# Measure Twice cuj Once Quilting Project Based Learning 

## $3^{\text {rd }}$ Grade Print \& Google Slides



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## FOR THE TEACHER

MEASURE TWICE, CUT ONCE is a project-based learning task that involves using Measurement and Geometry to solve problems related to quilt making. It addresses the following $3^{\text {rd }}$ grade CCSS standards:

- 3.OA.D. 8 Solve problems using the four operations.
- 3.NBT.A. 2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
- 3.NF.A. 2 Understand and represent a fraction as a number on the number line.
- 3.NF.A. 3 Explain equivalence of fractions in special cases and compare fractions by reasoning about their size.
- 3.MD.B. 3 Draw a scaled picture graph and scaled bar graph to represent a data set with several categories. Solve I and 2 step problems using information presented in scaled bar graphs.
- 3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot.
- 3.MD.C.5 Recognize area as an attribute of plane figures.
- 3.MD.C. 6 Measure areas by counting unit squares.
- 3MD.C. 7 Relate area to the operations of multiplication and addition.
- 3.MD.D. 8 Solve real world problems involving perimeters of polygons.
- 3.G.A.I Understand that shapes in different categories may share attributes.
- 3.G.A. 2 Partition shapes into parts with equal areas. Express area of each part as a unit fraction of the whole.


## DIRECTIONS

I. Assign students to work alone or in small groups.
2. Preview the activity with your students.
3. Allow students class time to complete the activity. This can span over several days.
4. Students have an opportunity to complete optional extra challenge activities.
5. Students will complete the self-evaluation reflection and evaluation rubric.

6. Allow students an opportunity to share their completed projects.
7. Put students' finished quilt pieces together to create a class quilt.


## MEASURE TWICE, CUT ONCE

Your grandmother is a master quilter. She wants to teach you about the history and art of quilt making. Follow the directions in this packet, and you will learn about quilt making as you practice many fun math skills, like geometry and measurement. When you are done, you will be ready to make your own quilt.

## HERE ARE YOUR TASKS

- Read through the entire packet before beginning.
- Read the informational slide about quilt making.
- Place fractions in order on a number line.
- Partition shapes into equal areas.
- Classify and sort shapes by attribute.
- Solve shape riddles.
- Work with lines of symmetry.
- Relate area of quilt top to multiplication and addition.
- Find the perimeter an area of Grandmother's quilt.
- Measure area of quilt top with unit squares.
- Measure, cut, and compare lengths of fabric.
- Follow directions for creating a pattern for your quilt.
- Draw a scaled bar graph with quilt measurements and solve I and 2 step problems.
- Create a line plot marked with whole numbers, halves, and quarters based on fabric measurement data.
- (Optional) Complete the challenge pages.
- Complete the self-reflection and evaluation rubric.


## WHAT IS QUILT MAKING?

Do you have a special quilt or blanket? Most people have that one cozy blanket that they want to sleep with every night. If you are lucky, yours is a quilt that was made by someone special who loves you very much.

Quilt work has been discovered dating back to ancient times. In London, at the British Museum, an ivory carving shows the king of the First Egyptian Dynasty wearing a cloak that appears to be quilted. There is evidence of quilt work that has been found in Asia that dates to late $B C$ and early $A D$ years. Also, quilted garments worn by the Crusaders under their armor for warmth and protection were discovered dating to the $12^{\text {th }}$ century.

More quilt works have been found in Europe throughout time. Many have been described as obviously beautiful works, but they were usually made to be used. One of the earliest decorative quilts made in the 14th century is the Tristan Quilt. It was made in Sicily, Italy and is one of the oldest surviving quilts in the world. Sections of the quilt are on display in the V\&A Museum in London, England and in the Bargello Palace in Florence, Italy.

The craft came to America with the early settlers. Back then, quilts were made for only one purpose. They provided warmth. Families used them on beds and to cover their windows and doors to help keep out the cold. There was little money and few resources, so women used worn clothing to make their quilts. Women gathered in quilting bees to sew for new neighbors and to teach their daughters to quilt. Girls often made many quilts by the time they were grown.

Quilts were sewn together by hand until 1846 when the sewing machine was invented. Soon, more and more colorful fabrics became available. People started creating different patterns for their quilts and began using them to decorate their homes. Quilts were also made for soldiers and hospitals during wartime.

Quilt making has an important role in our country's history. Quilts tell a part of the American story. Quilting has taught generations of people practical sewing and measurement skills. Today, quilting is not done just as a necessity. It has become an artistic expression and creative hobby enjoyed by practitioners around the globe.


## DEVELOPING MEASUREMENT SKILLS

Grandmother asks you to cut these squares into quarters two different ways. Draw lines to show where you will cut the squares.


Grandmother always says it is better to, "Measure Twice and Cut Once." What does she mean?


## SHAPE RIDDLES

I. I am a quadrilateral with four equal sides and four equal angles. I am a special type of rectangle. What am I?

I am a
2. I am a 3-dimensional figure with two flat sides. I can roll. What am I?

I am a
3. I am a polygon with 6 sides and 6 angles. What am I?

I am a $\qquad$ -
4. I am a 3-dimensional figure with four triangular faces and one square face. What am I?

I am a $\qquad$ .
5. I am a quadrilateral. I have one pair of opposite sides that are parallel. What am I?

I am a $\qquad$ .


## FINDING AREA

Before you get started on your own quilt, Grandmother will help you learn some measurement skills. She drew one pattern piece and asked you to divide it into 9 equal squares.
I. Grandmother helped by making the first two cutting marks. Finish drawing in the lines to divide the square into 9 equal squares.
2. How many square units did you create?


## MEASURING FABRIC

The table shows the measurements for the 5 fabrics Grandmother is using in each of the 9-Patch squares.

|  | Pink Solid <br>  <br> Fabric | Blue Solid <br> Fabric | Yellow Print <br> Fabric | Pink Print <br> Fabric | Green Print <br> Fabric |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Length in <br> Inches | $121 / 2$ inches | $122 / 4$ inches | $121 / 4$ inches | $121 / 3$ inches | $123 / 4$ inches |

I. Place the measurements where they will fall on the number line.

2. Which two fractions on the number line are equivalent?


## FINDING PERIMETER AND AREA

Grandmother needs to know the size of the finished 9-Patch Quilt so she can see it if will fit on her bed. She sewed the 9 -inch squares in seven rows of eight squares each, just like the picture below shows. Use the picture to help you answer the questions.
width
I. Each square is 9 inches by 9 inches. How many inches wide is the quilt? Show how you know.
2. How many inches long is the quilt? Show how you know.
3. Grandmother wants to put a border on the quilt. Help her find the perimeter of the quilt in inches.
4. Find the area of Grandmother's new quilt in inches.

## MEASURING AND CUTTING FABRIC

First, you must mark your solid fabric into 9-inch squares. Remember that each piece is 18 inches wide, but they are different lengths. Before you cut your fabric, you must calculate how many 9 -inch squares you will get from one piece of each color. Grandmother made a 9-inch stencil for you to trace on each piece of fabric.
I. Estimate how many 9 -inch squares you can cut from each fabric.

## I estimate

$\qquad$ 9-inch green fabric squares and $\qquad$ 9-inch blue fabric squares.
2. Grandmother placed one stencil on each piece of fabric to use as a guide. Use a ruler to measure where you will cut the fabric. Draw lines to show all your cuts. Will you have leftover fabric?


3. How many squares of each color will you get from one piece of fabric?


## MAKING TWO PATTERNS

Now that all your triangles are cut, it is time to arrange them into four different patterns. You must make four squares using 8 triangles each. There are many ways you can place your triangles, but they must follow a pattern. Below are a few ideas to help you get started.

Once you have your four patterns arranged, glue them to pieces of white construction paper. Be sure each pattern makes a square. When the glue dries, you can trim away any extra white paper.

Have fun and be creative!


## CHALLENGE 1-GRANDMOTHER'S QUILTS

Grandmother makes quilts for charity. The table shows quilts of different sizes she made this year that she donated to hospitals and homeless shelters. Use the data to create a bar graph that shows how many quilts she made.

| Quilts Made for Charity |  |
| :---: | :---: |
| Crib Size | 39 |
| Twin Size | 22 |
| Lap Size | 25 |
| Queen Size | 16 |

I. Write a title for the bar graph in the top rectangle.
2. Add the names of the quilts Grandmother made to label the bar graph. Shade the bars to show the data.
3. Grandmother set a goal to make 100 quilts for charity this year. Did she meet her goal? Explain.

## MEASURE TWICE, CUT ONCE

SELF REFLECTION: Write a reflection of your experience, with this project. How did you feel about the math problems and activities? Explain what you found easy to do and any difficulties you had while working on this project. Did you enjoy this activity? Why or why not?


## Rate This Project

Circle the statement you most agree with.

I am ready for something harder.
It was just right.
I found this very challenging.

## RUBRIC

## SELF-EVALUATION RUBRIC: Highlight or shade the parts of the rubric that

 express how you rate yourself on this Project Based Learning Activity.| I felt very confident <br> about the math in this project. | I felt pretty good about my <br> ability to complete the <br> math in this project. | I felt a lot of the math in <br> this project was too hard <br> for me to do alone. |
| :---: | :---: | :---: |
| I understood all of the math |  |  |
| and did not need help to |  |  |
| complete the problems. |  |  |$\quad$| I understand most of the math |
| ---: |
| but needed a little help to solve |
| some of the problems. |$\quad$| I understood some of the |
| :---: |
| math but needed help to |
| complete most of the problems. |

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