**Mathematicians Work Together**

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| **This is lesson two in a series of six lessons focused around developing a mathematical community at the beginning of the school year. While this lesson meets standard NC.K.MD.2, its primary goal is for students to learn how to work with a partner on a task. A secondary goal is to begin establishing norms for how students work together during math class.** |

**NC Mathematics Standards:**

**Identify and describe shapes.**

**NC.K.MD.2** Directly compare two objects with a measurable attribute in common, to see which object has “more of/less of” the attribute ***[without counting],*** and describe the difference.

**Standards for Mathematical Practice:**

1. Make sense of problems and persevere in solving them.

4. Model with mathematics.

6. Attend to precision.

**Student Outcomes:**

* I can work with a partner to complete a math task.
* I can use blocks to build a tower that is taller or shorter than a cereal box.

**Math Language:**

* Mathematician
* Taller / shorter
* Bigger / smaller
* The same height as
* Attribute
* Compare

**Materials:**

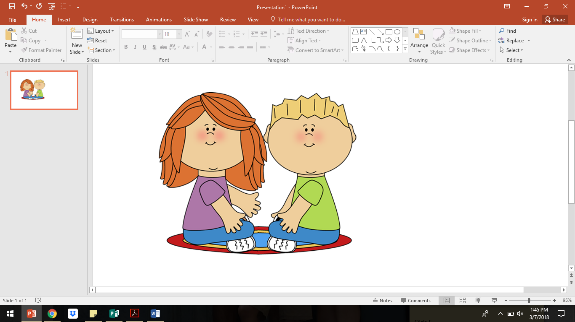
* Laptop, access to internet, speakers
* Building blocks
* One cereal box
* Photos of people working together
* *Towers and Teamwork* recording sheet.

**Advance Preparation**:

* Preview [Wonder Gove: Work Together as a Team](https://www.youtube.com/watch?v=TZqFYtWCWXg) video.
* Copy class set of *Towers and Teamwork* recording sheet.
* Print pictures of people working together.

**Launch:**

1. Introduce the word ***mathematician***.

* Say: *Mathematicians solve problems*. *During our daily math time, we will be mathematicians and solve problems with objects, shapes and numbers.*
* Explain: *Many times mathematicians work together to solve problems.*
* Show pictures of people working together. Ask: *What do you notice in these pictures? What do you see that tells you the partners are doing a great job working together?*
* Watch [Wonder Gove: Work Together as a Team](https://www.youtube.com/watch?v=TZqFYtWCWXg). Have students look for ways the students work together during the video.

**knees to knees**

* After video, say: *Maria had trouble building a tower. Talk to your partners about ways the friends work together to help Maria. Remember, when walk talk to our partners, we sit “knees to knees”*. *Then, we decide who shares first. I say something, then my partner says something. We keep taking turns until the teacher gives a signal.* (Model with a student if needed).
* Have students share their ideas with the class. As students share, generate a ***“Math partners…”*** chart (see right). This chart may be displayed and added to throughout the school year.

**Sample**

**Chart:**

Only

record

items

students

share.

***Math partners…***

* listen
* take turns
* talk quietly
* explain their thinking
* are helpful.
* Encourage each other

1. Introduce today’s task.

* Before introducing today’s math task, arrange students in pairs. Distribute blocks. Allow 2-3 minutes of free exploration time.
* As students are busy exploring, build a block tower that is shorter than a cereal box.
* Bring students back together (away from the blocks).
* Explain task. Say: *Today’s math task is partners will work together to build block towers, just like Maria did with her friends.*
* Say: *Look at my tower I’ve made* (place cereal box beside it)*. How does my tower compare to this box* (i.e., bigger/smaller/taller/shorter)? *Turn and talk with your partner.*
* *Your challenge is to build towers* ***taller*** *than this cereal box. As you work, be sure to remember the things mathematicians do when they work together.*

**Explore:**

1. Allow 5-10 minutes for partners to build their towers. This exploration time is useful for observing and collecting formative data on students’ current level of understanding. If students are productively grappling, walk around asking questions to elicit thinking (see chart). If the class shows unproductive frustration, pull students back together. Redirect the entire class by asking questions to elicit thinking.

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| **Observation** | **Questions to Ask** |
| They are each building their own tower, rather than working together. | Students may not have had previous experiences working with partners, and need help getting started.   * How many towers did Maria and her friends build when they were working together? * What can you do to start building one tower together (take turns adding blocks)? |
| Partners are disagreeing or one is doing all the work. | Refer to the **“*Math partners”*** chart.   * What is one thing you and your partner can do so that both of you are building the tower (take turns adding blocks, talk about where the blocks should go, etc.). |

* As each pair of students finishes their tower, place the cereal box beside the tower. Ask: *Is your tower taller or shorter than the cereal box? How do you know?* Then partners complete the recording sheet by drawing their tower and the cereal box. Teacher moves on to next partner team.
* Select a few towers to share during the “Discuss” section of the lesson (both taller and shorter than the cereal box). Determine sequence in which students will share (e.g., justifications for knowing why the tower is taller or shorter than the cereal box as they progress from least to most sophisticated).

**Discuss:**

1. Bring students together on the carpet (leave papers at tables/desks).
   * Remind students that they were mathematicians and they worked with their partner to build a tower.
2. Have pre-selected students to share the picture of their tower beside the cereal box.
   * Ask questions to elicit thinking, and draw attention to the attributes taller than/shorter than or bigger/smaller.

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| **Sample Questions** | **Possible Responses**  **(in order of least to most sophisticated)** |
| * How does your tower compare to the cereal box? | * It is taller/bigger. * It is shorter/smaller. * It is the same height. |
| * How did you know that it was taller? * How did you know that it was shorter? | * I can look and see it. * I used a lot of blocks/not enough blocks. * It is higher/lower than the box. * It is above/below the box. * It is the same height/level as the box. |

* + As each picture is shown, ask students to turn and talk to their partner and decide if the tower is taller or shorter than the cereal box.

1. Say: *We all are mathematicians. Today, we learned how to work with a partner to solve a math task. Today and every day, we will be mathematicians and keep talking about math, looking for math in our world, and using math to solve problems.*

**Evaluation of Student Understanding:**

**Informal Evaluation:**

* When shown a picture of a circle (or rectangle), students will be able to find an object that looks similar. The student should be able to label that object as a circle (or rectangle).
* Students will find math in the classroom (e.g., shapes or numbers).

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

**Interventions:**

* As this was an introductory lesson, it is not expected that students have prior knowledge of attributes and vocabulary describing attributes. Continue to provide all students with experiences noticing, describing, and comparing objects based on its attributes.

**Extensions:**

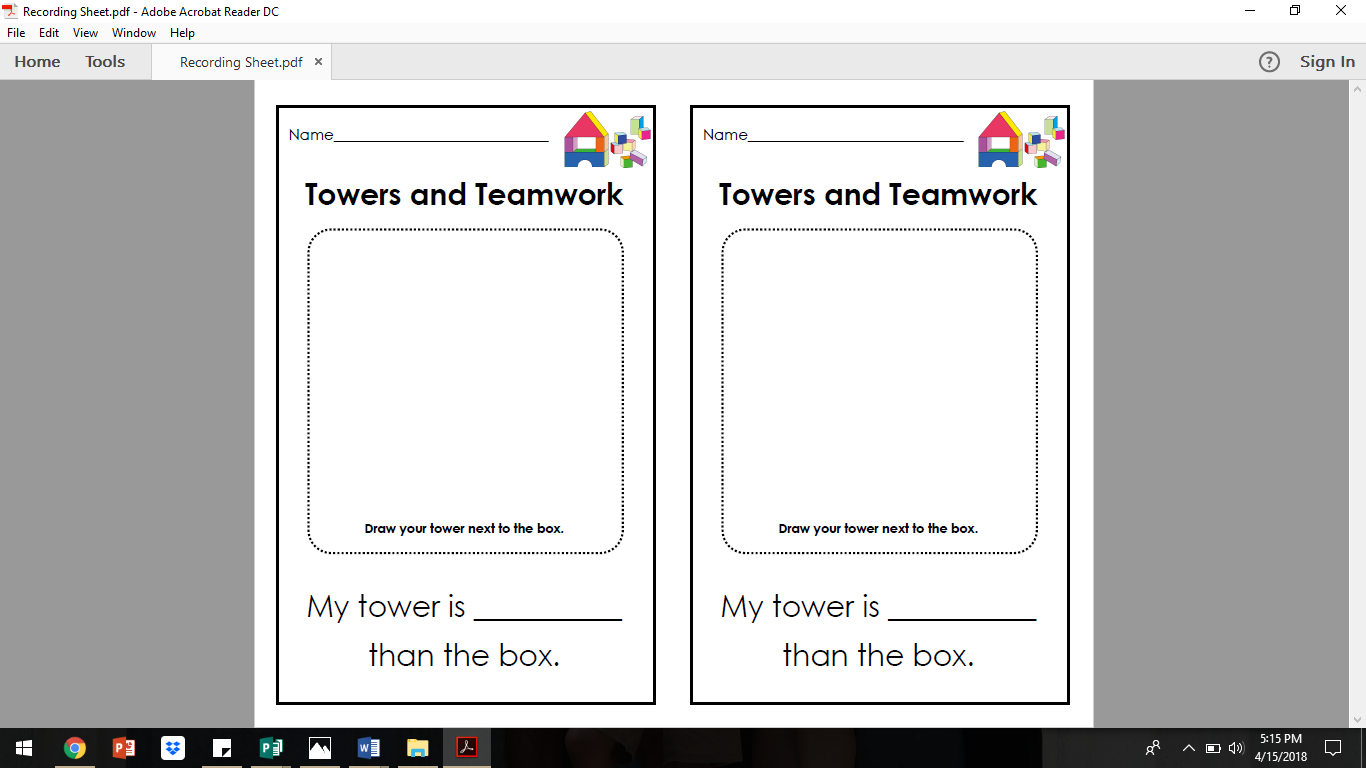
* Throughout the school day, find opportunities to compare two objects and describe its attributes using taller than/shorter than (books, pencils, children, etc.).
* Create another task that involves cup stacking (build a tower using cups and compare to another partner team. Discuss which tower is taller than/shorter than the other tower.
* Play “I spy”.  *“I spy an object that is taller than the cubbies, what could it be? I spy an object that is shorter than this book, what could it be?”*

**Possible Misconceptions/Suggestions:**

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| **Possible Errors**  **and Misconceptions** | **Suggestions** |
| Student does not understand the word attribute and confuses the words *taller than/shorter than.* | Explicitly teach the vocabulary word attribute. Give student one object at a time to practice describing the measurable attributes of that object. Ensure student understanding and correct use of the following terms: tall(er), short(er). Once describing one measurable attribute of one object is mastered, give student two objects and ask him/her to describe the attributes of both objects. |

**Special Notes:**

* This was an introductory lesson, with the intended goal of learning how to work on a math task/activity with a partner. Therefore, students should not be held accountable for comparing two objects by specific attributes. By the end of the school year, after having many experiences with directly comparing two objects with a measurable attribute in common, students will be able to describe the difference.
* After completing this lesson, students can go to math stations/centers (stations can be allowing the students time to explore with math manipulatives such as pop cubes, blocks, links, counters). This will allow time for the teacher to conduct informal observations by visiting each center and observing what the students are doing (counting, building, etc.).



**Examples of People Working Together**







