Translation: You will need to be able to translate a figure when given a rule, translate to a given point, and write a rule when given the pre-image and image.

1. Plot the points:
   B (-7, -4)
   E (-8, -8)
   A (-3, -9)
   R (-4, -5)

   Translate: (x+5, y+6)

2. Translate CAT \(\rightarrow\) C’A’T’

3. Translate ROAD \(\rightarrow\) R’O’A’D’

Write the rule:

Reflections: You will need to be able to reflect over an axis, over a given horizontal or vertical line, or over a line in the form \(y = mx + b\).

4. Reflect MAP over the y-axis.

5. Reflect TACK over \(y = -1\)
6. Reflect TACK over \( y = x \)

7. Reflect DOT over the given line.

Rotation: You will need to be able to rotate a figure around the origin, or around a given point.

8. Rotate ABC 180° about the origin

9. Rotate BUG 90° clockwise around the origin

10. Rotate ABCDE 90° clockwise around the point \((-1, -1)\)

11. Rotate ABCD 90° clockwise around point E
Perpendicular Lines: You will need to be able to write and/or graph the slope of a line that is perpendicular to a given line or equation.

12. Draw a line that is perpendicular to the given line.

13. Graph the line \( y = \frac{1}{3}x - 2 \), then graph a line that is perpendicular to it.

14. Give the slope of a line that is perpendicular to \( y = -\frac{2}{3}x + 4 \)

15. Give the slope of a line that is perpendicular to \( y = 2x - 5 \)

Symmetry & Rotational Symmetry: You will need to determine how many and where the lines of symmetry are for a given figure. You will need to be able to find the angle of rotational symmetry for a given figure.

For each figure:
   a) draw all lines of symmetry and determine the total number of lines of symmetry
   b) give the angle of rotation if there is rotational symmetry.

16. [Diagram of a square]
   a.  
   b.  

17. [Diagram of a hexagon]
   a.  
   b.  

18. [Diagram of a star]
   a.  
   b.  

19. How many lines of symmetry will a regular 38-gon have? What is the angle of rotation?

20. How many lines of symmetry will a regular 14-gon have? What is the angle of rotation?