



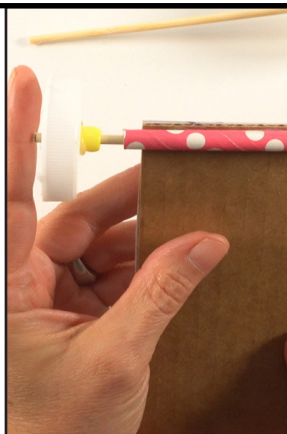
SCRATCH MAKING

Build engineering literacy while inventing with basic materials

WHEELS & AXLES

A Simple Machine used for lifting, locomotion & movement. A wheel is a series of levers in a circle usually attached to a rod or shaft called an axle.

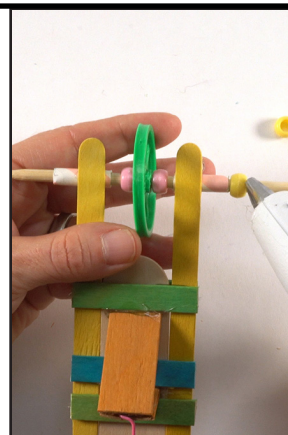
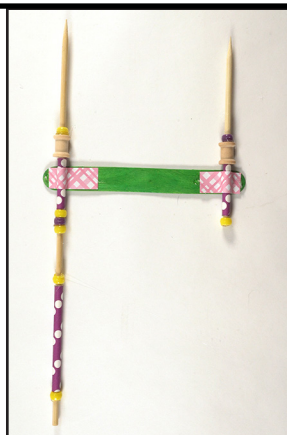
- Bamboo Skewers & Dowels
- Wire
- Lids, Spools & CDs
- Cardboard & Paper Circles
- 3D Printed Wheels



BEARINGS & BUSHINGS

Objects that assist other parts with rotation and lessen friction. Best friends of the wheel & axle.

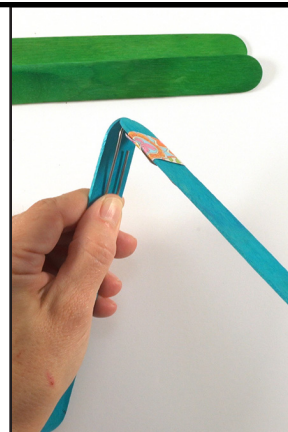
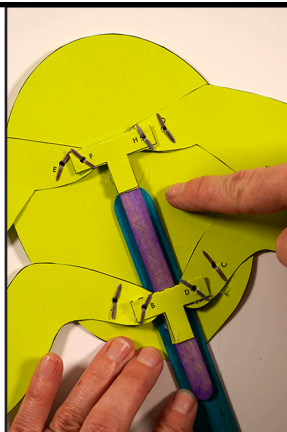
- Paper Straws
- Plastic Straws
- Pony Beads
- Spools
- Cardboard with Holes
- Stiff Materials



LEVERS

A Simple Machine used to increase force, lift and move objects. Made with a rigid beam that rotates around a point called a fulcrum.

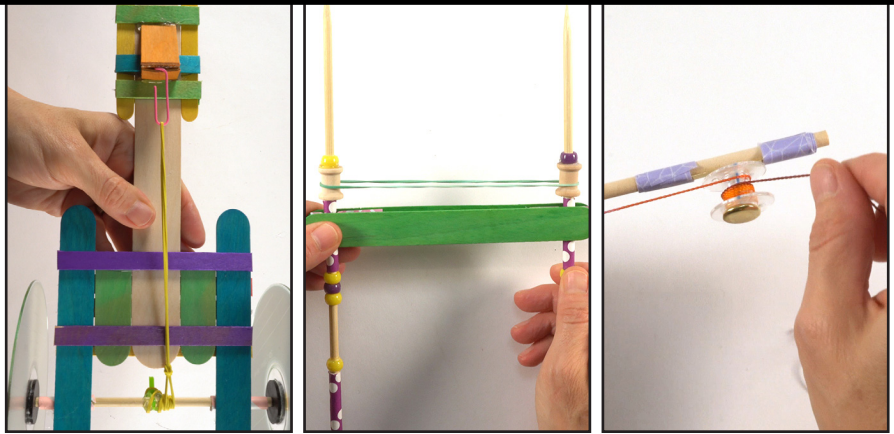
- Large Brads
- Small Brads
- Paperclips
- Clothespins
- Stiff Materials i.e. Cardboard & Plastic



PULLEYS

A Simple Machine used to multiply force and lift weight. Made with a cord or rope wrapped around a wheel & axle.

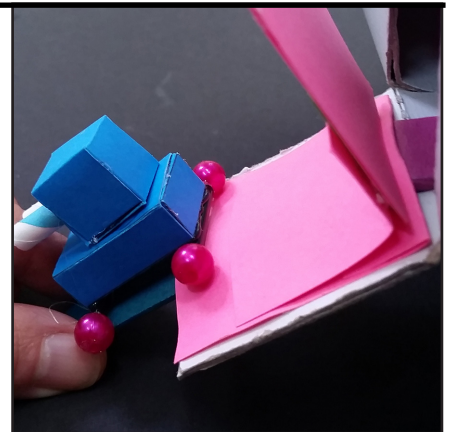
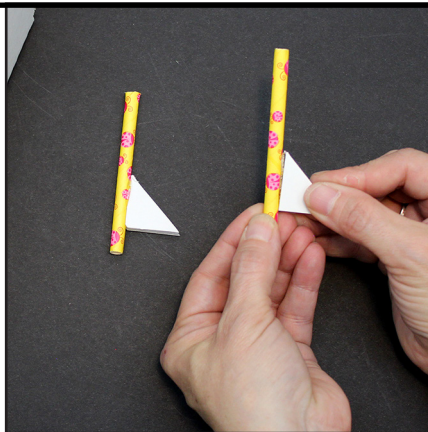
- Bobbins, Straws & Brads
- Spools & String
- Rubberbands & Skewers
- Retractable Conference Badges



INCLINED PLANE

A Simple Machine made of a tilted surface or ramp. Used to make lifting and transport easier. Also used as braces or trusses to distribute weight.

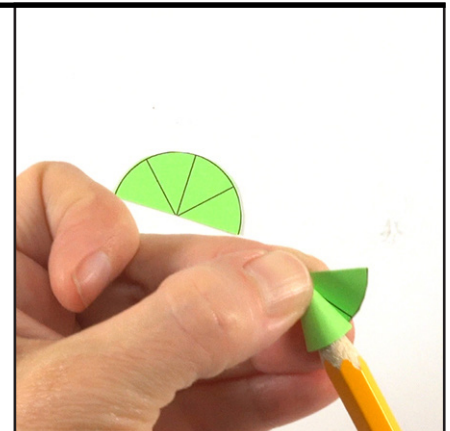
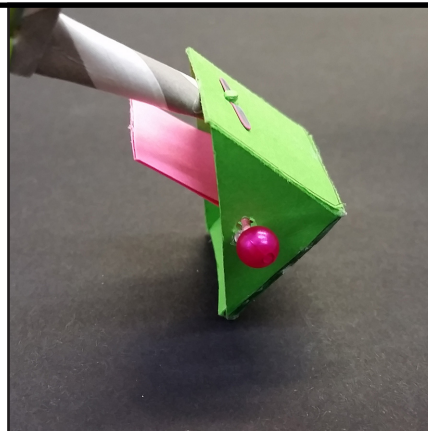
- Cardboard
- Foam Core
- Foam Math Squares
- Other Stiff Materials



WEDGE

A Simple Machine that has rigid rods or sides that taper to an edge used for splitting and cutting. The edges of a wedge are made with inclined planes.

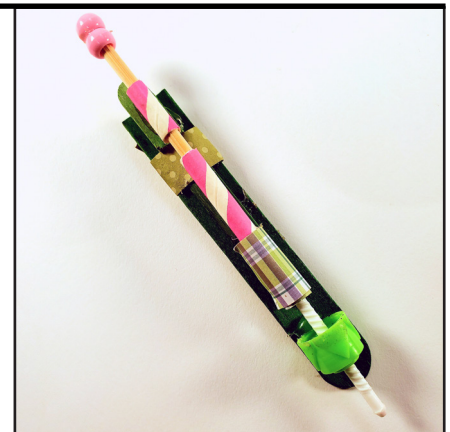
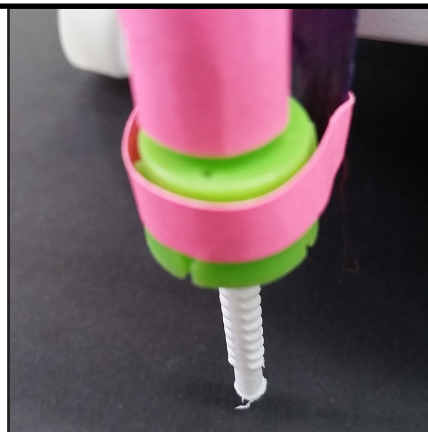
- Skewer Point
- Paper Scoops
- Paper Cones
- Plastic Utensils



SCREW

A Simple Machine used for connecting objects and lifting. A screw has an inclined plane wrapped around an axle.

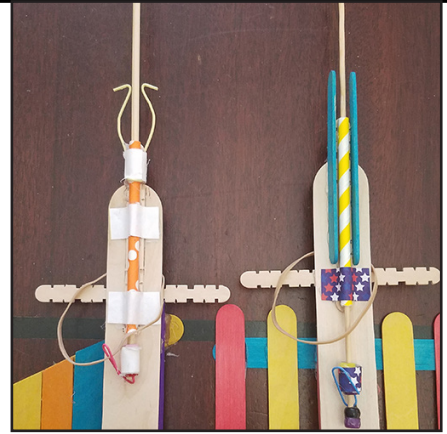
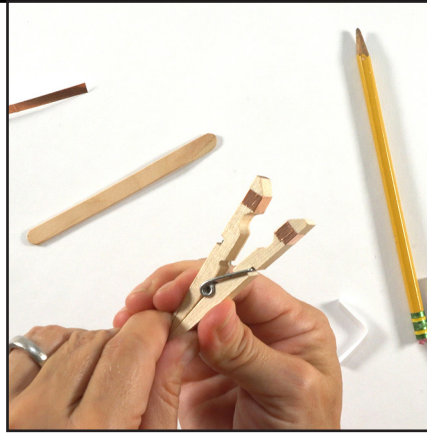
- Re-purposed Glue Sticks
- Re-purposed Chapsticks
- Skewers & Pipecleaners
- Hardware Screws



SPRINGS

An elastic object that stores mechanical potential energy often in a coil. It releases force when decompressed.

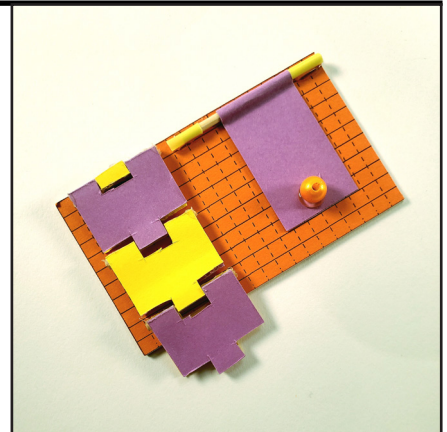
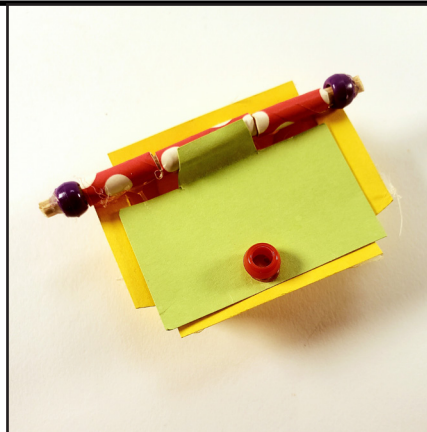
- Metal Paperclips
- Rubber Bands
- Re-purposed Pens
- Clothespins
- Metal Springs



HINGES

A door, gate or hatch that swings open with the use of levers, axles & bearings.

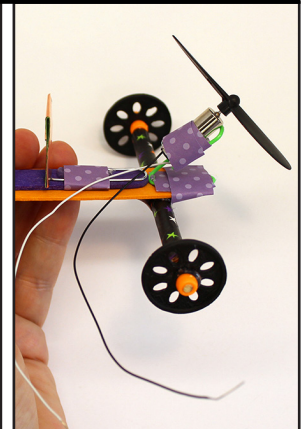
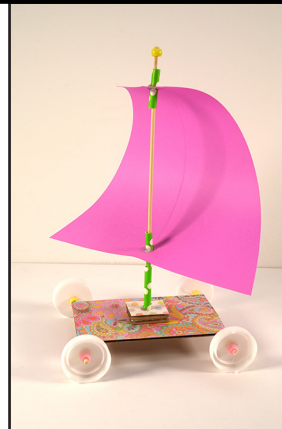
- Skewers & Toothpicks
- Paperclips
- Straws (Various Sizes)
- Beads
- Cardboard
- Florist Wire



PROPULSION

A force that pushes something forward. Can be created with many basic objects.

- Balloons
- Paper Foils
- Rubberbands
- Paperclips
- Springs
- Motors
- Propellers



CIRCUITS & SWITCHES

You can design scratch circuits with many basic items.

- Metal Paperclips
- Binder Clips
- Brass Brads
- Copper Tape
- Paper Battery Boxes
- Popsicle Sticks
- Small Electronic Switches

