



Half a Day



Grades
6–8, 9–12

Build a Better Candy Bag

Make the strongest candy bag you can and see how much it will hold.

Instructions

Students work in pairs to design a prototype for a candy bag that is sturdy—able to hold a lot of weight—useful, and appealing.

Caution: For safety, be sure to inform participants not to taste or eat any of the materials during this activity.

- 1** Describe the challenge. Students will have a chance to test whether their candy bag can hold a lot of weight and then redesign as needed to make it stronger.
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- 2** Place students in pairs and give them time to sketch some designs before choosing one to try.
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- 3** Pairs build their prototype, noting the volume of their bag and how much weight they think it will hold.
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- 4** Test the candy bags. Hold them by the handles and add weight until they fall apart. Decide how to redesign the bag to make improvements.
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- 5** Sketch a new design, build the next prototype, and test.
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- 6** Present findings to the other teams.

Materials

PER CLASS:

- Scale, such as a spring scale
- Measuring cups
- Bags of candy, blocks, or other objects to use as weights
- Items to check for volume, such as rice or candy

PER PAIR OF STUDENTS:

- Paper and pencil
- 8" x 12" pieces of thin plastic material, such as plastic painter's drop cloth or plastic sheeting
- Masking tape
- Twine
- Ruler & Scissors



Engineering & Science Connections

- 🔗 In the late 1800s, stores bagged items in large envelopes or more rarely, flat-bottomed paper bags (like a paper grocery bag) made by hand. While working at a paper bag company in the late 1860s, Margaret Knight devised a machine that could fold the paper and apply glue much faster than any human. Her machine, patented in 1871, allowed for the mass production of paper bags, and changed the way people shop.
- 🔗 Glue is a powerful tool in engineering, and it has been combined with many substances to create stronger, better products. For example, carbon fiber reinforced plastic (CFRP) is an extremely strong and lightweight material used in cars, high-end sporting goods, and aerospace engineering. It is made by combining carbon fibers with resin glue. Although it is much lighter than steel, CFRP can be up to 10 times stronger.
- 🔗 As our understanding of materials evolve, engineers improve designs to meet current needs, reduce costs, or improve efficiency. In 1965, the company Celloplast obtained a patent for the first two-handled plastic bag, which was sturdier and cheaper to produce than paper. Today, as concerns about the environment increase, engineers are inventing different types of biodegradable and reusable bags. Amin Hataman, a 15-year-old from the Philippines, won two international competitions for the biodegradable plastic bag he invented using a byproduct of coconut water.

Guiding Questions ?

What kinds of bottoms do strong bags have that you could incorporate into your design?

What kinds of handles are the easiest to carry and the strongest?

What kind of candy do you want your candy bag to hold a lot of?

Where is the greatest stress on the bag?

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