TESSELLATIONS

DIRECTIONS & WORKSHEET

Definition: A tessellation is a complete covering of a plane by one figure in a repeating pattern with no overlapping figures and no gaps between the figures. Tessellations begin as shapes and are later altered to make figures.

A. WHAT MAKES A SHAPE TESSELLATE?

Area "A" on the board explains three transformations:

1. translation
2. rotation
3. reflection

Read each definition and move the shapes to experience each transformation.

B. CAN YOU MAKE A SHAPE TESSELLATE?

Area B has pink felt and a pouch below it containing various shapes. Using a set of the **same** shapes, figure out which of the shapes does not tessellate.

Example: Gather all the squares and stick them on the felt. See if you can arrange them so they tessellate (refer to the definition above). Do the same for all sets of shapes.

What do you observe?

The _____ does not tessellate.

name of shape

C. SO WHAT TESSELLATES?

You just had the chance to manipulate certain shapes and discover what does and does not tessellate. View the chart on the board and fill in the missing areas below. Do not remove the yellow square on the board.

Regular Polygon	Measure Of Each Interior Angle	Does it Tessellate?
triangle		
quadrilateral		
pentagon		
hexagon		
heptagon		
octagon		

In reference to angles, what can you conclude about the shapes that tessellate and the shapes that do not?

Now you may remove the yellow square and check your answers.

There are numerous types of tessellations, but this bulletin board concentrates on the simplest type—regular tessellations.

Regular Tessellation: comprised of 3 regular polygons (all sides have equal measures and all angles have equal measures)

1. equilateral triangle
2. square
3. regular hexagon

D. WHAT MAKES THESE SHAPES TESSELLATE

Read the explanations below the two tessellations in Area D. Look for the transformations (that you learned in Part A) in the tessellations.

E. DISSECTION OF AN ESCHER TESSELLATION

M.C. Escher was a Dutch graphic artist whose name is often associated with tessellations. Escher combined visual illusions with mathematical concepts to create clever drawings. His work is studied and appreciated by mathematicians around the world, yet Escher had no formal training in mathematics. It is necessary to look more than once at Escher's work because there is much more to see than what you see at first glance.

Part E on the board breaks apart one of Escher's tessellations that resembles a pegasus figure. You can see how the dynamic drawing began with just a simple square!

F., G., H. WHAT MAKES TESSELLATIONS TESSELLATE?

Complete the chart below. The tessellations are labeled F, G, and H on the board.

	UNDERLYING SHAPE	TRANSLATION	ROTATION	REFLECTION
F		yes or no	yes or no	yes or no
G		yes or no	yes or no	yes or no
H		yes or no	yes or no	yes or no

FINAL QUESTION: What do you notice about the colors in tessellations?