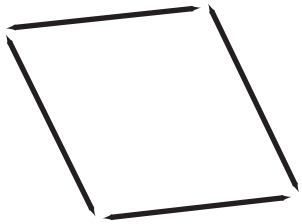
EXPLORATION

6-4 Properties of Special Parallelograms

A *rhombus* is a quadrilateral with four congruent sides. Use toothpicks to explore properties of rhombuses.

1. Arrange four congruent toothpicks to form a quadrilateral. Since the toothpicks are congruent, the quadrilateral is a rhombus.



2. Form different rhombuses by changing the angles between the toothpicks. What do you notice about the opposite sides of every rhombus you make? What can you conclude?

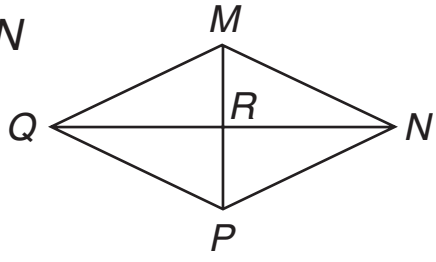
3. Use toothpicks to form a rhombus on a sheet of paper. Mark the vertices on the paper and remove the toothpicks. Connect the vertices to draw the rhombus and its diagonals. What do you notice about the angle of intersection of the diagonals?

4. Repeat Step 3 with a different rhombus. Do you get the same result?

THINK AND DISCUSS

5. **Explain** how you can use your findings to state a conjecture about the diagonals of a rhombus.

6. **Discuss** how you could classify $\triangle QMN$ and $\triangle MRN$ when given that quadrilateral $MNPQ$ is a rhombus.



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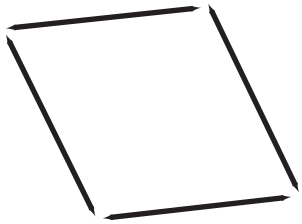


Check students' work.

2. Form different rhombuses by changing the angles between the toothpicks. What do you notice about the opposite sides of every rhombus you make? What can you conclude?

The opposite sides of a rhombus are parallel. Therefore a rhombus is also a parallelogram.

3. Use toothpicks to form a rhombus on a sheet of paper. Mark the vertices on the paper and remove the toothpicks. Connect the vertices to draw the rhombus and its diagonals. What do you notice about the angle of intersection of the diagonals?

The diagonals intersect at right angles.

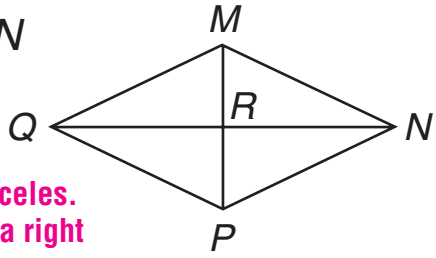
4. Repeat Step 3 with a different rhombus. Do you get the same result? **yes**

THINK AND DISCUSS

5. **Explain** how you can use your findings to state a conjecture about the diagonals of a rhombus.

If a parallelogram is a rhombus, then its diagonals are perpendicular.

6. **Discuss** how you could classify $\triangle QMN$ and $\triangle MRN$ when given that quadrilateral $MNPQ$ is a rhombus.



Since *MNPQ* is a rhombus, $\overline{MQ} \cong \overline{MN}$. So $\triangle QMN$ is isosceles. The diagonals of *MNPQ* are perpendicular. So $\angle MRN$ is a right angle, and $\triangle MRN$ is a right triangle.