Symmetry worksheet

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Origami

Make at least one origami model.

1. Is your model symmetric? If not at what point did it become asymmetrical?

Dolls

Make at least one paper doll chain where each doll has left-right reflectional (flip) symmetry.
Make at least one paper doll chain where no doll has left-right symmetry.

1. What sort of slide symmetries would your doll-chains have if they continued on forever? How do the two kinds of doll chains differ as far as slide symmetries?

2. What sorts of symmetries are possible to make using the paper doll instructions (assuming you allow yourself to cut out shapes other than just dolls)?
What orders of rotational symmetries are possible?

Snowflakes

Make at least one four-sided and at least one eight-sided snowflake.

1. How many sheets of paper are stacked on top of each other when you are cutting the four-sided flake? The eight-sided flake? A six-sided flake?

2. Does your snowflake have reflectional-symmetry (as in, flip the paper over)?
How many lines of reflection does a four-sided flake have? An eight-sided?

3. Is it possible to make a snowflake without reflectional-symmetry?
Can you draw a snowflake-looking shape without reflectional-symmetry?

Polyhedra

Examine the shapes carefully and try to describe their symmetries to each other. Three dimensionsal symmetry is a little more complicated! Try to describe the "center" of the rotation, as in "rotate around an imaginary line from one corner to an opposite corner."

1a. Which types of rotational symmetry does the tetrahedron have? Can you find a 180^o rotation?

1b. How many rotational symmetries does the tetrahedron have total?

2a. Which types of rotational symmetry does the cube have? Can you find a 120^o rotation?

2b. How many rotational symmetries does the cube have total? (This might be a little hard)

3a. Which types of rotational symmetries does the octahedron have?

3b. How does it compare to the cube?

4a. Which types of rotational symmetries does the square pyramid have? Can you find a 120^o rotation?

4b. How does it compare to the tetrahedron?

Transparencies

Match the transparency to the paper. Try rotating and flipping the transparency so that it lines up with the paper again.

1. Sketch a picture with more than one reflectional (flip) symmetry.

2. Sketch a picture with no reflectional symmetries.

3. Sketch a picture with rotational symmetry of order 2 (but not 3,4,...).

4. Sketch a picture with no rotational symmetries (but some symmetry).

5. Sketch a wall-paper pattern with more than one center of rotation.
Can you even make it so they have different orders?

6. Sketch a picture with only one direction of translational (slide) symmetries.

7. Sketch a picture with two directions of translational symmetries that are not perpendicular.