

# Engineering at Home!

Please provide appropriate supervision when designing, building, and testing projects at home.

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## Foil Boats

### *Challenge:*

- Design a boat out of aluminum foil that will hold the most number of objects while staying afloat.

### *Materials:*

- Aluminum foil
- Small unit of weight (pennies, washers, paperclips, cheerios, etc.)
- Container to hold water
- Water



### *Math:*

- Use a ruler to measure foil sheets. Practice in inches and centimeters.
  - Calculate difference between improved designs.
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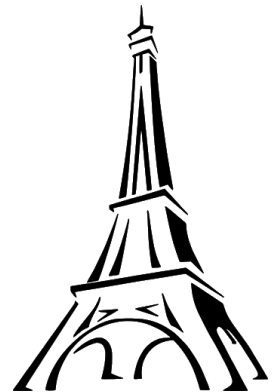
## Paper Tower

### *Challenge:*

- Build the tallest tower using only paper.
- Build a pointed roof tower and then try a flat roofed tower.

### *Materials:*

- Paper, newspaper, index cards, cardboard, etc.
- Tape or mailing labels, if available (try building with or without)
- Object to test strength (for flat roofed towers)



### *Math:*

- Use a ruler or yard stick to measure tower height. Practice in inches and centimeters.
  - Add a price to each piece of paper used. Calculate the total cost of your tower.
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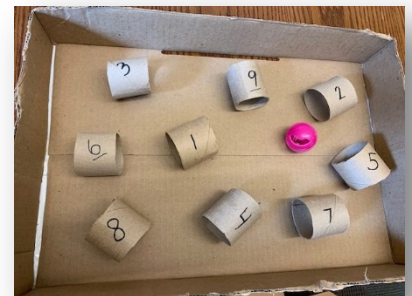
## Cardboard Maze

### *Challenge:*

- Build a maze using found objects around the house.

### *Materials:*

- Cardboard box (shoebox, shipping box, box lid, etc.)
- Rolling object (marble, bouncy ball, marshmallow, etc.)
- Building items (toilet paper tubes, paper items, straws, craft sticks, corks, q-tips, recycled items, etc.)
- Tape or glue (glue gun with supervision)



### *Math:*

- Add a price to type of materials used. Calculate the total cost of your maze.
- Assign points to sections of the maze. Add up points along the way.

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## Recycled Racer

### *Challenge:*

- Build a vehicle powered by air or gravity.
- No wheels or axles? Try racing a sled down a ramp instead.

### *Materials:*

- Wheels: plastic lids, mints/lifesavers, wheel pasta, CDs, etc.
- Axle: straws, toothpicks, pencils, skewers, etc.
- Body: juice/milk box, cardboard, index cards, recycled items, etc.
- Power: straw/balloon for air powered or makeshift ramp for gravity powered



### *Math:*

- Measure the distance traveled and calculate improvements.
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## Paper Bridge

### *Challenge:*

- Build a bridge that is twelve inches long that can support the weight of an object.

### *Materials:*

- Building materials: paper items (cardboard, paper, newspaper, index cards, etc.)
- Object: Toy car, stuffed animal, pennies, or any other weight)
- Connecters: tape, mailing labels, clay, paperclips, etc.

### *Math:*

- Count the number of objects the bridge can hold.
- Measure out the bridge distance.
- Add a cost for each object used and calculate total bridge cost.



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## Parachute

### *Challenge:*

- Design a parachute that can land an object from a safe height.

### *Materials:*

- Canopy: paper items, fabric, or anything that can resist wind.
- Connectors: string, yard, twine, rubberbands, straws, pipecleaners, etc.
- Cargo holder: cup, paper box, milk carton, etc.
- Cargo: stuffed animal, ball, egg (plastic or real!), or any weighted object.

### *Math:*

- Use a timer to calculate time. Compare after improvements are made.
- Measure the weight of your device and try to make it lighter.
- Measure the weight of your cargo to see which cargo works better.

