Connecticut Academic/Career Development Integration Activity

Title **Exploring Occupations with Tessellations**
Subject **Math/ Geometry** **Grade Level(s)** **6-10**

CT Content Standard: Geometry and Measurement

3.2 Use spatial reasoning, location, and geometric relationships to solve problems.
3.2.a Verify geometric relationships using algebra, coordinate geometry, and transformations.
3.2.a.3 Apply transformations, to plane figures to determine congruence, similarity, symmetry, and tessellations.
3.3 Develop and apply units, systems, formulas, and appropriate tools to estimate and measure.
3.3.a Solve a variety of problems involving one-, two-, and three-dimensional measurements using geometric relationships and trigonometric ratios.
3.3.a.4 Use two-dimensional representations and formal and informal methods to solve surface-area and volume problems.

National Career Development Guidelines Goal/Indicator

Career Management GOAL CM3. Use accurate, current, and unbiased career information during career planning and management.

Indicator CM3.K5. Identify occupations that you might consider without regard to your gender, race, culture, or ability.

Career Development Objectives

1. Students will demonstrate an understanding of applications of tessellations in everyday life.
2. Students will identify several occupations in which they might have an interest.

Assessment

1. Students will use knowledge of translations, rotations, reflections, symmetry, and transformations to draw a tessellation.
2. Students will give examples of occupations that use applications of transformations.
3. Students will identify occupations in the 16 Connecticut Career Clusters that might interest them.

Preparation

- Prior Learning—Geometry Unit – transformations and tessellations, introduction to Connecticut's Career Clusters

- Handouts/Worksheets—*Connecticut Career Cluster Wheel* handout, *Tessellations* handout, and *Exploring Occupations in Tessellations* worksheet.
- Resources/Materials—markers/crayons, ruler, compass, protractors, and tan grams. Optional: access to computers and the Internet. (Note: This website has interactive software that students can use to create tessellations of their own. http://www.shodor.org/interactivate/activities/tessellate/?version=1.6.0_05&browser=Mozilla&vendor=Sun_Microsystems_Inc.) *Geometer's Sketchpad* is a computer software program that can also be used to create tessellations if your school has a license. CT Department of Labor (www.ctjobsandcareer.org), O*Net (www.onetcenter.org), or other career information system. *Connecticut Career Paths* booklet available from CT DOL http://www.ctdol.state.ct.us/lmi/crpaths.htm.
- Time Required—2 class periods

Procedures

Part One

- In this activity, students will use translations, rotations, reflections, symmetry, and transformations to draw a tessellation. They will explore occupations that use these techniques in their work.
- Review with students how to use translations, rotations, reflections, symmetry, and transformations to draw tessellations. Share the *Tessellations handout* and show any additional examples of tessellations and have the students identify the transformations.
- Have students brainstorm some applications of transformations they have seen in everyday life (e.g., bricks, garden pavers, tiles, mosaics, fabric design [argyle, hounds tooth, herringbone, and checkers], and art).
- Tell students they are to create a tessellation for a specific purpose of their choice.
- After students have completed their tessellations, have them give a brief presentation to the class. Optional: display the tessellations on a bulletin board.

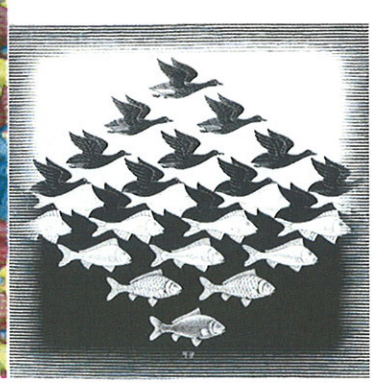
Part Two — Career Development Connections

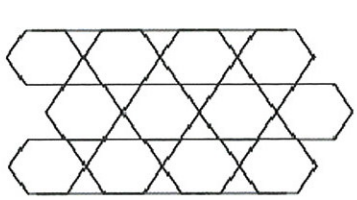
- Give students a copy of the *Connecticut Career Cluster Wheel* handout. Begin by reviewing the concept of career clusters.
- Have students brainstorm a list of occupations that might use the technique of transformations. What career clusters would include these occupations? What other occupations are found in the clusters identified?
- Ask students what occupations might be of special interest to them.
- Ask students if they know anyone who works in an occupation found in the cluster. If so, discuss what the person does and where he/she works.
- Remind students about the importance of working in an occupation they enjoy and in which they can earn a good living.
- Give students a copy of the *Exploring Occupations with Tessellations* worksheet and review it with them.
- After students have completed the worksheet, have them share some of their ideas with the class.
- Optional: have students further explore occupations using CT DOL, O*Net or another career information system.

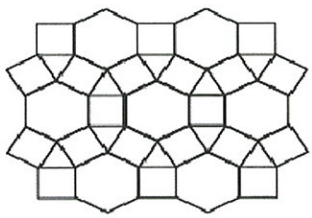
Crosswalks
Key 21st Century Skills
Thinking Skills—Critical thinking
Information Management—Acquires, interprets, and communicates information

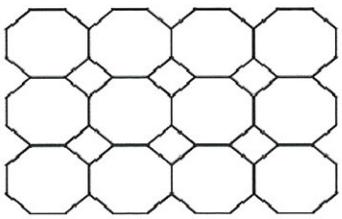
Tessellations

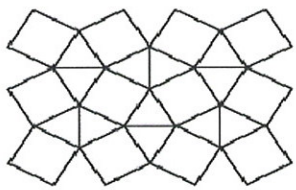
A tessellation is created when a figure or series of figures is repeated over and over again without any overlaps or gaps. M.C. Escher was a Dutch, mathematically inspired artist known for was his work with tessellations. The following are some of his pieces and various examples of tessellations.

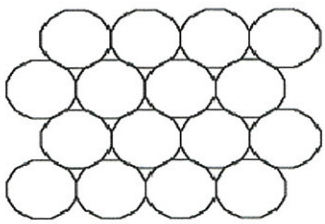


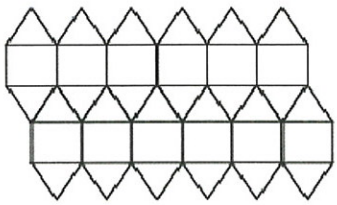


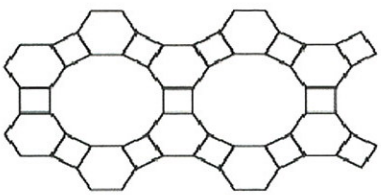












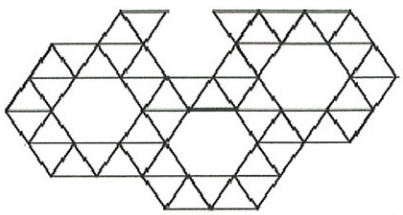


Photo Credits: www.mcescher.net and http://mathworld.wolfram.com/Tessellation.html

Exploring Occupations with Tessellations

Name_____ Date_____

Directions: Complete each of the sections below.

1. Pick one of the following applications of tessellations and describe the occupations that would use that tessellation.

Tessellation Applications: Bricks, garden pavers, tile, honeycomb (think of the packaging on Burt's Bee's products), basketball nets, jewelry/watch links, and patterns on: quilts, scarves, purses, linens, fabric (think argyle, hounds tooth, herringbone, and checkered), shoes (think Vans checkered shoes), or something you've thought of on your own!

For example, the following occupations are connected to a soccer ball: athletic *equipment designers at Nike, Adidas and Puma; professional MLS players; Sales Associates at Dick's Sporting Goods and Sports Authority; FIFA World Cup public relations managers; Sports Illustrated writers; ESPN anchors; workers in manufacturing plants that make athletic equipment; activists lobbying to end child labor (in the early 1990s, most soccer balls were made in developing countries by children); physical education teachers; etc.*

2. List 3 occupations you've thought of in question 1 that might be of interest to you.

a. _____

b. _____

c. _____

3. What high school courses would help you prepare for these occupations?

4. What education/training after high school is required for these occupations?

a. _____

b. _____

c. _____

The Connecticut Career Pathways Initiative for Career & Technical Education 2007-2008

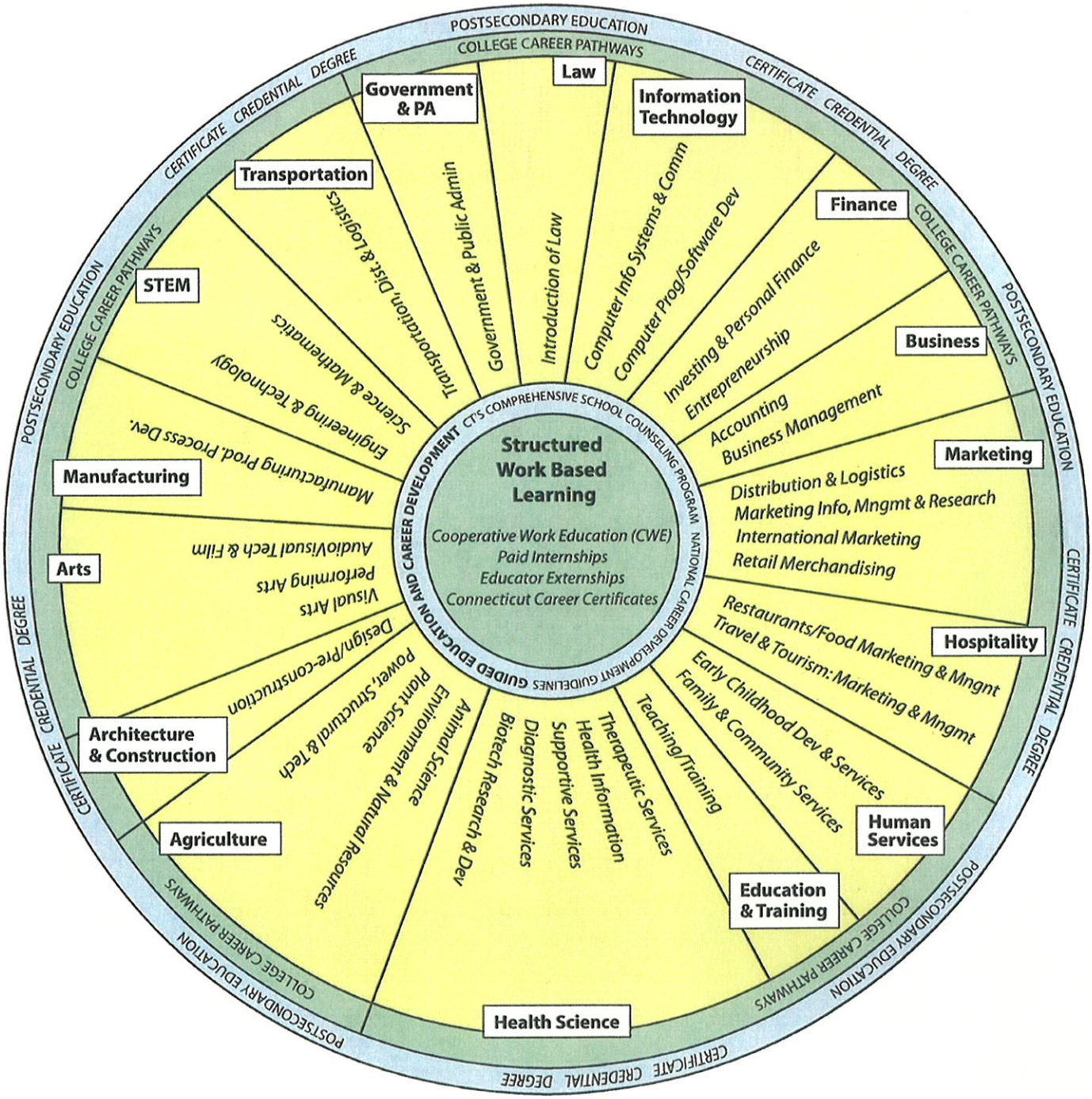


Figure 2: The Connecticut Career Cluster Wheel, February 2007