The Tech Interactive at Home

DIY Grabbers

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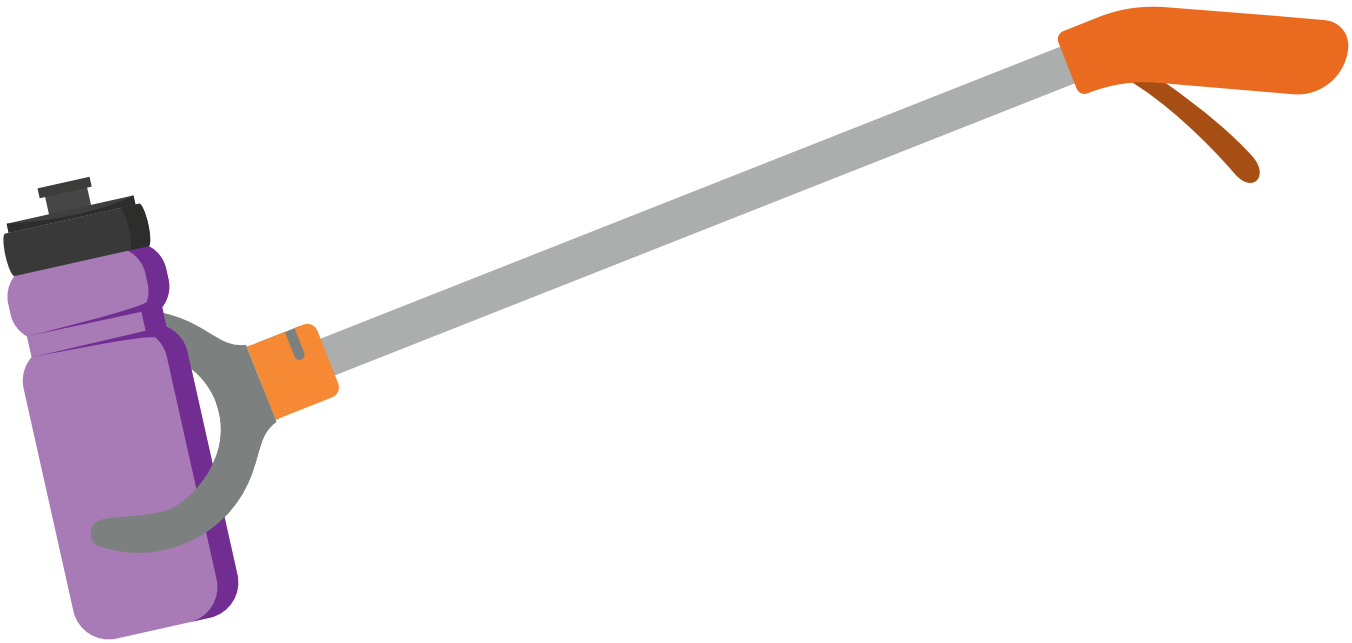
Who says all the fun has to happen at The Tech Interactive? This DIY engineering activity can be done with inexpensive store-bought supplies and things you find around the house!



Introduction

Grabbers are handheld tools used to aid a person's reach and pick up items. Grabbers are often mechanical, meaning they have moving parts that the user can control, but there are lots of different types of grabbers. As the name suggests, the mechanism on these designs will be used for grabbing things! In addition to creating with simple machines, building a grabber will give you a practical tool you can use around your house!

Design Challenge

Design a device that can pick up three different objects from at least three feet away.

Materials

Check out the suggested materials to get started, but don't limit yourself to what is here. Look around your home and think about what items could fit in the categories on the next page. In addition to what you're picking up, you will also need to think about how to extend the reach of your grabber to at least three feet.

Subject:
Design Thinking

Ages:
8-12

Time:
45+ minutes

Key concepts:
Mechanics, motion, structure, simple machines

Things you can use

Don't limit yourself to the items on this list. Use whatever you have on hand — be creative!

Items to create reach and structure	Items that can enable motion	Items that can stick, grip, or grab
• Rulers • Paint sticks • Broom or mop handles • Long cardboard tubes • Cardboard • Food and drink packaging	• Straws • String or yarn • Rubber bands • Hair bands • Craft sticks • Hair clips • Chip bag clips	• Gaffers or painter's tape • Rubber bands • Hair bands • Silicone bakeware • Hooks

Fasteners	Tools
• Paper fasteners • Twist ties • String • Rubber bands • Hair bands	• Scissors • Tape • Hot glue • Hole puncher

Instructions

Define the Problem

A successful grabber can be defined in many different ways, but it should always be able to pick up an object without damaging or dropping it. Think about **what** you want your grabber to grab. Consider the texture, size, and shape of the objects around you.

- Specialized grabbers can pick up many similar objects, such as a bag of crackers, a bag of dried fruit or a bag of cereal.
- Versatile grabbers can pick up many objects with different characteristics, such as a water bottle, a stuffed animal or a box.

It is up to you to decide what your grabber should do!

Create

Now that you've decided on objects to test with, think about **how** you want your grabber to function. What kind of moving parts could you make? Keep your test objects nearby for reference and think about how you can get the grip and length you need to successfully retrieve them.

As you build, do some small tests as you go along. See if you can pick up the items you selected from a table or the floor. Don't be afraid to try several methods of retrieving the items as you build. This will help you narrow down what materials work best for your design.

Top Tips

For younger designers, try building a specialized grabber that targets one test item. For example, can you pick up your favorite stuffed animal?

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Test
Since your device may be long, make sure you test in a space that has plenty of room. You don't want to accidentally hit others or knock things over! If you are able, set up a line three feet away from your objects and stand behind it during the test.

Try to test and rebuild several times. After each test, consider writing down how it went.

- Did the grabber meet the goal you set?
- Are there ways it can be improved?

Engineers are always iterating and improving their designs, and writing down your notes and observations is a great way to help guide you in redesigning.

Explore More

- **Customize:** Grabbers do not have to be just functional. Embellish your design however you wish.
- **Talk to a user:** Do you know someone who uses a mechanical grabber in everyday life? Ask them what they use it for, and what kind of challenges they have while using it.
- **Keep experimenting:** Try these suggested design challenges or create your own grabber challenge!
  - **Pass me a drink challenge** - Design a grabber that can hand someone a water bottle across the room while you are both sitting.
  - **Social distancing challenge** - Design a grabber that can pass someone a tissue while maintaining social distancing space.
  - **Versatility challenge** - See how many different types of objects your grabber can pick up.

Looking for some inspiration?

See if you can reverse engineer one of these everyday designs.

Share Your Results! Keep us posted about your design challenges on social media with **#TheTechatHome.**

Top Tips

A **lever** is a common simple machine you might incorporate into your grabber design. A lever is a bar that rotates around a pivot point like a seesaw. Shifting the pivot point can change how much force it takes to move one end of the bar and how far each end of the bar moves. Try moving your pivot point to see if it changes the functionality of your grabber!