

Balloon Bust

Student Instructions



Introduction

What happens if you drop a water balloon from a height of 25 feet? Is there any way to prevent it from bursting? In this challenge, you'll use everyday materials to design a way to land a water balloon, undamaged, from a height of 25 feet—about the same height as a second-story window or balcony. Be sure to get permission from a parent or guardian and ask them to help you find a good location for testing.

Here are the engineering constraints for this challenge:

- The balloon must be completely filled with water.
- The water balloon must be dropped from a height of approximately 25 feet (i.e., dropped from a second-story window or balcony).
- The water balloon must be dropped onto a hard surface (i.e., concrete, asphalt, sidewalk).

To be successful, your design must meet the following criteria:

- The water balloon is undamaged after its fall.

Brainstorm Designs

Materials engineers develop and test different types of materials. Sometimes they look for ways to reduce air resistance, or drag, so a product moves faster or more efficiently. Other times, their goal is to increase air resistance, or create drag, to purposefully slow an object down.

Materials

- Masking tape
- Scissors
- String or yarn
- Water balloons (2), fully filled
- (Optional) Mobile device for video recording
- Variety of building materials that you have on hand (you don't need everything on the list), such as:
 - Air pillows or bubble wrap
 - Cardboard boxes, small
 - Coffee filters
 - Craft sticks
 - Egg cartons
 - Newspaper
 - Packing peanuts
 - Paper bags
 - Pipe cleaners
 - Plastic bags (different sizes and weights)
 - Plastic containers
 - Straws

Your challenge is to design a way to keep a water balloon from bursting when dropped from a height of approximately 25 feet.

1 Watch the Challenge Video for inspiration and to review the parameters of the activity.

2 Figure out the logistics.

- Find a location for the balloon drop that is about 25 feet high, such as a second-story window or balcony. Make sure the area below is free of cars, bicyclists, pets, and people. (You don't want anyone to accidentally get struck by a falling water balloon!)
 - Ask a friend to help you with the drop. Your friend can remain on the ground to keep the area clear and even record your balloon drop on video.
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3 Before you start brainstorming designs, think about what you already know. Consider:

- Is there anything you could do to prevent the balloon from bursting when dropped? What ideas do you have?
 - What is gravity? How does gravity act on the balloon?
 - What do you know about air resistance, or drag? Can you use the idea of drag to prevent the balloon from bursting?
 - How might you cushion the balloon as it hits the ground?
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4 Take a look at your materials. Think about which materials might be useful as you consider gravity and air resistance.

5 Sketch some designs or jot ideas.

Build and Test

1 Choose your best idea and build a prototype. A prototype is a model or something you build that shows your idea.

2 Make a prediction about how your prototype will work and explain your thinking.

3 When you're ready, take your friend and go to the drop zone. Make sure there aren't any cars, bicyclists, pets, or people when you drop your balloon. If you have a mobile device, ask your friend to make a video of your balloon drop.

- 4 Did you meet the success criterion? If not, make changes to your prototype and try again.

Reflect

- What did you like and dislike about the challenge?
- What problems did you have when building, testing, and redesigning?
- How did you use the concepts of gravity and drag in your design?

Did your design meet the success criteria? Nice job! Share your results with a family member, teacher, or DiscoverE! You can also share photos and videos on social media and tag @DiscoverEorg.