$\underset{\scriptscriptstyle \rm By \ Jack \ Schmidt}{Symmetry \ worksheet \ IV}$

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11.6 Symmetries of finite shapes

You were very good at identifying the symmetry from the picture. Now we want to be able to go from the symmetry to the picture! 1. Draw a shape with D_1 symmetry. What are some names of shapes that have D_1 symmetry?

2. Draw a shape with D_2 symmetry. What are some names of shapes that have D_2 symmetry?

3. Draw a shape with D_3 symmetry. What are some names of shapes that have D_3 symmetry?

4. Draw a shape with D_4 symmetry. What are some names of shapes that have D_4 symmetry?

n. What are some names of shapes with D_n symmetry? (Your answer will use "n", which you can assume is a positive integer, at least 3)

 ∞ . Draw a shape with D_{∞} symmetry. What are some names of shapes that have D_{∞} symmetry?

1. Draw a shape with Z_1 symmetry. Do shapes like this have names?

2. Draw a shape with Z_2 symmetry. Is there a letter of the alphabet with this symmetry?

3. Draw a shape with Z_3 symmetry. Can you modify your D_3 example?

4. Draw a shape with Z_4 symmetry. Can you just modify your D_4 answer a little?

n. What is a shape with Z_n symmetry? $(n \ge 3 \text{ a positive integer})$

Here is a **field guide** to identifying symmetries of finite shapes:

- Does it have any reflectional symmetries?
 - Yes: How many? If it has n, then we call the point group D_n . n can be any positive integer or ∞ .
 - No: What is the smallest positive angle of a rotational symmetry? If it is $\frac{1}{n}$ TH of a circle, then we call the point group Z_n . n can be any positive integer, but not infinity.

11.7 Symmetries of infinite shapes

1. Imagine an infinitely long horizontal strip:

What sort of symmetries does it have?

(a) What angles are possible for a rotational symmetry?

(b) What "slopes" are possible for lines of reflectional symmetry?

(c) What centers of rotation work? There are a ton. Is there a name for all of them?

(d) For each slope, describe the "intercepts" for the lines of relfectional symmetry. (The slopes have very different, but simple, answers.)

(e) Does it have any other kinds of symmetries?

2. Now imagine an infinitely long row of Qs:

(a) How many rotations does it have?

(b) How many reflections does it have?

(c) Does it have any symmetry at all?

3. Choose a letter of the alphabet, and answer a version of #2 with your letter instead of Q.