

## Building Mathematical Thinkers: Mini-Activities

### *Geoboard Challenge*

**Objective :** 4<sup>th</sup> grade Geometry – Symmetry

**Theoretical Foundation:** Creating figures on a geoboard helps students focus on the properties of shapes. Students also draw conclusions about how properties are related to one another. Finally, they use spatial sense to visualize how those properties do or don't change when a shape is altered.

**Estimated Time:** 20-30 minutes

**Materials:** One geoboard and a rubber band for each student, overhead geoboard or projection system (optional)

**Description:**

1. Distribute geoboards and allow students a minute or so to explore these materials
2. Pose some or all of the challenges below one at a time. After posing the challenge allow students time to work on their geoboards then ask them to hold up their board so you can see their work. Choose a few to recreate on the overhead/projection system. Ask probing questions (see suggestions below).

Challenges: Can you make a figure that has:

- Exactly one line of symmetry
- Exactly two lines of symmetry
- No lines of symmetry
- More than two lines of symmetry
- Rotational symmetry
- Rotational *and* line symmetry
- Only rotational symmetry (without line symmetry)

**Differentiation Suggestions:**

- Students who need additional support might work with a partner
- Students who need an additional challenge might create *two* figures for each challenge
- As an extension, add additional criteria to each challenge for example: Can you make a figure that has exactly one line of symmetry and exactly two right angles? Can you make a figure that has rotational and line symmetry and a perimeter of at least 8 inches?
- As an extension, students could record their shapes on dot paper. The class could, then cut out and sort selected figures on a bulletin board.

**Probing Questions:**

- Does this figure meet the challenge? How can you tell?
- Would it still meet the challenge if...? How can you tell?
- If a figure shared *doesn't* meet the challenge: What could you change to make this figure meet the challenge?

**Assessment:**

- Do most figures created by the students meet the challenges?
- What confusions are present – line vs. rotational? Exactly vs. more than?
- Are answers to the probing questions accurate and thoughtful?