Symmetry and Lyrics

Explanation: We say that a figure has symmetry if there is an isometry that maps the figure onto itself. Even this can be further refined, since we can define the following:

- A figure has reflectional symmetry (or line symmetry) if the isometry is the reflection of the plane figure.
- A figure that has rotational symmetry is its own image for some rotation of 180° or less.

Purpose: In order to illustrate reflectional symmetry, you should compose a haiku (a poem with the standard 5-7-5 syllable format). The middle line of the haiku is the line of reflection.

For rotational symmetry, you can compose three lines of equal syllable length (for a triangle) or four lines of equal syllable length (for a square). All of the lines need to rhyme, and what is written needs to make sense no matter which line is read first, going around your geometric shape. This will ensure the rotational property of the lyrics.

Materials: We will need the following:
1. Large sheets of butcher paper or poster paper
2. Rulers
3. Markers

Procedure:
1. Break up into groups of 4.
2. Take one of the large sheets of paper, some markers, and a ruler.
3. Fold the paper in half length-wise and then fold the paper in half width-wise twice. Then draw the division lines.
4. Label the paper as follows:
   - Top row: Reflectional Symmetry, Definition, Examples, Haiku
   - Bottom row: Rotational Symmetry, Definition, Examples, Lyrics
5. Write the definitions in the appropriate boxes for reflectional symmetry and rotational symmetry in the box to the right of the term.
6. Draw examples of reflectional and rotational symmetry. The following can be used:
   - Reflectional symmetry: rectangle, isosceles trapezoid, TX Longhorn logo
   - Rotational symmetry: square, regular hexagon, 5-pointed star
7. In the last column, compose a haiku (3 lines of 5-7-5 syllables) in the top right box. In the bottom right box, draw either a triangle or a square. Then compose either 3 or 4 lines (depending on the shape you chose) with the same number of syllables that all rhyme. Ideally, the lyrics should make sense no matter which line is read first.

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**Exercises:**

1. Are there any shapes that can have both reflectional and rotational symmetry? Draw an example.

2. Are there any shapes that have neither reflectional symmetry nor rotational symmetry? Draw an example.

3. Using a red pencil, draw the lines of reflectional symmetry for the following shapes.

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