

## Activity Spark for Playing with Blocks Workshop:

# Toothpick Puzzles

This activity starts with a simple task (creating polygons with 12 toothpicks) and then leads to open-ended exploration of polygons and some of their properties. The toothpick problems are perfect for a math circle or a classroom because they adapt so easily to a wide range of levels. In fact almost anyone can dig into these problems and find *some* solutions. Yet to work the problems out completely takes sophisticated and careful reasoning.

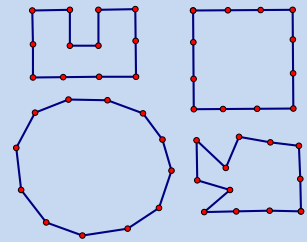
### 1 Start simple

Make a polygon with 12 toothpicks. But don't look at your neighbor's polygon! How are your polygons the same? How are they different?



### 2 Play & explore

How many different "kinds" of polygons can you make with 12 toothpicks? What makes two polygons the same "kind"? You decide! Of these polygons, for example, which would you place in the same category?



### 3 Ask your own questions

Now it's time to make your own mathematics. What do YOU want to explore? Ask your own questions, find one that intrigues you, and then see if you can solve it.

Penelope, for example, just learned about different kinds of triangles in school: equilateral, isosceles, and scalene. She wants to find out how many different scalene triangles she can make with a perimeter of 12 units. And the answer she finds surprises her!



### 4 Remix

Maybe you want to explore quadrilaterals. Maybe you are interested in exploring polygons with whole-number areas. (How many polygons can you make with 12 toothpicks with an area of exactly 5 square units?) Or maybe you want to change the number of toothpicks and start with a whole new set of explorations. Try to find your own ways to remix the activity.