**Mathematicians Persevere**

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| **This is lesson six in a series of six lessons focused around developing a mathematical community at the beginning of the school year.  While this lesson uses puzzle exploration to informally review the names of shapes, its main goal is to recognize that students must persevere when problem solving.** |

**NC Mathematics Standard(s):**

**Geometry**

**NC.K.G.1** Describe objects in the environment using names of shapes, ~~and describe the relative positions of objects using positional terms.~~

**NC.K.G.3** Identify squares, ~~circles~~, triangles, ~~rectangles~~, hexagons, ~~cubes, cones, cylinders, and spheres as two-dimensional or three dimensional~~

**Standards for Mathematical Practice:**

1. Make Sense of Problems and Persevere in Solving Them.

**Student Outcomes:**

* I can keep trying and not guide up when things get tricky.
* I can find squares, triangles and hexagons in pictures.

**Math Language**

* Mathematician
* Persevere: *keep trying, don’t give up*
* triangle, square, hexagon

**Materials:**

* computer with speakers
* access to internet
* Growth Mindset video: [ClassDojo Episode 1 of 5](https://www.youtube.com/watch?v=2zrtHt3bBmQ&feature=youtu.be)
* Sesame Street Video: [Bruno Mars Don’t Give Up](https://youtu.be/I0uSn9zXlTw)
* Pattern Block Puzzles from <https://www.prekinders.com/pattern-blocks/> or <http://youngmathematicians.edc.org/patternblockpuzzles/>

**Advance Preparation**:

* Print pattern block mats from the PreKinders website. Notice that some mats are in color and others are black and white. Colored mats can be used for more intensive learners who may need additional support.
* Have the Growth Mindset and Sesame Street Videos read to play.

**Launch:**

1. Say: *I’ve been thinking a lot lately about our brains. Do you think brains grow?*
2. Allow students to respond to the question in pairs. Then share out a few ideas.
3. Watch the Class Dojo video “[Growth Mindset for students- Episode 1 of 5](https://youtu.be/2zrtHt3bBmQ)”.
4. After watching the video pose these questions to students: (questions adapted from <https://ideas.classdojo.com/>)
	* Why does Mojo want to leave school?
	* Tell your partner about a time you wanted to quit.
	* What does Katie say to Mojo to convince him not to leave?
	* Do you think Mojo can become smarter? Why or why not? (Possible answers: Your brain is like a muscle you just have to exercise it or anyone can be smart you just have to keep trying until one day you can)
	* What will you need to do in order to become smarter? (Possible answers: work at it, keep trying, don’t give up, persevere)
5. Introduce today’s task:
	* Say: *Mathematicians, today we will work to make our brains stronger by completing some math puzzles. You will use shapes to build pictures. You might find some puzzles to be difficult, but I want you to keep trying and not give up. If we want our brains to grow smarter, we need to keep trying and persevere. Even if you don’t get it today, you’ll get it soon.*
	* Pass out pattern block puzzles and pattern blocks. Put more puzzles on each table than there are students so they can be continuously engaged in the task.

**Explore:**

1. Students work to solve puzzles.
2. Observe students as while circling the room. Make formative assessments of their ability to name shapes and persevere by posing questions.

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| **Observation** | **Question to Pose** |
| Student can identify hexagon, triangle and square.  | * What shape is this? (point to a shape)
* How do you know it’s a \_\_\_\_\_?
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| Student shows a growth mindset by persevering when things get difficult.  | * What part of this puzzle has been difficult?
* How did you figure it out? (Praise student for working hard and not giving up)
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**Discuss:**

1. Bring students to the carpet to share.
	* Say: *I’ve seen lots of brains growing today as you solved these puzzles. Remember, we want to have a growth mindset. We get smarter when we work hard at things and keep trying when it’s difficult. How did you grow smarter today while you were working on the shape puzzles? How did you keeping trying and persevere? Talk to your partner about a time today that things were difficult but you persevered.*
	* Have a few students share their ideas with the whole group.
	* Say: *Persevering relates to one of the eight Math Practice Standards. These are eight things that great mathematicians do. Great mathematicians “Make Sense of Problems and Persevere in Solving Them.” I saw lots of you being great mathematicians today when you persevered in finding just the right spot for your puzzle pieces.”* (If you have classroom posters of the Math Practice Standards point out the poster at this time.)
2. Close lesson:
	* Say: *This year in Kindergarten you’re going to encounter all sorts of things that seem difficult at first. I want you to remember that if you keep trying and don’t give up you’ll soon figure it out. Just don’t give up.*
	* Watch the Sesame Street Video: [Bruno Mars Don’t Give Up](https://youtu.be/I0uSn9zXlTw)
	* Say: *Remember in everything we do in Kindergarten we don’t want to give up, just try and try and try again*.

**Evaluation of Student Understanding**

Informal Evaluation:

* Students can correctly identify squares, triangles and hexagons.
* Students persevere when solving problems.

**Meeting the Needs of the Range of Learners**

**Intervention:**

* If students have much difficulty with the puzzle they’ve chosen, suggest they try a simpler puzzle. The colored versions of puzzles can also be used for student support.
* As this was an introductory lesson, it is not expected that students are proficient naming shapes at this time. Continue to provide all students with experiences to build upon the ideas presented in this lesson.

**Extension:**

* The interior lines of the black and white puzzles can be whited out to require additional perseverance when solving. Whiting out the inner lines will also allow for a variety of conformations to be used to fill the puzzle.
* This lesson focuses on the first Standard for Mathematical Practice: *Make Sense of Problems and Persevere in Solving Them.* During the first few weeks of school, facilitate lessons around the other practice standards.

**Special Notes:**

* The main purpose of this lesson is to have students begin developing a growth mindset rooted in perseverance. The math standard should be revisited in a more formal manner later in the year. By the end of the year, students should be able to identify squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres as two-dimensional or three dimensional.
* This lesson focuses on the first Standard for Mathematical Practice: *Make Sense of Problems and Persevere in Solving Them.* It is important that these practice standards are introduced early in the school year, and embedded into daily instruction.