Unit 1, Lesson 16

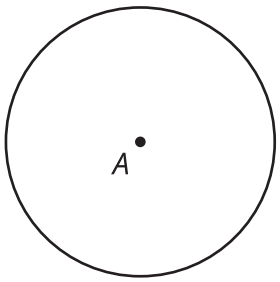
More Symmetry

Let's describe more symmetries of shapes.

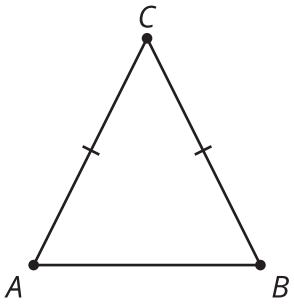
16.1 Which Three Go Together: Symmetry

Which three go together? Why do they go together?

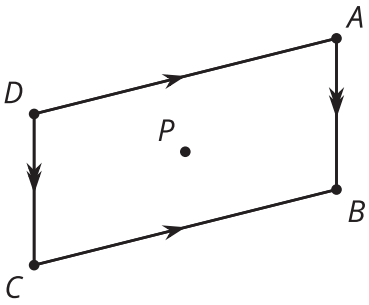
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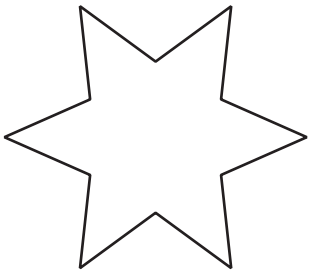
B



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)

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?

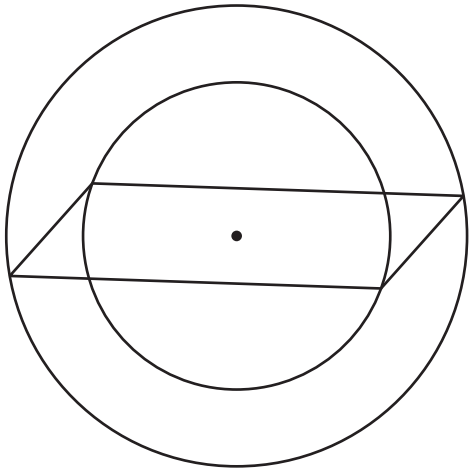
3. What translations produce symmetry for this pattern if we imagine it extending horizontally forever?

16.3 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."

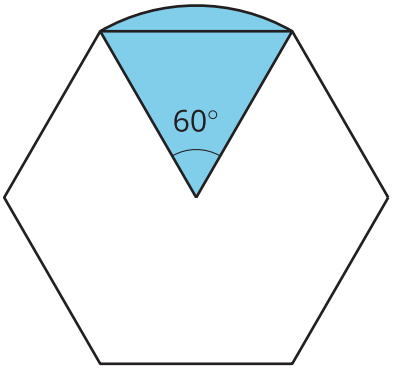
Lin says, "I thought that too at first, but now I think that a parallelogram *does* have rotation symmetry. Here, look at this."

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.