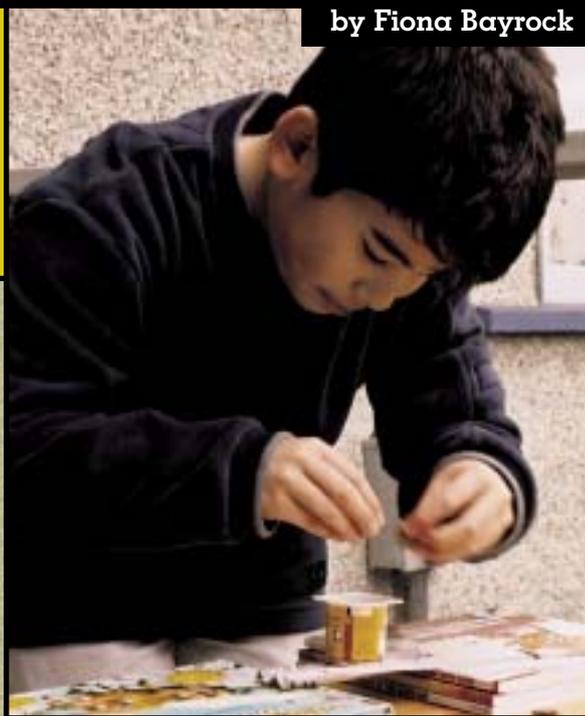




Money Bridges

by Fiona Bayrock

Engineers can often make whatever they're building stronger and safer by changing the shape of the materials they use. A bridge deck made from flat paper won't hold much weight. But can you change the shape of the paper to make a "bridge" strong enough to support a container of pennies?



Alli Jude Isabella

Instructions

1. Place the book piles on a table, about ten centimetres apart, with spines facing each other.



2. Fold the bill lengthwise about one centimetre from the edge.
3. Pinch along the fold to make a sharp crease.
4. Fold again about one cm from the first fold, this time in the opposite direction. (You're making a fan.) Continue folding and creasing until the whole bill is folded like a fan.

5. Place the bill lengthwise on top of the books, forming a "bridge" between them.

6. Place the container in the middle of your "bridge" and gently add pennies to the container, one at a time. How many pennies can you add before the bridge collapses?



Materials

- Books (two piles about three centimetres high)
- New dollar bill
- Empty single-serving size plastic container (from yogurt or pudding)
- Pennies

What's Happening

A flat-paper bridge deck is so flimsy, it may not even support itself. The fan-fold shape is stronger. The pleats, with the creases going from one book support to the other, act like beams. You have increased what engineers call "effective thickness"—that is, you haven't made your paper any thicker, but the new shape makes it behave as though you had.

You can see this design in corrugated cardboard. Three layers of cardboard are much stronger if the middle layer wiggles back and forth between the other two.

Can you think of another way to change the shape of paper to make it stronger? You be the engineer!

Kids, Try This At Home!

Goodie-Goodie Gumdrops Dome

How do you get a roof 210 metres in diameter to stay up? You make it dome-shaped. The Louisiana Superdome is the world's largest steel-constructed room unobstructed by posts—a dome! Try making your own low-tech dome.



Materials

- Round toothpicks
- 30 gumdrops



Instructions

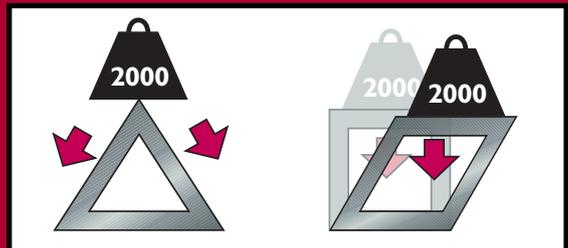
1. Form a base by connecting five gumdrops in a ring.
2. Make a triangle on one side of the base using two toothpicks and one gumdrop.
3. Repeat step 2 all the way around the base until you have five triangles.
4. Connect the gumdrops at the top of the triangles with toothpicks. You should have ten triangles.
5. Insert a toothpick into each top gumdrop and use one gumdrop to connect them all.
6. To continue the project, start over again and make a base with six sides instead of five sides and see what happens.



7. Eat the remaining gumdrops. Unless it's too close to dinner time.

What's Happening

Your dome is constructed entirely of triangles. Triangles are often used in engineering because they are stable shapes. When a load is put on a triangle, its sides work together to keep the triangle stable. Because it's not easily deformed by the loads placed on it, the triangle is the key to building strong structures.



Amazing Dome Facts

- ▶ Stretched out, the electrical wiring (including fibre optic lines) in the Louisiana Superdome measures 640 kilometres.
- ▶ Toronto's SkyDome has 88 washrooms and a total of 1,280 toilets. The women's toilets outnumber men's by 4 to 1.
- ▶ Vancouver's BC Place Stadium is the largest air-supported domed stadium in the world. The roof is made of fibreglass and Teflon but is stronger than steel.
- ▶ Rome's Pantheon—43 metres in diameter—was the world's largest dome for 1,300 years. It was finished in the year 123 A.D.