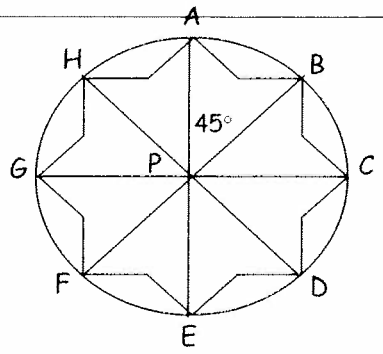
9-3 Rotations Master &

ROTATION:

A rotation or turn moves every point of a preimage through a specified angle and direction about a fixed point, called the center of rotation

- The direction of rotation can be either clockwise or counterclockwise
- We will assume that all rotations are counterclockwise unless stated otherwise.

1-6: The diagonals of the regular octagon shown form 8 congruent triangles. Point P is the angle of rotation. Complete each of the following rotations:

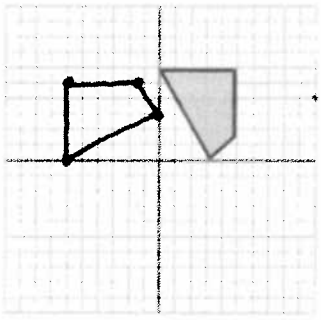


1. A clockwise rotation of 45° about P maps A onto B.
2. A clockwise rotation of 90° about P maps C onto E.
3. A clockwise rotation of 180° about P maps B onto F.
4. A counterclockwise rotation of 90° about P maps H onto F.
5. A counterclockwise rotation of 45° about P maps F onto E.
6. A counterclockwise rotation of 135° about P maps D onto A.

ROTATIONS USING COORDINATE PLANE:

7. **90° Rotation:**
To rotate a point 90° counterclockwise about the origin, switch the x and y coordinate and negate the new x-coordinate.

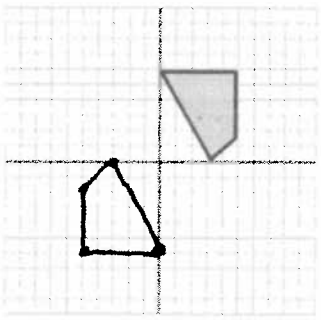
$(x, y) \rightarrow (-y, x)$



$(0,6) \rightarrow (-6,0)$
$(5,6) \rightarrow (-6,5)$
$(5,1.5) \rightarrow (-1.5,5)$
$(3,0) \rightarrow (0,3)$

8. **180° Rotation :**
To rotate a point 180° clockwise or counterclockwise about the origin, negate both the x- and y- coordinates.

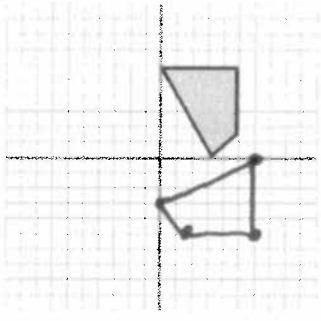
$(x, y) \rightarrow (-x, -y)$



$(0,6) \rightarrow (0,-6)$
$(5,6) \rightarrow (-5,-6)$
$(5,1.5) \rightarrow (-5,-1.5)$
$(3,0) \rightarrow (-3,0)$

9. **270° Rotation (same as 90° clockwise):**
To rotate a point 270° counterclockwise about the origin, switch the x and y coordinate and negate the new y-coordinate.

$(x, y) \rightarrow (y, -x)$



$(0,6) \rightarrow (6,0)$
$(5,6) \rightarrow (6,-5)$
$(5,1.5) \rightarrow (1.5,-5)$
$(3,0) \rightarrow (0,-3)$

9-5 Symmetry Master E

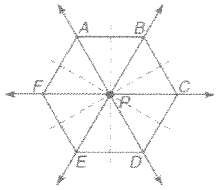
A figure has Symmetry if there exists a rigid motion--------reflection, translation, or rotation that maps the figure onto itself.

LINE SYMMETRY:

- A figure in the plane has line symmetry if the figure can be mapped onto itself by a reflection in a line.
- You can also tell if it has line symmetry if the figure can be folded so that the 2 halves match exactly.
- The fold line is called the axis or line of symmetry.

POINT SYMMETRY:

- A figure has point symmetry if the figure can be mapped onto itself by a rotation of 180 degrees and it looks exactly the same after the rotation.



1-9: Fill in in the blanks below each polygon for the following:
a) Determine how many lines of symmetry each figure has.
b) Determine whether the figure has point symmetry. State YES or NO.

1. Square a) 4 b) yes	2. Equilateral triangle a) 3 b) No	3. Rectangle a) 2 b) yes
4. Regular pentagon a) 5 b) No	5. Rhombus a) 2 b) yes	6. Scalene triangle a) 0 b) No
7. Isosceles triangle a) 1 b) No	8. Isosceles trapezoid a) 1 b) No	9. Kite a) 1 b) No

10-13: Sketch the figure described, if possible.

10. A triangle with exactly one line of symmetry.

11. A trapezoid with exactly one line of symmetry.

12. A pentagon with exactly one line of symmetry.

13. A hexagon with exactly two lines of symmetry.