canine House of cards



Kids test three common architectural shapes—a square, a triangle, and an arch—to determine which is the strongest. Then they choose one shape and build a two-story structure out of index cards and tape. To pass the building inspection, the structure has to be stable enough to support a jumbo dog biscuit.

prepare ahead

- Collect images of buildings and bridges that feature arches, triangles, and squares/rectangles. (See suggestions under "Materials.")
- Assemble several models of index card triangles, arches, and squares, so that groups of 4 or 5 kids can each have a set to examine and test. To form the shapes, see diagram below.



Lead the Activity Introduce Ruff's challenge. (5 minutes)

Hand out the activity sheets and explain that today's challenge is to construct a strong building out of tape and index cards, using one of three common architectural shapes—a square, an arch, or a triangle. Tell kids that buildings are made up of a lot of shapes they're familiar with. Show kids the images you collected and ask them to point out triangles, arches, squares, and rectangles.

- **Test.** (5 minutes) Display the index-card model shapes you made earlier. Tell kids that some shapes are stronger than others. They should examine the three shapes and choose the strongest one to build with (step 2 on the activity sheet).
- **Review the rules** for building listed on the activity sheet. Demonstrate rule #3—shapes must stand upright; they cannot rest on their sides.



materials

- Activity sheet for each kid
- 3" x 5" index cards (50 per kid)
- Transparent tape (2 kids can share a roll)
- 2 boxes of large dog biscuits
- Images of architecture from books or the Internet featuring arches (aqueducts, churches, tunnels), triangles (roofs, truss bridges, pyramids), and squares/rectangles (windows, doors)

National Science Education Standards

Grades K–4 Science and Technology: abilities of technological design

Grades 5–8 Science and Technology: abilities of technological design TM/© 2008 WGBH Educational Found

- **Brainstorm.** (5 minutes) Once they've chosen a shape, have kids brainstorm ideas for how they're going to construct the two-story building (step 3 on the activity sheet). Encourage them to keep their goal in mind (a strong building) but also to be creative. Strength is important, but architects and engineers also care about quality, beauty, and how something functions. Remind them to build something Ruff will like!
- **Build.** (25 minutes) When building, some kids may want to reinforce their structures by building shapes within shapes (e.g., squares within squares, or two arches within a larger arch). As long as they're using just one shape, this is fine. Tell kids that they are building with just one shape because that lets them judge the strength of that shape better. If they used two or more shapes, they wouldn't be able to tell which shape was doing the most work to support the structure.

- **Evaluate designs.** (5 minutes) When everyone is finished, pass around the dog biscuits around so kids can test their designs. Most buildings will easily hold one biscuit many kids will want to pile on more.
- **Discuss What happened.** (10 minutes) Gather as a group and line up the buildings.
- Ask kids how many biscuits their buildings could hold.
- Ask kids how many used triangles. Arches? Squares? (It's likely that kids used triangles or arches, but not index-card squares, which are extremely unstable.)
- Then have them talk about their buildings and what they like about their designs.

- **3 Award Points.** (5 minutes) Time to rack up some points! Review the activity's key ideas by asking the following questions, worth 50 points each:
- Which shape do you think is the strongest? (*Triangles*) Is there another shape that's also strong? (*Arches*)
- What is the most unstable? (Squares. They don't hold their shape under pressure.)
- How did you decide which was the strongest shape? (We tested them out by putting weight on them and moving them side to side.)
- How did you make your building strong enough to support a dog biscuit? (Answers will vary. Encourage kids who made a wide base to talk about how that helped stabilize their building.)
- Name some structures that use the three shapes we worked with today. (*Triangle: roofs, some bridges. Square/Rectangle: doors, windows. Arches: churches, tunnels, aqueducts.*)

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Build a two-story building for Ruff out of index cards, using just one shape—a square, an arch, or a triangle. Then see if it can support the weight of a jumbo dog biscuit on top!

f Get what You need.

- Index cards Tape Large dog biscuits
- **Test the shapes and Pick one to build with.** Tape together a square, arch, and triangle out of index cards, and test each one for strength and stability. Push down on them and rock them side to side. Choose one shape to build with—the one you think will make the strongest, most stable structure. Be sure to follow the building rules below.

Building Rules:

- **I.** Build with one shape only.
- **2.** Your building must be at least two stories high.
- **3.** You cannot lay a shape on its side.
- **4.** You can tape shapes together.
- **5.** You can build a flat platform on top for the dog biscuit.

- **Brainstorm some ideas** about the best way to build your two-story building. How wide should you make the base? What kind of surface or platform will be needed to support the dog biscuit?
- Build a two-story building. Use tape and index cards to construct a building out of the shape you chose.
- **5 Test Your design.** Can you place a dog biscuit on top without it falling off or the building toppling over? Can your building support even more dog biscuits? If not, redesign. You can even start over using a different shape.

chew on This!

The material that a building is made from—wood, concrete, brick, or steel, for example—affects how strong and stable it is. But the shapes used to build a structure also help the structure support weight. In this activity, you tested three commonly used architectural shapes: arches, squares, and triangles. The material you used was weak (thin index cards), so you had to rely on the shape to help provide strength. And, now that you've tried this out, you know which shape is the strongest of them all!









Shapes must be upright (see triangle at left), not on their side (at right).

Cool Science Jobs!

Like designing buildings? Then you might love one of these jobs.

Architectural Engineer

An architect decides on the form and appearance of a building, but it's the architectural engineer who makes sure everything inside it works. A skyscraper might need fast elevators, a concert hall might require soundproofing, and a "green" school might light its rooms with solar energy. An architectural engineer has the expertise to make it all happen!

Engineering Geologist

The leaning tower of Pisa leans because it was built on unstable ground. If only the town of Pisa had hired an engineering geologist! Before a building is built, engineering geologists study the rocks and soil beneath it, making sure it has a stable foundation. They also evaluate whether buildings, bridges, and roads face dangers like landslides, earthquakes, and flooding.



Watch the related FETCH! episode, "When Home is a House of Cards," on PBS KIDS GO! (check local listings) or visit the FETCH! Web site at pbskidsgo.org/fetch.



FETCHI is produced by WGBH Boston. Major funding for FETCHI is provided by the National Science Foundation and public television viewers. Corporate funding is provided by Greendog®. This FBTCHI material is based upon work supported by the National Science Foundation under Grant No. 0714714. Nay opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation. © 2008 WGBH Educational Foundation. All rights reserved. FETCHI, the characters and related indicia are trademarks of the WGBH Educational Foundation. All third party trademarks are the property of their respective owners. Used with permission.



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canine House of cards

Sure, I may be a dog with a TV show, but I've got even bigger dreams, like owning my own media empire radio, TV, magazines, movies, and more! I can picture it now ... goodbye Studio G, hello RUFF WORLDWIDE MEDIA COMPLEX! Build me a model of my new headquarters—and make sure there's a dog bone statue on top. I want everyone to know a dog runs the show!