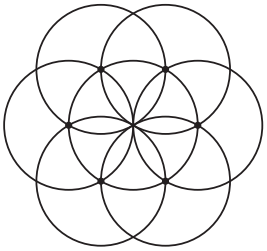
Unit 1 Family Support Materials

Constructions and Rigid Transformations

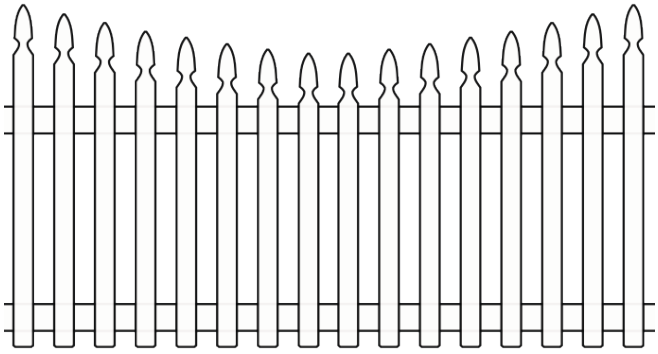


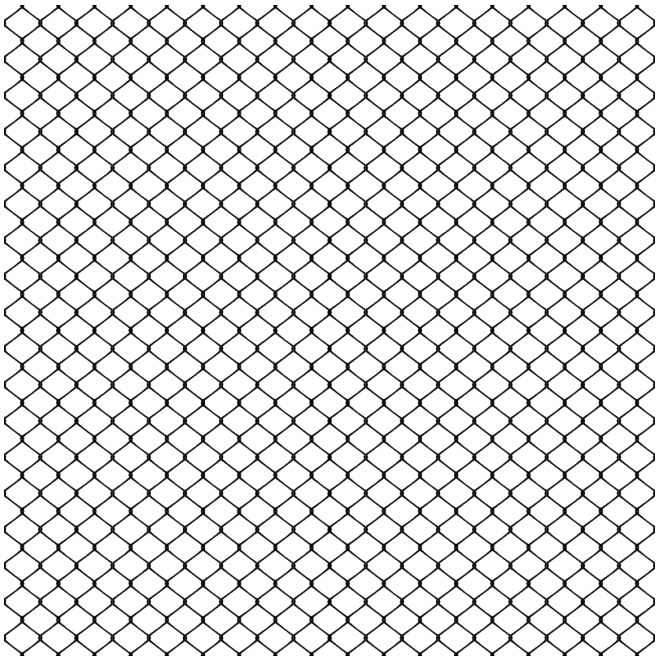
In this unit, your student will be learning about constructing geometric figures. A *construction* in geometry class is similar to a construction site in the real world—students use a variety of materials to build something. At the beginning of the unit they only have two options: draw a line or draw a circle. It seems like that's not enough to make much, but this image is made entirely of circles:

Can you see how to add lines to make a triangle, rectangle, or hexagon?

In this unit, students also revisit some ideas first encountered in previous grades: *rotation*, *reflection*, and *translation*, which are the three *rigid transformations*. You might invite your student to look for transformations and *symmetry* in their everyday life.

What do you see in these two fences?





Each fence has a vertical line of reflection, because if you folded it in half, the left and right halves would match up. The chain-link fence also has a horizontal line of reflection, because if you folded it in half the other way, the top and bottom halves would match up. The picket fence doesn't have any rotational symmetry, but you could rotate the whole image of the chain-link fence 180 degrees and it would look the same.

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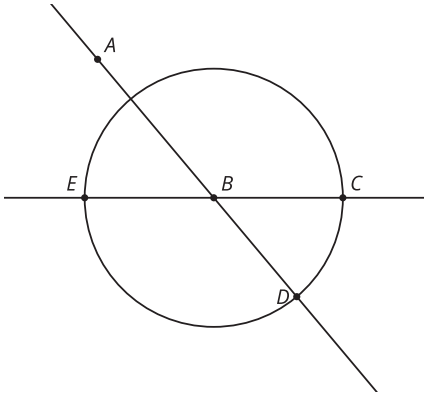
Students are developing skills in proving their claims during this unit. So instead of saying "the fence looks symmetric," students would use the definition of reflection to show that every part of the left half lines up exactly with every part of the right half.

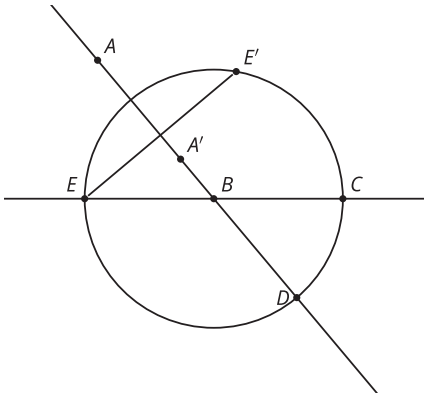
Here is a task to try with your student:



Line AD intersects line EC at point B, and B is the center of the circle. It may be helpful to draw on a piece of wax paper to see these moves.

Determine whether each statement is true or false. Explain how you know.

1. Reflect point E over the line AD. The image is point C.
2. Rotate point C 180 degrees clockwise using center B. The image is point E.
3. Rotate point D counterclockwise using center B and angle DBC. The image is point C.
4. Translate point A by the directed line segment BD. The image is point B.
5. Angle ABE is congruent to angle DBC.



Solution:

1. False. The line connecting a point to its image has to be perpendicular to the line of reflection.
2. True. A 180-degree rotation takes C to a point on the other side of line BC, which is the same distance away from the center.
3. True. The path of the rotation will follow the edge of the circle.
4. False. The distance from A to B is not the same as the distance from B to D.
5. True. Rotating angle ABE 180 degrees using center B would take it to angle DBC, because when you rotate a line 180 degrees, it lands on itself. Rotation does not change the size of an angle.