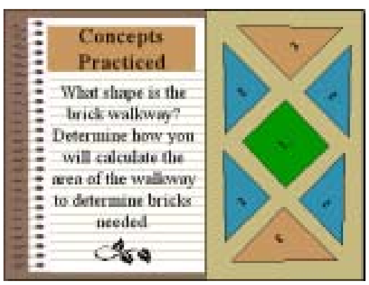
4



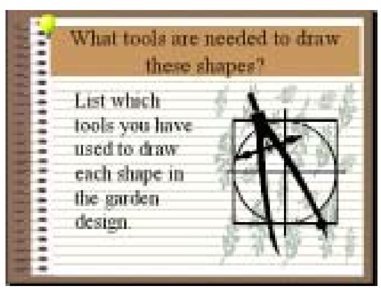
5



6

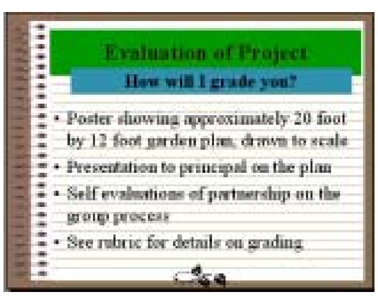


7



8

9



10

11