

Newspaper Tower

Overview

Science Concept	Try It Out	ZOOMon: Change One Variable	Share Results
Shape, stability, and strength of a building material	Build the tallest tower you can with two sheets of newspaper.	<ul style="list-style-type: none"> • Shape of the newspaper • Type of paper • If tape is used • Width of tower's base 	<ul style="list-style-type: none"> • How tall is your tower? • What limited the height of your tower? Why? • If you could use one other material to make your tower taller, what would it be? Why?

Science Scoop

The key to building a tower out of newspaper is to figure out how to make a weak and flimsy material strong. Newspaper is weak under **compression** (a pressing force that squeezes a material together). In other words, if you push the ends together, it collapses. Newspaper is somewhat stronger under **tension** (a stretching force that pulls on a material). That means you'll find it is harder to pull it apart. One way to increase the strength of newspaper is by changing its shape, like rolling it into a tube, crumpling it, or pleating it with folds.

To make sure your tower will stand up, you also need to consider the different forces acting on it. The tower's weight (caused by the pull of gravity from the Earth) is pulling the tower down. The surface on which the tower is resting is pushing back up. Small air movements are also adding forces from the side. Building a wide base at the bottom will distribute the weight over a wider area and make the tower more stable if it is pushed sideways by the air.





Changing the shape of the newspaper can increase its stiffness and strength. You can do this by pleating, crumpling, or rolling it.

The **type of paper** you use can affect the strength and stability of the tower. You'll find that stiff paper (like cardboard) makes a taller, more stable tower than flimsy paper (like tissue paper).

Tape can be used to stiffen the newspaper, particularly at the base, or to hold stable shapes, such as triangles or columns, together.

By building a **wide base**, either with paper or books, you can make the tower more stable.

Set Up

- Watch the Newspaper Tower video segment, and try the activity yourself before the meeting.
- Post the new ClubZOOM Board activities (see end of section).
- Set up a VCR and monitor to show the Newspaper Tower video segment (optional).
- Collect materials for the ClubZOOM Box. For each kid, make copies of the Newspaper Tower activity handout and the Stay Tuned (see end of section).



Materials		
<p>For Each Pair</p> <ul style="list-style-type: none"> • 2 sheets of newspaper • ruler • Newspaper Tower handout (see end of section) • Stay Tuned (see end of section) 	<p>To Share</p> <ul style="list-style-type: none"> • masking tape • books • different types of paper (tissue, wrapping, copier, cardboard, etc.) • hand wipes for cleanup • ZOOM Challenge (see end of section) 	<p>For Demonstration</p> <ul style="list-style-type: none"> • index card <p>Have extra materials available so the kids can test different variables.</p>



Find Out More

The Art of Construction

Salvadori, Mario. Chicago: Chicago Review Press, 1990.

The friendly writing style, drawings, and frequent examples using household items make this classic presentation of the physical science of structures accessible for kids.

Eyewitness Books: Force & Motion

Lafferty, Peter. New York: Dorling Kindersley Publishing, Inc., 2000.

This guide uses photographs, charts, illustrations, and models to introduce the basic science of force and motion.



Building Big Loads Lab

pbs.org/buildingbig/lab/loads.html

In this hands-on workshop, learn why structures like skyscrapers stand up—and what keeps them from falling down.

Forces and Structures

coe.ilstu.edu/scienceed/lorsbach/257forces.htm

This site includes a general overview of the types of forces acting on a structure.

Run the Meeting

1 Kick Off the Meeting (5 minutes)

Welcome the kids and ask for a volunteer to decipher the Stay Tuned. (Answer: Build a tower from paper.) Then have another volunteer read the ZOOM Challenge.

2 Try It Out (25 minutes)

- ◆ Try this quick demonstration to introduce the activity. Hold up an index card and announce that you want it to stand up on a table. Ask the kids if they think you can do this. Stand the card up on one edge and let it fall over. Then ask the kids if there's any way to make it stand up. (They may suggest folding it, rolling it, or tearing the bottom to make "feet.")
- ◆ Now introduce the challenge: Make two sheets of newspaper stand up as the tallest tower possible. You can't use tape, staples, glue, or other materials to make the tower. You can, however, bend, fold, or tear the newspaper.
- ◆ Distribute the activity materials and assist the kids as they make their towers. Encourage them to redesign their towers until they can't go any higher.

3 ZOOMon (10 minutes)

How can the kids use new materials to make their towers even taller? What happens if they add 20 cm (about 8 in.) of **tape**? What happens if they use **books** as a foundation to support the bottom of the structure? Or, what happens if they use a **different type of paper**, like tissue paper, copier paper, or cardboard? Make sure they change one variable at a time. Ask them to make a prediction of what they think will happen before they test it.

Activity Tips



- Remind the kids that looking at what other groups are doing is OK. They can learn from one another.
- Encourage the kids to redesign their towers several times, even if their first tower stands.
- In the ZOOMon, kids will find that tape can be used to stiffen the newspaper, particularly at the base, or to hold together stable shapes, such as triangles or columns. They'll also discover that building a wide base, either with paper or books, makes the tower more stable.
- You can test how well the towers stand up to wind by using an electric fan or waving a piece of cardboard near them.

4 Share Results (10 minutes)

Have the kids put all of the towers on a table and draw conclusions about their results.

- **What different approaches did the groups use to solve the problem?**
- **What is similar among the taller structures?**
- **What limited the height of your tower?**
- **If you could use one other material to make your tower taller, what would it be and why?**

Have the kids write or draw their results on the back of their activity handouts. If they have difficulty, use the questions above to guide them. Then have the kids post their results on the ClubZOOM Board.

Send It to ZOOM!

Remind the kids to send their results and ideas about **newspaper towers** to ZOOM. They can do this by mailing their activity handouts to ZOOM or by visiting the ZOOM Web site at pbskids.org/zoom/sendit/sci-exp.html

**ZOOM Links**

Visit the ZOOM Web site and continue experimenting with **structures made from newspaper**:

Newspaper Chair

pbskids.org/zoom/sci/newspaperchair.html

Support your own weight with newspaper!

Paper Tower pbskids.org/zoom/sci/papertower.html

Visit the online version of Newspaper Tower and see the results posted by other kids.

Super Golf Tower

pbskids.org/zoom/sci/golftower.html

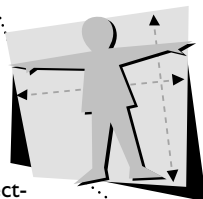
Build a tower that can hold a golf ball at the top using ten pieces of newspaper and 50 centimeters of tape.

5 Wrap Up (5 minutes)

Hand out the activity stickers and the Stay Tuned coded message for the next meeting.

Don't Forget Square or Rectangle!

Remind the kids to keep collecting data to add to the Data Chart. What **patterns** do they notice in the data collected so far?





Challenge

Dear ClubZOOMers,

Jen W. of Maple Springs, New York, has this challenge for you:

Build the **tallest tower** you can using just **two sheets** of newspaper.

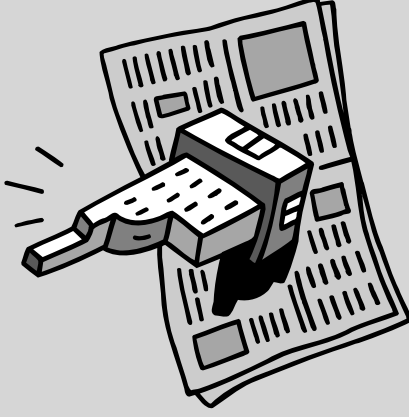
How high can you go?

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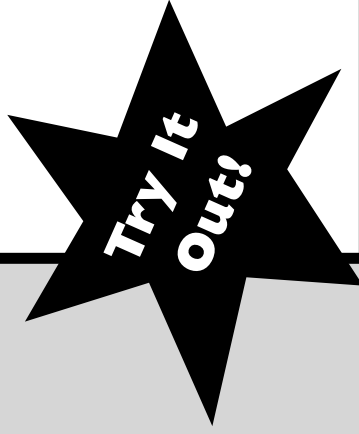
Newspaper Tower

What's the tallest tower you can build with just two sheets of newspaper?



What You Need:

- 2 sheets of newspaper
- ruler



Science 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 it over. If you build a **wide base** at the bottom, this distributes the weight over a wider area and makes the tower more stable if it is pushed sideways by the air.



1 Build the tallest tower you can. You can bend, tear, crumple, or roll the paper.

2 Try to make the tower **taller**. Keep **redesigning** it until you can't go any higher.

3 Use the ruler to **measure the height** of your tower. It must stand for at least **30 seconds** without falling over.



How can you make your tower even **taller**? What happens if you add 20 cm (about 8 in.) of **tape**? What happens if you use **books** as a foundation to support the bottom of the structure? Or, what happens if you use a **different type of paper**, like tissue paper, copier paper, or cardboard? Choose **one thing** to change (that's the variable) and make a **prediction**. Then **test it** and send your results to ZOOM.

Sent in by Jen W. of Maple Springs, NY



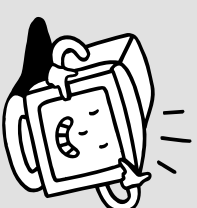
Send your ideas to ZOOM!

Dear ZOOM,

Here's what happened when I made a newspaper tower:



Write or draw here.



Send an e-mail:

pbskids.org/zoom/sendit

Then instantly print out a copy of ZOOMerang—a news-letter filled with cast trivia and lots of fun ZOOM activities.



Or, send a letter:

ZOOM
Box 350
Boston, MA 02134

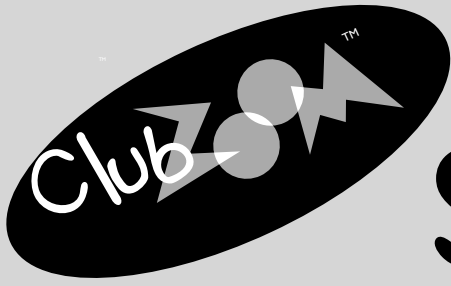
Don't forget to include your name and return address so we can send you a copy of ZOOMerang.

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All submissions become the property of ZOOM and will be eligible for inclusion in all ZOOMmedia. This means that we can share your ideas with other ZOOMers on TV, the Web, in print materials and in other ZOOMways. So, send it to ZOOM. Thanks!



pbskids.org/zoom



Stay Tuned

At the next meeting,
you'll be challenged to:

AGU SUB NEW OSI ASU ETI THA JEB
ORO SUM OLE VEN ASE



Crack the Code

Read the message by learning the **Sandwich Code**.

Here's how it works:

Just read the **middle** letter of each three-letter word. It's like each letter is in the middle of a sandwich! For example, here's how "SEND IT TO ZOOM" looks in Sandwich Code:

ASM WED OND EDY JIM STE ATU BOS AZE YOR LON OME

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Zoom phenom™

Keep in Chair

Stretch back in the chair and put your arms **across** your chest.

Put your legs **straight** out with your **heels** on the **floor**.

Get a friend to **press** his or her finger against your **forehead**.

See if you can **get up**.



Try It Out!

Sent in by Joyce of Texas

Zoom zinger™

Arm Stretch

Stretch your arm out so that it just **barely touches** the wall.

Then **bend** the same arm and **rub** your elbow hard for a few seconds.

Now **stretch** your arm back to the wall.

What happens?

Try It Out!



Sent in by Kimmi and Nicholas L. of Highland, IN

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Lauren S. of Watertown, Massachusetts, is a member of the ZOOMteam.

She has been in the hospital a lot and understands that at first it can be scary.

So she started a group called **Kid2Kid**.

In this group, kids who have been in the hospital talk to other kids who are in the hospital about what it's like.



pbskids.org/zoom



Join the ZOOMteam!

Visit the ZOOM Web site for ideas on how you can volunteer. Then tell us what you did, and we'll send you a **free** ZOOM Into Action wristband and iron-on T-shirt decal.

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funny™



What does an ice cube do when it's nervous?

Ha-Ha-Ha-Ha-Ha!

It breaks into a cold sweat!



Sent in by Keyonna W. of St. Louis, MO

Hee-Hee-Hee-Hee

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