

Teaching Symmetry

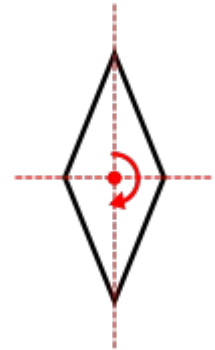
- How deep to go?
 - Concept of isometry
 - Groups of symmetries
 - Classifications
 - Subtleties

Isometries

- Isometry of the plane vs. Symmetry of a figure
- Classify into four types. Prove it?
- Composition of isometries.

Group structure

- Symmetry group as a collection of markings
- Forced symmetries:
 - Intersecting reflections force rotation
 - Parallel reflections force translation
 - Different rotation centers force an infinite group.
 - more
- Multiplication tables
- Abstract groups

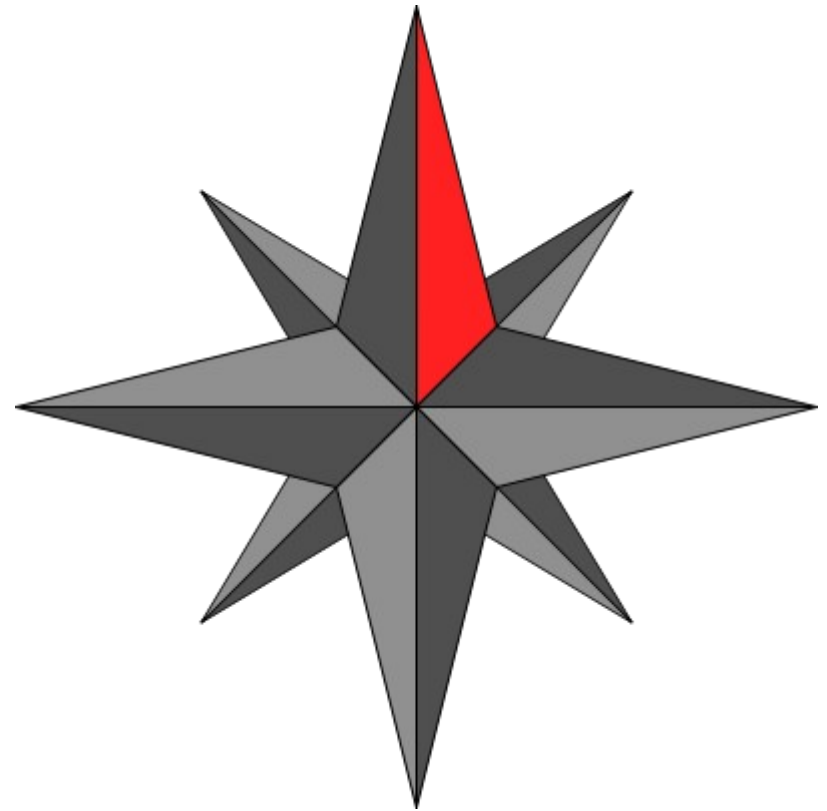


Classifications

- Classification as a unifying theme
- Prove for Rosette groups?
- Prove for Frieze groups?
- Prove for Wallpaper groups?

Subtleties

- Non-discrete symmetries
 - “Bulls eye” or target.
 - Solid line
 - Reality: A whole lot of non-discrete groups.
- Color symmetry
 - Unavoidable.
 - “Ignore colors”



Learning Isometries

- Reflections
 - Mirrors, fold and trace, rotate to vertical
- Rotations
 - Angle of rotation, order of rotation.
 - Cut outs. Graph paper.
- Glide Reflections
 - Transparencies. 'Zigzags'.
- Looking for 'S' or 'Z' shapes to rule out reflection symmetry.

Learning Symmetry Groups

- Students can produce their own examples with rosette symmetry.
- Software, e.g. Kali, Escher Web Sketch, Tess
- Find and mark symmetries.
- Group naming conventions.
- Dealing with wallpaper: Flowcharts. Lattices and the fundamental domain.

Sources of Examples

- Art, architecture, culture, science
- Escher's tessellations
- Washburn & Crowe 'Symmetries of Culture'
- Wikipedia Commons
-