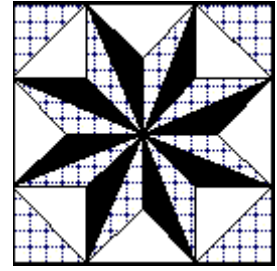


Topic: Quilt Squares

Grade: Seventh or Eighth

An integrated lesson plan covering five plus sessions of approximately 1 hour each.



Lesson-Planning Approach

Some learners perceive their “world” as a whole, where all things are interconnected and dependent upon each other. These “integrated” students face major challenges in coping with our dominant educational, social, and economic systems, which tend to present information in a linear fashion without the necessity of integration into meaningful context. Integrated students are at-risk of failing as they attempt to grasp information in ways that do not match their experience. Among large populations of at-risk students are many from Native American and similar cultures who do not regard their world as a sum of parts but as a blend of all that they experience.

This lesson plan does include some traditional, linear approaches to delivering information (checklists, rules, analysis, problem solving and organization). In addition to the traditional, linear delivery of information, this lesson plan also includes some of the following strategies, designed to appeal to at-risk students as they learn academic/life skills:



- Integration of technology
- Story telling/anecdotal information
- Non-competitive group and team work
- Performance-based assessment and rubrics
- Visual presentations and practice through technology and other means
- Project-based assignments that integrate family and community
- Activities appealing to multiple intelligences (Gardner)

Lesson Overview

In this lesson students will work with polygons and transformations to create a quilt square using colored paper. They will construct nine of the squares and assemble them into a nine square quilt. They will research the history of the quilt in American history. They will complete several writing assignments related to the project.

Lesson Objectives

Project Objectives: When students complete this session, they will be able to...



Produce a nine square quilt using transformations



Perform rotations, translations, dilations, and reflections on the computer and on a coordinate grid



Use transformations of polygons to create a tessellation

Integration of Other Functional/Academic Skills: (Critical thinking is required throughout the lesson.) Students will be able to...



Writing: write a descriptive paragraph of how they constructed their square



Social Studies: relate the use of quilts in the history of America



Grammar: apply standard punctuation and sentence structure in writing



Art: coordinate color for an attractive square



Technology: use software to practice transformations and search the Internet for history of quilts

State/National Standards (Complete as Appropriate)



Colorado State Standard 4.6: Students extend their knowledge, what they know, and are able to transform geometric figures using reflections, translations, and rotations to explore congruence.



NCTM Geometry Standard: Instructional programs from pre-kindergarten through grade twelve should enable all students to apply transformations and use symmetry to analyze mathematical situations.

Websites

Required:

www.womenfolk.com/historyuofquilts/ This site has a long list of historical topics dealing with quilts. It includes Native American and Civil War articles which are very interesting.

Support:

www.pbs.org/americquilts/classroom/stories2.html This site is a list of ways quilts have been used in the classroom.

www.quilting.about.com/cs/clipartgraphics On this site I used the black and white clip art in the PowerPoint slide show.

Pre-requisites

Students should be able to:



Identify polygons



Work with the computer program Geometer's Sketchpad

Required Materials



Geometer's Sketchpad (This software may be purchased from Key Curriculum Press. It is excellent software for teaching geometry.)



Colored paper, scissors, grid paper



The Quilt Story Johnston and dePaola. G. P. Putnam's Sons. 1985. (or a similar quilt story)



Quilt PowerPoint (included)

Suggested Materials



Mathematics Teaching in the Middle School. NCTM. Volume 5, #6. February 2000.



From Tessellations to Polyhedra: Big Polyhedra. (The Middle School magazine that NCTM publishes is an excellent source of ideas in all areas of math.)

Handouts



Handout One - Transformations

Required Equipment/Technology



Computers



Internet

THE LESSON

Note: Students do not learn from what you do but from what you have them do.

Preparation

Day One

Activity	Instructor Notes
<ol style="list-style-type: none"> 1. Go to the site www.womenfolk.com/historyofquilt/ and read about how quilts had a part in the history of America. 2. Write a paragraph about one thing you learned about quilts in history. Tell which article you found it in. 3. Discuss the rubric for the final project. 	<p>Read the story "The Quilt Story" before you go to the web site. This story is about a quilt made in early America and passed on to future generations.</p> <p>This site has stories about quilts in the early American times through the Civil War and even some information about Native American quilts.</p>

Presentation

Day Two and Three

Using The Geometer's Sketchpad, complete Handout One on transformations.	This handout has activities in which students will work with translations, dilations, reflections, and rotations.
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Practice

Day Four

Instructions for Students	Teacher Notes
Using grid paper show translations, dilations, reflections, and rotations. Use a protractor when necessary. Label and explain your work.	This is just a practice activity to transfer their knowledge of transformations from computer to paper and pencil.

Performance

Day Five...

View the slideshow about quilt squares.	This slide show has quilt squares in which you can identify the polygons and the transformations. It should help the students to see how they design their square.
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Design your quilt block on the coordinate grid using polygons and transformations. When finished with the design, write a description of how you made it. Be sure to describe the transformations and include the line of reflection, the point of rotation, the angle of rotation and the ratio of dilation. Cut out the design and use it as a pattern to make your colored quilt square. Make nine of the colored squares and put them together to make a nine square quilt.

This can be started in class. Give a few days to work in class. Then it is homework. I usually give a few days to work in class, but some of it must be done at home. I also allow them to work on it after they finish their work in class. Give the students folders or large envelopes to keep their quilt parts in.

Lesson Assessment Strategy (Formative – As the lesson progresses)

Preparation, Presentation and Overall Implementation (Instructor)

1. Are the instructions and expectations for the class clear from the beginning?
2. Am I spending sufficient time on modeling the skills I want students to acquire?
3. Are students “connecting” to lesson project?
4. How is this lesson “integrated?”

Performance and Practice (Student)

1. Do all students have the skills to follow instructions? If not, what measures am I taking to address the challenge?
2. Are all students participating in the activities either by active observation or by voicing their thoughts?
3. Am I identifying the strengths of each student and pairing/grouping people accordingly? What results am I getting?
4. How are students performing? Are all of them able to meet 80% of the lesson objectives? If not, what am I doing to help them achieve more?

Technology

1. Is the technology working?
2. How are students reacting to the technology?
3. How are students applying or wanting to apply their technical skills in other areas?
4. What do I need to remember when I teach this lesson again?

Technology Checklists

Internet Checklist

	Open Explorer.
	Type in the address.
	Scroll down and click on a topic.
	Read the article and write your paragraph.

MS Word Checklist

	Open MS Word.
	Create new document (blank document).
	Type your paragraph. (Use regular style, size 14 font, Times New Roman font.) (Be sure your name is on the paper at the top left of the page.)
	Print your document.
	Save your document.

Activity Checklist

	Go to the site www.womenfolk.com/historyofquilt/ and read about how quilts had a part in the history of America.
	Write a paragraph about one thing you learned about quilts in history. Tell which article you found it in.
	Discuss the rubric for the final project.
	Using The Geometer's Sketchpad, complete Handout One on transformations.
	Using grid paper show translations, dilations, reflections, and rotations. Use a protractor when necessary. Label and explain your work.
	View the slideshow about quilt squares.
	Design your quilt block on the coordinate grid using polygons and transformations.
	When finished with the design, write a description of how you made it. Be sure to describe the transformations and include the line of reflection, the point of rotation, the angle of rotation and the ratio of dilation.
	Cut out the design and use it as a pattern to make your colored quilt square.
	Make nine of the colored squares and put them together to make a nine square quilt.

Transformations

Translations	
1.	Open Geometer's Sketchpad.
2.	Open new sketch.
3.	Construct a triangle.
4.	From Transform Menu select Translate.
5.	Choose Polar. Set distance at 2 and angle at 45° .
6.	Select original triangle.
7.	Repeat step 4-5. Use Distance of 2 and angles of 90° , 180° , and several others.
8.	Put your name in the left top corner of the paper and print it to turn in. Do not save the sketch.
9.	Open a new sketch.
10.	Construct a triangle.
11.	Select translate from the transform menu.
12.	Choose Rectangular. Set the Horizontal at 2 and the Vertical at 2.
13.	Select the original triangle.
14.	Repeat steps 11-12. Use Horizontal of -2 and Vertical of -2 .
15.	Try several other Horizontal and Vertical settings.
16.	Put your name in the left top corner of the paper and print it to turn in. Do not save the sketch.
17.	Write a paragraph explaining what a translation is.
Rotations	
1.	Open new sketch.
2.	Construct a triangle.
3.	Select all sides of the triangle.
4.	Select Rotate from the Transform menu.

	5. Rotate 90° .
	6. Repeat steps 4-5 four times.
	7. Put your name in the left top corner of the paper and print it to turn in. Do not save the sketch.
	8. Write a paragraph explaining what a rotation is.
Dilations	
	1. Open new sketch.
	2. Construct a triangle.
	3. Select the sides of the triangle.
	4. Choose Dilate from the Transform menu.
	5. Enter a ratio of 1 to 2.
	6. Choose the original triangle.
	7. Repeat steps 4-5 several times with different ratios.
	8. Put your name in the left top corner of the paper and print it to turn in. Do not save the sketch.
	9. Write a paragraph explaining what a dilation is.
Reflections	
	1. Open new sketch.
	2. Construct a triangle.
	3. Select all three sides.
	4. From Transform select Mark Mirror.
	5. From Transform select Reflect.
	6. Experiment choosing different mirrors.
	7. Construct a new triangle.
	8. Construct a line segment to the right of the triangle.
	9. Mark that line as the mirror.
	10. Select Reflect.
	11. Play with this transformation to see what all it does.
	12. Put your name in the left top corner of the paper and print it to turn in. Do not save the sketch.
	13. Write a paragraph explaining what a reflection is.

Make a design using all four transformations. Put your name in the left top corner of the paper and print it to turn in. Do not save the sketch.

Rubric for Final Project

	Project	Writing
5	<ul style="list-style-type: none"> <input type="checkbox"/> Has at least ten polygons in each square <input type="checkbox"/> Uses four transformations in each square <input type="checkbox"/> Colors are coordinated <input type="checkbox"/> Has nine squares <input type="checkbox"/> Assembled neatly and with no gaps or overlaps 	<ul style="list-style-type: none"> <input type="checkbox"/> Describes the construction of the quilt clearly enough that I could recreate one from your directions <input type="checkbox"/> Includes measurements of sides and angles <input type="checkbox"/> Includes the points and lines used for the transformations <input type="checkbox"/> Uses correct punctuation <input type="checkbox"/> Uses correct grammar <input type="checkbox"/> Uses correct spelling <input type="checkbox"/> Uses correct sentence structure
4	<ul style="list-style-type: none"> <input type="checkbox"/> Has at least eight polygons in each square <input type="checkbox"/> Uses three transformations in each square <input type="checkbox"/> Colors coordinated <input type="checkbox"/> Has nine squares <input type="checkbox"/> Assembled neatly and with no gaps 	<ul style="list-style-type: none"> <input type="checkbox"/> Describes the construction of the quilt clearly enough that I know what you mean <input type="checkbox"/> Includes measurements of sides and angles <input type="checkbox"/> Includes the points and lines used for the transformations <input type="checkbox"/> Uses most punctuation correctly <input type="checkbox"/> Uses most grammar correctly <input type="checkbox"/> Uses most spelling correctly <input type="checkbox"/> Uses most sentence structure correctly
3	<ul style="list-style-type: none"> <input type="checkbox"/> Has at least six polygons in each square <input type="checkbox"/> Uses two transformations in each square <input type="checkbox"/> Colors coordinated <input type="checkbox"/> Has nine squares <input type="checkbox"/> Assembled neatly and with no gaps 	<ul style="list-style-type: none"> <input type="checkbox"/> Describes the construction of the quilt clearly <input type="checkbox"/> Includes measurements of sides and angles <input type="checkbox"/> Includes the names of the transformations <input type="checkbox"/> Uses some correct punctuation <input type="checkbox"/> Uses some correct grammar <input type="checkbox"/> Uses some correct spelling <input type="checkbox"/> Uses some correct sentence structure
2	<ul style="list-style-type: none"> <input type="checkbox"/> Has at least four polygons in each square <input type="checkbox"/> Uses two transformations in each square <input type="checkbox"/> Colors coordinated <input type="checkbox"/> Has six squares <input type="checkbox"/> Assembled neatly 	<ul style="list-style-type: none"> <input type="checkbox"/> Describes the construction of the quilt <input type="checkbox"/> Includes measurements of sides <input type="checkbox"/> Uses few correct punctuation <input type="checkbox"/> Uses few correct grammar <input type="checkbox"/> Uses few correct spelling <input type="checkbox"/> Uses few correct sentence structure
1	<ul style="list-style-type: none"> <input type="checkbox"/> Has at least two polygons in each square <input type="checkbox"/> Uses one transformations in each square 	<ul style="list-style-type: none"> <input type="checkbox"/> Describes the construction of the square <input type="checkbox"/> Has many mistakes in punctuation <input type="checkbox"/> Has many mistakes in grammar <input type="checkbox"/> Has many mistakes in spelling

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	<input type="checkbox"/> Colors coordinated <input type="checkbox"/> Has one square	<input type="checkbox"/> Has many mistakes in sentence structure
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I will check the box that applies to your project. You receive the number of points for that is in the column on the left for each check. I will then average the points.