

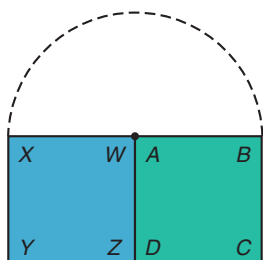


MATH ACTIVITY 11.1

Tracing Figures from Motions with Tiles

Purpose: Rotate color tiles to study the motion of points in the plane.

Materials: Color Tiles in Manipulative Kit.



1. The two tiles shown here are a stationary tile (blue) and a moving tile (green). Imagine rotating the green tile about point A , keeping point A fixed, until side \overline{AB} is next to side \overline{XW} ; then rotate the green tile by keeping point B fixed until side \overline{CB} is next to side \overline{XY} ; then rotate the green tile by keeping point C fixed so that side \overline{DC} is next to side \overline{YZ} ; finally, rotate the green tile by keeping point D fixed so that the green tile is back in its starting position.
 - a. For the first part of the motion of the green tile about the blue tile, point B traces out the dotted semicircle shown in the figure at the left. Try to visualize the figure traced out by point B for the complete motion of the green tile about the blue tile, and make a prediction about its shape.
 - b. Carry out the motion of the green tile about the blue tile, and sketch the path traced by B . You may want to have a classmate help you hold and move the tiles.
 - *c. Remove the green tile and trace around the blue tile to mark its position relative to the figure traced by point B . The figure traced by point B can be subdivided into a large right triangle with three semicircles on its legs. Write about relationships between the area of the blue tile and the area of the right triangle; the area of the blue tile and the total area of the two small semicircles; and the total area of the two small semicircles and the area of the large semicircle.
2. Each of the figures shown below is created by the path of a point on the green tile as it is moved about the blue tile. (*Note:* These figures are smaller than the ones that will be reproduced by your tiles.)
 - a. Write detailed directions for moving the green tile about the blue tile so that some point on the green tile traces out each figure. Include in your description the location of the blue tile and the point on the green tile that traces out the figure.
 - b. Using the blue tile as the unit of area, determine the area of each figure traced out in part a. Explain with a diagram how you obtained each area.

