Mosaics in Math and Reading

Grade Level: Grade 3

Content area(s): Math, Reading and Art

Classroom Time: Two 45 minute class periods

Purpose:
Review TAKS Math Objective 6, understanding the mathematical process and tools used in problem solving and TAKS Reading Objective 6, understanding culturally diverse written texts.

Skills Addressed:
Math skill: Problem solving, Communication, Representation and Connections
Reading skill: Evaluating and applying information
Visual Arts skill: Designing and creating a 2-D architectural piece.

Supplies:
Website for 2 cm graph paper - http://math.about.com/library/Worksheets/2cmgraphpaper.pdf?once=true&, 6 different colored 2 cm squares (ex. 9 orange, 8 red, 7green, 6 blue, 5 yellow, 3 white), templates copied onto card stock and cut out, construction paper – 1 sheet per student, small shapes or paper for students to design their own shapes, tissue paper if desired, glue, paper, and pencil

Lesson Process:

Warm-up –

1. Define "mosaic" and show examples from the following website: http://www.artlex.com/ArtLex/m/mosaic.html
2. Find out what the students know about mosaics. Have they seen mosaics in their community? What were the mosaics usually made out of? Do they see any similarities in the different mosaics? - *(Mosaics are located in churches, parks; etc., glass, tiles, etc.; people are depicted, patterns, etc.)*

Lesson procedure –

1. Start with a math review: Ask the students the following questions
   - How do you find the perimeter of a solid? *– Add all the sides together*
   - How would you write the equation of the perimeter? *s + s + s until all the sides are added*
2. Distribute a set of colored tiles to each student. Using the 2 cm squares have students construct a variety of squares and rectangles.
3. Distribute the handout (Attachment 1). The students will fill in the handout with the teacher checking for understanding and re-teaching as necessary.
4. Students may work alone or with a partner to answer the questions. *Answers are with the attachment.*
5. Distribute "Mrs. Green's Mosaic Classroom" (Attachment 2).
6. Students read the story to themselves silently.

7. Students answer the questions following the story as the teacher checks responses for understanding and re-teaching as necessary. *- Answers are with the attachment.*
8. Distribute pieces of construction paper in different colors or tissue paper to each student. *(Squares of tissue paper may be purchased inexpensively)*
9. Instruct the students to cut out a set of tiles. (Ex: 14 squares, 13 triangles, 12 rectangles, etc.)
10. Distribute a piece of construction paper to each student.
11. Students create their own self – portrait mosaics on the construction paper using the tiles they created.
12. After the students have created their design by gluing the tiles (pieces of paper) on the construction paper, have each student write an equation showing the number of tiles used to create their mosaic. *– 12 squares + 4 triangles + 15 rectangles = 31 tiles*
13. The students then write an explanation of the process of constructing their mosaic. *– I created my mosaic by first cutting out tiles. I used 12 squares to create the main portion of my face. I then used 4 triangles to create my nose and mouth. The other features were created by using the 15 rectangles. Etc…*
14. Students write at least two sentences using the following vocabulary words: mosaic, self-portrait, perimeter and area *– The mosaic I created has a perimeter of 12 tiles and an area of 32 tiles. The mosaic was a self-portrait. Etc…*
15. Display the mosaics and the writings around the classroom. Ask the students to match the writings with the mosaics. Displaying the mosaics will also help to remind the students of their experience.
16. Have the students share their mosaics and writings with the class.

Student Assessment/Final product to be developed

Handouts, writings, written equations

Attachment 1

Mosaic Math

Name _____

1. Using the templates, fill in the chart stating the number of tiles used to find the perimeter of the shape, (8 red + 7 green + 5 yellow = 20), the number of tiles used to fill the shape and write an equation for each.

Template	Perimeter	Equation	Number used to fill in	Equation
1				
2				
3				
4				
5				

2. Pretend you were asked to create a border for the top of a picture 18 cm long. If you have to use different colored 2 cm tiles, which ones would you use? How many of each would you use? Explain your process of deciding which colors to use and the number needed. Write an equation.

3. Create a pattern using the tiles. Describe the pattern. Write the pattern as a math equation.

4. If each tile is a 2 cm square and a rectangle is created using 3 orange, 2 pink, 4 green, 1 white and 5 yellow tiles, what is the perimeter and the area of your rectangle? Do you think every student in your class has the same perimeter and area for their rectangles?

5. Create a pattern with the tiles. Draw it in the space below. Describe the pattern. Write an equation for your pattern.

6. Juan would like to create a mosaic. He went to the store to purchase tiles. The orange tiles are $1 each but the Pink tiles are only $.50. The green tiles cost less than the pink tiles, they cost $.25. The white tiles are the most expensive, they cost $3 and the yellow tiles cost $2. Juan needed 3 orange tiles, 2 pink tiles, 4 green tiles, 1 white tile and 5 yellow tiles. How much did he pay for the tiles? Write an equation.

ANSWERS

1.

Template	Perimeter	Equation	Number used to fill in	Equation
1	30	13+2+13+2=30	26	2*13=26
2	40	11+9+11+9=40	99	11*9=99
3	20	4+3+8+5=20	Approx. 17	(4*3)+(~25)=17
4	24	6+8+10=24	24	½(6*8)=24
5	21	5+5+5+3+3=21	Approx. 29	(5*5)+(~4)=29

~ means approximately

2. There will be many correct answers. One ex. 3 orange + 3 Green + 3 Yellow = 9 or 6+6+6=18.

   Ex. Each tile equals 2 cm, therefore I will need 9 tiles. I decided to use 3 of each, orange, green and yellow.

3. There will be many correct answers.

O	O	G	O	O	O	G	G

   Ex. Equation should match pattern. 2 Orange + 1 Green + 3 Or + 2 Gr = 8 tiles

4.

O	O	O	P	P
G	G	G	G	W
Y	Y	Y	Y	Y

OR

Y	G	P
O	G	Y
O	G	Y
O	G	Y
Y	W	P

The tiles may be placed in different orders.

4.

P	O	G	O

The answers will probably be all different. I decided to use a pink tile than an orange one, a green one, then an orange one. The oranges separate my two favorite colors.

1 P + 1 Or + 1 Gr + 1 Or = 4 tiles

5. 3*1=3; 2*.50 = 1; 4*.25=1; 1*3=3; 5*2=6 (Students may know that 4 quarters equals $1 or 2 half dollars equal a dollar therefore they may need assistance writing an equation) Total = $3+1+1+3+6 = ***$14 Juan paid $14 for all of the tiles.***

Attachment 2

Mrs. Green's Mosaic Classroom

1 Mrs. Green wanted to create a wall of mosaics in her classroom. She asked each of her students to create a specific mosaic piece for the wall. Mary was asked to create a self-portrait. John was asked to create a chair, Steven a dog and Mark was asked to create a table. Each student selected the appropriate number and color of shapes of paper needed for their mosaic.

2 Mrs. Green walked around the room as the students were creating their mosaics watching the students as they were thinking about their projects. She noticed Mary looking at each of the students in the classroom and herself in a mirror trying to decide how she wanted to create her self-portrait. Each student had a nose, two eyes, a mouth, ears and hair. She was trying to decide if she wanted to make her self-portrait colorful and fun or exact and precise. Making a colorful self-portrait would be fun and colorful for the wall so she decided to create a funny image of herself.

3 John had already started his chair. He decided it would be fun to have an orange chair. John was using the orange squares creating the chair on his desk before gluing them to the paper. John wanted to make sure his chair was perfect. The four legs had to appear to be exactly the same size. The seat of the chair had to be just right. John was working on the height of the back of the chair. He was having difficulty deciding how high to make it when Mrs. Green walked by. She suggested John look around the room at the chairs. Mrs. Green asked John about measuring the chairs, would the back be longer, shorter or the same length as the legs of the chair. After looking at the chairs in the room John decided on the height of the back of his chair.

4 Mrs. Green continued to walk around the room, she noticed Steven giggling to himself. He liked the dog he created. The dog was green and appeared to be running in the wind. Steven was very proud of his mosaic asking Mrs. Green where to hang his on the wall. Mrs. Green asked him to wait until everyone was done.

5 When Mrs. Green walked by Mark's desk she noticed Mark had created a table using brown squares. It had four legs with a flat surface for the tabletop. Mrs. Green agreed with Mark, creating a table is a difficult assignment. The table had to appear as if all the legs were the same length and the top was level. She asked Mark if he understood how important it was to create a realistic table. Mark thought creating a table would be easy, and then he looked at the table he created. It looked like lines, not like a table. After moving the squares around the tabletop looked level. All the legs except the back right leg appeared to be the same length. The bell rang, it was time to put the squares away. Mark would have to finish his table tomorrow.

1. What is paragraph 3 mostly about?

2. In the story it mentioned Mark's table had a short leg. Which picture below shows the table discussed in the story?

3. In paragraph 2, which words help the reader know what self-portrait means?

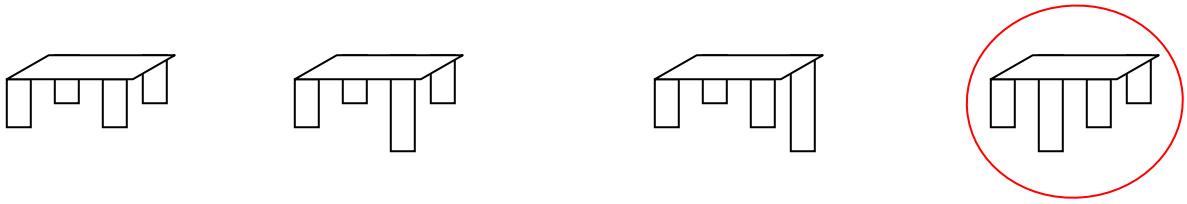
4. Briefly give a summary of the story.

5. In paragraph 1, the word shapes means –

- ⬭ a condition
- ⬭ spatial form
- ⬭ identifying features
- ⬭ a molded dessert

ANSWERS

1. John deciding how tall to construct the back of his chair.

2. 

3. Looking at the others, looking in the mirror,

4. Mrs. Green's class was creating mosaics to hang on the wall. Each student was asked to create a certain design. The story describes the process Mary, John, Steven and Mark used to create their mosaic.

5. Spatial form

National Standards

Math:

Problem Solving Standard:

- Build new mathematical knowledge through problem solving;
- Solve problems that arise in mathematics and in other contexts;
- Apply and adapt a variety of appropriate strategies to solve problems;
- Monitor and reflect on the process of mathematical problem solving.

Communication Standard:

- Organize and consolidate their mathematical thinking through communication;
- Communicate their mathematical thinking coherently and clearly to peers, teachers, and others;
- Analyze and evaluate the mathematical thinking and strategies of others;
- Use the language of mathematics to express mathematical ideas precisely.

Connections Standard for Grades 3 – 5

- Recognize and use connections among mathematical ideas;
- Understand how mathematical ideas inter connect and build on one another to produce a coherent whole;
- Recognize and apply mathematics in contexts outside of mathematics.

Representation Standard for Grades 3 – 5

- Create and use representations to organize, record and communicate mathematical ideas;
- Select, apply, and translate among mathematical representations to solve problems;
- Use representations to model and interpret physical, social and mathematical phenomena.

Language Arts:

NL – ENG – K-12.3 Evaluation Strategies
Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics).

NL-ENG-K-12.6 Applying Knowledge
Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language, and genre to create, critique, and discuss print and non-print texts.

Fine Arts:

NA-VA.K4-1 Understanding and applying media, techniques, and processes

- Students know the difference between materials, techniques, and processes
- Students describe how different materials, techniques, and processes cause different responses
- Students use different media, techniques and processes to communicate ideas, experiences, and stories
- Students use art materials and tools in a safe and responsible manner.

NA-VA.K-4.3 Choosing and evaluating a range of subject matter, symbols and ideas

- Students select and use subject matter, symbols and ideas to communicate meaning

TAKS

Math:

Objective 6: The student will demonstrate an understanding of the mathematical process and tools used in problem solving.

(3.14) Underlying processes and mathematical tools: The student applies Grade 3 mathematics to solve problems connected to everyday experiences and activities in and outside of school. The student is expected to (A) identify the mathematics in everyday situations: (B) solve problems that incorporate understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness: and (C) select or develop an appropriate problem-solving plan or strategy, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem.

(3.15) Underlying processes and mathematical tools: The student communicates about Grade 3 mathematics using informal language. The student is expected to (B) relate informal language to mathematical language and symbols.

(3.16) Underlying process and mathematical tools: The student uses logical reasoning. The student is expected to (A) make generalizations from patterns or sets of examples and non-examples.

Reading:

Objective 1: The student will demonstrate a basic understanding of culturally diverse written texts.

(3.5) Reading/word identification: The student uses a variety of word identification strategies. The student is expected to (D) use root words and other structural cues such as prefixes, suffixes, and derivational endings to recognize words (3); and (E) use knowledge of word order (syntax) and context to support word identification and confirm word meaning (1-3)

(3.7) Reading/variety of texts: The student reads widely for different purposes in varied sources. The student is expected to (B) read from a variety of genres (for pleasure and) to acquire information (from both print and electronic sources) (2-3)

(3.8) Reading/vocabulary development: The student develops and extensive vocabulary. The student is expected to (C) use (resources and references such as beginners' dictionaries, glossaries, available technology, and context to build word meanings and to confirm pronunciations of words (2-3); and (D) demonstrate knowledge of synonyms, antonyms and multi=meaning words (for example, by sorting, classifying, and identifying related words) (3).

(3.9) Reading/comprehension: The student uses a variety of strategies to comprehend selections read aloud and selections read independently. The student is expected to (C) retell (or act out the order).