**PROGRAM OVERVIEW**

“The Many Faces of Math” is a project born of an activity I did in the 7th grade. I remember making a dodecahedron, a 12-faced 3-dimensional figure, with my favorite bible verses written on each face. I adapted this project for my 7th grade mathematics students in preparation for the FCAT. The students are allowed to use a Mathematics Reference Sheet on the test and I want to be certain they are familiar with using the formulas provided.

I worked on this project with 22 intensive math students who scored a “1” on the FCAT last year. I have these seventh graders for two class periods daily because they need extra help to prepare for the FCAT. We did this project as a whole class, but it could definitely be done in small groups and with different class levels.

The two preliminary activities of this project were the Polygon Worksheet and the Formula Worksheet. On the first, students identified several types of polygons and labeled characteristics. On the second, students derived and used formulas for finding the area, circumference, surface area and volume of two- and three-dimensional figures.

The main activity of “The Many Faces of Math” was the making of the dodecahedron. My students cut out patterns of 12 circles with pentagons traced out on them to be the faces of their dodecahedrons. On one face, they wrote their name and decorated it. On another face, they wrote “The Many Faces of Math” and the word “Geometry”. On the other 10 faces, they wrote 10 mathematics formulas from the Mathematics Reference Sheet. We then used these dodecahedrons as a study in preparation for the FCAT.

I believe this approach is innovative because it provides the students a hands-on way to study and work with the formulas they will need for the FCAT.

**OVERALL VALUE**

“The Many Faces of Math” is a project that really helps students learn and use mathematics formulas. It is also hands-on, an aspect that students love. Students will certainly perform better on the FCAT after participating in this innovative project. It is also easily adaptable to all facets of math as well as other subjects. This is a fun and educational project that will be beneficial to all students!

**MATERIALS**

My students used simple function calculators, construction paper, scissors, colored pencils, crayons, markers, staplers and the Mathematics Reference Sheet.

**ABOUT THE DEVELOPER**

Kristen Chaves has a B.S. in Secondary Math Education from Florida State University. She is currently a 7th grade Math Teacher at Bartow Middle School.
 SUBJECTS COVERED
This lesson introduces students to all different kinds of polygons. This could be used in a math class or more specifically, a geometry class.

 GRADES
Six - Twelve

 OBJECTIVES
1. Students will identify various polygons and will determine the differences in polygons.
2. Students will participate in a word study of “polygon” in order to better comprehend this vocabulary word.

 SUNSHINE STATE STANDARDS
MA.C.1.3.1: The student understands the basic properties of, and relationships pertaining to, regular and irregular geometric shapes in two- and three-dimensions.

 MATERIALS
• Polygon Worksheet
• Frayer Model Worksheet

 DIRECTIONS
1. Distribute Frayer Model or have students copy the model from an overhead projector.
2. Top Left – DEFINITION
   Top Right – FACTS/CHARACTERISTICS
   Bottom Left – EXAMPLES
   Bottom Right – NONEXAMPLES
3. Fill in all sections of the Frayer Model for the vocabulary word, polygon, using student responses as you fill in the model.
4. Introduce students to the different polygons discussing the various properties of each.
   a. Triangle
   b. Rectangle
   c. Square
   d. Trapezoid
   e. Parallelogram
   f. Pentagon
   g. Hexagon
   h. Heptagon
   i. Octagon
5. We would then discuss how as the number of sides of the polygon increases, the polygon looks more and more like a circle. However, a circle is not considered a polygon, because it doesn’t actually have any sides.
6. Distribute Polygon Worksheet.
7. Have students work independently and then check answers as a class.
8. Mention that we will be specifically looking at a regular pentagon (five-sided figure) when we make the Dodecahedron.

 EVALUATION/ASSESSMENT
• Students have identified several different types of polygons.
• Students will take a short quiz on the different types of polygons.

 EXTENSION
Students can create all the different types of polygons based on what they have learned.

 ★ ★ ★

 2007 - 2008 IDEA CATALOG OF EXCELLENCE
SUBJECTS COVERED
This lesson has students apply their knowledge of mathematical formulas in solving various problems.

GRADES
Six - Twelve

OBJECTIVE
• Students will appropriately use formulas for finding area, surface area, volume, and circumference of two- and three-dimensional shapes.

SUNSHINE STATE STANDARDS
MA.B.1.3.1: The student used concrete and graphic models to derive formulas for finding perimeter, area, surface area, circumference, and volume of two- and three-dimensional shapes, including rectangular solids and cylinders.
MA.C.3.3.1: The student represents and applies geometric properties and relationships to solve real-world and mathematical problems.

MATERIALS
• Formula Worksheet 1
• Formula Worksheet 2
• Basic Operation Calculator

DIRECTIONS
1. Distribute Formula Worksheet 1.
2. Tell the students the meaning of all the variables and have students write them on their paper beside the figure.
3. Do several examples showing how to use the formulas. Have students do examples as well.
4. Discuss with students the appropriate time to use a calculator.
6. Have students work independently on word problems helping when necessary.

EVALUATION/ASSESSMENT
• Students have identified the different types of polygons.
• Students have used calculators on the appropriate types of problems.
• Students will take a short quiz on finding the area, volume, circumference, surface area, etc. of several polygons and polyhedra.

EXTENSION
Students will finish this project by creating a dodecahedron and "decorating" it with the formulas they have learned and mastered.
Math - Problem Solving: The Many Faces of Math

Student Name: ________________________________

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematical Terminology and Notation</td>
<td>Correct terminology and notation are always used, making it easy to understand what was done.</td>
<td>Correct terminology and notation are usually used, making it fairly easy to understand what was done.</td>
<td>Correct terminology and notation are used, but it is sometimes not easy to understand what was done.</td>
<td>There is little use, or a lot of inappropriate use, of terminology and notation.</td>
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<tr>
<td>Diagrams and Sketches</td>
<td>Diagrams and/or sketches are clear and greatly add to the reader's understanding of the procedure(s).</td>
<td>Diagrams and/or sketches are clear and easy to understand.</td>
<td>Diagrams and/or sketches are somewhat difficult to understand.</td>
<td>Diagrams and/or sketches are difficult to understand or are not used.</td>
</tr>
<tr>
<td>Neatness and Organization</td>
<td>The work is presented in a neat, clear, organized fashion that is easy to read.</td>
<td>The work is presented in a neat and organized fashion that is usually easy to read.</td>
<td>The work is presented in an organized fashion but may be hard to read at times.</td>
<td>The work appears sloppy and unorganized. It is hard to know what information goes together.</td>
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<tr>
<td>Use of Manipulatives</td>
<td>Student always listens and follows directions and only uses manipulatives as instructed.</td>
<td>Student typically listens and follows directions and uses manipulatives as instructed most of the time.</td>
<td>Student sometimes listens and follows directions and uses manipulatives appropriately when reminded.</td>
<td>Student rarely listens and often &quot;plays&quot; with the manipulatives instead of using them as instructed.</td>
</tr>
<tr>
<td>Completion</td>
<td>All problems are completed.</td>
<td>All but 1 of the problems are completed.</td>
<td>All but 2 of the problems are completed.</td>
<td>Several of the problems are not completed.</td>
</tr>
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# Materials Budget

<table>
<thead>
<tr>
<th>SUPPLIER</th>
<th>ITEM DESCRIPTION</th>
<th>COST</th>
<th>QUANTITY</th>
<th>TOTAL COST</th>
</tr>
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<tbody>
<tr>
<td>Wal Mart</td>
<td>Scissors – Blunt</td>
<td>.97</td>
<td>31</td>
<td>30.07</td>
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<td>Wal Mart</td>
<td>Construction Paper</td>
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<td>6</td>
<td>11.82</td>
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<td>Wal Mart</td>
<td>Calculators</td>
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<td>19</td>
<td>94.43</td>
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<td>Wal Mart</td>
<td>Crayons</td>
<td>7.58</td>
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<td>Wal Mart</td>
<td>Markers</td>
<td>2.84</td>
<td>1</td>
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<tr>
<td>Wal Mart</td>
<td>50 Count Super Tip Markers</td>
<td>7.32</td>
<td>1</td>
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<td>Wal Mart</td>
<td>50 Count Colored Pencils</td>
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<td>Staples</td>
<td>Mini Staplers</td>
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<td>15</td>
<td>38.70</td>
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Subtotal: $199.89

Total Budget Amount: $199.89

Teacher’s Name: Margaret Kristen Chaves
School: Bartow Middle School

2007 - 2008 IDEA CATALOG OF EXCELLENCE
The Many Faces of Math

FORMULAS

A = area          V = volume          S.A. = surface area        C = circumference

A = \frac{1}{2} bh

A = \pi r^2        C = 2\pi r

A = lw

V = \pi r^2 h      S.A. = 2\pi rh + 2 \pi r^2

A = \frac{1}{2} h (b_1 + b_2)

V = lwh           S.A. = 2(lw) + 2(hw) + 2(lh)
The Many Faces of Math

FORMULAS

Name: ___________________________  Date: ________________  Period: __________

<table>
<thead>
<tr>
<th>Name</th>
<th>Number of sides</th>
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<td>(not a polygon)</td>
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</tbody>
</table>

Definition ________________________
_________________________________
_________________________________
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1. What is the area of a triangle with base 10 cm and height 25 cm?

2. What is the area of a rectangular garden 10 m in length and 5 m in width?

3. A trapezoid has bases that measure 8 ft and 11 ft. The height measures 14 ft. What is the area of the trapezoid?

4. What is the area of a parallelogram with base 30 ft and height 25 ft?

5. A circular pool has a diameter of 20 ft. You want to purchase a cover for the pool. What area needs to be covered? Round to the nearest square foot.

6. What is the circumference of a circle with a 16-yd radius? Use 3 for π.

7. A cosmetics company that makes small cylindrical bars of soap wraps the bars in plastic prior to shipping. Find the surface area of a bar of soap if the diameter is 5 cm and the height is 2 cm. Round to the nearest tenth of a centimeter.

8. Find the surface area of a rectangular prism with length 16 ft, width 5 ft, and height 4 ft.

9. A cylinder has a base radius 20 ft and height 10 ft. What is the volume of the cylinder, to the nearest cubic foot?

10. Find the volume of a rectangular prism with length 11 ft, width 5 ft, and height 6 ft.