Learning is... so much MORE Than a Worksheet!

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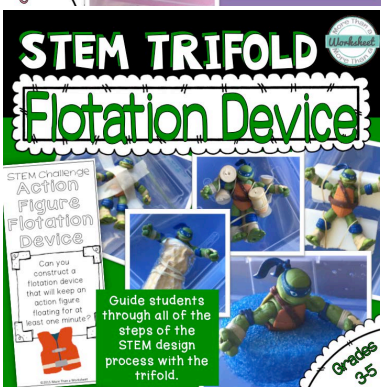

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Please feel free to contact me with any questions, concerns, suggestions, or specific praise ;)
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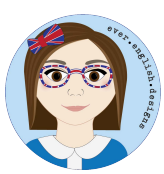
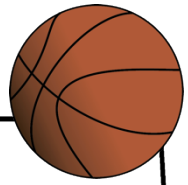


momgineer

STEM Challenge: Basketball Tower {Notes to Teacher}



Materials:
-newspaper
-masking tape
-basketball

Time Requirements:
Building: 25 minutes
Testing: 10 minutes
Repeat if possible!

Groups: 2-3 students

Science Background:

A basketball is pretty heavy relative to newspaper. In order for newspaper to support the weight of the basketball, the tower needs to be able to withstand the force of gravity that pulls the basketball down. Students will need to build a tower that is strong enough to not buckle under this weight.

To do so, students will need to find ways to make the newspaper stronger than it is. You can do this by rolling it into columns, folding it accordion style, crumpling it into a wad. Encourage students to find different ways to use the paper to create supports for the tower.

A basketball is quite large, so it will be important that students balance the weight by distributing it or spreading it out over a wider surface. They can do this by creating a larger base. Think about the base of the Eiffel tower.

For an Extra Challenge:
-For students who require an extra challenge, you can limit the amount of tape or newspaper used or create stricter time constraints.
-Try to create the tallest tower possible.

Tips and Suggestions:
-Grab LOTS of newspaper, or have students bring it in.
-It's easiest if you have a roll of masking tape for each student, but you can also have a few rolls that you walk around and dispense. You could also just tear 10-20 strips off for each group.

Procedure:

1. Catch students attention by bouncing a basketball.
2. Show a stack of newspaper. Ask students if they think newspaper could hold a basketball.
3. Pass out the challenge organizer (with or without guiding questions, depending on your needs).
4. Explain that they will be constructing a tower that will hold a basketball. They can use only newspaper and masking tape.
5. Guide students through the "Ask," "Imagine," and "Plan" sections. The boxes are designed to guide thinking and discussions and jot notes.
6. Give students time to create. I recommend 25 minutes, but you can do more or less based on your available time. I do recommend setting time constraints. Otherwise, students will go on forever ;) The first time you do a STEM project, it will be harder to fit in the constraints, but as your students get accustomed to the process, they will learn that they have to work efficiently and together to complete the project in the allotted time.
7. When completed, have students measure the height of their towers.
8. To test, place a basketball on the tower, and measure the time. You could test all of the towers together with everyone watching. To save time, I would often travel around and just help students test as they finished building.
9. If you have time allow students to improve and rebuild. This can be completed on the same day or the next day. Although it is time consuming, there is so much students can learn from creating a better design.

Name_____

Basketball Tower

START

Ask

Think about the shapes of various towers you have seen. What makes them stand? What makes them strong?

What are some different ways you can manipulate and fold the newspaper to build with it?

Imagine & Plan

Tinker around with the newspaper. What are some ways you could shape it to construct a tall and strong tower?

With your group, come up with a plan.

Create

Work together to create a newspaper tower that will support the basketball.

Test

Measure:

Tower Height

Test: Place the basketball on the tower. Does the tower support the ball for at least 20 seconds?

Circle: yes / no

Improve

Try to improve your tower. What can you do to make it taller or stronger?

If you have time, try it and test again!

Challenge:
Design a tower that can support a basketball.

Constraints:
*You may only use newspaper and masking tape.

*Time allowed _____

Success Criteria:
*Your tower should support a basketball for at least 20 seconds.

Bonus Challenge:
*Construct the tallest tower possible!

Name_____

Basketball Tower

START

Ask

Imagine & Plan

Create

Test

Improve

Challenge:
Design a tower that can support a basketball.

Constraints:
*You may only use newspaper and masking tape.

*Time allowed _____

Success Criteria:
*Your tower should support a basketball for at least 20 seconds.

Bonus Challenge:
*Construct the tallest tower possible!

Name_____

Basketball Tower

This is your assessment for your Basketball Tower STEM engineering challenge. As engineers, growing and improving is very important so that we can become skilled and model engineers.

STEM Engineering Levels:

N	G	S	M
Novice Engineer (7 points)	Growing Engineer (8 points)	Skilled Engineer (9 points)	Model Engineer (10 points)
Criteria is not attempted or is attempted incorrectly.	Criteria is attempted correctly, and there is room for improvement with the results.	Criteria is attempted correctly and met accurately.	Criteria is attempted and met accurately and in an exemplary way that serves as an example for other engineers.

Basketball Tower STEM Engineering Challenge Criteria	Engineering Level
Ask—Ask and answer questions to define the challenge, criteria, constraints. Consider what makes towers tall and strong.	
Imagine—Brainstorm with your group to generate and compare multiple possible solutions to meet the design challenge. Discuss different ways to construct the tower.	
Plan—Choose one design, and create a plan.	
Create—Create a tower using newspaper and masking tape. It should meet the design criteria (support the weight of the basketball for at least 20 seconds) and also adhere to the constraints for time and materials.	
Test—Conduct the test carefully by placing the basketball on the tower and measuring the time. Accurately record results of the test.	
Improve—Consider multiple possibilities for improvement.	

Grade: **Comments:**

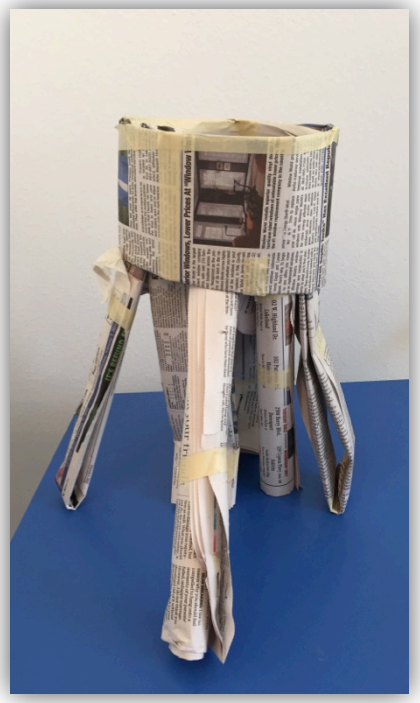
Basketball Tower Extension Menu

Language Arts Write a letter to your principal explaining why you think students should do more STEM projects. Be sure to use examples of what you have learned from this.	**Language Arts** Create a commercial persuading your audience to purchase your basketball tower.	**Creative Thinking** List all of the reasons why a basketball player might need a place to set the basketball down.	**Art** Decorate your tower with paint or other art supplies.
Math & Science Hang a small bucket, basket, or pouch from your tower. Measure how much mass it can hold without toppling.	**Engineering** Create a newspaper tower that is taller than you are.	**Technology, Engineering, & Art** Research a famous tower and draw an architect's blueprint of it.	**Math** Measure the approximate area and perimeter of the base of your tower.
Language Arts Write out step by step instructions for someone who wants to build a replica of your tower.	**Art & Language Arts** Pretend that your basketball tower is a famous tourist attraction. Create a magazine advertisement for it.	**Social Studies & Engineering** Use the newspaper or tape to create a replica of a famous tower, building, or other structure.	**Math** Measure the height of your tower.

Sample Towers

A note about examples: With all STEM engineering projects, I recommend that you do not show students examples ahead of time. They will tend to copy the examples. If you leave it open, they will amaze you with their creativity and ingenuity!

This tower was created by using rolled up newspaper to make 3 A-shaped structures. Then, those three were taped together to create a base. On top, there was a thick cylinder attached over the point of the base. Then, there was a paper hat-shaped piece placed inside the cylinder to hold the ball. It took a lot of trial and error to find a structure that would support the weight of the ball but also hold it without the ball rolling off.



For this tower, we made the thick cylinder to hold the basketball first. Then, we just added newspaper legs until it held up the ball. The legs were columns and also folded paper. (The columns worked best!)

Thank you!!

Thank you so much for downloading this freebie! I hope that you and your students love it! I am so honored that you took the time out of your busy day to visit my store. I appreciate you so much!
And in case no one told you this today:
☺ You are an amazing teacher ☺

Your feedback is important to me. You can reach me at sarah@morethanaworksheet.com Or you can also reach me using the Q&A section of my TpT Store, More Than a Worksheet.

Happy Teaching!
Sarah

The More Than a Worksheet Promise:
I promise to create engaging learning experiences that first and foremost make students think. They are rigorous, standards-based, versatile, and perfect for the teacher who wants to light a spark in students. Teachers don't have extra time to re-invent the wheel with each lesson, but you shouldn't have to sacrifice good teaching practices in lieu of textbooks, test prep, worksheets, and standards. Let me help you add critical thinking, creativity, and fun into your curriculum!

PS: I would LOVE to see pics of your completed projects!
If you are on Instagram, feel free to tag me @morethanaworksheet or use the hashtags: #stemchallenge #howdoyoustem or #morethanworksheet. I think it would be so cool to fill up Instagram with STEM challenge pics as a way to encourage more teachers to jump on board!