

Discovering How It Works (For children ages 5-8)

Assembling and disassembling simple machines for a fun, hands-on experience with tinkering, technology, and the use of tools.

30-40 minutes (can be divided into 2-3 shorter segments)

Skills Developed:

- Creative thinking
- Fine motor coordination
- Sequencing
- Decision making
- Problem solving
- Using tools

Materials Needed:

Choose one simple, small, safe, and easy-to-put-together machine from the list below.

- Manual food grinder (can be found in housewares stores, or restaurant suppliers) and Play-Doh® for grinding
- Manual press juice squeezer, oranges or lemons, and a cup to catch the juice
- Plant mister (pump kind), a small amount of water, and food coloring
- Basket or box to hold the parts
- Newspaper or a plastic cloth to cover the table

What's the Science?

Simple machines are tools that make work easier. The three machines used in this activity are: lever, wheel/axle, and inclined plane.

Lever

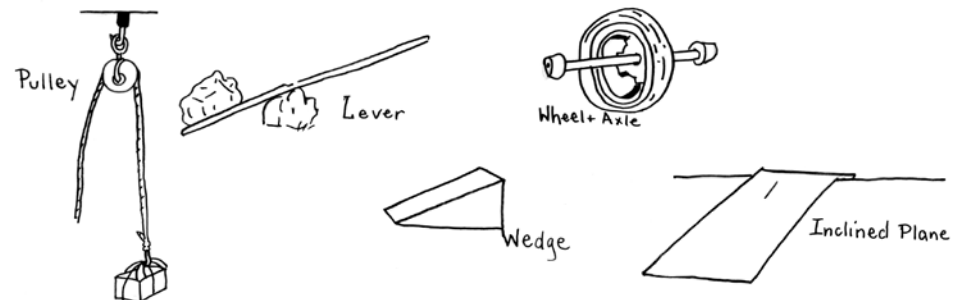
A lever makes things easier to lift or move. The handle on a manual juicer is a lever that works to push the liquid out.

Wheel/Axle

A wheel/axle helps to create motion. A food grinder is an example of a wheel/axle machine.

Inclined Plane

An inclined plane makes it easier to move heavy things. The plane is a sloped surface, like a ramp. A screw is an inclined plane wrapped around a cylinder.



Getting Ready:

Choose a machine and practice taking it apart and putting it back together before you begin. Cover the table with newspaper or a plastic cloth, disassemble the machine, and put all the parts in a box or basket.

Activity:

1. Tell your daughter that together you will explore how things work. Explain that the parts in the basket fit together to make a working machine and she can take as long as she needs to figure out how they all fit together.
2. If you need to, ask a few questions to help her start:
 - Does this part look like it could attach to anything else?
 - Are there any shapes you can see that look like they might fit into each other?
 - Do any of these parts look like something you've seen before?
3. Once the machine is assembled, ask what she thinks the machine is used for.
4. Have fun using the machine for its intended purpose — grinding, spraying, juicing.
5. As you and your daughter take the machine apart for cleaning and storing, review the parts and count them. Compare the shapes to each other, and to familiar things in the world around them. For instance, the spiral in the food grinder is like the spiral in some kinds of seashells.

Remember, your job is to facilitate, not do the work. Sometimes it's hard to watch your child struggle when you could do it for her in a minute, but it's VERY important to let your daughter figure it out for herself.

Activities for different age-levels:

5-6 year olds

Look around for machines you use every day, such as manual egg-beaters, mixers, safety scissors, or vacuum cleaners. Discuss what each machine does.

Save some shirt cardboard or other large pieces of thick paper. Get a glue stick or jar of paste. Gather magazines (car, computer, or homemaking) with pictures of a variety of machines. Cut out pictures and paste onto the cardboard to make a "machine" collage.

7-8 year olds

Create a "machine book." Ask your daughter to name all the machines your family uses. List the names and descriptions. You can write the word and your daughter can copy it. Illustrate the book with drawings or cut-out pictures. Ask your daughter to imagine machines she'd like to invent, perhaps to pick up toys or make the bed. Draw pictures and write stories about these inventions. Leave blank pages to add more later. Bind the book by stapling along the edges or with a paper fastener or twine. Read it together.

Activities for different age-levels (con't)

Gather a manual drill, a variety of screws and screwdrivers, and pieces of wood (preferably pine). Cover a table or counter with several layers of newspapers. Let your daughter experiment with screwing pieces of wood together, trying different sizes and types of screws and screwdrivers. Use safety goggles when working with tools, and be close at hand to supervise the activity.

If Your Child Has a Disability

All the activities can be done with children with a wide range of disabilities by making some modifications. You are the best judge of what those modifications might need to be, but here are some suggestions that have worked well.

For a child who is blind or visually impaired:

Put the machine parts in a tray rather than a box or basket. Start with an assembled machine and let your daughter take it apart and handle each part before reassembling.

For a child who is deaf or hard of hearing:

Name the machine in ASL and English (or child's native language). Have your daughter draw each part of the machine and label it.

For a child who is physically disabled:

Put the machine parts on a tray. Choose a machine that is workable for your daughter — for example, a larger machine such as a food grinder. Let your daughter do as much of the assembling and disassembling as possible. If she uses a communication device, include "machine" words.

For a child who has learning/emotional disabilities:

Select a machine that you feel will be most successful for your daughter. Start with the assembled machine before taking it apart and then reassemble. Allow plenty of time. Do the activity in small (10-minute) segments.



©Copyright 2009 Educational Equity Center at AED

This material is based on work supported by the National Science Foundation under grant no. HRD-0833022. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect those of the National Science Foundation.

Design by Rappy & Company, NYC. Illustrations by Nate Ripp.

**Science:
It's a Girl
Thing!**