# More Symmetry

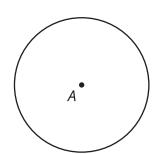
Let's describe more symmetries of shapes.



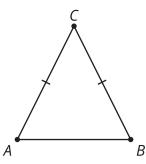
# **Which Three Go Together: Symmetry**

Which three go together? Why do they go together?

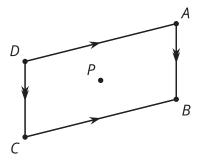
Α



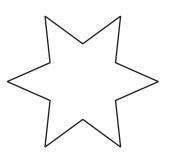
R



C



D





# 16.2 Self-Rotation

Determine all the angles of rotation that create symmetry for the shape your teacher assigns you. Create a visual display about your shape. Include these parts in your display:

- the name of your shape
- · the definition of your shape
- · drawings of each rotation that creates symmetry
- a description in words of each rotation that creates symmetry, including the center, angle, and direction of rotation
- one nonexample (a description and drawing of a rotation that does *not* result in symmetry)

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## Are you ready for more?

Finite figures, like the shapes we have looked at in class, cannot have translation symmetry. But with a pattern that continues on forever, it is possible. This image is from a mosque in Iran. Patterns like this one that have translation symmetry in only one direction are called *frieze patterns*.



- 1. What are the lines of symmetry for this pattern?
- 2. What angles of rotation produce symmetry for this pattern?
- 3. What translations produce symmetry for this pattern if we imagine it extending horizontally forever?

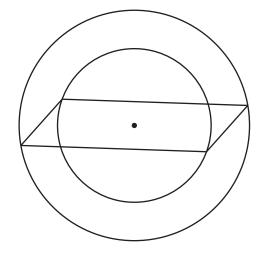


## **Parallelogram Symmetry**

Clare says, "Last class, I thought the parallelogram would have reflection symmetry. I tried using a diagonal as the line of symmetry, but it didn't work. So now I'm doubting that it has rotation symmetry."

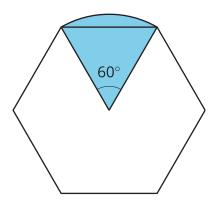
Lin says, "I thought that too at first, but now I think that a parallelogram does have rotation symmetry. Here, look at this."

How could Lin describe to Clare the symmetry she sees?



## Lesson 16 Summary

A shape has **rotation symmetry** if there is a rotation greater than 0 degrees and less than 360 degrees that takes the shape to itself. A regular hexagon has many angles that work to create rotation symmetry. Here is one of them. What other angles would create a rotation where the image is the same as the original figure?



Can you think of a shape that has translation symmetry?

There aren't any polygons with translation symmetry, but an infinite shape like a line can be translated such that the translation takes the line to itself.

