Third Grade Shapes Up!

Grade Level: Third Grade
Written by: Jill Pisman, St. Mary's School – East Moline, Illinois
Length of Unit: Eight Lessons

I. ABSTRACT

This unit contains lessons that focus on geometric shapes and figures. Students are exposed to hands-on activities to enhance their understanding of geometry. The students will observe geometric shapes in their environment. The class will discuss angles, tangrams, symmetry, and congruency. The class will also discuss different types of polygons and solid figures.

II. OVERVIEW

A. Concept Objectives
   1. Students will develop an awareness of the properties of geometric shapes and spatial sense to connect geometry to situations in their everyday environment.
   2. Students will develop an awareness of angles and their importance to many geometric concepts.
   3. Students will demonstrate a spatial awareness of congruent shapes and symmetry.
   4. Students will develop an awareness of polygons and be able to recognize and name the different types.
   5. Students will develop an awareness of solid figures and be able to name the different types.

B. Content from the *Core Knowledge Sequence*
   1. Polygons: recognize vertex; identify sides as line segments; identify pentagon, hexagon, and octagon.
   2. Identify angles by letter names; identify a right angle; know that there are four right angles in a square or rectangle.
   3. Recognize and draw congruent figures; identify a line of symmetry, and create symmetric figures.
   4. Identify solid figures: sphere, cube, rectangular solid, pyramid, cone, and cylinder.

C. Skill Objectives
   1. Use hands-on activities and manipulatives to discuss and demonstrate geometry concepts.
   2. Recognize, identify, and construct geometric shapes and objects.
   3. Determine the relationship between shapes using congruence and similarity.
   4. Construct shapes and models to demonstrate geometry concepts.
   5. Illustrate the presence of geometric concepts in everyday life through written work.
   6. Sort and classify geometric shapes and objects.
   7. Recognize, label, and name different types of angles.
   8. Create and recognize lines of symmetry in everyday objects.

III. BACKGROUND KNOWLEDGE

A. For Teachers
   1. *What Your Third Grader Needs to Know*

B. For Students

1. Topics and information introduced previously are found in kindergarten, first, and second grade. These topics include basic plane figures, congruent shapes, lines and line segments, and lines of symmetry.

IV. RESOURCES

A. Progress in Mathematics: Sadlier-Oxford (2000)
B. Adler, David A. Shape Up! Fun with Triangles and Other Polygons (1998)
C. Bullock, Ivan. Shapes (1994)
D. Hewitt, Sally. Take Off With Shapes (1996)
E. Superbook – Grade 3 (1997)

V. LESSONS

Lesson One: Shapes

A. *Daily Objectives*
   1. Concept Objective(s)
      a. Students will develop an awareness of the properties of geometric shapes and spatial sense to connect geometry to situations in their everyday environment.
   2. Lesson Content
      a. Polygons: recognize vertex; identify sides as line segments
   3. Skill Objective(s)
      a. Recognize, identify, and construct geometric shapes and objects.
      b. Illustrate the presence of geometric concepts in everyday life.
      c. Construct shapes and models to demonstrate geometry concepts.
      d. Illustrate the presence of geometric concepts in everyday life through written work.

B. *Materials*
   1. Chart paper
   2. Markers
   3. Examples of shapes: triangles, squares, rectangles, and circles
   4. Book, *Sir Cumference and the First Round Table*
   5. Geometry journals
   6. Pencils
   7. Pretzel sticks

C. *Key Vocabulary*
   1. Shapes – outline of specific form or figure
   2. Triangle – a three, cornered and three sided figure
   3. Square – a four sided figure whose sides are all equal
   4. Rectangle – parallelogram having four right angles
   5. Circle – a shape with no sides or corners
   6. Octagon – an eight sided figure whose sides are equal length

D. *Procedures/Activities*
   1. Introduce with KWL chart on shapes.
   2. Review basic shapes: triangle, square, rectangle, and circle.
   3. Read and discuss the book, *Sir Cumference and the First Round Table.*
   4. Point out and discuss the different shapes that the table was in the book.
   5. Pass out eight pretzel sticks to each student.

6. Have the students construct the rectangular table with the pretzel sticks.
7. Children describe this shape in their geometry journals and the problem this shape presented as a table.
8. Have the students construct the square table with the pretzel sticks.
9. Children describe this shape in their geometry journals and the problem this shape presented as a table.
10. Model for the students the shape of the next table, which was the square table, cut diagonally.
11. Have the students construct this table with the pretzel sticks pointing out the square and triangle.
12. Children describe this shape in their geometry journal and the problem this shape presented as a table.
13. Model for the students the shape of the next table and introduce the shape as an octagon.
14. Have the students construct the table shaped like an octagon out of pretzel sticks.
15. Children describe this shape in their geometry journals and the problem this shape presented as a table.
16. Ask the students which shape the table ended up as.
17. Discuss why their pretzel sticks can not be used to create a circle.
18. Show a circle to the students explaining that a circle has no corners or sides.
19. Have the students make a list of all the tables in their house and describe their shapes in their geometry journals.

E. *Assessment/Evaluation*
1. The teacher will assess the students by reviewing their geometry journals.
2. The teacher will assess the students by viewing the shapes they constructed.

Lesson Two: Triangles

A. *Daily Objectives*
1. Concept Objective(s)
   a. Students will develop an awareness of the properties of geometric shapes and spatial sense to connect geometry to situations in their everyday environment.
   b. Students will develop an awareness of polygons and be able to recognize and name the different types.
2. Lesson Content
   a. Polygons: identify triangle, square, quadrilateral, pentagon, hexagon heptagon, octagon, nonagon, and decagon.
3. Skill Objective(s)
   a. Use hand on activities and manipulatives to discuss and demonstrate geometric concepts.
   b. Construct shapes and models to demonstrate geometry concepts.
   c. Sort and classify geometric shapes and objects.

B. *Materials*
1. Chart paper
2. Markers
3. Pretzel sticks
4. Book, *The Greedy Triangle*
5. Shape worksheet (appendix A)

C. *Key Vocabulary*

1. Polygon – a many sided plane figure
2. Triangle – tree sided polygon
3. Equilateral triangle – triangle with three equal sides
4. Isosceles triangle – triangle with two equal sides
5. Square – four sided polygon
6. Quadrilateral – four sided polygon
7. Pentagon – five sided polygon
8. Hexagon – six sided polygon
9. Heptagon – seven sided polygon
10. Octagon – eight sided polygon
11. Nonagon – nine sided polygon
12. Decagon – ten sided polygon

D. *Procedures/Activities*

1. Show the book *The Greedy Triangle* to the students.
2. Hand out three pretzel sticks to the students and ask them to construct a triangle.
3. Explain that the triangle that was constructed was an equilateral triangle.
4. Ask the students to take a bite out of just one of the pretzel sticks.
5. Students then should construct an isosceles triangle recognizing that just two sides are equal.
6. Read and discuss book *The Greedy Triangle.*
7. List the names of shapes that the triangle turns into on chart paper: quadrilateral, pentagon, hexagon, heptagon, octagon, nonagon, and decagon. On the chart note the prefixes and their meanings.
8. Give the students the shape worksheet (Appendix A).
9. Students will complete the shape worksheet in class.

E. *Evaluation/Assessment*

1. Students will complete the shape worksheet.
2. Teacher will evaluate the completed Appendix A for accuracy.

Lesson Three: Polygons

A. *Daily Objectives*

1. Concept Objective(s)
   a. Students will develop an awareness of polygons and be able to recognize and name the different types.
2. Lesson Content
   a. Polygons: recognize vertex, identify pentagon, hexagon, and octagon.
3. Skill Objective(s)
   a. Use hands-on activities and manipulatives to discuss and demonstrate geometry concepts
   b. Recognize, identify, and construct geometric shapes and objects.
   c. Construct shapes and models to demonstrate geometry concepts.

B. *Materials*

1. Book, *Grandfather Tang's Story*
2. Tangram puzzle (Appendix B)
3. Geometry Journals

C. *Key Vocabulary*

1. Tangram puzzle – seven piece puzzle that can be put together to make hundreds of different shapes and figures.

2. Trapezoids – quadrilaterals that have one pair of parallel sides
3. Quadrilaterals – polygons that have four sides
4. Hexagons – polygons that have six sides

D. *Procedures/Activities*

1. Teacher will review vocabulary from previous lessons with students.
2. Teacher will read book, *Grandfather Tang's Story.*
3. Discuss the shapes that Grandfather Tang and Little Soo used in creating fox fairies.
4. Have students cut out their tangram pieces (Appendix B).
5. Have students try to put the seven pieces back together to form a square.
6. Read the story again, and have the students make the shapes described in the story with their tangram shapes.
7. Have the students create their own shapes using their tangram pieces.
8. After the students have created their shapes, have them describe their shapes in their geometry journals and write a story about their shape.

F. *Evaluation/Assessment*

1. Students will be observed making geometric shapes.
2. Teacher will assess the writing in the student's geometry journals.

Lesson Four: Angles

A. *Daily Objectives*

1. Concept Objective(s)
   a. Students will develop an awareness of angles and their importance to many geometric concepts.
2. Lesson Content
   a. Identify angles by letter names; identify a right angle; know there are four angles in a square or rectangle.
3. Skill Objective(s)
   a. Recognize, label, and name different types of angles.

B. *Materials*

1. Geometric shapes such as a triangle, quadrilateral, pentagon, hexagon, and octagon.
2. Round pieces of white paper
3. Markers
4. Eight popsicle sticks
5. Overhead projector

C. *Key Vocabulary*

1. Angle – formed by two rays or two line segments that start out from the same point
2. Vertex – the point where two lines meet to form an angle
3. Triangle – three sided polygon
4. Quadrilateral – four sided polygon
5. Pentagon – five sided polygon
6. Hexagon – six sided polygon
7. Octagon – eight sided polygon
8. Right angle – an angle formed by two straight lines
9. Acute angle – less than a right angle
10. Obtuse angle – larger than a right angle

D. *Procedures/Activities*

1. Show each shape to the students and have them name each shape.
2. Discuss the number of sides that each shape has.
3. Construct a triangle on the overhead using popsicle sticks.
4. Discuss the presence of angles where two lines meet.
5. Ask how many angles the triangle has.
6. Take one of the popsicle sticks away and form a right angle.
7. Explain to the students what a right angle is.
8. Point out the vertex of the angle.
9. Invite one of the students up to the overhead to create a quadrilateral with the popsicle sticks.
10. Point out the angles in this shape.
11. Ask the students what types of angles are in the quadrilateral.
12. Invite one of the students up to the overhead to create a pentagon out of popsicle sticks.
13. Point out the angles in the shape.
14. The students should be able to point out the right angles.
15. Point out the obtuse angles in the pentagon.
16. Point out the acute angle in the pentagon.
17. Invite one of the students up to the overhead to create a hexagon.
18. Point out the angles in the shape and state what types of angles they are.
19. Invite one of the students up to the overhead to create an octagon.
20. Point out the angles in the shape and state what type of angles they are.
21. Explain to the students that all angles can be labeled by using the letters of the alphabet.
22. Provide the students with one round piece of paper.
23. Model for the students how to fold the paper once so it has a straight edge and then have the students fold their papers.
24. Model for the students how to fold the paper again so one half of the straight edge falls on top of the other and then have the students fold their papers.
25. Point out to the students that a right angle was created.
26. Remind the students that angles can be labeled by using letters of the alphabet.
27. Have students label their angles.

E. *Evaluation/Assessment*

1. Students will be observed labeling their angles.
2. Students will identify their angle names.

Lesson Six – Symmetry

A. *Daily Objectives*

1. Concept Objective(s)
   a. Students will develop a spatial awareness of congruent shapes and symmetry.
2. Lesson Content
   a. Identify a line of symmetry.
3. Skill Objective(s)
   a. Create and recognize lines of symmetry in everyday objects.

B. *Materials*

1. Copies of Appendix C
2. Copies of Appendix D

3. Alphabet Stencils
4. Construction paper
5. Large heart shape
6. Geometry journals

C. *Key Vocabulary*
1. Symmetry – exact matching of shapes or figures on opposite sides of dividing lines or around a center point
2. Line of symmetry – the dividing line of symmetry

D. *Procedures/Activities*
1. Show the students the large heart shape.
2. Fold the heart in half in such a way that both sides match.
3. Explain that when both sides match that is symmetry.
4. Open the heart up and show the students the line of symmetry.
5. Pass out appendix C and have the students cut out the hearts.
6. Students will fold hearts in such a way that both sides match.
7. Discuss why hearts only have one line of symmetry.
8. Pass out leaf patterns (Appendix D).
9. Have students cut out leaf patterns.
10. Have students try to find lines of symmetry.
11. Discuss why the leaf patterns are not symmetrical.
12. Provide each student with a sheet of construction paper and five alphabet stencils.
13. Instruct each student to trace their five letters on the construction paper and cut them out.
14. Have the students manipulate their letters to help them decide whether or not their letters have lines of symmetry.
15. Have the students write about this activity in their geometry journals. The writing should include what letters are symmetrical and which are not.

E. *Evaluation/Assessment*
1. Students will be observed finding symmetry in the letters of the alphabet.
2. Teachers will evaluate the student's geometry journals.

Lesson Seven: Congruent Shapes

A. *Daily Objectives*
1. Concept Objective(s)
   a. Students will demonstrate a spatial awareness of congruent shapes.
2. Lesson Content
   a. Recognize and draw congruent figures
3. Skill Objective(s)
   a. Determine the relationship between shapes using congruence and similarity.

B. *Materials*
1. Transparency of appendix E
2. Transparency of appendix F
3. Student copies of appendix F
4. Overhead projector
5. White construction paper
6. Attribute blocks

C. *Key Vocabulary*
1. Congruent – refers to two shapes of exactly the same shape and size
2. Similar – objects that have the same shape but are not the same size

D. *Procedures/Activities*

1. Introduce the lesson with congruent figures display on the overhead projector (appendix E). Explain to students why they are congruent.
2. Use overhead projector to match congruent sets of rectangles (appendix E).
3. Use the overhead projector to explain similarity in figures (appendix E).
4. Distribute a copy of (appendix F). Display a transparency on the overhead projector. Explain that they will draw a figure congruent to the figure the teacher draws.
5. Draw a square on the transparency of (appendix F).
6. Observe the students drawing a square that is congruent.
7. Draw a rectangle on the transparency of (appendix F).
8. Observe the students drawing a rectangle that is congruent.
9. Draw a triangle on the transparency of (appendix F).
10. Observe the students drawing a triangle that is congruent.
11. Distribute a sheet of paper to students and instruct them to fold it into four sections.
12. The students select four attribute blocks and traces one block in each section of the paper.
13. After everyone has filled in all four sections, instruct students to compare papers.
14. When a student finds a paper featuring a shape that is congruent to one on his or her paper, they have the classmate sign that section of their paper.

E. *Evaluation/Assessment*

1. Students will be observed drawing congruent figures.
2. Students will be observed when they are gaining peer's signatures.

Lesson Eight: Solid Figures

A. *Daily Objectives*

1. Concept Objective(s)
   b. Students will develop an awareness of solid figures and be able to name the different types.
2. Lesson Content
   a. Identify solid figures: sphere, cube, rectangular solid, pyramid, cone, and cylinder.
3. Skill Objective(s)
   c. Recognize, identify, and construct geometric shapes and objects.
   d. Construct shapes and models to demonstrate geometry concepts.
   e. Sort and classify geometric shapes and objects.

B. *Materials*

1. Solid figure shapes: sphere, cube, rectangular solid, pyramid, cone, and cylinder
2. Tagboard
3. Copies of solid figure patterns (appendix G and H)
4. Paint
5. Geometry journals
6. Chart paper
7. Markers
8. Tennis balls
9. Rubber cement

C. *Key Vocabulary*

1. Solid figure – three dimensional figures
2. Sphere – perfectly round ball shape with a curved surface

3. Cube – a 3-D shape with six flat sides which are all the same size
4. Rectangular solid – a 3-D shapes with six rectangular sides
5. Pyramid – a 3-D shape made up of triangle faces that meet together in a point
6. Cone – a 3-D shape with a circle face at one end and a curved face that makes a point at the other end
7. Cylinder – a 3-D shape with a circle at each end and is joined together by a curved face

D. *Procedures/Activities*

1. Introduce solid figures to the students.
2. Show the students each of the solid figures and discuss each one.
3. List each of the solid figures on the chart paper.
4. Under each solid figure make a list of objects that resemble each shape.
5. Place the students in groups of two.
6. Give each group three copies of (appendix G and H), six pieces of tagboard, and a tennis ball.
7. Have the students cut out the shapes on (appendix G and H) and trace the shapes three times on the tagboard.
8. Have the students cut the shapes out and fold them together. They may need to be glued.
9. Explain to the groups of the students that they will be using these shapes to create an animal of their choice.
10. After the animal is finished the students should paint their creation.
11. Have the students describe their animal in their geometry journals and write a story about their animal.

E. *Evaluation/Assessment*

1. Students will be observed when creating their animal.
2. Teacher will evaluate the creativity used when creating their animal.
3. Teacher will evaluate the writing in the student's geometry journals.

VI. CULMINATING ACTIVITY (Optional)

Students will be taken on a shape walk. While on the walk, students will be asked to make a list of all the shapes they see around them. After the shape walk is finished, the students will choose three shapes to write about. The students will then write a paragraph about each shape. When the student's paragraphs are completed, they will publish their writing into a book along with illustrations.

VII. HANDOUTS/WORKSHEETS

A. Appendices A-H

Note: Appendices B, G & H have been deleted for copyright reasons. You can find them on your own at:

Appendix B: The Education Center - *Classroom Clips and Seasonal Clips, Intermediate.* 1998. New York: New York

Appendix G & H: *The Mailbox Superbook, Grade 3*, Cynthia Holcomb, pages 229-230

VIII. BIBLIOGRAPHY

Adler, David A. Shape Up! Fun with Triangles and Other Polygons. New York: Holiday House, Inc., 1998. ISBN 0-8234-1346-2 (Hardcover)

Bullock, Ivan. Shapes. New York: Thomson Learning. 1994. ISBN 1-56847-232-3.

Burns, Marilyn. The Greedy Triangle. 1975. ISBN 0590-48991-7. New York: Scholastic Inc.

Hewitt, Sally. Take Off With Shapes. Austin, TX: Steck-Vaughn Company, 1996. ISBN 0-8172-4114-0.

Holcomb, Cynthia. The Mailbox Superbook, Grade 3. North Carolina: The Education Center. 1998. ISBN 1-56234-199-5.

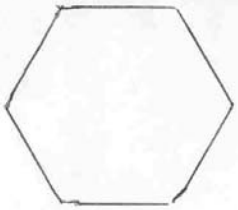
Neuschwander, Cindy. Sir Cumference and the First Round Table. 1997. ISBN 1-579091-160-6 (reinforced for library use). ISBN 1-57091-152-5 (softcover). Massachusetts: Charlesbridge, Publishing.

Sadlier-Oxford. Progress in Mathematics, Grade 3. New York: William H. Sadlier. 2000. ISBN 0-8215-2613-8

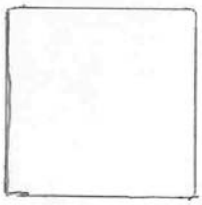
The Education Center - *Classroom Clips and Seasonal Clips, Intermediate.* 1998. New York: New York

Tompert, Ann. Grandfather Tang Story. 1990. ISBN 0-517-57487-X. New York: Crown Publishing.

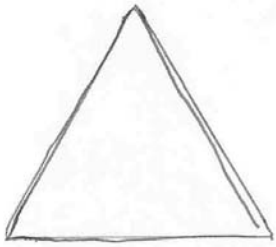
Match the shape to its name
Appendix A



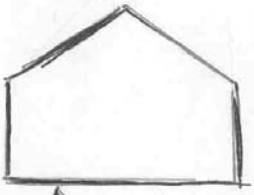
Quadrilateral



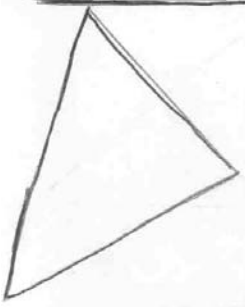
Pentagon



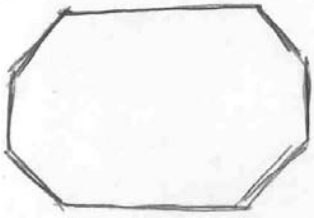
Hexagon



Equilateral triangle



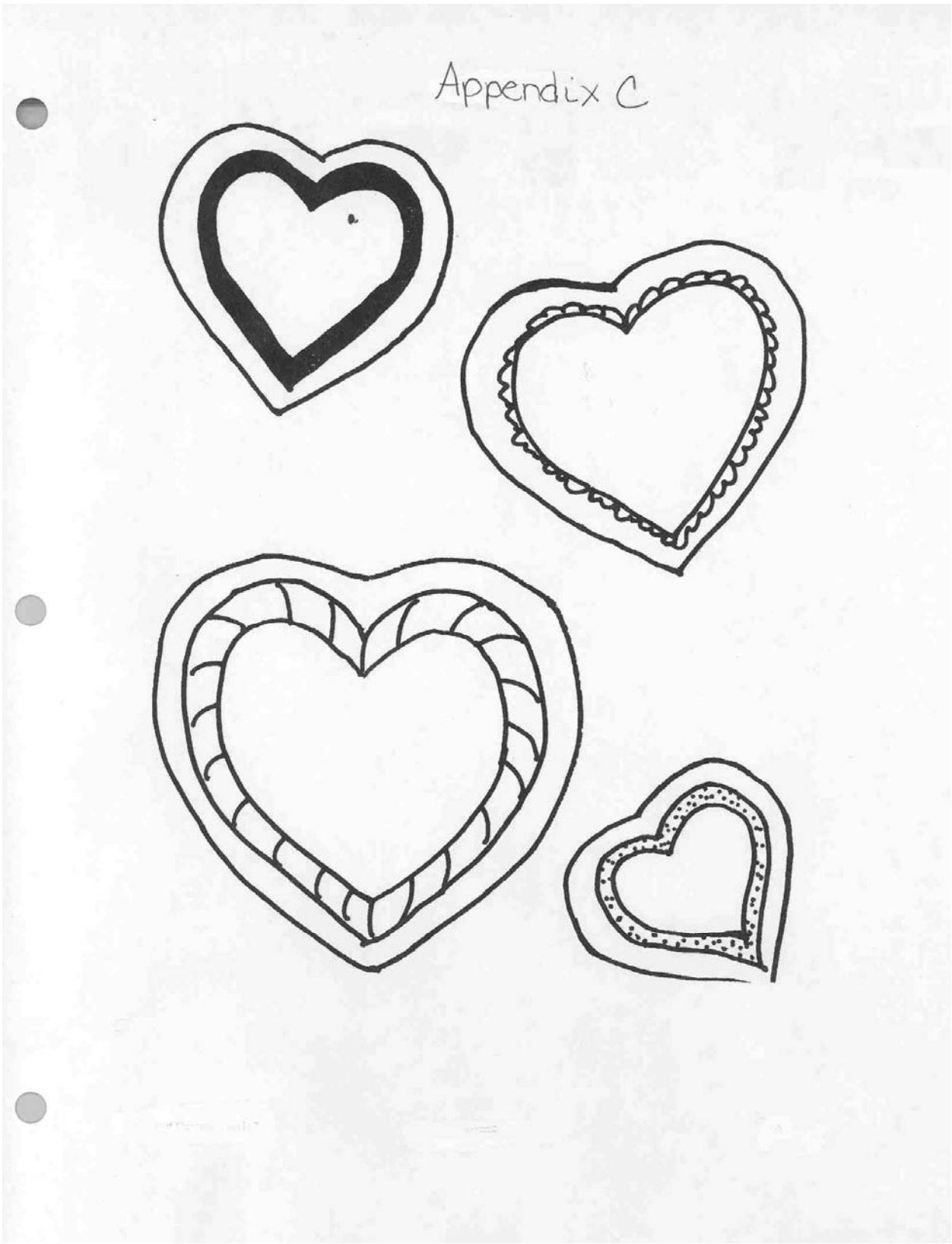
Octagon



Isosceles triangle

You can find Appendix B on your own at:
The Education Center - *Classroom Clips and Seasonal Clips, Intermediate*. 1998. New York: New York

Appendix C



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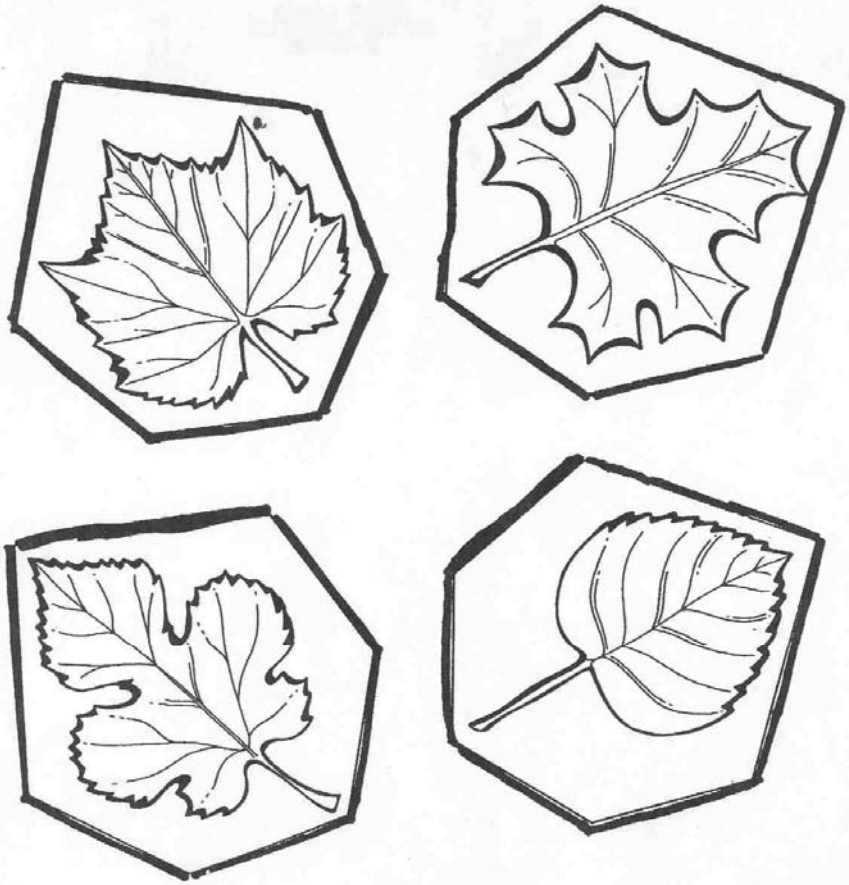
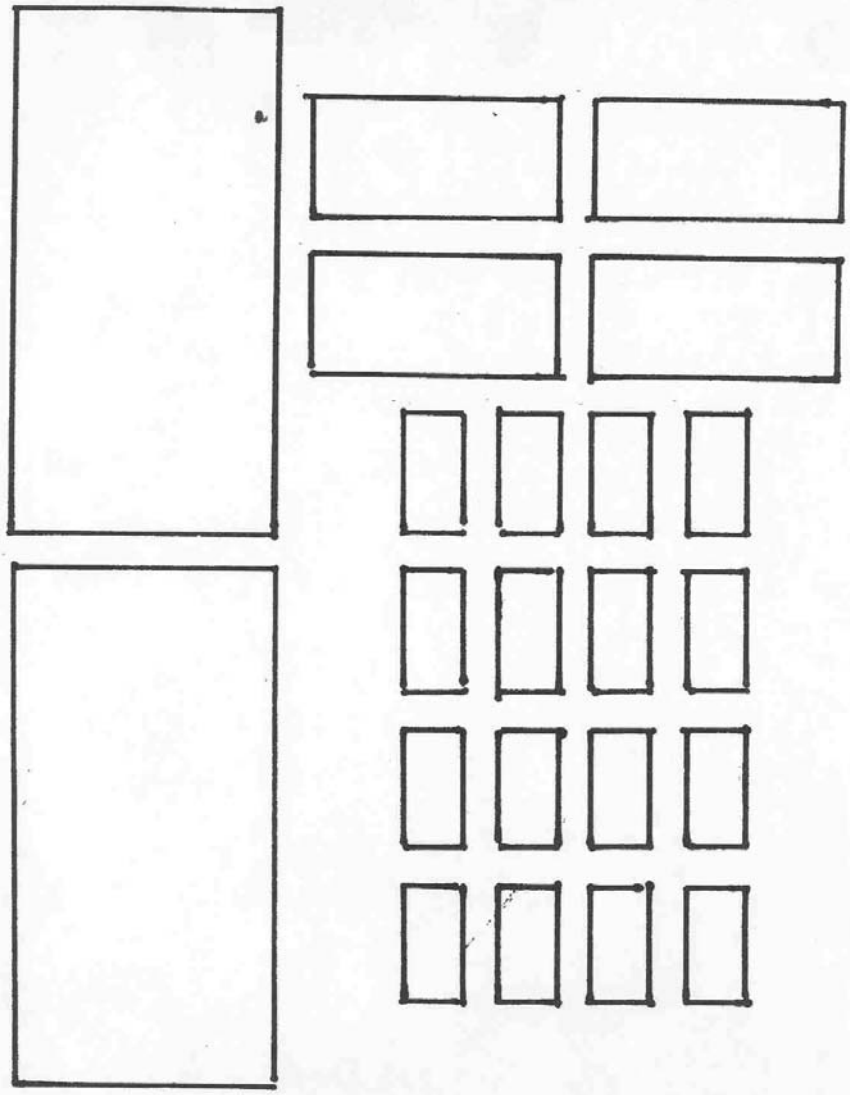
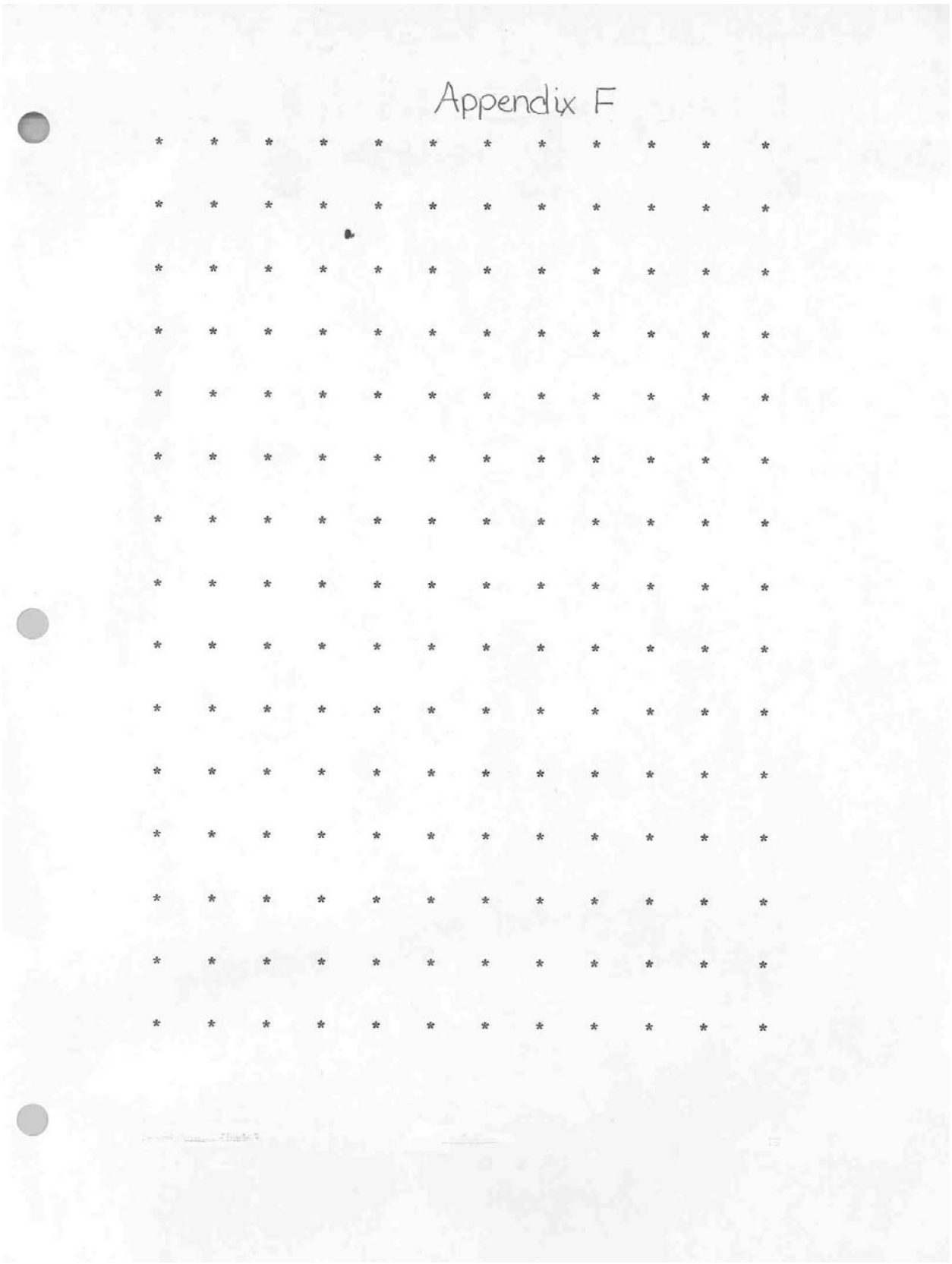


Appendix E



Appendix F



You can find Appendices G & H on your own at: *The Mailbox Superbook, Grade 3*, Cynthia Holcomb, pages 229-230