

Module on Spatial/Geometric for Grade 3

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Adapted from:

Korean Mathematics, Grades 2-3. (2001). Edited by Janice Grow-Maienza, translated by Sue Chung Nugent. Kirksville, MO: Truman State University. From Ministry of Education. *Arithmetic, Grades 1-6*. Seoul, Korea: National Textbooks Inc, 1993.

Houghton Mifflin Company. The Mathematics Experience Grade 3. (1992)
Boston

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Math Module Outline

Strand: Geometric/Spatial

Grade Level: 3

Concepts Included in Module:

- Angles
- Polygons
- Perimeter
- Area

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District: Green City R-1

Statement of Basis for Selection of Strand/Concepts:

- After analyzing our MAP results, we noted a deficit in the area of geometry.
- We collaborated with secondary teachers to find areas that they sought to have further developed.

Module Resources:

- Houghton Mifflin Company. The Mathematics Experience Grade 3. (1992) Boston
- *Korean Mathematics, Grades 2-3*. (2001). Edited by Janice Grow-Maienza, translated by Sue Chung Nugent. Kirksville, MO: Truman State University. From Ministry of Education. *Arithmetic, Grades 1-6*. Seoul, Korea: National Textbooks Inc, 1993.

Module Materials

- The Greedy Triangle: by Marilyn Burns
- Pattern Blocks
- Picture catalogs

Pretest Form A

Name: _____ Date: _____

- ❖ Circle the larger angle. What makes this the larger angle? _____

_____ (Insert an acute, right and obtuse angle; first one with A at side and B at vertex)

What are parts A and B called of the first triangle?

A _____ B _____

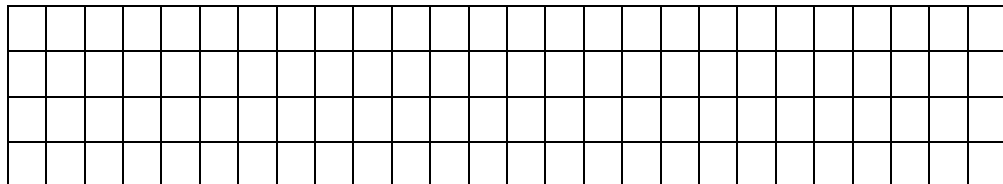
- ❖ How many right angles can be found in the following figures? _____
Circle them.
(Insert angles and polygons graphic)

Where could you find a right angle in the classroom? _____

- ❖ What is the perimeter of the following figures?
(Insert a triangle, square, and rectangle graphic)

- ❖ What is the area of the following figure?

- ❖ Draw a right triangle and a quadrangle.



- ❖ What makes a square a square? _____

-
-
- ❖ Answer the questions from the following figures.

(Insert a square, rectangle, quadrangle, right, an acute, and an obtuse triangle and label them A, B, C, D, E, and F)

Which one is a square? _____

Which one is a rectangle? _____

Which one is a quadrangle? _____

Which one is a right triangle? _____

Which one is an acute triangle? _____

Which one is an obtuse triangle? _____

Let's study angles.

Lesson #1: 3rd grade,

Objective:

To discuss and identify angles and pictures with various shapes in the world around us.

Lesson Resources and Materials:

- Translated Korean Textbook level 3-1
- Houghton Mifflin Textbook 3rd grade

Standards Addressed:

- Show-Me Standard: geometric and spatial sense involving measurement (including length, area, volume), trigonometry, and similarity and transformations of shapes.
- NCTM Content Standard #: 2,3,6,7,8,9,10

Real Life Problem:

What is an angle and where do we use them?

Demonstration of Process(es)/Exploration:

Let's study the figures in the following picture.

(Insert a picture of three different size houses with three angles labeled A, B, and C)

The point met by two lines is called the angle of a figure. A, B, and C are called angles.

Guided Practice:

Draw an angle on the board. Label it A, B, C. Ask students if anyone knows what the side is called. If no one knows have them collectively discuss what they think it might be called. Tell them that the corner is know by a special name, vertex. Would anyone like to predict what the whole angle is called? (Discussion time.) It is called either $\angle ABC$ or $\angle CBA$.

Put various angles on the board with different labels ($\angle DEF$, $\angle HIJ$, etc). Discuss that these are all named after the letters with which it is labeled. Write a few more on the board and have students answer orally. Write a few more, one at a time, and have students write on white boards.

Independent Practice:

Have students use rulers to make and label their own angles.

Note(s) for Teachers:

Center - Have students find examples of angles and make an angle catalog collage.

Let's study the size of angles.

Lesson #2: 3rd grade

Objective:

Students will identify right angles and explore acute and obtuse angles.

Lesson Resources and Materials:

- Translated Korean Textbook level 3-1
- Houghton Mifflin Textbook 3rd grade

Standards Addressed:

- Show-Me Standard: Geometric and spatial sense involving measurement (including length, area, volume), trigonometry, and similarity and transformations of shapes.
- NCTM Content Standard #: 2,3,6,7,8,9,10

Real Life Problem:

Can angles be different sizes? Why would we want different sized angles?

Demonstration of Process(es)/Exploration:

What would make an angle a different size? Discuss building corners, baseball diamonds, etc. Can you think of anything else with other sizes of angles? Draw an acute, right, and obtuse angle on the board.

Guided Practice:

Draw the angle $\angle ABC$, small acute angle, on the board. Draw the angle $\angle DEF$, larger acute angle, on the board. Fold a piece of paper the size of angle $\angle ABC$, lay over angle $\angle DEF$. Which angle is the larger?
(Insert angle graphics)

Using the folded angle $\angle ABC$ tell whether the following angles are larger or smaller.

(Insert graphic with various angles, angle $\angle GHI$ as a right angle)

Have students make angles with arms, jump ropes, etc.

The angle $\angle GHI$ is called a right angle. This can be told by looking at the vertex. A box shows us that this is a square corner. This is an acute triangle. What do you notice about this angle? (Smaller than right, a cute little angle) This is an obtuse angle. What do you notice about this angle? (Larger than right)

Fold a piece of paper as below and open it. Find the right angles in the paper.

(Insert paper folded into quarters, graphic)

Independent Practice:

Circle the right angles in the following.

(Insert several figures, some containing right angles)

Draw angle $\angle ABC$ and $\angle DEF$.

(Insert six dots; three labeled ABC and three labeled DEF.)

Note(s) to Teachers:

Let's study polygons: triangles.

Lesson #3: 3rd grade

Objective:

Students will identify a right triangle and review triangles and circles.

Lesson Resources and Materials:

- Translated Korean Textbook level 3-1
- Houghton Mifflin Textbook 3rd grade
- Right triangle ruler(s)
- The Greedy Triangle: By Marilyn Burns

Standards Addressed:

- Show-Me Standard: geometric and spatial sense involving measurement (including length, area, volume), trigonometry, and similarity and transformations of shapes.
- NCTM Content Standard #: 2,3,6,7,8,9,10

Real Life Problem:

Why are different shapes important to us?

Demonstration of Process(es)/Exploration:

Read, "The Greedy Triangle," by Marilyn Burns. Draw a triangle and a circle on the board. What do you think this might be called (point to side)? Repeat for vertices. How many corners, vertices, and sides do these figures have? Discuss why it is called TRIangle.

Draw shapes on board. Which one(s) has (have) three vertices and three sides? This has three vertices and three sides. It is called $\triangle ABC$.

Which of the following has a right angle?

(Insert triangle graphics with at least one being a right triangle)

The triangle with a right angle is called a right triangle. Why do you think it is called a right triangle?

Guided Practice:

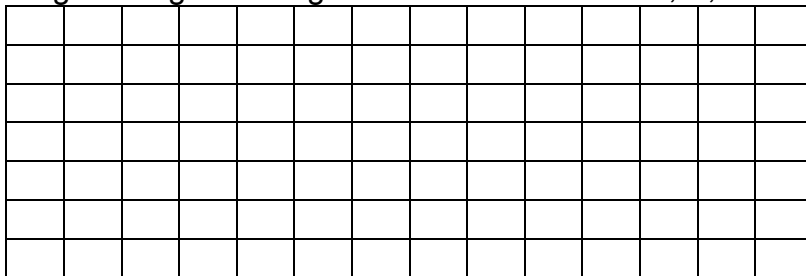
Find the right triangle from the following. What makes this a right triangle? Repeat for other triangles.

(Insert triangle graphics)

Have students cooperatively compare and contrast the triangle with a circle.

Independent Practice:

Draw a right triangle in the grid. Label the vertices A, B, and C.



Using the dots, draw a right triangle.
(Insert dots)

Explain what makes this a right triangle and not a circle. What does make a circle.

Note(s) to Teachers:

Center – Have students cut out various triangles and circles and design a picture. (Writing connection – Have students write how to make their design.)

- ❖ Right triangle: A triangle with a 90° angle.

Let's study polygons: quadrangles.

Lesson #4: 3rd grade

Objective:

Students will identify quadrangles, rectangles, and squares.

Lesson Resources and Materials:

- Translated Korean Textbook level 3-1
- Houghton Mifflin Textbook 3rd grade

Standards Addressed:

- Show-Me Standard: geometric and spatial sense involving measurement (including length, area, volume), trigonometry, and similarity and transformations of shapes.
- NCTM Content Standard #: 2,3,6,7,8,9,10

Real Life Problem:

What shape is a baseball field?

Demonstration of Process(es)/Exploration:

Draw a triangle, pentagon, etc. with some quadrangles. How many points and sides are there in these figures. Which one has 4 vertices and 4 sides? Discuss QUADrangle.

This picture has 4 vertices. This type of quadrangle is called ABCD.

Draw a square (A), rectangle (B), and another quadrangle (C) with one 90° angle. Which of these has 4 right angles? The quadrangles with four right angles as A and B are called rectangles. Does anyone see anything interesting about the sides of the rectangles? (Two opposite sides equal) A rectangle with all sides equal is a ____?

Guided Practice:

Draw a quadrangle for EFGH and IJKL.
(Insert two- four dot graphics)

Which of the following have 4 right angles?
(Insert graphics)

Which of these are rectangles? Squares?
Is a square a rectangle? Squares?

Independent Practice:

Draw a quadrangle for EFGH and IJKL.

Find the right angle in the following.

(Insert a square, rectangle, and another quadrangle with a 90° angle.)

Find the rectangles from the following quadrangles.

(Insert some quadrangle graphics)

Describe a rectangle. _____

Note(s) to Teachers:

Center – Have students draw triangles, flip to form quadrangles. Some students may know a 4-wheeler as a quad. I used this as a consolidation method.

Let's study perimeter.

Lesson #5; 3rd grade

Objective:

Students will understand perimeter.

Lesson Resources and Materials:

- Translated Korean Textbook level 3-1
- Houghton Mifflin Textbook 3rd grade

Standards Addressed:

- Show-Me Standard: geometric and spatial sense involving measurement (including length, area, volume), trigonometry, and similarity and transformations of shapes.
- NCTM Content Standard #: 2,3,6,7,8,9,10

Real Life Problem:

Where would you have to walk if you were to walk the perimeter of the playground?

Demonstration of Process(es)/Exploration:

Draw quadrangles on the board. Why are these quadrangles? What would I do to find the length of the sides? Now that we have measured them what do you suppose we should do with them? Are quadrangles the only shapes for which we can find a perimeter?

Guided Practice:

What is the perimeter of the following?
(Insert polygons)

Independent Practice:

What is the perimeter of the following?
(Insert polygons)

Note(s) to Teachers:

Having students engage in walking the perimeter of an area, eating the crust of bread, or putting border on a bulletin board helps expand this concept.

Let's study area.

Lesson #6: 3rd grade

Objective:

Students will understand area.

Lesson Resources and Materials:

- Translated Korean Textbook level 3-1
- Houghton Mifflin Textbook 3rd grade

Standards Addressed:

- Show-Me Standard: geometric and spatial sense involving measurement (including length, area, volume), trigonometry, and similarity and transformations of shapes.
- NCTM Content Standard #: 2,3,6,7,8,9,10

Real Life Problem:

Before we have recess today, explain how you think you would find the area of the playground?

Demonstration of Process(es)/Exploration:

What do you think of when I say area? What if I tell you that your toy is in that area? If the sides of an object measure perimeter, how do you suppose we find the area of something?

Guided Practice:

Hand out manipulative square inch tiles and have them use these to help solve the area of different figures. Have students create a square using 4 tiles. Explain that the area of this shape is equal to the number of tiles used. Have students construct an L shape with 4 tiles. Explain that even though this is a different shape it has the same area as the square.

Independent Practice:

Students will construct different shapes using 6 tiles and 8 tiles. Students will find the area of different objects that have been provided.

Note(s) to Teachers:

Center – Shapes of various sizes with one-inch tiles. Find the area of these figures. If you do not have tiles, have students cut one-inch squares.

Lesson #7: 3rd grade

Objective:

Students will identify rectangular prisms, cubes, and pyramids.

Lesson Resources and Materials:

- Houghton Mifflin Textbook 3rd grade
- Overhead of cube, pyramid, and rectangular prism
- Handouts – figure cutouts

Standards Addressed:

- Show-Me Standard: geometric and spatial sense involving measurement (including length, area, volume), trigonometry, and similarity and transformations of shapes.
- NCTM Content Standard #: 2,3,6,7,8,9,10

Real Life Problem:

What career would use these space figures?

Demonstration of Process(es)/Exploration:

Students will independently analyze what career(s) they think would use these figures (use overhead). Once they have some ideas they will pair-and-share. Consolidation of ideas will occur during whole group discussion.

Guided Practice:

Hand out worksheet cutouts of rectangular prism, cube, and pyramid. Have students write the name of the figure on each side of the cutout, cut them out, and construct each figure.

Independent Practice:

Take students out of classroom and have them make a list of ten items total that encompasses these shapes.

Note(s) to Teachers:

Prior to leaving class, make sure the area you take them to has all of the shapes. Home connection: Have students list things at home that are these shapes.

Lesson #8: 3rd grade

Objective:

Students will identify cylinders, cones, and spheres.

Lesson Resources and Materials:

- Houghton Mifflin Textbook 3rd grade
- Shape figures: cube, pyramid, rectangular prism, cylinder, cone, and sphere
- Handouts

Standards Addressed:

- Show-Me Standard: geometric and spatial sense involving measurement (including length, area, volume), trigonometry, and similarity and transformations of shapes.
- NCTM Content Standard #: 2,3,6,7,8,9,10

Real Life Problem:

How can you tell if a space figure will roll?

Demonstration of Process(es)/Exploration:

Have a cube, pyramid, rectangular prism, cylinder, cone, and sphere present. Conduct an experiment with each to determine rolling abilities. Discuss results. These figures have curved surfaces, these do not. (Show them)

Guided Practice:

Name a space figure that does not roll. Name a space figure that does roll. Hold up each figure and discuss the name of each.

Independent Practice:

Label each of these figures.

Note(s) to Teachers:

Lesson #9: 3rd grade

Objective:

Students will identify shapes with lines of symmetry.

Lesson Resources and Materials:

- Houghton Mifflin Textbook 3rd grade
- Construction paper
- Grid paper
- Scissors
- Mirrors

Standards Addressed:

- Show-Me Standard: geometric and spatial sense involving measurement (including length, area, volume), trigonometry, and similarity and transformations of shapes.
- NCTM Content Standard #: 2,3,6,7,8,9,10

Real Life Problem:

What capitol letters have a line of symmetry?

Demonstration of Process(es)/Exploration:

Hand out colored paper and have students fold and make various shapes. Hand out mirrors to explore various lines of symmetry.

Guided Practice:

Each student will fold a sheet of paper in half. Students will draw half a heart using the fold line as a line of symmetry. Then have students cut the figure out. When students have figures cut out, have them cut the heart in half on the fold line. Have students exchange one half with another student. Each will compare this half with their original half. Noting that they do not match. (hopefully) Each student will use a sheet of paper to recreate the partner's heart. Then they will compare it to the original.

Independent Practice:

Give each student a sheet of grid paper to draw letters that have a line of symmetry.

Note(s) to Teachers:

Lesson #10: 3rd grade

Objective:

Students will identify congruent and similar figures.

Lesson Resources and Materials:

- Houghton Mifflin Textbook 3rd grade
- Grid paper

Standards Addressed:

- Show-Me Standard: geometric and spatial sense involving measurement (including length, area, volume), trigonometry, and similarity and transformations of shapes.
- NCTM Content Standard #: 2,3,6,7,8,9,10

Real Life Problem:

Can you find a pair of congruent figures in this classroom? Similar?

Demonstration of Process(es)/Exploration:

Explain the difference between congruent and similar shapes. Your math books are congruent, the same size and shape. Can you find another congruent figure? Your math book and reading books are similar but not congruent. How are they alike? Different?

Guided Practice:

Give each student a sheet of grid paper. Instruct students to draw a figure in the upper left corner of the paper. Next, have them draw the following on the paper: 1. a figure that is similar but not the same size; 2. a congruent figure; 3. a figure that is not similar. Have students exchange and identify the figures that are similar and those that are congruent.

Independent Practice:

Give students a worksheet with congruent and similar figures. Have them label each as such.

Note(s) to Teachers:

Congruent shapes are an exact copy of the same shape. Similar shapes have the same shape and a different size.

Posttest Form B

Name: _____ Date: _____

- ❖ Circle the larger angle. What makes this the larger angle? _____

(Insert an acute, right and obtuse angle; first one with A at side and B at vertex)

What are parts A and B called of the first triangle?

A _____ B _____

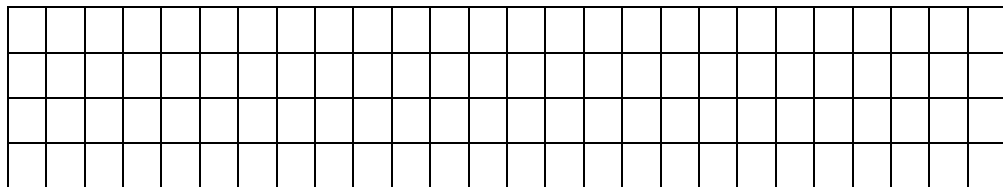
- ❖ How many right angles can be found in the following figures? _____
Circle them.
(Insert angles and polygons graphic)

❖ Where could you find a right angle in the classroom? _____

❖ What is the perimeter of the following figures?
(Insert a triangle, square, and rectangle graphic)

❖ What is the area of the following figure?

❖ Draw a right triangle and a quadrangle.



❖ What makes a square a square? _____



- ❖ Answer the questions from the following figures.
(Insert a square, rectangle, quadrangle, right, an acute, and an obtuse triangle and label them A, B, C, D, E, and F)

Which one is a square? _____

Which one is a rectangle? _____

Which one is a quadrangle? _____

Which one is a right triangle? _____

Which one is an acute angle? _____

Which one is an obtuse angle? _____

Which one is a right angle? _____

Which one is a sphere? _____

Which one is a cube? _____

Which one is a pyramid? _____

Which one is a rectangular prism? _____

Which one is a cylinder? _____

Which one is a cone? _____

Which one is a circle? _____

- ❖ Does the figure have a line of symmetry? _____ (Insert an equilateral triangle)

- ❖ Are the two figures congruent?
(Insert two sets of figures; one congruent, one not congruent. Insert a line under each for an answer.)

- ❖ Are the two figures similar?
(Insert two sets of figures; one similar, one not similar. Insert a line under each for an answer.)

- ❖ What symmetrical shape would this make?
(Insert a graphic of a shape with a fold and one correct answer and one incorrect answer.)