# DEMOLITION BY **SLINGSHOT**

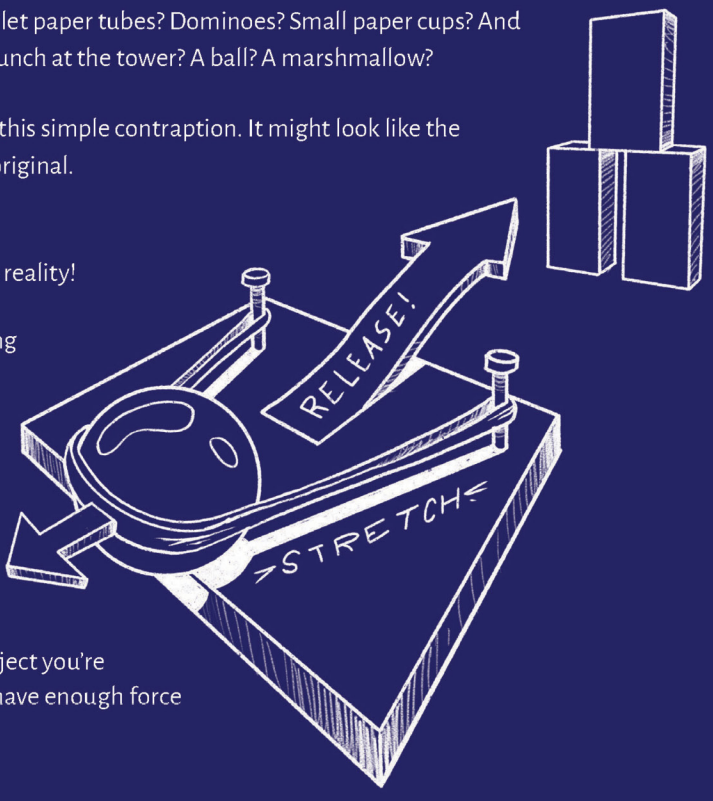
**Let's start with a simple task—demolishing a tower with a slingshot. In this challenge, you can practice following the engineering design process—from brainstorming and drawing a plan to building, testing, evaluating, and possibly redesigning your contraption.** Not only will you learn to follow the engineering design process, you will also gain experience with the elastic potential energy of rubber bands and get ideas for future contraptions.

**Always be careful when launching objects. Never aim at people or other living creatures.**

**Challenge Identified.** Demolition! In this first, very simple contraption, create a slingshot and use it to knock over a tower.

**Brainstorm ideas and supplies.** Obviously, you need a rubber band. What about the base of the slingshot? You can make a simple one with a rubber band, two pushpins (or nails), and a piece of wood. If you don't have any wood, think about other things you could use instead, perhaps several pieces of cardboard glued together or empty toilet paper rolls. How do you want to secure the slingshot to the tabletop? Duct tape? Why do you think you need to secure the slingshot? Next, what can you make the tower out of? Empty toilet paper tubes? Dominoes? Small paper cups? And what kind of object do you want to launch at the tower? A ball? A marshmallow?

**Draw a plan.** Sketch out a plan of this simple contraption. It might look like the drawing below, or it could be totally original.




**Build.** Time to turn your plan into reality!

* Assemble the slingshot by pushing the pins into the piece of wood a couple inches apart. Attach the rubber band to the two pins. You have a slingshot!
* Secure the slingshot to the surface you're using.
* Build the tower—any size you like, but keep in mind that the object you're launching at the tower needs to have enough force to knock over the tower.



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- **Test.** Aim the slingshot at the tower and load the object you are launching. Pull back and release the rubber band. Ziiiiing!

- **Evaluate.** Is your tower still standing? Was there too much or not enough force? Did the object launch in the direction you wanted it to? What can you adjust to keep the object on the right path? In addition, did you pull the rubber band back far enough, storing enough potential energy in it to launch the object?

- **Redesign.** Based on your evaluation, redesign your simple slingshot if necessary. You could try using different objects to launch or make the tower smaller or out of something different. The redesign could include "guardrails" to keep your object moving in the right direction. After redesigning, test it again.

## CONTRAPTION TIP!

Sometimes, engineers and other creators use backward design during the planning phase of the process. That means starting with what you want to accomplish. In this case, the end goal is to launch the object you've chosen. Working backward, decide how you might hold back the rubber band that will launch it. Next, plan the step before that. Keep thinking backward from there.

### Trampolines

If you have ever jumped on a trampoline, you have experienced both elastic and gravitational potential energy firsthand! The trampoline mat itself is like one giant rubber band. And as you jump, gravity is at work.

When you jump up, your gravitational potential energy increases—and the higher you jump, the more potential energy you have. Then, at your highest point, you have a maximum amount of gravitational potential energy. As you begin to fall back toward the trampoline mat, that energy is converted to potential energy.

Also at play (pun intended) is the elastic potential energy of the trampoline. When you land on its surface, the trampoline's springs and mat stretch due to your weight—this stores elastic potential energy. This is then converted to kinetic energy and up you go!



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