

Stomp Rocket

Explore the physics of flight! You'll harness the power of compression to launch a rocket through the sky.

Materials

- Pool noodle
- Two-liter plastic bottle
- A tube or piece of PVC pipe that fits inside the pool noodle
- Ping pong ball
- Duct tape
- Clear tape
- Paper (8.5 x 11 inch)
- Scissors
- Markers
- Cardstock
- Hula hoop or other rings (optional)



Directions

1. Build the stomp rocket launcher by inserting the mouth of the two-liter bottle into one end of the pool noodle. Secure thoroughly with duct tape, trying to make it as airtight as possible.
2. Insert the PVC pipe or tube into the other end of the pool noodle. This is the launch position for your rocket.
3. Make your rocket by rolling an 8.5 by 11 piece of paper into a tube so that it fits around the outside of the launch tube. Don't make it tight; the paper should slide on and off. Tape it in place. This is the fuselage of your rocket.
4. Use clear tape to attach a ping pong ball to one end of the rocket's nose.
5. Cut some wings and rudders out of cardstock. Experiment with different shapes and sizes. Attach them to the fuselage with tape, and decorate if you'd like.
6. Load the rocket onto the tube. Place the two-liter bottle on the ground and aim the launcher. (It may be easier to ask a partner to hold the launcher for you.) Stomp on the bottle to watch the rocket fly! To launch again, just blow into the pool noodle until the bottle re-inflates.

What's happening?

When you stomp on the bottle you compress, or squish, the air inside. This compressed air has to go somewhere, so it escapes through the easiest way out—which is the other end of the launcher. By placing the rocket over the other opening, this escaping air pushes it out of the way. If the compressed air didn't have an escape route, like the launching tube, the container would burst. That's why compressed air or gas containers like pressure cookers and propane gas cylinders always have a safety valve that keeps the pressure from getting too high.

Tips

- If you don't have a pool noodle, any tube you can make airtight will work, such as a bike inner tube or PVC pipe.
- The duct tape or bottle will eventually wear out from all the stomping. When that happens, just cut off the end of the pool noodle and attach a new bottle.

Video: Youtube

Summer Brain Games 2016: Stomp Gliders

MAGNIFICENT MAGICAL MAGNETS

Description: Become a magician and suspend objects with your mind! Or, at least magnets!

Materials:

- Bendy Drinking Straw
- Collapsible Cup
- Foldable Ruler
- Magnetic Field Viewer Card
- Magnets
- Washers

Activity Plan:

Activity 1:

1. Construct a bridge by suspending the ruler between two supports. Supports can be cups, books, glasses...etc. Make sure that ruler is suspended at least 10 inches in the air.
2. In the middle of the suspended ruler, place one magnet on top of the ruler and the other magnet on the underside of the ruler, under the magnet on top.
3. One at a time, suspend a washer from magnet on the underside of the ruler. Form a chain of washers.
4. Suspend as many washers as you can. How many washers are in your chain?
5. Use the straw to gently blow the bottom washer to make it spin! How fast and how long does the washer spin?
6. Can you attach more washers to the magnet under the bridge? No restrictions they don't have to form a chain. Explore, investigate and how many washers can attach under the bridge.

Activity 2:

1. Use the same ruler from the first activity and create a lower bridge by using two magnets and the collapsible cups as the supports.
2. Create a two-ring chain by suspending two washers from the magnet on the underside of the ruler.
3. Take both washers and lower them to the table.
4. Make sure the washers are standing one on top of the other and not attached to the magnet.
5. With the straw, gently blow the stack of washers to make them both spin! How fast and how long do the washers spin?
6. What happens if you put your finger or a straw between the washers and the magnets?

What's Happening:

One property of magnets is that they **attract** some objects, just like one property of water is that it's wet. Magnets have **magnetic force**, the property of attracting some objects or pushing objects away. The force called magnetism happens when the atoms in the magnet line up. Although, we cannot see the atoms line up, we can experience what happens to an object when it's near a magnet. Use the magnetic field viewer card and investigate the magnets. What do you notice? Use it and take a closer look at other magnets you may have around you. Remember, magic is just science you don't understand yet!

Mind Reader

Materials:

- A Friend
- Deck of Cards

Instructions:

- Count 21 cards from the deck and set the rest aside.
- Ask your friend to pick a card from the deck of 21 cards and remember it, but not tell you what it is. Have your friend shuffle the deck of 21 cards and return it to you.
- Deal the cards face up into three columns moving from left to right, with the cards overlapping. You should have seven cards in each column when you're done.
- Ask your friend to point to the column their card is in: left column, middle column or right column. Slide each column of cards together so they're in three stacks, keeping the cards in order as you slide them. Make the three stacks into one deck again but in a specific order—make sure that the stack your friend pointed to is always collected second! This is very important to remember. This ensures that the column they pointed to is always placed in the middle of the deck.
- Repeat the process. Deal the cards into three columns and ask your friend to point to the column with their card. Make the columns into three stacks, and pick up the stacks into one deck making sure to pick up your friend's column second. Repeat twice more, for a total of four times. Reveal that your friend's card is the fourth card down in the middle column. It will be there every time!

WHAT'S HAPPENING?

This trick uses an algorithm, or a specific set of steps that reach a predictable outcome. You deal the cards out in a way that organizes them and forces the selected card into a predictable position. When you repeat this pattern four times, the selected card always ends up in the exact middle of the deck. When dealt into columns, the card in the exact middle of the deck always ends up the fourth card down in the middle column. Examples of algorithms can be found in many different natural environments, from the way that ants behave when foraging for food to the way enzymes work in our own bodies. Natural processes that follow a set of steps to result in a predictable outcome are examples of natural algorithms. Look for their results in patterns of plant growth, animal coloration patterns and the way water flows.