

ENGINEER THAT!

One day, your child may have a job that doesn't even exist yet! She'll need creativity, problem-solving skills, and persistence—qualities that engineers rely on. Share these projects to help your youngster think like an engineer and enjoy taking on challenges

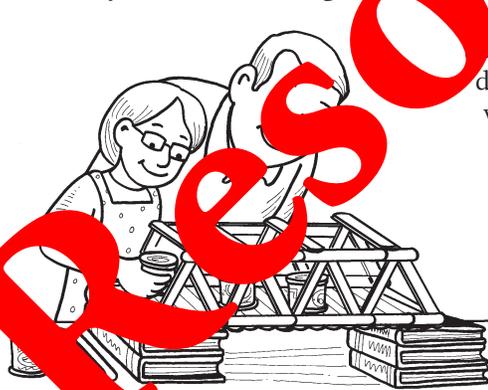


BUILD A STRONGER BRIDGE

Let your child construct a bridge to explore what kind of design supports the most weight.

Materials: books or internet access, craft sticks, glue, tape, soup cans

Together, look at photos of bridges in books or online. Talk about design elements, such as arches, vertical beams, or triangular supports. This will give your youngster ideas on different ways to build her bridge.



Using craft sticks and glue, can she design a bridge that will support one or more cans? To test her bridge, she should rest it atop two stacks of books. Add cans one at a time.

Suggest that your child rede-

sign her bridge so it holds more cans. For instance, a series of connected triangles (called a *truss*) is one design element engineers use to make strong bridges.

DON'T STOP SPINNING!

Generations of children have played with spinning tops. No need for your youngster to buy a top to see how its motion keeps it balanced—he can create his own.

Materials: old CDs, bottle caps, tape, marble, timer, pennies

Have your child tape a bottle cap over the hole in a CD. He should place a marble on the table and carefully set the CD over it so the marble fits into the hole. To spin the top, he'll need to grasp the bottle cap, twist quickly, and let



ENGINEERING STEP BY STEP

How do engineers design rockets that launch into orbit or running shoes that help athletes run faster? Here's a framework your youngster can use to tackle engineering projects.

- **DEFINE THE CHALLENGE.** Maybe you'd like to play pinball, but you don't have a machine, so you decide to build one.
- **DO RESEARCH.** What designs already exist that you can draw from? You might examine a real pinball machine or look at photos to see what parts include a ball launcher, tube, obstacles, flipper.
- **DESIGN.** Create a model. Sketch out possibilities, gather materials, and experiment.
- **TEST.** Does your design work? Spin the model through its paces. Do the flippers move? Does the ball bounce off of obstacles?
- **REDESIGN AND RETEST.** Use what you learned from your test to improve your model, and test it again. The flippers may need to be longer or sturdier, for instance.
- **REPORT.** Continue to design and test new models until you find a design that lets you play a game of pinball.

go. Help him time how long it stays in motion before any part of the disc touches the table.

Now suggest that he tape a penny to the top of the bottle cap, then spin and time the top again. He should stack and tape additional pennies, one at a time, testing and timing the top after adding each coin. What happens? The more pennies he adds, the longer the top spins. That's because a heavier disc stores more energy, which keeps it going longer.