

Engineer

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Strength of Hollow Tubes:

Begin the demonstration by laying a brick on a Styrofoam cup laying on its side. Place another cup on its rim and add bricks (2 to 3) until it crushes. Glue four cups together rim to rim and bottom to bottom with white glue and allow to dry. Place bricks (usually four) on top until the structure crushes. Demonstration shows the use of columns in engineering and bridges.

Pulleys:

A simple pulley is when you have a single pulley with the rope going through it. When a simple pulley is used, you are pulling downwards to lift the object up, thus using your weight to help you. Thus with a simple pulley you can only lift an object that weighs as much as you.

A common example of a pulley is a bicycle rear sprocket connected by its chain with the chain wheel.

Levers:

A lever helps you to lift things easily. A lever can be made by laying a plank over a wooden log or a can with both ends intact. Balance the plank so that there is a short end and a long end. Place the short end under the object to be raised and push down on the long end. Try raising some bricks. To experiment you can try to raise things with the short end and you will find that it is more difficult or not possible to raise the object. The longer end of the plank gives you the ability to create more force and therefore raise weights easier.

Common Levers:

- 1) Door - Easier to push by door handle then by hinges.
- 2) Wheelbarrow - Wheel is the balancing point.

Experiment: Obtain a 2 x 4 piece of wood and place a can or a wooden log of the same diameter on one chair. Try to lift a scout in a second chair by placing the plank over the log and under the second chair and lift. Don't try to lift too fast or high or the second chair will tip over with the boy in it.

Springs:

Springs store energy when compressed, which is released when the is released. Catapults are a form of springs.

Energy Racer: This toy makes use of the spring use of stored energy. The stored energy in the case is in the rubber band. Push a thumb tack part way into one end of a wooden spool. Use a rubber band just a little longer than the spool. Push it through the spool and loop it around the thumbtack. Thread a short stick through the rubber band loop, wind it up. Release the energy racer on the floor.

Le Mouse 500 Racer: Remove the bait pan and hook arm from a mousetrap. Cut a 1/2 inch V-notch at the rear; sanding and waxing it so the string will slide smoothly . Turn it over and screw in small screw eyes 1/2 inch from the edge. Axles are cut from coat hanger wire. Make the wheels by sawing 3/16 inch sections from 1 1/4 inch dowel. Drill holes in the center of the wheels. Pound flat the ends of the axles and push the axles into the holes in the wheels. Glue in place. With sandpaper, roughen the rear axle where the string will be wound. Tie the string to the snapper, but not to the axle. To run the snapper, pull snapper back and hold it with your thumb. Wind the string onto the rear axle until tight. Set the racer on a rough or rough surface and watch it go.