

UWindsor Engineering OUTREACH



University
of Windsor
Faculty of Engineering

Create Your Own Bouncing Ball: Grades K to 2

YOUR MISSION

In this activity, you will use engineering and chemistry to make your own homemade bouncing ball.

After you have made one ball, you can make others too!



WHAT'S GOING ON

Engineers are problem solvers and they come up with solutions to problems to better the lives of everyone around them. They do this by coming up with designs, products, technologies, innovations, procedures and systems to make the world a better place.

Engineering is always changing the way the world works and this can include the materials we use to build with. Long ago, stone and wood were used to make balls. It wasn't until the discovery of rubber that we could create balls that bounce!

Rubber is a very important material that is used in so many things around us: tires, shoes, rubber bands, and of course, balls that can bounce! Natural rubber was the first material used to make balls that can bounce and is made from the milky juice from special tropical plants. Natural rubber is a polymer that is made up of long chains of molecules.

Material engineers then work in the lab to transform these polymers into all kinds of things, like the rubber erasers on the end of your pencils.

Before we get to explaining how you can build your own bouncing ball, let's go through a few definitions you should know before you get started so you can understand what everything means and how it all works!



KEY TERMS

- **Rubber:** An elastic substance that is made from the milky juice of some tropical plants.
- **Polymer:** A very big molecule made up of a chain of lots of smaller molecules.
- **Molecules and Atoms:** A molecule is a group of two or more atoms joined together. Atoms are the basic building blocks of everything around us. A good way to remember molecules and atoms is to consider a word and the letters that make it what it is. For example: the word “hat” is made up of the letters h-a-t so the letters are the atoms and they join together to make the molecule!
- **Solid:** In a solid, molecules are very close together. This is why solids keep their shape.
- **Liquid:** In a liquid, molecules are a little further apart. This is why liquids can change shape when put in different containers.

Now that you are familiar with these terms, let’s get started!

MATERIALS NEEDED

Before you design your own bouncing ball here are the materials you will need. Ask a parent or teacher to help you gather these materials and to do the activity.

- Cornstarch (3 tbsp)
- Water (1 tbsp + 1 tsp)
- 2-3 drops of food coloring (optional)
- Mixing bowl (make sure it is microwave-safe)
- Stirring stick (popsicle stick, spoon)
- Microwave



WHAT YOU NEED TO DO

1. In the bowl, mix together the 3 tbsp of cornstarch and 1 tbsp + 1 tsp of water. Add a couple drops of food colouring to change the colour of the balls (optional).
2. Microwave the mixture for 20 seconds.
3. Add 1 + ½ tsp of water to the mix and stir well. Once the water is fully combined, you can now use your hands to roll the mixture into a ball.
4. Put the ball back into the bowl and microwave for an additional 15 seconds.
5. Your bouncy ball is ready to bounce!

Note: You can store the ball in a container and re-microwave it if it loses its shape (have your parents help you).



FURTHER REFLECTIONS

1. Keep a paper and pencil with you and make observations before and while experimenting. You can also draw what you've done. Follow the steps and test the experiment. Do you think you can improve the bouncing ball? Change your steps and use your observations to predict the results of these changes. Note: Try warm versus cold ingredients to see what changes. Vary the amount of cornstarch used.



2. How long does the mixture takes to solidify and turn into your ball? Is the solution closer to a liquid or a solid?
3. Measure the size of the ball, the stickiness of the ball, and how high the ball can bounce. You can measure these each time you change your experiment and choose the best design.
4. Do you think the surface the ball is bouncing on will change how high the ball will bounce? Try experimenting on different surfaces such as the floor or a towel and see how the height changes.
5. You learned how molecules are close together in a solid and that is why they don't move and stay where they are put. In a liquid, the molecules are a little further apart. This is why liquids are able to move to fit in different containers. Do you think molecules are closer together or further apart in a gas?

ENGINEERING DESIGN PROCESS

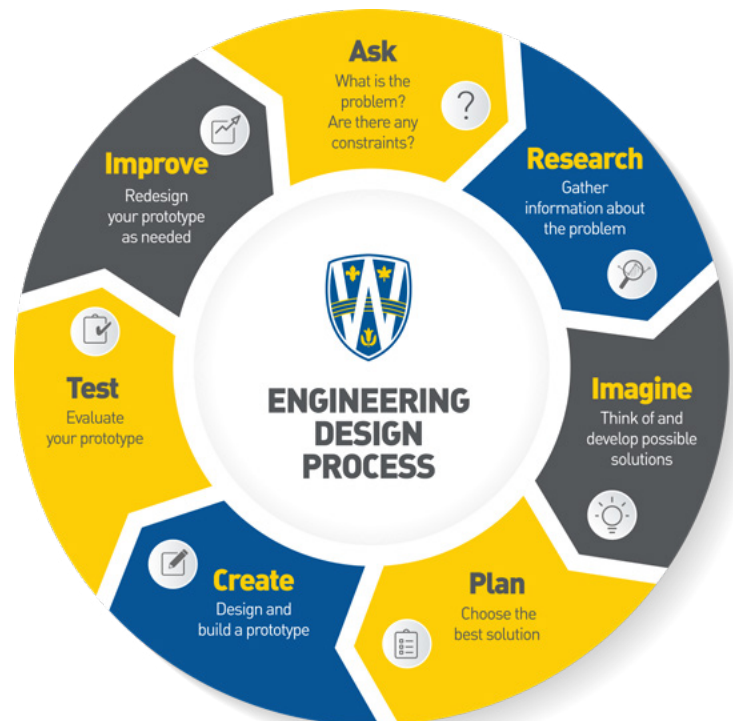
All engineers use the Engineering Design Process to plan, build, test and reflect on their designs and when coming up with solutions to a problem. The steps for the Engineering Design Process are listed below. Use the Engineering Design Process to test and improve your design.

First, think of the problem.

How can you fix it? Think of as many ideas as you can that you think will solve this problem.

It might be helpful to first sketch out your ideas on a piece of paper. Make as many different designs as you can!

Test and compare all of your solutions. Which one solves the problem and works the best?





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CURRICULUM UNIT CONNECTIONS

Grades K to 2 – Understanding Structures and Mechanisms – Materials, Objects and Everyday Structures; Movement; Understanding Matter and Energy – Properties of Liquids and Solids

SHARE YOUR DESIGNS WITH US!

Tag us on our UWindsor Engineering Social Media Pages and show us your designs!

Twitter: @UWindsorENG

Facebook: @UWindsorEngineering

Hashtag: #UWindsorENG

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