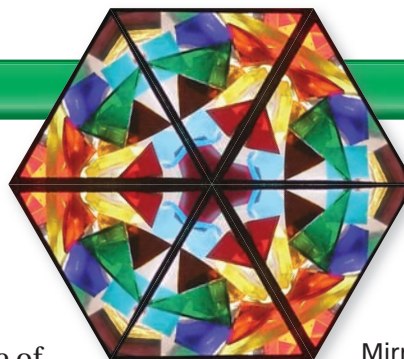


Building a Kaleidoscope

1 Getting Started

A kaleidoscope is a tube of mirrors containing loose colored beads, pebbles, or other small colored objects. You look in one end and light enters the other end, reflecting off the mirrors.



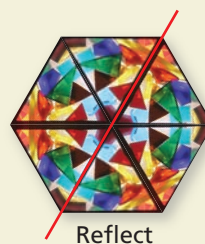
Mirrors set at 60°

Essential Question How does the knowledge of mathematics help you create a kaleidoscope?

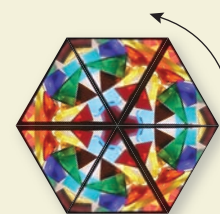
If the angle between the mirrors is 45° , you see 8 duplicate images. If the angle is 60° , you see 6 duplicate images. If the angle is 90° , you see 4 duplicate images. As the tube is rotated, the colored objects tumble, creating various patterns.

Write a report about kaleidoscopes. Discuss the mathematics you need to know in order to build a kaleidoscope.

Sample: A kaleidoscope whose mirrors meet at 60° angles has reflective symmetry and rotational symmetry.



Reflect



Rotate 120°



Antique Kaleidoscope

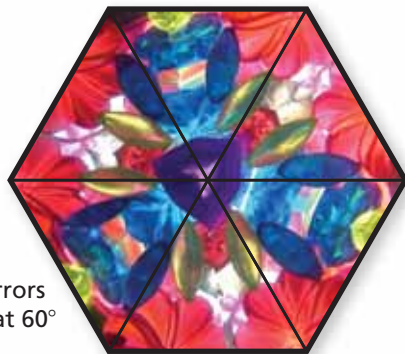
2

Things to Include

- How does the angle at which the mirrors meet affect the number of duplicate images that you see?
- What angles can you use other than 45° , 60° , and 90° ? Explain your reasoning.
- Research the history of kaleidoscopes. Can you find examples of kaleidoscopes being used before they were patented by David Brewster in 1816?
- Make your own kaleidoscope.
- Describe the mathematics you used to create your kaleidoscope.



Mirrors
set at 90°



Mirrors
set at 60°



Giant Kaleidoscope, San Diego harbor

3

Things to Think About

- Add your own drawings and pattern creations to your project.
- Organize your report in a folder, and think of a title for your report.



Mirrors
set at 45°