**Mathematicians Work Together**

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| **This is lesson three 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.1.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:**

**Measure lengths.**

**NC.1.MD. 2** Measure lengths with non-standard units.

• Express the length of an object as a whole number of non-standard length units.

• Measure by laying multiple copies of a shorter object (the length unit) end to end (iterating) with no gaps or overlaps.

**NC.1.MD.1** Order three objects by length; compare the lengths of two objects indirectly by using a third object

**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 than one object but shorter than another.

**Math Language:**

* Attribute, bigger, compare, mathematician, shorter, smaller, taller

**Materials:**

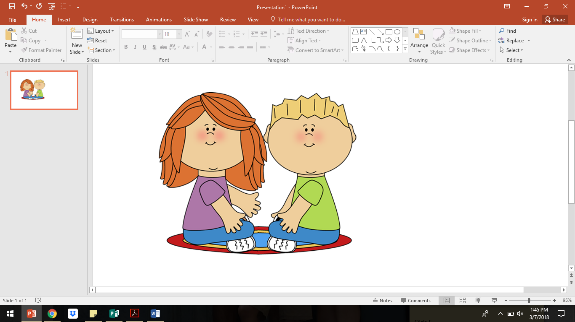
* Laptop, access to internet, speakers, building blocks, multi-link (pop) cubes, one drinking bottle or cup, one cereal box, photos of people working together

**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 or get access to 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 and/or multi-link pop cubes. Allow 2-3 minutes of free exploration time.
* As students are busy exploring, build a block tower that is taller than a drink bottle/cup.
* 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 drink bottle/cup beside it)*. How does my tower compare to this drink bottle/cup* (i.e., bigger/smaller/taller/shorter)? *Turn and talk with your partner.*
* *Your challenge is to build towers* ***taller*** *than this drink bottle/cup but* ***shorter*** than this cereal box. *As you work, be sure to remember the things mathematicians do when they work together.*

**Explore:**

1. Allow 8-10 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.)? |
| They are building the tower but not using the benchmarks of the drinking bottle/cup and the cereal box. | Ask students: *What were the directions of the task? What does our tower need to be taller than?” What does it need to be shorter than?* |

* As each pair of students finishes their tower, place the drinking bottle/cup and cereal box beside the tower. Ask: *Is your tower taller or shorter than the drinking bottle/up? 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 and drinking bottle/cup.
   * 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, drinking bottle/cup)?* | * 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. Do the same with the drinking bottle/cup.

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.*

**Additional Activities:**

These activities can either be done by everyone in the class or as part of centers/math workshop.

**Larger than or Shorter than**

Version 1: Students pull a number card and make a tower of that many multi-link (pop) cubes. Students then make another tower that is either taller than or shorter than their first tower.

Version 2: Students pull two number cards. They then make a tower that is taller than the smallest number and shorter than OR equal to the largest number.

**Start with/Get to**

Students pull a number card and make a pile or tower of that many multi-link (pop) cubes. Students then pull another number card and change their pile so that the new pile has as many multi-link (pop) cubes as the new number card. Students can record their start number and new number and how they changed it in their math journal. Example:

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| **Start number** | **New number** | **Change** |
| 3 | 5 | Put 2 more in |
| 8 | 7 | Took one out |
| 9 | 9 | No change |
| 2 | 8 | Put 6 more in |

**Longer than 10 cubes**

Students make a measuring tool out of 10 multi-link (pop) cubes. Students spend time walking around the classroom looking for items that are longer than their measuring tool.

**Evaluation of Student Understanding:**

**Informal Evaluation:**

* Observe and ask questions as students are building their towers. Ask questions about how they started the task and how they will know if their tower will be taller than the drink container/cup or shorter than the cereal box.

**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 vocabulary regarding length. Provide access to the words via a word wall, anchor chart, and allow multiple opportunities for students to talk about these concepts.

**Extensions:**

* Throughout the school day, find opportunities to compare three objects and describe their 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.
* The Additional Activities can be completed as centers at various times during the year.

**Examples of People Working Together**







