

Apple Engineering



<https://www.velvetmag.co.uk/homes-and-gardens/gardening-an-apple-a-day-9083837/>

TODAY I WILL LEARN...

Today you will tackle several engineering challenges to test your design and build skills as well as your critical thinking.

For all of these activities, you may want to think about your designs and draw your ideas on paper before you begin.

MATERIALS FROM HOME:

-  3 or more apples, mini pumpkins, or other small roundish objects
-  Books (to create an incline)
-  A sturdy board (flat lid to a large plastic bin, removable shelf, plywood)
-  Small container (yogurt container or plastic/paper cup)
-  String
-  Lots of Pennies (or other small objects such as Lego bricks, or beans)
-  Rubber band
-  Scissors and/or hole puncher
-  Paper and Pen

ACTIVITY 1: APPLE STACK

While it may sound simple, stacking apples is harder than it looks.

INSTRUCTIONS:

1. Stack at least 3 apples (or mini pumpkins).
2. Your stack must be able to stand alone, without support for at least 10 seconds.
3. You may not use any other materials to stack- only the apples.

THINK ABOUT IT:

1. What made this activity challenging?

2. What adjustments did you make as you stacked?
3. Does it matter the order that you stacked your apples?
4. Can you make your stack taller by adding more apples?

ACTIVITY 2: HOW MANY PENNIES DOES IT TAKE TO PULL AN APPLE UP AN INCLINE PLANE?

GOOD THINGS TO KNOW

An incline plane is one of six simple machines used to make work easier. It is just a flat object (like a board) that is tilted so that one end is higher than the other. The incline plane helps reduce the weight of an object. Think about if you lift a heavy object vertically straight off the ground. You are supporting the whole weight of that object. But, if you slide that heavy object up an incline plane, some of the weight is supported by the ramp which makes it lighter and easier to push or pull to the top.

INSTRUCTIONS:

To do this activity, you first must build your incline plane. This is where your engineering comes in. How do you want to make your design? Will the ramp be steep? Will it be long or short? How high will you move your apple?

Part 1- Build your incline plane

1. Use books or other sturdy items under one end of your flat board (your incline). The high end of the incline should be at least 6 inches off the ground. The incline plane should be stable without support.

2. Poke two holes on opposite sides of your small container towards the top using a hole punch or scissors.
3. Thread a small length of string through the holes and tie it securely so that your container now looks like a small bucket with a handle.
4. Take the rubber band and place it around the apple so that you can connect it to the string.
5. Cut long piece of string (about 3 feet or more). Tie one end around the rubber band on the apple. Tie the other end to the handle of your small container.
6. When ready to “pull”, place the apple at the low end of the incline so that the string runs up and the container hangs down off the high end of the incline.

Part 2: Experiment

1. Make a hypothesis. How many pennies do you think it will take to pull the apple up the ramp?
2. Test your hypothesis. Add pennies, one-by-one, to your container. Keep adding pennies until the apple moves and is moved to the top of the incline.

THINK ABOUT IT

1. What happens if you replace the pennies with quarters? Will it take more or less coins to do the job?
2. What happens if you change the angle of the incline by adding another book (or taking one away)? Will you need more or less pennies to move the apple?
3. What happens if you take a few bites out of the apple (reducing its weight)? Or if you try the activity using a larger or a smaller apple?
4. Now reverse the activity. How many pennies can an apple pull up the ramp? Switch the positions so that the apple is hanging off the ramp and then the container is being pulled up it. How many pennies is too much weight for the apple to pull?

MORE APPLE ACTIVITIES:

Apple Toothpick Tower:

For this activity, you will need 1 apple, 15 toothpicks, a knife, and a plate (optional). Your challenge is to build the tallest tower you can using only the apple and toothpicks. Prepare your apple “bricks” by cutting the apples in half and flipping them upside down. Ask an adult for help using the knife. Next, slice them into flat, brick shape pieces (about inch long and $\frac{1}{4}$ - $\frac{1}{2}$ inches thick). Now, it’s time to design and build. Try different ideas and methods and see how tall you can go. Remember the tower must stand on its own when you finish.

Apple Volcano

This activity is messy and is perfect to do outside. You will need an apple, a knife, baking soda, vinegar (lemon juice or other acid can be substituted), a plate, and food coloring (optional). First, remove the apple core using a knife. Ask an adult for help if you need it. Be sure to leave the apple in tact at the bottom so that the hole does not go all the way through. Place the apple on the plate. Fill the hollow center of the apple about half way with baking soda. If you want, add a drop of food coloring. Then, pour the vinegar in the hole. Watch what happens!

Dancing Apple Seeds

For this activity, you will need seeds from an apple, a clear container such as a drinking glass or plastic cup, seltzer (or other clear soda such as sprite or club soda). First, fill the glass with soda. Drop in your apple seeds. Wait a minute or two and have a dance party. Once you try this, test different types of sodas and liquids to see how they compare. So what’s happening here? The apple seeds are more dense than the soda so they sink to the bottom. At the bottom air bubbles from the soda then form on the outside of the seeds which cause them to float up to the top. When the bubbles pop they sink back down which makes it look like they are dancing!