



Who says all the fun has to happen at The Tech Interactive? This DIY engineering activity can be done with inexpensive store-bought supplies and things you find around the house!

Introduction

This classic design challenge examines how to control the fall of an object. In this case, you will be trying to stop a bouncy ball from ... that's right ... bouncing! The multiple solutions and variations make this a great activity for all ages. Although this can be a quick activity, as you play with gravity and force, you may find yourself prototyping and testing for an hour or more!

Design Challenge

Drop a bouncy ball from a height of six feet without letting it bounce (your ball and device must remain together in one piece).

Bonus Challenge

What happens after the fall? See if you can get the ball to stay in one place or roll to a specific spot.

Make it Real

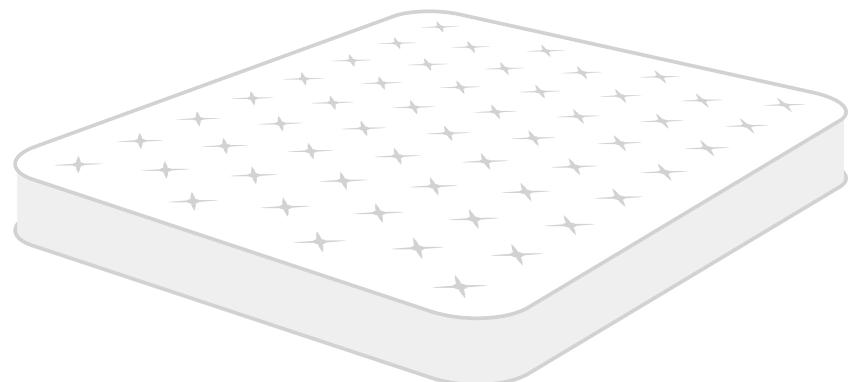
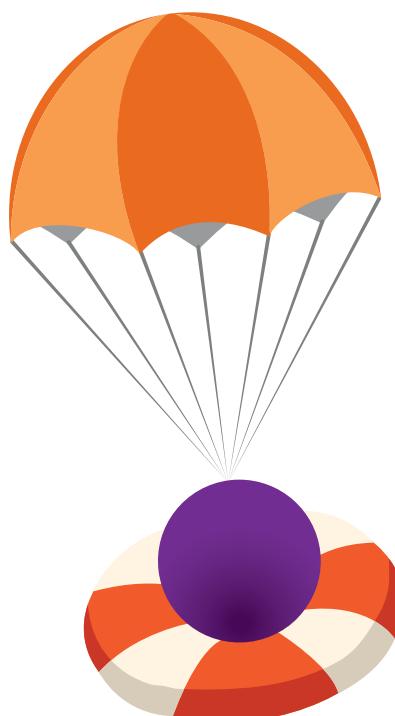
Add a story or narrative to your challenge! Think about who you are building for and how it might be used. Perhaps you need to...

- Build a device that can survive a drop in order to deliver emergency supplies.
- Drop a Mars Rover without damaging it.
- Safely send something to a neighbor on the first floor.
- Deliver packages by drone without breaking them!

Materials

First, choose an item to drop. Bouncy balls of all sorts work well — rubber, ping pong, tennis. Light-up balls can be great at demonstrating whether you succeeded. (Just make sure you leave the ball visible so you can see if it lights up.)

Next, choose the materials to build your device. Explore your recycling bin or junk drawer for unique items. Make sure to use things that are durable or disposable since you will be dropping them from a height and may not want a messy clean-up.



Subject:

Design Challenge,
Engineering

Ages:

6+

Time:

20+ minutes

Key concepts:

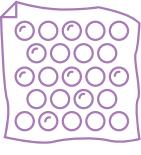
Gravity, force,
dampening, material
properties, prototype

No Bounce?

Don't have a bouncy ball? Don't worry! This activity works great with any item. You could use plastic figurines, a rubber dog toy, or even an old cork. In this scenario, try and get your object to bounce/roll/move to a specific zone.

Things you can use

Choose a couple items from each category. Don't limit yourself to the items on this list. Use whatever you have on hand — be creative!

All purpose materials	Connectors	Net or basket-like materials
<ul style="list-style-type: none">• Cardboard• Straws• Paper towel/toilet paper rolls• Chopsticks• Craft sticks 	<ul style="list-style-type: none">• Twist ties• Pipe cleaners (chenille stems)• Rubber bands• String• Paper/binder clips• Clothes pins• Paper fasteners 	<ul style="list-style-type: none">• Fruit baskets• Paper cups/bowls• Fabric scraps• Coffee filters 
Cushioning materials	Tools	
<ul style="list-style-type: none">• Foam• Bubble wrap• Tissue paper 	<ul style="list-style-type: none">• Scissors• Hole punch• Masking tape (optional) 	<p>Tip: Try to avoid glue and limit tape. This allows for faster iteration, more reuse of materials and less mess.</p>

Instructions

Building and testing

Once you have collected everything, play with how the different materials cushion, slow down or dampen the bounce. Explore and experiment while you build. Try out smaller drops on a table or from a low height to see what happens.

When you are ready to try out your device, choose a space to test it. Think about your landing surface. A soft surface like a rug might cushion the bounce, while a harder floor like wood or tile might add an extra challenge. Safely stand on a step stool, or have a taller person hold and drop the device from about a six-foot height.

Use what you observed to make changes to your design, then keep testing, observing and iterating. Remember, don't get discouraged if your device did not work as you expected, as this is part of the process! Just like engineers, you will reflect, iterate and improve.

Some things to consider:

- What happened when you dropped your device?
- Did it bounce? How many times?
- Is there a direction it likes to bounce? Can you use that to your advantage?
- Which materials or combinations of materials seemed most successful at preventing it from bouncing?
- What else could you try to slow down or stop the bouncing?

Share Your Results! Keep us posted about your design challenges on social media with **#TheTechatHome**.



Explore More

- **Change things up:** Adjust the landing zone, height, the ball(s), the speed, or the number of materials.

- **Target practice:** Try to get your ball and device to bounce from the initial drop area to a specific spot nearby.



Top Tips

Think about different ways to reduce the force on the ball.

For example:

- slowing down the fall,
- cushioning the fall,
- or catching/capturing the ball when it hits the floor.

If you've tried one of these, attempt a different way to stop the bounce.



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