### 1.5 - Transformations in the Coordinate Plane

#### Symmetry

**Symmetries**

A shape has a **vertical line of symmetry** if you can fold it in half vertically and have the halves match up. On a scrap sheet of paper try folding the letter “M” in half.

A shape has a **horizontal line of symmetry** if you can fold it in half horizontally and have the halves match up. On a scrap sheet of paper try folding the letter “H” in half.

A general **line of symmetry** is any line in which you can fold the shape in half and it maps onto itself. Consider the hexagon at the right has 6 lines of symmetry.

A shape has **point symmetry** if you can rotate the shape 180° from a center point and have it look the same as it did before you rotated it. On a scrap sheet of paper try rotating a letter “N” as shown in the right.

A shape has **rotational symmetry** if you can rotate the shape by a set degree from a center point and have it look the same as it did before you rotated it. On a scrap sheet of paper try rotating a hexagon (which has 60° rotational symmetry.)
1. Provide 2 Letters of the Alphabet that have a **vertical line of symmetry**.

2. Provide 2 Letters of the Alphabet that have a **horizontal line of symmetry**.

3. Provide 2 Letters of the Alphabet that have both a **horizontal line of symmetry** and **vertical line of symmetry**.

4. Provide a letter of the Alphabet that has **point symmetry** but **NOT** a **vertical line of symmetry**.

5. Which letter depending on how it’s written could have **infinite lines of symmetry**?

6. Draw all the lines of symmetry for the following regular shapes.
7. Describe in detail at least three transformations that would map hexagon ABCDEF onto itself.

![Hexagon ABCDEF](image)

8. Describe any symmetries that parallelogram ABCD might have.

![Parallelogram ABCD](image)

9. Ambigrams are usually words created with point symmetry.

![Ambigrams](image)