

LEARNING TO QUILT

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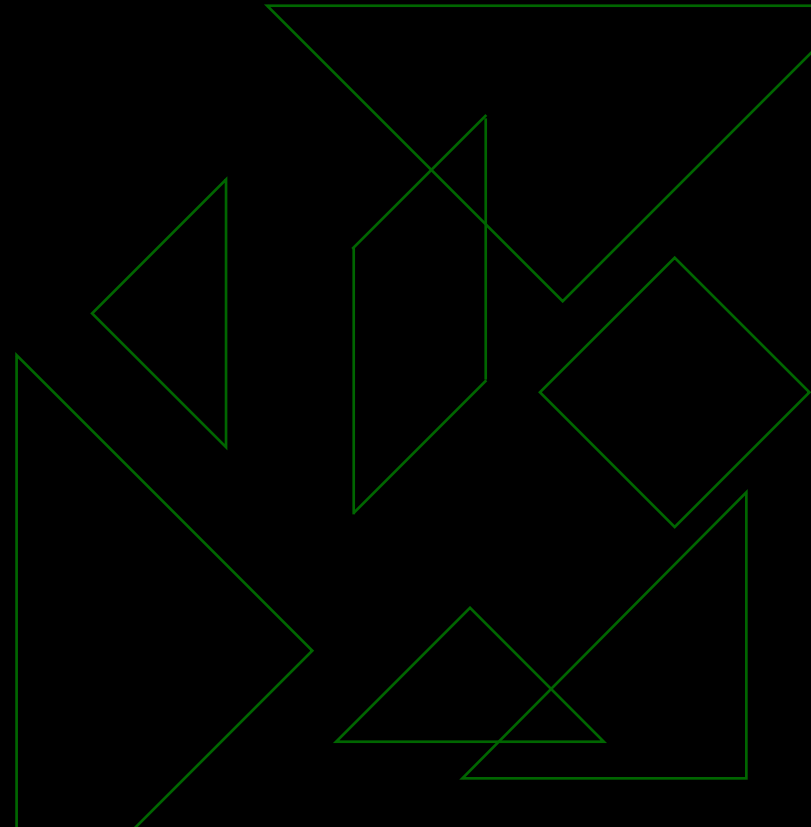
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USING TANGRAMS

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TEACHING GEOMETRY INVOLVES THE USE OF

- Shapes
- Patterns
- Transformations
- Congruency and Symmetry



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Geometry Standards

Use **visualization, spatial reasoning, and geometric modeling** to solve problems

- ⇒ build and draw geometric objects;
- ⇒ create and describe mental images of objects, patterns, and paths;
- ⇒ identify and build a three-dimensional object from two-dimensional representations of that object;
- ⇒ identify and draw a two-dimensional representation of a three-dimensional object;
- ⇒ use geometric models to solve problems in other areas of mathematics, such as number and measurement;
- ⇒ recognize geometric ideas and relationships and apply them to other disciplines and to problems that arise in the classroom or in everyday life.

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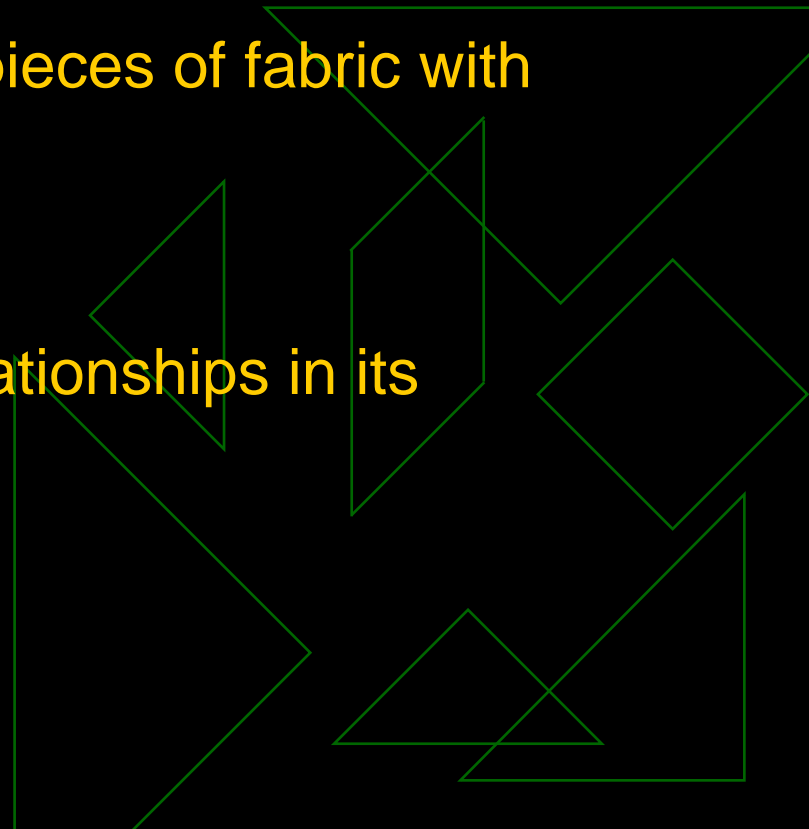
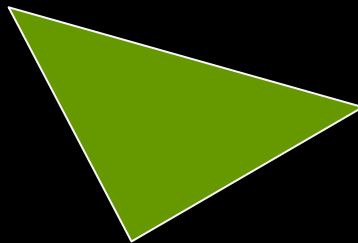
QUILTING

The art of using geometrical shapes to compose patterns

Patchwork or the stitching of pieces of fabric with an inside padding.

Tells a story or has a theme

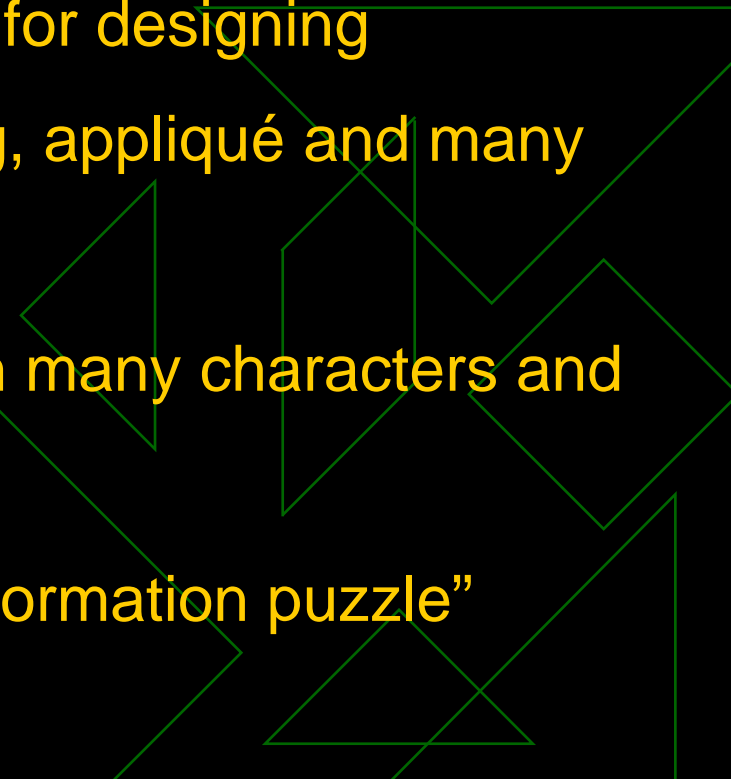
Involves visual and spatial relationships in its design



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TANGRAMS

- Originated in China before the 19th century
- Square composed by seven shapes or tans
- The geometry in it allows its use for designing
- Designs are adaptable to quilting, appliqué and many other artistic or craft projects
- Storytellers can weave a tale with many characters and objects using the seven tans.
- Called also “Dissection or Transformation puzzle”



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ACROSS THE CURRICULUM

- Literature on the related topic, in this case, Quilts
- Analyzing and discussing the history of patchwork
in the US
- Practice of listening and comprehension skills
- AR tests
- Writing a how to and/or their own quilt story.

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OVERVIEW

The lesson is intended for elementary students. For the second and third grades is an excellent way to introduce patterns, shapes and transformational geometry, while for the fourth and fifth grades is a tool to reinforce previous knowledge and establish a firm foundation for the concepts that follow in the middle grades.

In the activity, participants engage in the task of creating their own geometrical design by using pieces of a tangram to finally assemble a quilt.

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THE LESSON

Objectives:

1. By exploring the pieces of a tangram, students will be able to choose shapes that combined will form another shape with which to assemble a design and prepare a pattern that shows transformational moves in at least 3 different ways.
2. Once in display, comparisons among the models will be made and the students will vote after evaluating them for the most congruent, original and use of the transformational moves model.
3. After reading the story, the students will engage in a discussion of the purpose of the quilt in the story and argue on how a pattern can tell a story.

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TEKS

4.9 Geometry and spatial reasoning. The student connects transformations to congruence and symmetry.

The student is expected to:

- (A) demonstrate translations, reflections, and rotations using concrete models;
- (B) use translations, reflections, and rotations to verify that two shapes are congruent; and
- (C) use reflections to verify that a shape has symmetry.

5.8 Geometry and spatial reasoning. The student models transformations.

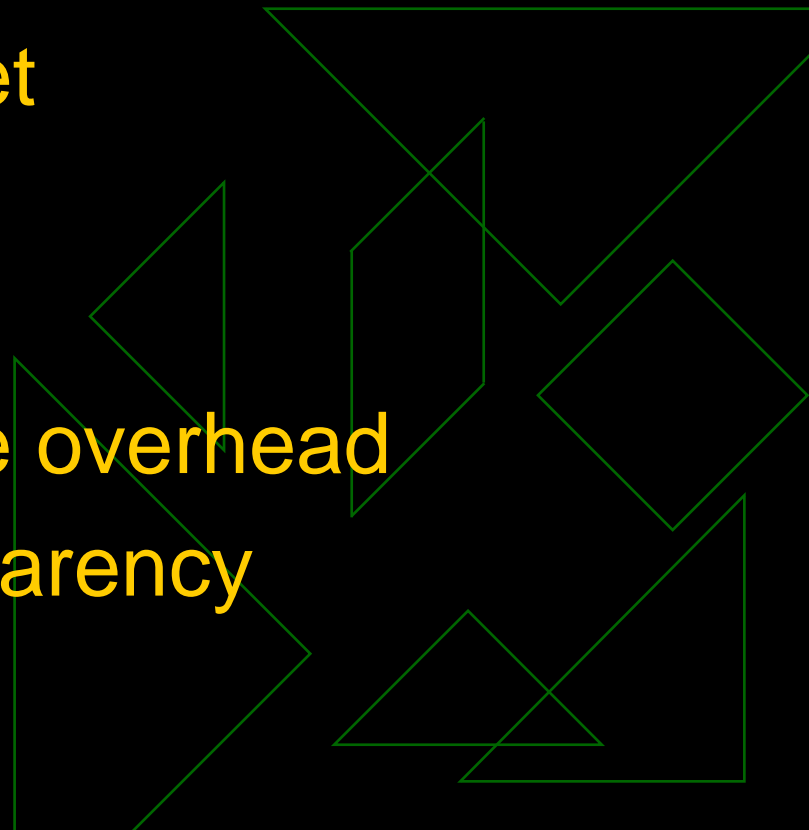
The student is expected to:

- (A) sketch the results of translations, rotations, and reflections on a Quadrant I coordinate grid;
- (B) identify the transformation that generates one figure from the other when given two congruent figures on a Quadrant I coordinate grid.

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MATERIALS/ RESOURCES

- ◆ 2 sets of tangrams different colors
- ◆ A nine-patch quilt sheet
- ◆ Construction paper
- ◆ Crayons
- ◆ Set of tangrams for the overhead
- ◆ Nine-patch quilt transparency



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PROCEDURE

1. Working in groups of 3-4, participants will handle the pieces of the tangram with the purpose of exploring them.
2. Teacher will explain how participants can manipulate the tans to form different designs and then complete patterns and provide a few puzzle-patterns to solve.



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3. After several trials, teacher talks to participants to make them aware of the importance of visualizing a pattern and combines efforts among the groups to solve the given puzzles.

4. Teacher will read the story out loud asking comprehension questions.

5. To wrap it up, teacher will explain that participants are to work on a quilt.

6. Participants will then work with a nine patch sheet and two or three triangles to create their own design, (which can be extended with the use of a ruler and specific measures) by arranging the pieces in different directions.

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7. Using transformational geometry, participants will identify and name the different designs when the triangles move in different directions.

8. Participants will transfer their designs onto the nine patch sheet and color it using 2 or three different colors.

9. When their designs are finished, participants will display their designs in front of the whole group.

10. Participants will look at all the designs and identify the transformational move used to create the design and identify the line of symmetry, if any.

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11. Involved in a discussion, the teacher will ask questions to participants to assess their level of understanding and their use of vocabulary: rotation, reflection, translation, congruent, symmetry, patterns.

12. The participants will finally vote for the best design, pointing to the characteristics of shape, moves, symmetry and color.

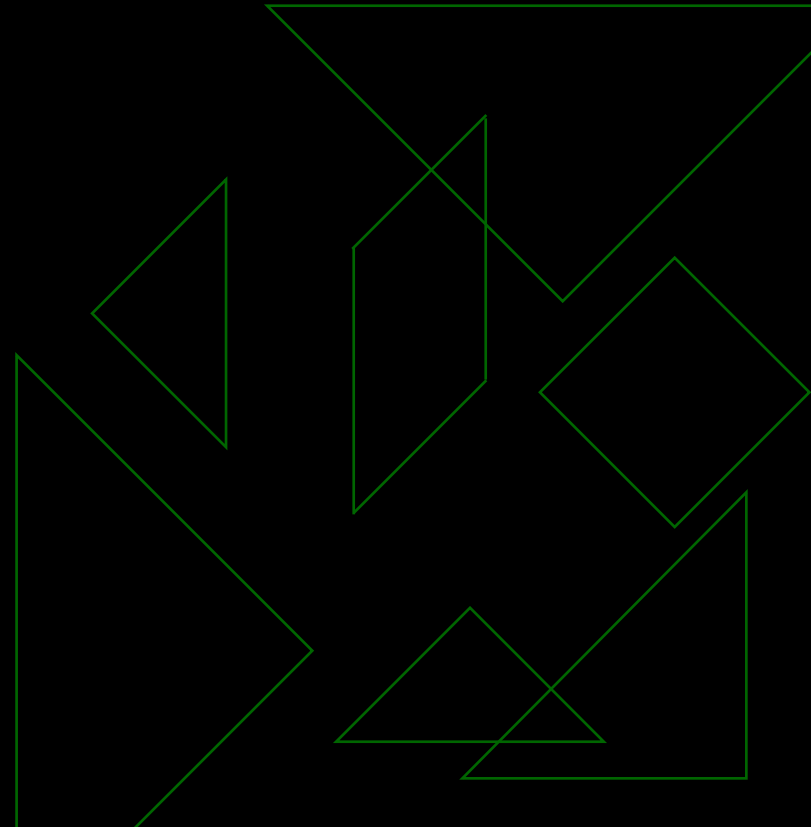
13. To extend the activity, participants can work on a quilt using the winning pattern as a group, making it carry an important meaning for the group.

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ASSESSMENT

Different tools:

- Oral examination
- Write own quilt story
- How-to composition
- Rubric



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SHORT STORY THEME BOOKS

The Patchwork Quilt by Valerie Flournoy

Tender Loving Covers by Tni Phillips and Juanita Simonich

Patchwork Quilts to Make For Children by Margaret Rolfe

Quilt a Koala by Margaret Rolfe

Sam Johnson and the Blue Ribbon Quilt by Lisa Campbell Ernst

The Rag Coat by Lauren Mills

The Patchwork Lady by Mary K. Whittington

Sweet Clara and the Freedom Quilt by Deborah Hopkinson

The Boy and the Quilt by Shirley Kurtz

The Mountains of Quilt by Nancy Willard and Tomie DePaola

Tar Beach by Faith Ringgold

The Keeping Quilt by Patricia Polacco

The Quilt Story by Tony Johnston

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REFERENCES

Bohning, G. and Williams, R. (Winter 1996/1997). "Quilts and tangrams: Linking literature and geometry." *Childhood Education*.

Math Forum

<http://mathforum.org/trscavo/tangrams.html>

National Council of Teachers of Mathematics

<http://standards.nctm.org/document/eexamples/chap4/4.4/index.htm>

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Tangrams

<http://www.tangrams.ca/>

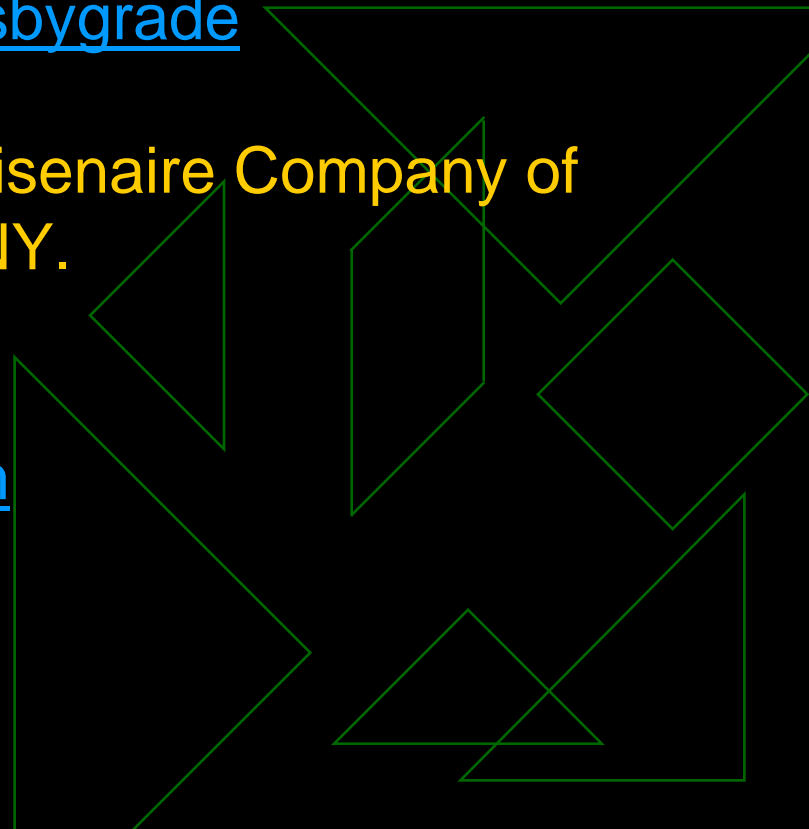
Texas Education Agency

<http://www.tea.state.tx.us/teks/#teksbygrade>

“The Super Source, Tangrams.” Cuisenaire Company of America, Inc. White Plains, NY.

Wikipedia

<http://en.wikipedia.org/wiki/Tangram>



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USEFUL LINKS

- National Library of Virtual Manipulatives

<http://nlvm.usu.edu/en/nav/vlibrary.html>

- Math Nerds

<http://www.mathnerds.com/mathnerds/>

- Math is Fun

<http://www.mathsisfun.com/geometry/index.html>