

Activity 13.9 DIAGONAL DESIGNATIONS



For this activity, students need three strips of card stock about 2 cm wide. Two strips should be of the same length (about 30 cm), and the third should be shorter (about 20 cm). Punch nine holes equally spaced along the strip. (Punch a hole near each end. Divide the distance between the holes by 8. This will be the distance between the remaining holes.) Use a brass fastener to join two strips. A quadrilateral is formed by joining the four holes (Figure 13.11). Provide students with the following list of possible

relationships to investigate for quadrilaterals. For ELLs, provide a list of the quadrilaterals with pictures next to the names of the various shapes (or refer them to a word wall or journal entry with each option). Ask, "What quadrilaterals can these diagonals form?"

- Diagonals that are the same length
- Diagonals that are perpendicular
- Diagonals that bisect each other
- Diagonals that are perpendicular and of the same length

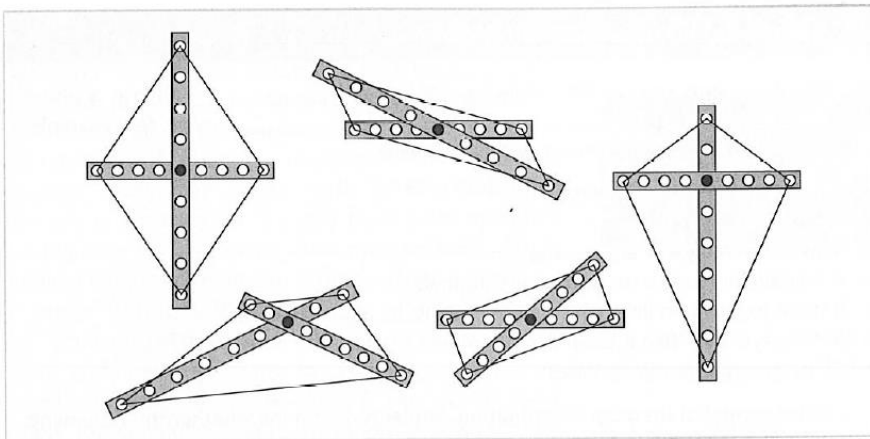
Students use the strips to build shapes that fit these conditions. They may want to make shapes on geoboards or dot paper, or they can use dynamic geometry software to explore the tasks and test hypotheses. With dynamic software (e.g., *The Geometer's Sketchpad* or *GeoGebra*), objects can be moved and manipulated easily. Lines can be drawn and designated as perpendicular, or a point can be placed as the midpoint of a segment. The most significant idea is that when a geometric object is created with a particular relationship to another, that relationship is maintained no matter how either object is moved or changed. This is a very powerful way to see how diagonals relate to the type of quadrilateral formed. Some students will work with the diagonal relationships to see what shapes can be made. Others will begin with examples of the shapes and observe the diagonal relationships.

Standards for Mathematical Practice

5 Use appropriate tools strategically

Figure 13.11

Handmade strips can be used to explore diagonals (and other properties) of shapes.



From Van de Walle et. al. (2014). *Teaching Student-Centered Mathematics Grades: Developmentally Appropriate Instruction for Grades 6 – 8* (2nd Ed.). Toronto: Pearson Education, Inc. (p. 276-277).