

**BACKGROUND FOR TEACHERS:**  
**TESSELLATIONS**

**A** tessellation is a collection of individual units that fit together without gaps or overlaps to fill a two-dimensional space, like a tabletop, or a three-dimensional space, such as a box. Floor tiles, brick walls, and honeycombs are all examples of tessellations. The word tessellation comes from *tessella*, the Latin term for the small stone tiles in ancient Roman mosaics.

There are two types of tessellations, regular and irregular. Regular tessellations are made by one repeating shape. There are only three shapes that create regular tessellations: triangles, squares, and hexagons. Irregular tessellations can be made from a variety of repeating

interlocking shapes as long as they fit together without gaps or overlaps. The artist M. C. Escher used fanciful geometric creatures to create beautiful irregular tessellating patterns.

Tessellations can extend in a two-dimensional plane infinitely in every direction. Tessellating shapes fill space efficiently without waste. Some common tessellations are checkerboards and floor tiles. Three-dimensional tessellations are structurally strong. Honeycombs, for example, use hexagonal tubes to provide the maximum amount of storage space for honey, with a minimum of material, beeswax. Other examples of natural tessellations include corn cobs, turtle shells, and soap bubbles.

# TESSELLATION FORMATIONS

## CONVERSATION STARTERS

Use these questions to guide your class in a conversation about tessellating objects and images. In your discussion, listen for ideas that could lead to interesting classroom investigations.

**What** do you notice about the tessellation objects? **How** are they the same and how are they different? **Create** a list of the shapes you see.

**Where** around the classroom do you see tessellations? **Compare** the tessellations that you see around your classroom with those in the kit. **How** are they the same, and how are they different?

**Make** a list of some reasons **why** tessellating patterns might be useful.

## TESSELLATION ACTIVITIES

**CRAZY QUILT**—Explore tessellating patterns while creating a classroom quilt.

**Skills:** artistic expression, creating and extending patterns, learning cooperatively, comparing and contrasting, making cultural connections, using fine motor skills, observing objects, and critical thinking

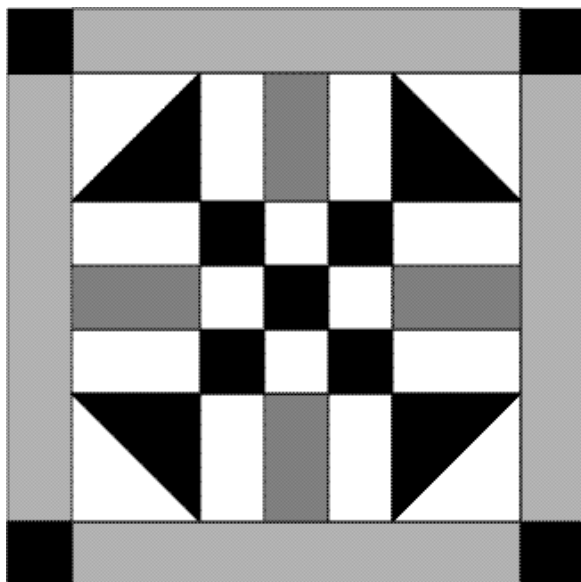
Creating a classroom quilt is a great way for children to experience a wonderful variety of tessellations. Quilts are also a fun way to connect math with culture. The instructions below show two simple techniques for creating quilting pieces that fit together. Try experimenting with different types of quilt materials like recycled giftwrap, colorful magazines, fabric, and wallpaper.

Each participant should make one quilt square approximately eight inches in size. (You may want to adjust this size depending upon the size of your bulletin board and the number of students in your classroom, but

remember, each piece should be the same size.) Assemble all the finished squares on a bulletin board to create a classroom quilt.

### MATERIALS

- pre-cut quilt pieces of assorted materials
- pre-cut cardboard or oaktag
- white glue
- scissors



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# TESSELLATION FORMATIONS

## AHEAD OF TIME

Cut the quilt pieces. (Have an adult use the technique below to prepare pieces in advance.)

Help insure that all the quilt pieces fit together neatly. Carefully stack three to five pieces of the same sized material together. Make a copy of the pattern master on page 25 to use as a template. Carefully pin all the sheets and the template together using straight pins or a stapler. Cut the sheets with scissors. If you are comfortable using an Exacto™ knife, you can also cut a stack of paper by using a straight metal ruler (or a wooden one with a metal edge) and aligning it with the cutting lines on the master.

If you want the children to do some of the cutting, photocopy the Pattern Master Quilt Template on page 25 onto colored paper .

## INSTRUCTIONS

**1.** Start by giving each child an eight-inch square piece of cardboard and a container of white glue. Then have each child select a variety of shapes from the cut quilt pieces.

**2.** Invite children to experiment with different combinations of shapes and colors until they are pleased with their pattern. Older children can be given the option of cutting down the pattern shapes to create more intricate tessellations. Remember that students' patterns must be a tessellation—i.e., pieces fit together without gaps or overlaps.

**3.** Instruct the children to glue each piece in place on the cardboard form by carefully lifting one piece at a time, applying glue, and then replacing it in its former location. After the whole class is finished gluing their squares, have the children take a few moments to look at each other's work. Attach the quilt squares to a bulletin board to make a classroom quilt.

## WRAP UP

Ask students to share how they created their quilt patterns, what shapes they chose to use, and what they learned. Have children look at the **American quilt** in the kit and discuss its pattern and origin. Discuss ways in which the quilt and the other tessellation objects and images are both similar and different from the quilt that the class made.

# TESSELLATION FORMATIONS

## ADDITIONAL ACTIVITIES

Look for opportunities to connect tessellation activities with math topics like geometry, measurement, and number operations.

### TESSELLATION FIELD TRIP

**Skills:** creating and extending patterns, learning cooperatively, comparing and contrasting, using gross motor skills, using fine motor skills, observing objects, learning through inquiry, spatial awareness, and critical thinking Take a field trip in the classroom by looking for tessellation everywhere—from the ceiling to the floor tiles! Play “I Spy” a tessellation as you continue around the school and outside. Make a list and create drawings of all the different kinds of tessellations you discover. Remember to look for tessellations found in nature as well as those made by people. Follow up with a tessellating snack—like crackers!

### SPONGE PRINT PLACE MATS

**Skills:** artistic expression, creating and extending patterns, using fine motor skills, and observing objects

Make place mats using craft paper, paint, and pop-up sponges. First, have the children design a tessellating shape from a three-inch square and then create a template out of cardboard. Use the templates to mark the shapes to cut out on a sheet of pop-up craft sponge. Then sponge-print a tessellating pattern on a blank piece of 12” x 18” craft paper. Once the paint is dry, laminate the final artwork to keep the place mat food free.

### CRACKER FACTORY CHALLENGE

**Skills:** learning cooperatively, comparing and contrasting, observing objects, learning through inquiry, and critical thinking

Engage students in a little imaginative role-play by having them study cracker shapes and design new ones. Bring in samples of different shaped crackers. Demonstrate how many cracker shapes fit together to create tessellation patterns. Invite the children to come up with a shape for a new cracker.