The Tallest Tower

1st Grade
Unit 5 – American Contributions
Text Connection: *The Man Who Walked Between the Towers* by Mordicai Gerstein

Design Challenge Summary
Challenge: What will the students be required to do?
Phillipe walked between the two tallest towers in New York City. Your challenge today is to build the tallest tower you can build with just 2 sheets of newspaper. Your tower must be able to stand on its own for at least 30 seconds without falling over. Challenge adapted from: **http://www.pbs.org/parents/zoom/engineering/**
Standards: What standards are addressed?
Science: NS.1.K.4 Estimate and measure length, mass and capacity/volume of familiar objects using non-standard units NS.1.1.1 Communicate observations orally, in writing and in graphic organizers NS.1.1.2 Ask questions based on observations NS.1.1.3 Conduct scientific investigations as a class and in teams NS.1.1.5 Collect measurable empirical evidence as a class NS.1.1.6 Make predictions as a class and in teams based upon empirical evidence NS.1.1.7 Use age-appropriate equipment and tools in scientific investigations **Math:** Mathematical Practice Standards 1.NBT.1 Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral. 1.NBT.3 Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, <. 1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object. 1.MD.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.* **Other:** W.1.3 Write narratives in which they recount two or more appropriately sequenced events, include some details regarding what happened, use temporal words to signal event order, and provide some sense of closure. SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups SL.1.3 Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood. SL.1.5 Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts or feelings SL.1.6 Produce complete sentences when appropriate to task and situation.

The Tallest Tower

Result: What will students know, value, and be able to do as a result of the lesson? What's the big idea?

Know and apply the engineering design loop process.
Demonstrate ability to modify designs based on observations and predictions.
Work collaboratively on solving a problem.
Experiment with the idea of how to make a "weak" material become "stronger" in a structural design.
Measure towers with connecting cubes and compare measurements to determine who built the tallest tower.

Assessment: What evidence will be used to determine student learning?

Did they build a tower that could stand on its own?
Did they follow the design loop process?
Did they work collaboratively?
Were they able to measure the height of their tower with connecting cubes and compare their measurements with those of other groups?

Prior Knowledge/Experiences: What prior content knowledge and skills will the students need?

Connections to the Mathematical Practices
Investigations/inquiry in Science
Experiences with measurement and use of connecting cubes as a non-standard unit of measurement

Summary/Connections: How will this design challenge connect with new/future learning, other content areas, real world experiences, etc.?

This lesson will help students develop problem solving skills and collaboration skills that are essential in succeeding in the 21st century. It will allow student the opportunity to transfer and apply skills from various content areas within one task.

As a summary activity, you could engage students in: **W.1.3** Write narratives in which they recount two or more appropriately sequenced events, include some details regarding what happened, use temporal words to signal event order, and provide some sense of closure.

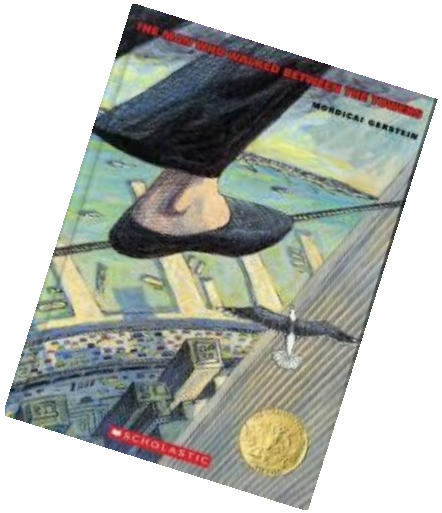
Extensions:
How could we make our towers even taller? What would happen if you were able to use tape? (about 8 in)
What would happen if we used books as a foundation to support the structure?
What would happen if we used a different type of paper?

Materials/Equipment/Preparation: What materials and equipment will students need to successfully complete this design challenge?

Newspaper – 2 sheets
Connecting Cubes – for measurement
Timer/stop watch

Engineering Scoop: How can you make a ***WEAK*** material like newspaper **strong** enough to stand up? One way is to ***change its shape***, like rolling it into a tube, crumpling it, or pleating it with folds. You also need to think about the different forces that are acting on it. The tower's weight is pulling the tower down. The surface on which the tower is resting is pushing back up. Small air movements are also pushing from the side and can blow the tower over. If you build a wide base as the bottom, this distributes the weight over a wider area and makes the tower more stable.

The Tallest Tower



Phillipe walked between the two tallest towers in New York City. Your challenge today is to build the tallest tower you can build with just 2 sheets of newspaper. It must be able to stand on its own for at least 30 seconds without falling over.

Group Supplies:
2 sheets of newspaper

Other supplies:
Timer/Stop watch, Connecting Cubes – for measurement