

Title _____ **Get In Shape: Tessellation** _____

Curriculum _____ **Mathematics** _____

Grade Level Span _____ **Middle Level Grades 5-8** _____

Purpose: Students will use technology to define, discriminate, and create tessellations (tiling).

Description: Students will demonstrate an understanding of shapes that will or will not tessellate and create a tessellation using technology. They will create a product from tessellations that could apply to real life, for example advertisement, wallpaper.

Activities	Curriculum Standards	NETS for Students
1. Teacher will model examples of tessellations/tiling.	N/A	N/A
2. Students will look for tiling patterns and quilt patterns from real world examples and bring them in to share. Include use of Internet or other forms of technology. Sources must be cited.	NCTM: 2, 3, 6, 7, 8, 9, 10	2, 3, 4, 8, 10
3. From these examples students should develop a definition of tessellations. Use a word processor.	NCTM: 3, 7, 8	6, 7
4a. Using manipulative or templates with a variety of shapes, students will create their own tessellation and discriminate which will tessellate or not. The student could tessellate more than two shapes.	MN Middle Level Standard: Shape, Space, and Measurement: 2,3 NCTM: 3,6	N/A

<p>4b. Students will complete an angle chart to aid with this step – see example. Teachers should remind students that a tessellation should have their angles around the point add up to 360°. This should be done on a spreadsheet.</p> <table border="1" data-bbox="285 203 1188 609"> <thead> <tr> <th>Polygon</th> <th>#of sides-angles</th> <th>Measure of int. angle</th> <th>Sums of interior angles</th> <th>No. of polygons around point</th> <th>Gap or overlap</th> </tr> </thead> <tbody> <tr> <td>Triangle</td> <td>3</td> <td>60°</td> <td>180°</td> <td>6</td> <td>no gap</td> </tr> <tr> <td>Square</td> <td>4</td> <td>90°</td> <td>360°</td> <td>4</td> <td>no gap</td> </tr> <tr> <td>Pentagon</td> <td>5</td> <td>108°</td> <td>540°</td> <td>3</td> <td>Gap</td> </tr> <tr> <td>Hexagon</td> <td>6</td> <td>120°</td> <td>720°</td> <td>3</td> <td>no gap</td> </tr> <tr> <td>Octagon</td> <td>8</td> <td>135°</td> <td>1080°</td> <td>2</td> <td>Gap</td> </tr> <tr> <td>Decagon</td> <td>10</td> <td>144°</td> <td>1440°</td> <td>2</td> <td>Gap</td> </tr> <tr> <td>Dodecagon</td> <td>12</td> <td>150°</td> <td>1800°</td> <td>2</td> <td>Gap</td> </tr> <tr> <td>n-gon</td> <td>n sides</td> <td>$(n-2)180^\circ/n$</td> <td>$(n-2)180^\circ$</td> <td></td> <td></td> </tr> </tbody> </table>	Polygon	#of sides-angles	Measure of int. angle	Sums of interior angles	No. of polygons around point	Gap or overlap	Triangle	3	60°	180°	6	no gap	Square	4	90°	360°	4	no gap	Pentagon	5	108°	540°	3	Gap	Hexagon	6	120°	720°	3	no gap	Octagon	8	135°	1080°	2	Gap	Decagon	10	144°	1440°	2	Gap	Dodecagon	12	150°	1800°	2	Gap	n-gon	n sides	$(n-2)180^\circ/n$	$(n-2)180^\circ$			<p>MN Middle Level Standard: Shape, Space, and Measurement: 5 NCTM: 1, 2, 3, 4, 5, 6, 10</p>	<p>6, 7, 8, 9</p>
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<p>5. Students will choose a shape or two to tessellate and make an example using paper and pencil.</p>	<p>MN Middle Level Standard: Shape, Space, and Measurement: 2, 3, 5 NCTM: 2, 3, 4, 6, 7, 8, 10</p>	<p>N/A</p>																																																						
<p>6. Teacher will model available computer technology to create and construct a tessellation.</p>	<p>N/A</p>	<p>N/A</p>																																																						
<p>7. Students will create their own tessellation using one simple shape to begin with. Students will then tessellate two simple shapes. Students will use technology to prove their earlier finding (why some shapes don't tessellate). Extension: Students will tessellate by modifying the shapes.</p>	<p>MN Middle Level Standard: Shape, Space, and Measurement: 2, 3 NCTM: 2, 3, 4, 6, 7, 8, 10</p>	<p>1, 3, 4, 5, 6, 7, 8, 9</p>																																																						
<p>8. Students will create an original computer-generated tessellation design using two or more shapes. They will use their design for a real life purpose such as an advertisement, wallpaper design, etc.</p>	<p>MN Middle Level Standard: Shape, Space, and Measurement: 2, 3 NCTM: 2, 3, 4, 6, 7, 8, 9, 10</p>	<p>1, 3, 4, 5, 6, 8, 9</p>																																																						

Tools and Resources

(List all Web sites, specific software and hardware needs)

Computers with a “draw or paint” program and a printer. Manipulatives such as tangrams, pattern blocks, and shape sets. Transparent ones will work well for overhead modeling.

Introduction to Tessellations, Dale Seymour

Geometry In the Middle Grades: Curriculum Evaluation Standards for School Mathematics Addenda Series, NCTM

Assessment

(How will you assess the students' learning? If you have a rubric, record it here. Be as specific as possible)

Checklist: Student will

- Share two or more examples of tiling/tessellations
- Write definition of tessellation
- Demonstrate their ability to use shapes properly
- Complete a table/chart of shapes that tessellate
- Draw a rough draft tessellation which must be a minimum of ten congruent figures and two deep on each side
- Create a tiling pattern that demonstrates their understanding of tessellations by using technology
- Use technology to create a shape that does not tessellate
- Create a tessellation design using two or more shapes for a real world purpose. i.e. wall coverings, advertisement, floor covering, etc.
- Present your project

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Personal Account

(Have you taught this lesson sequence before? What are the great learning/experiences you had?)

Parts of it, but without the technology piece.

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