Kaleidoscopes, Hubcaps and Mirrors

Glossary

Congruent Figures – Two figures are congruent if one is an image of the other under a translation

Kaleidoscope – A tube containing colored beads or pieces of glass and carefully placed mirrors. When the kaleidoscope is held to the eye and rotated, the viewer sees colorful, symmetric patterns.

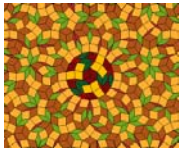
Line Reflection – A transformation that matches each point on a figure with its mirror image over a line

Reflectional Symmetry – A figure or design has reflectional symmetry if you can draw a line that divides the figure into halves that are mirror images.

Rotational Symmetry – A figure or design has rotational symmetry if it can be rotated less than a full turn about a point to a psition in which it looks the same as the original.

Symmetry – An object or design has symmetry if part of it is repeated to create a balanced pattern.

Tessellation – A design made from copies of a basic design element that cover a surface without gaps or overlaps.



Transformation – A geometric operation that matches each point on a figure with an image point.

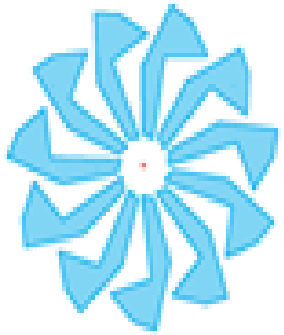
Translation – A Transformation that slides each point or a figure to an image point a given distance and direction from the original point.

Translational Symmetry – A design that can be created by copying and sliding a basic shape in a regular pattern.

Web Resources

WWW.illuminations.nctm.org

Symmetry



http://math.rice.edu/~lanius/misc/rotat.html

Everett Public Schools

Connected Mathematics Project

Everett Public Schools Mathematics Program

Kaleidoscopes, Hubcaps, and Mirrors

Geometry
Measurement

Unit Goals:

- **Recognizing symmetry in designs**
- **Looking for patterns that can be used to predict attributes of designs**
- **Relating rigid motions in words and with coordinate rules**
- **Composing symmetry transformation**
- **Making tables of combinations of symmetry**

Proposed Time Frame:
Approximately 6 weeks

Mathematics in Investigations

Investigation 1: Three Types of Symmetry

* Explore reflectional, rotational, and translational symmetry informally
* Explore the use of tools, such as tracing paper, to analyze designs to determine their symmetries
* Design shapes that have specified symmetries
* Identify basic design elements that can be used to replicate a design

Investigation 2:

* Examine reflections, translations and rotations to determine how to specify such transformations precisely
* Use the properties of reflections, translations, and roattins to perform transformations
* Find lines of reflection magnitudes and directions of translation, and centers and angles of rotation
* Examine the results of combining reflections over two intersecting lines or two parallel lines, two translations, or two rotations to find a single transformation that will produce the same result.

Investigation 3: Transforming Coordinates

* Write directions for drawing figures composed of line segments
* Analyze the vertices of a figure under a transformation and to specify translations with coordinate rules

Tips for Helping at Home

Good questions and good listening will help children make sense of mathematics and build self-confidence. A good question opens up a problem and supports different ways of thinking about it. Here are some questions you might try, notice that none of them can be answered with a simple "yes" or "no".

Getting Started

* What do you need to find out?
* What do you need to know?
* What terms do you understand or not understand?

While Working

* How can you organize the information?
* Do you see any patterns or relationships that will help solve this?
* What would happen if…?

Reflecting about the Solution

* How do you know your answer is reasonable?
* Has the question been answered?
* Can you explain it another way?

At Home:

1 Talk with your child about what's going on in mathematics class.

2 Look for ways to link mathematical learning to daily activities. Encourage your child to figure out the amounts for halving a recipe, estimating gas mileage, or figuring a restaurant tip.

3 Encourage your child to schedule a regular time for homework and provide a comfortable place for their study, free from distractions.

4 Monitor your child's homework on a regular basis by looking at one problem or asking your child to briefly describe the focus of the homework. When your child asks for help, work with them instead of doing the problem for them.

At School

1 Attend Open House, Back to School Night, and after school events.

2 Join the parent-teacher organization

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