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Modeling a Proposed Layout Using TI Calculator

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CMST SCOLLARCITY Lesson Plan Template-Lesson Plan using **TI Technologies**
(Due Tuesday, July 27th)

Submit as hard copy AND electronically through ANGEL

Name: Annette Pennella
Grade level(s)/Subject taught: Mathematics-7 th & 8 th grade
Objectives: (Remember... <i>How will the modeling tool help the student better learn the objective?</i>) Students will be able to apply area formulas of the rectangle, square and circle, to section off a gymnasium for an athletic event. The students will produce a scaled diagram (blueprint) of the gymnasium to use as a reference tool to accommodate as many sections for tournament rings as possible, the judges' table, and an area for a concession stand to fit into the specified size gymnasium. The modeling tool will make the students preplan the layout of the gym, requiring them to use formulas and create a logical scale to for their blueprint. The blueprints will assist the students when they attempt the actual activity of sectioning off the gymnasium according to the specifications of their models.

Items to include in your TI Technologies lesson plan: (use *your* area/discipline/concepts).

For the math teacher:

1. **Write the Mathematical Concept or "key idea" that TI Technologies will be used to teach:** (e.g. Students use mathematical modeling/ multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships)

<u>Mathematical Concepts:</u> Key Idea #5-F: Apply proportions to scale drawings and direct variation. Key Idea #4-A: Represent problem situations symbolically by geometric figures. Key Idea #4-B: Justify the procedures for basic geometric constructions. Key Idea #6-A: Judge the reasonableness of results obtained from applications in geometry.
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and/or...

For the Science teacher:

1b. Write the Science Concept or “key idea” that TI Technologies will be used to teach: (e.g. Organisms maintain a dynamic equilibrium that sustains life).

For your **TI Technologies** lesson and using the following prompts, please provide a rich **one-page, single-spaced** description or a *vision* of your best thinking on a way or ways you might teach the planned lesson using the TI technology. Pay special attention to the modeling package in your description. Also, construct and submit a tentative rubric that you might use with your students. ** see example page 5

Essential Question: (*Displayed on Board for Students*) How many tournament rings are able to be sectioned off in the gymnasium while allowing room for a Head Judge Table, and a concession stand? (There must be the specified minimum measurements between each tournament ring and the rings are to be the size indicated.)

(This essential question will be the culminating unit question. The students will have had several lessons prior to this one that introduced them to the area formulas and prepared them to use the TI-84 Plus calculator with their partner. This essential question will be presented several days in a row giving the students enough class time to complete the blueprint and perform the activity.)

Warm Up: There will be warm-up example problems up on the overhead projector. The students have the first 7-10 minutes to work out each problem on his/her calculator. After the allotted time, I will go over the warm-up answers eliciting responses from the students. These examples will bring to remembrance our prior lessons and assessments with the area formulas for a circle, rectangle and square. Students will have the answers written on paper that shows the work for each step taken to solve the problem. (While using the calculator, the students are required to write down the numbers they punch into the calculators and the answers.) I will be circulating around the classroom while taking attendance for the class. Warm-up papers are collected.

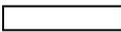
Mini-Lesson: There will be a quick review of the rubric for this blueprint model. Students will understand prior to constructing the blueprint model what the criteria is and how they will be scored

for a grade. Each set of partners will receive a combined grade. The mini-lesson will consist of a review demonstration on how to create a scale to proportion, using ratios and the calculator. I will use my example blueprint on the chalkboard while demonstrating on the view screen with my calculator, how to create the scale (key) for the blueprint. Students can follow along with their partners using their calculators.

Student Work Time: Students will have approximately 30 minutes to work on their blueprints with a partner. During this time I will be circulating around the room observing the students working and assisting when their partners do not know the process for solving the answers. Students will be required to produce a completed blueprint model after two consecutive classes where they have had ample student work time.

Closing: The last 12 minutes a set of partners will volunteer to share one of their examples to the rest of the class. They are able to come to the front of the room to use the calculator and view screen for the demonstration. All work is collected. When blueprints models are completed, they will be displayed around the classroom with the attached rubric for assessment. Students will have the opportunity to perform the activity of sectioning off the gym, according to the availability of the gymnasium and the time schedule.

Gymnasium Floor

Project: You and your partner must calculate the area space for a tournament event. On the gymnasium floor you must have the Head Judges Table  a rectangle (2 meters wide and 4 meters long, a concession stand  a circle (radius of 2 meters), and as many tournament rings as you can fit into the gym while having at least 3 meters around each ring. Each tournament ring must be a square  with the measurements of 6 meters by 6 meters. The gymnasium floor is 30 meters long and 30 meters wide.

Blueprint Model: You must create a blueprint model of the gymnasium floor and the entrance. You will display a layout of where the Head Judges Table, the concession stand and as many tournament ring that you can fit onto the floor leaving the specified 3 meters between each ring. (*Hint:* You may use the entrance.)

- 1) Write the formula for each geometric figure and **show the work** (write numbers that you punched into the calculator) for the various shapes.
- 2) Create a Scale for your blue print (Key) that is proportionate to the real gymnasium floor. Draw your layout of the gymnasium floor showing where each tournament ring will be placed, the Head Judges Table and the concession stand. Remember to leave at least 3 meters around every ring.
- 3) Use the Rubric as a reference guide to score the most points possible.

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Geometric Shape
Area Formulas
Rubric

	#3	#2	#1
<i>Formulas</i>	Formulas are written with a step-by-step representation of the mathematical processes. Formulas used are relevant and show how they applied to the situation.	Formulas are displayed and accurate with most of the solutions displayed with a step-by-step representation of the mathematical processes.	Some formulas are missing or inaccurate. Little or no representation of the mathematical processes taken to find areas
<i>Model to Scale</i>	All shapes for the model are displayed with accurate calculations and proportionate to the scale factor used for the Blueprint Key. The scale chosen is reasonable and consistent throughout the entire model	Most of the shapes for model are displayed with accurate calculations and proportionate to the scale factor used. The scale is reasonable and generally consistent throughout the entire model.	Shapes for model are not accurate calculations and not proportionately displayed for various figures. Scale is not reasonable or consistent through-out the entire model.
<i>Appearance</i>	Model makes use of all the paper provided. It is proportionally represented; all figures, formulas and commentary notes are clear and easy for students to read.	Model uses most of the paper provided. It is somewhat proportionally represented, with most of the figures, formulas and commentaries easy for students to read.	Model does not make use of the paper provided. Most of the model is not proportionally represented and not easily legible for students to read.

“...a rich **one-page, typed, single-spaced**, description or a *vision* of your best thinking...”

Prompts:

1. How will you assess the prior knowledge of the student?
2. How will you begin the lesson?
3. What are the teacher and students doing every 5-10 minutes? (Teacher Actions and Student Actions)
4. How will you assess the learning for the lesson?
5. How will TI be integrated into your teaching? (i.e. you may want to discuss a problem or describe how you might use the chosen modeling package in your plan. How does the model/tool help the concept(s) to be taught?)

Using Area Formulas, I plan on having my students...
(software / modeling package)

Rectangle:

Applications → #4 (Area Formulas) → Enter → Definitions & Formulas → Enter → Select I) Rectangle → Trace (under screen, for Example) press several times for different examples. → Zoom (under screen to show area formula for rectangle). Continue to press Zoom Key for more examples of area.

Square:

Y=(Key under screen to go back to menu of application) → #2 (Square) This shows the definition of a square. Continue to press Trace Key for an example and the Zoom Key for the area display.

Circle:

Y=(Key under screen to go back to menu of application) → #6 (Circle definition) → Trace Key for an example → Zoom Key (for area formula) → Graph Key (under screen to display the Why on the screen. This explains the reasoning behind the area formula. Continue to press the Graph Key five times to go through whole process, → Trace Key (for more examples)

These notes would be taken with the teacher as part of several lessons prior to the blueprint lesson. The view screen would display the information.

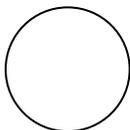
To get out of application press Blue Key 2nd → Mode Key (Quit) → #3 give you a blank screen.

Area Formulas and Calculations:

Use the view screen to display the mathematical calculations examples for the students.



Tournament Rings: Press 6x6 → Enter= 36
Length x Width or (Side x Side) =Area in square meters



Concession Stand: Press 2^2 → Enter=4 → X → 3.14 → Enter= 12.56 Square meters



Head Judge Table: Press 2x4 → Enter = 8 square meters
Length X Width = Area

Gymnasium Floor: 30X 30 → Enter = 900 sq. Meters

Students must draw out the blueprint on the paper provided. Gymnasium floor will be outlined. Press 30 / (division sign) 9 (each ring is 6 meters in length plus 3 meters for outside of the ring.) → Enter = 3.33 Approximately three rings will fit across the gym floor and down the floor. Students must decide where to place the Head Judges Table and the concession stand (Entrance may be used).

Scale: Key for blueprint

Students may create a scale similar to this example using ratios. Their answers may vary depending on the scale factor.

$$\frac{1 \text{ Meter}}{2 \text{ cm}} = \frac{30 \text{ Meters}}{N} \quad 30 / 4 \rightarrow \text{Enter} = 30$$

$$2 \times 30 \rightarrow 60 \text{ centimeters}$$

Geometric figures should be draw proportionally to the key. The square, 6-meter tournament ring would be displayed with a 12 cm square. The Head Judges' Table would be drawn with 4 cm x 8 cm rectangle. The round concession stand would be drawn with a 4 cm radius.

Students need to make a key for the Blueprint, label the length and width of the gym floor. They must draw the geometric figures on the gym floor displaying the measurements of each geometric figure and the 3 meters of space around each ring. Their numerical values must equal or be less than the 30 meters allotted for the gym. Area formulas must be displayed somewhere on the Blueprint and show their work (write the numbers punched into the calculator).

****Example:**“I was thinking about beginning the class on [modeling X] by using the overhead to ask students what they know about X. From this brainstorming session, I might ask them to get into groups and discuss one or more of the ideas they gave me. After about ten minutes, I would have the students give their ideas on X and write them down on a transparency so they would be able to see them for the entire hour. From here, I would provide a 10 to 15 minute demonstration of the basics of using _____ modeling software. I would use an conceptual example that they would find familiar with such as getting a cold and how it is transmitted. From here, I would have students at the computer stations using a prepared guide or tutorial to get them started on basic software usage. I expect that in a short time a number of students would “catch on” rather quickly and be able to help others. By the third lesson, I suspect that most would be well on their way to development of their own or small group models using the _____ software. My plan of assessment would probably be a group model so they would gain more confidence in using the software in a meaningful way. After the second or third lesson, I would ask them to choose from a list of thematic or topic areas that fit the software nice and develop a model using the technology. As a product, I may have partners share their model and describe to other small groups how it works. The rubric I design would be general at first so that I might see the kinds of the products the student were capable of creating. From the prototypes, I would hone my rubric to make the modeling product as challenging as possible without making it too difficult.” Etc...

For all lesson plans and within the context of the lesson plan(s) you develop, design (add) a rubric that addresses your objectives AND “guides” your students to success in the modeling arena you choose (AS, Stella, GSP, TI, IP). The rubric should have three or four levels or mastery with the highest level [TARGET], which should detail what you might initially expect of the capabilities from a student doing the best s/he can do. **(etc...)**

Ex:

Target	Acceptable	Unacceptable
Model <i>uses at least 5 functions</i> of Agent Sheet Software.	?	?
Math / Science Concept thoroughly addressed. Described (<i>written</i>) in rich detail.		
<i>Graphs</i> are neat, accurate and based on data from the model.	?	?
Student is very capable of <i>describing the model to a small group of peers</i> and is able to respond meaningfully to questions about the model.	?	?
<i>Defines</i> exactly how the modeling software “helped” solve the problem.		