

Cover Sheet for Math-eze
October 7, 2006
Bonnie Miller

The lesson plans that I created for this meeting fits the objectives from the Math-eze Workshop and the Topic of the Day – “Comprehension of Word Problems”

The objectives of my lesson plans include developing a higher-level knowledge of math content for the public schools and to assist in developing strategies for teaching reading comprehension of math problems. I developed a unit on Honeybees for my classroom that I hope will be useful for my peers to use. Through these activities I have analyzed the student’s achievement data and it has increased my reflective practices.

We used several activities to develop strategies for comprehending word problems. They used a ratio to help them solve a question in one of the word problems. The students did a hands on activity with shapes from a GeoFix kit to discover why a hexagon works best for a bee hive design. Using other pattern blocks they had to decipher which other geometric shapes would fit into a hexagon. The students also used a tape measure to measure how far and fast they could walk/run in a minute and then compare that to a honeybee’s rate.

Name: Bonnie Miller

Grade Level/Subject: 2nd Grade Math

Topic: 'All a-Buzz about Math' adapted from 'Teaching Children Mathematics' - Sept. issue.

Objectives (P.A.S.S.):

Standard 1: Patterns- The student will use a variety of problem-solving approaches to extend and create patterns.

1. Describe, extend, and create patterns using symbols, shapes or designs using symbols, shapes, or designs [e.g., repeating and growing patterns, made up offsets of shapes or designs, create patterns by combining different shapes and taking them apart].

Standard 2: Number Sense – The student will use numbers and number relationships to acquire basic facts.

4. Determine whether a number is odd or even.

Standard 3: Number Operations and Computation- The student will compute with whole numbers less than 100.

1. Develop and apply the concepts of addition and subtraction.
 - a. Demonstrate fluency with basic addition and subtraction facts [i.e., memorize and apply addition and subtraction facts] and fact families to 18.
2. Use mental strategies [or decomposition strategies] for addition and subtraction.
3. Complete addition number sentences with a missing addend and use to solve everyday problems.

Standard 4: Geometry and Measurement – The student will use geometric properties and relationships to recognize and describe shapes and use appropriate units of measure in a variety of situations.

1. Geometric Properties and Relationships
 - a. Sort and classify symmetric and congruent figures.
 - b. Identify 2- dimensional geometric shapes in everyday situations [e.g., a stop sign is an octagon.]

Instruction

1. Introduction: Start the lesson by asking some interesting questions. How many eyes do five bees have? What is the shape of a honey bee's hive?
2. Materials needed:
 1. Bees - ABDO Publishing CO – ISBN: 1-57765-717-9 or any book about bees.
 2. Worksheets from web sites – chose the ones you want to use
 3. Paper and pencil
 4. Geo-Fix kit
 5. Pattern Blocks – can copy some from internet – I used the ones from a Math series. [Need a variety- including circles.]
 6. Stop Watch

7. Tape Measure – 50' – 100' or something to measure distance.
3. Instructional process:
1. After I asked them a couple of 'math' type questions, I read the book.
 2. Activities-

1. Making a beeline: “To collect the amount of nectar needed to make 2 pounds of honey, bees must travel a distance that is approximately the same as circling the Earth 4 times. If we continue to compare distance in this way, how many times would the bees have to around the Earth in order to collect enough nectar to make 4 pounds of honey?”

Discuss the ratio of 4:2, explain it is the same as 2:1. To show this concept have students walk around their desks to indicate 2 times = 1 lb, then 4 times = 2 lbs. etc. until you get 4 lbs. Then write it out on paper using a missing addend number sentence. Then rewrite it with the numbers.

2. The eyes have it: “Each honeybee has 5 eyes! Three honeybees are circling a flower. How many bee eyes are around the flower? Five honeybees are returning to the hive with nectar. How many bee eyes are returning to the hive? Now there is a total of 30 bee eyes in the flower garden. How many honeybees are in the garden?”

Use this activity to count by 5's and do 3 to 5 number single column addition problems. You can make up more word problems if needed.

3. The shape of things: “Honey is stored in the beehive in a honeycomb, a structure of hexagon- shaped cells made of beeswax.”

GeoFix Activity - Hand out several triangles, squares, pentagons and hexagons from the GeoFix kit and have the students snap them together in a flat shape. Then discuss why the hexagon is the best shape for a beehive. Even though the [equilateral] triangles and squares snap together without any space between, they aren't good shapes for hives. Triangles don't make a straight line on the edge and squares aren't structurally strong enough for hives. Pentagons will have open spaces between shapes so they won't work for a hive either. Hexagons were the only ones that snapped together at all points and had more strength. Also discuss how many sides each shape has.

Shape Activity: Place a hexagon-shaped pattern block or GeoFix on a blank sheet of paper. Trace around it. If you use a GeoFix make dots at each point and have students use rulers to draw to make a hexagon. Then tell the students to use pattern blocks to cover it. Don't let any of the shapes go over the edges. Ask “Can you completely cover the hexagon using the pattern blocks?” “Are there any

shapes that won't work?" [circle] "Use the pattern blocks to explore and find the answer." Let them work on this for about 4-5 minutes.

Draw a hexagon on the board [or use SMARTBoard if you have one]. A SMARTBoard works great with this as it has the shapes in the gallery to fill the hexagon you draw.

1. Talk about symmetry. Divide in half – Trapezoid
2. Show them a rhombus and a triangle in each trapezoid.
3. Then show that each trapezoid can be divided into 3 triangles.
4. A square with a right angle triangle on each side also makes a trapezoid.
[hint: a square can be divided into 2 small rectangles too]

Use pattern blocks: hexagon, trapezoids, rhombus, squares, rectangles, various shapes of triangles,

1. Have students find the 1 piece that is a hexagon.
2. Then find 2 shapes and make a hexagon. [2 trapezoids]
3. Next find 4 pieces. [2 rhombus/2 triangles]
4. Find 6 pieces – there are 2 different ones. [6 triangles or 2 squares/4 Rt. Angle triangles]
5. Also remember rectangle hint = 8 pieces.

Hand out worksheet – No Matter What Shape – 1st page only [included]

Use 2nd page for upper level learners or for another lesson

<http://math.rice.edu/~lanius/Patterns/> - has answer key

Discuss and assist them with the lower part [fraction] of the worksheet.

4. Go for it: "When a honeybee is looking for nectar to make honey, it can travel 1 mile in four minutes. How far can you travel in 4 minutes? Time yourself while running or walking in your school gym or on your school's track. Use this data to determine how long it would take you to travel 1 mile. Ask your teacher or adult to help determine the distance you traveled."

You will want to time them. Measure the out of bound lines in the gym. Have each student walk normally around the gym one at a time while you time them for one minute. Compute measurement by using previous measurements plus any partial distance. Write measurement down. Activity can be changed to have students walk fast or run – how about doing all three.

Give each student their distance for 1 minute. Have them write it on their paper. Do column addition to determine how far they would walk/run in 4 minutes.

4. Closure:

Review Geometric shapes and properties. Discuss how honeybees know how to build their hives in hexagon shapes. Use a website to show students additional pictures of bees and hives.

Assessment:

Assess math problems done in Activity 1, 2, 3 and 4. Visual assessment can be done on Activity 3.

Modifications/Accommodations:

Some suggested modifications already listed in 'Go for it'. Accommodations for lower level students: Have the Math problems with columns and number sentence already on a worksheet [they fill in the answer]. Also have a hexagon and all alternative shapes drawn on paper. They would just have to match the pattern block up to the pre-drawn shape. Upper level learners can draw the various ways that a hexagon can be created. Challenge them to find how many more shapes fit into a hexagon. They can draw a hive – use a pattern block sheet if necessary. There is additional activity sheet included for upper level learners. All students like to help measure the distance for the 'Go for it.' activity.

Reflection: Make sure the hexagon and pattern blocks you use are compatible sizes. Remind students to 'walk' during the 'Go for it.' activity. My students liked all the activities in this lesson, especially the 'Go for it' when they got to run.

Personal note- I copied additional worksheets from websites and made this a unit on Honeybees that included Reading, Math, Science. You can also do a Geography lesson on what would be included in a 4 mile radius circle with the school in the center. This gives them a chance to use a compass.

Great Web sites for Math Activities and Honeybee Unit

<http://math.rice.edu/~lanius/Patterns/>

Great worksheet for 'The shape of things' hexagon, trapezoid, rhombus, triangle

<http://www.pbs.org/teachersource/mathline/lessonplans/pdf/esmp/perfectfit.pdf>

3 Lesson Plans - 'It's a Perfect Fit' - Part 1 - Part 2 - Part 3

Has shape blocks and lesson plans to use them also.

www.enchantedlearning.com/subjects/insects/bee/Honeybeecoloring.shtml

Will let you copy the coloring sheet for free - Subscription is \$20.00/year

<http://www.cyberbee.net/>

Cyberbee - [Bees 4 Kids](#) has some worksheets, interactive and animated sites.

<http://www.greensmiths.com/honey.htm>

great photos

<http://www.visualsunlimited.com> - put in 'honeybee'

great photos

<http://www.kohala.net/bees/>

http://www.everythingabout.net/articles/biology/animals/arthropods/insects/bees/honey_bee/index.shtml

http://www.uen.org/utahlink/activities/view_activity.cgi?activity_id=9986++

This site has more than just Honey Bees on it. Check it out!!

<http://www.goldenblossomhoney.com/gallery.html>

<http://www.pbs.org/wgbh/nova/bees/hive.html>

<http://academickids.com/encyclopedia/b/be/bee.html>

The following is a quote taken from Teaching Children Mathematics
Volume13, Number 2, September 2006 issue

“September is National Honey Month. This month’s problems will help children learn about the fascinating world of honeybees and honey production as well as solve mathematics problems that relate to number sense and geometry. Honey facts came from the following Web sites:”

www.suebee.com/honey

www.unt.edu/biology/bees/triva.htm


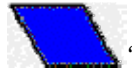



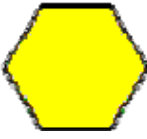


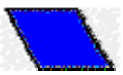
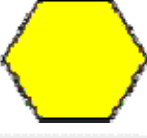
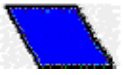

www.honey.com/kids/trivianns.html#3a

There are also Math activities listed for 3-4th Grades and 5-6th Grades.

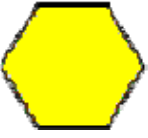





No Matter What Shape Your Fractions are In


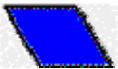
Determining the Relations

Use the figures you colored to answer the following questions.

1. How many  are in  ?
2. How many  are in  ?
3. How many  are in  ?
4. How many  are in  ?
5. How many  are in  ?
6. How many  are in  ?

Based on these relations,

7. If  = 1,  = ___ .
8. If  = 1,  = ___ .
9. If  = 1,  = ___ .

10. If  = 1,  = ___ .

This activity can be used for upper level learners.

Exploring the Shapes

1. Can you name the 4 [geometric figures](#)?
2. **What fun!** Experiment [online](#) with the shapes. (If you have a JAVA-capable browser). This will open a new window and you can move back and forth between the problems below and the online pattern blocks.
3. Print, color, and cut out [these shapes](#) to explore their various relations.
4. Print this page and color the four shapes on the triangle grid.

