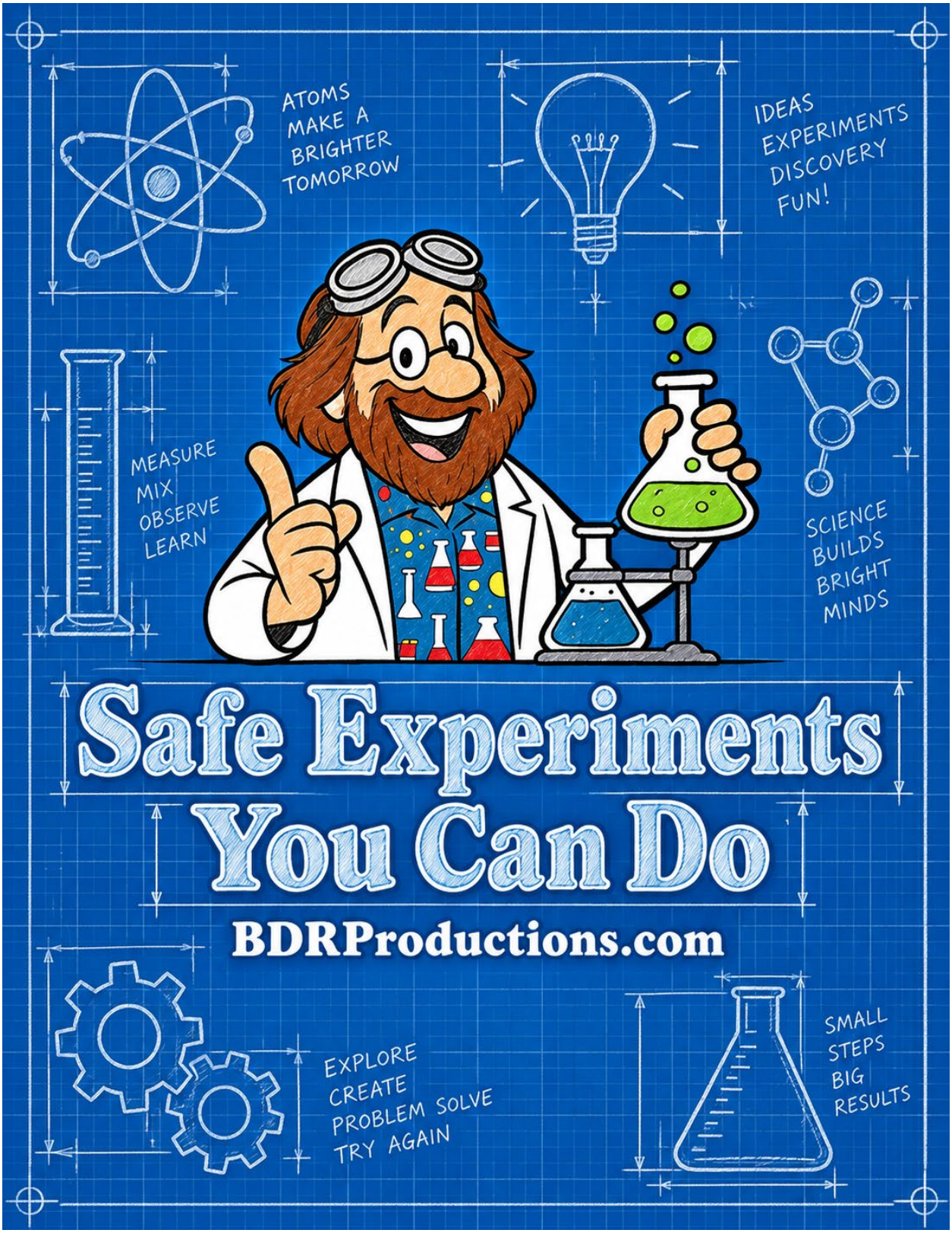

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The Floating Ping Pong Ball Experiment

What you need:

- A ping pong ball
- A bendy straw

What to do:

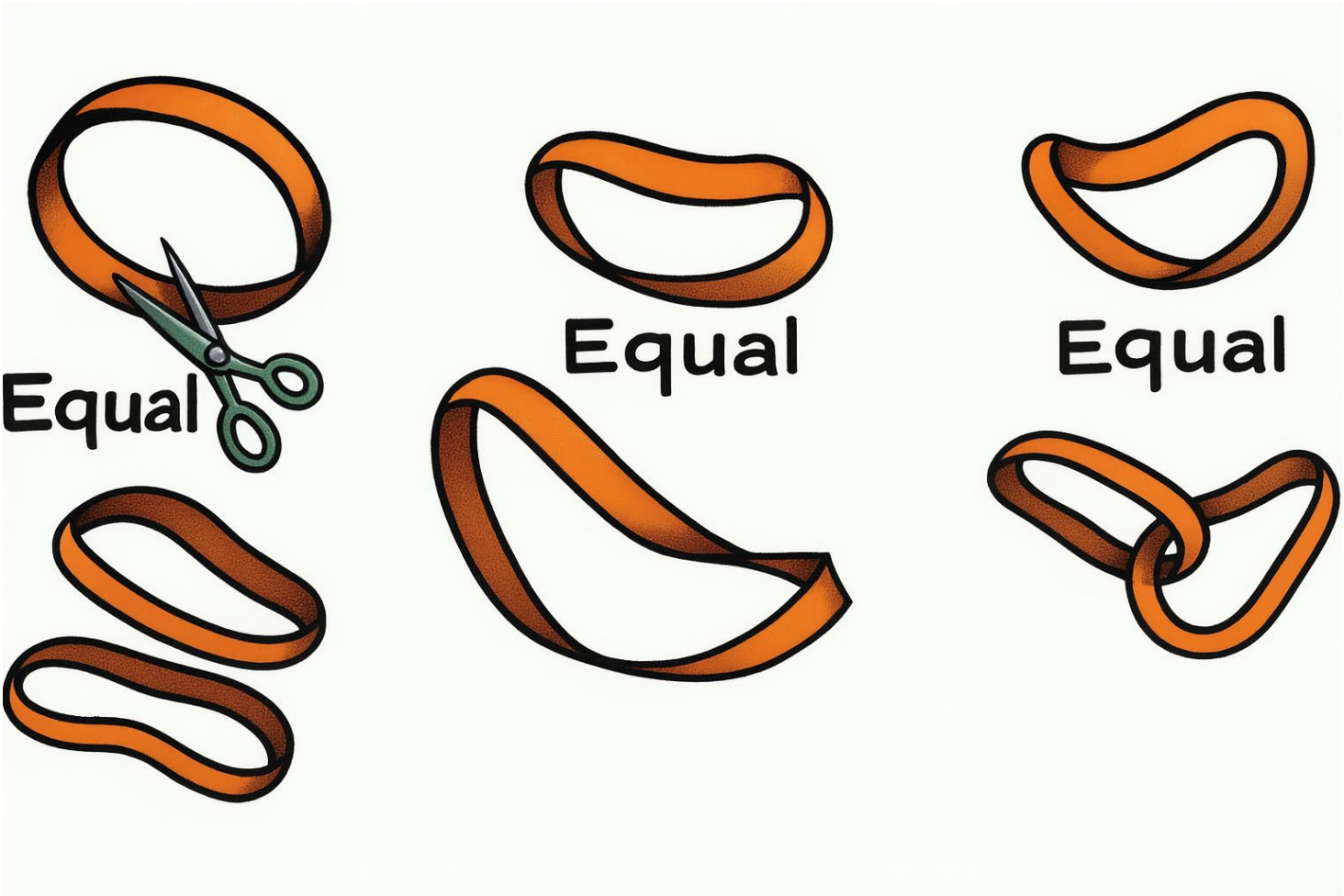
1. Bend your straw into an “L” shape.
2. Hold the ping pong ball above the part of the straw you would put in your mouth.
3. Blow through the other end of the straw as hard as you can.

Watch what happens! The ball will float in the air above the straw.

Why does this happen?
When you blow air through the straw, the air moves quickly around the ball. Fast-moving air has lower pressure than the air around it. The higher pressure from the air outside pushes the ball back into the low-pressure area, keeping it floating!

This is called **Bernoulli’s Principle**. It’s the same science that helps airplanes fly!

If you look closely, you might see the ball wobble a little. That’s because it’s trying to escape the low-pressure area, but the higher pressure keeps pushing it back.



Baffling Bands Experiment

What you need:

- Three strips of paper
- Glue
- Scissors

What to do:

1. Take the first strip of paper and glue the ends together to make a simple loop.
2. Take the second strip, give one end a half twist, then glue the ends together to make a loop with a twist.
3. Take the third strip, give one end a full twist, then glue the ends together to make a loop with a big twist.

Now for the fun part:

- Cut each loop straight down the middle, all the way around.

What happens?

- The first loop will turn into two separate loops—just like you'd expect!
- The second loop will become one giant loop!
- The third loop will turn into two loops that are linked together like magic!

Why does this work?

When you twist the paper before gluing it into a loop, you change how the paper is connected. If you make a simple loop and cut it down the middle, you get two loops—just like you'd expect! But if you give the paper a half twist before gluing, you make a special shape called a Möbius strip. When you cut this one, you get one big loop instead of two! If you give the paper a full twist before gluing, you get two loops that are linked together like magic when you cut them.



Musical Straw

What you need:

- A straw
- Scissors

Steps:

1. Flatten the top part of the straw with your teeth. Try to make it as flat as you can!
2. Cut off both corners of the flat end so it looks a little like a duck's beak.
3. Put the cut end of the straw in your mouth and seal your lips around it.
4. Blow into the straw. You might hear a funny squawk or squeak! If you don't hear anything, try moving the straw around in your mouth until you find the "sweet spot."
5. Once you can make a sound, use scissors to cut a little bit off the other end of the straw (not the end in your mouth!). Blow again and listen—does the sound change?
6. Keep cutting the straw shorter and shorter. Each time, the sound will get higher!

Why does this work?

When you blow into the straw, the flat end you made with your teeth starts to wiggle really fast. This wiggling makes a funny sound! The straw is like a tiny musical instrument. If you cut the straw shorter, the sound gets higher and squeakier. If the straw is longer, the sound is lower. That's because the air inside the straw vibrates differently depending on how long the straw is. You're making music with science!



Paper Bridge

Can you make a bridge out of paper that holds a cup? Let's find out!

What you need:

- A piece of paper
- Three cups or glasses

What to do:

1. Put two cups on the table, a little bit apart.
2. Lay your piece of paper across the tops of the two cups. This is your bridge!
3. Try to put the third cup on top of the paper bridge. What happens? (The paper will probably bend and the cup will fall!)
4. Now, take the paper and fold it back and forth like an accordion (this is called "pleating").
5. Put your pleated paper back across the two cups.
6. Try putting the third cup on top again. What happens now? (The bridge is much stronger!)

Why does this work?

When you fold the paper back and forth like an accordion (this is called "pleating"), you make the paper much stronger! The folds help spread out the weight of the cup so the paper doesn't bend as easily. It's like giving your paper bridge lots of tiny legs to hold up the cup. That's why your pleated paper bridge can hold the cup without falling!

You just made a super-strong bridge using science!



Water Whistle

What you need:

- A cup of water
- Scissors
- A straw

What to do:

1. Take your straw and, about one-third of the way down, use scissors to almost cut through it. Don’t cut all the way—leave a little bit so the straw stays together!
2. Bend the straw at the cut to make a right angle (like an “L” shape). Be gentle so it doesn’t break apart.
3. Fill your cup with water.
4. Put the longer part of the straw into the water and keep the straw bent at a right angle.
5. Place your lips on the shorter end of the straw and blow gently and steadily.
6. Listen! Do you hear a whistling sound? If not, try pinching the top of the long end of the straw and blowing again.
7. Once you hear the whistle, try moving the straw up and down in the water. What happens to the sound? Does it get higher or lower?

Why does this work?
When you blow, you make the air inside the straw vibrate. This vibration makes sound waves, which you hear as a whistle! If there is more air inside the straw, the whistle sounds lower. If there is less air, the whistle sounds higher.

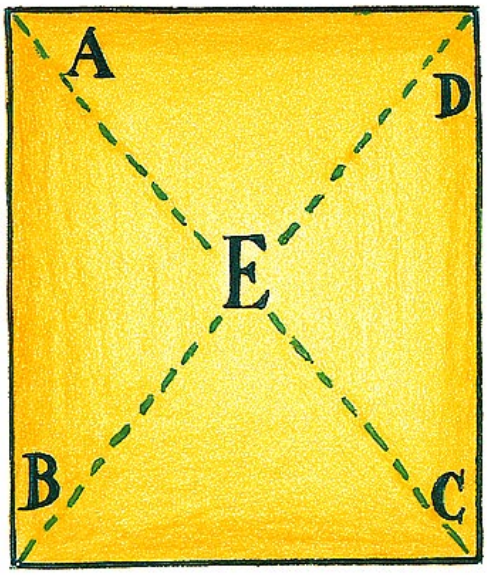


Fig. 1.



Fig. 2

Pinwheel

What you need:

- A square piece of paper (about four inches on each side)
- Scissors
- A pin
- A pencil with an eraser

What to do:

1. Use scissors to make four cuts from each corner of the paper toward the center. Don’t cut all the way—just stop near the middle!
2. Take the corners (A, B, C, and D) and fold them one by one toward the center of the paper.
3. Hold the corners in the center and use a pin to poke through them and the middle of the paper.
4. Stick the pin into the pencil’s eraser so your pinwheel can spin.
5. Blow on your pinwheel and watch it spin! You can color your pinwheel to make it look even prettier.

Why does the pinwheel spin when you blow on it?

When you blow air onto the pinwheel, the air pushes against the folded parts (the blades) of the paper. Because the blades are turned in different directions, the air makes the pinwheel spin around and around! The pin in the middle lets the pinwheel turn easily, just like a real windmill or the blades of a fan.

So, when you blow, you’re making wind—and your wind makes the pinwheel spin!



Mug Drop

What you need:

- A plastic mug
- String or yarn
- A nut
- A pencil

What to do:

1. Tie the mug to one end of the string and the nut to the other end.
2. Put the string over the pencil and hold the pencil at about shoulder height. Make sure one end of the pencil is higher than the other so the string doesn't fall off!
3. Hold the nut in one hand and the pencil in the other. Pull the nut away until the mug is near the pencil and the string is straight and flat.
4. Let go of the nut!

What happens?

The nut will start to swing down like a pendulum and the string will wrap itself around the pencil. The mug won't hit the ground!

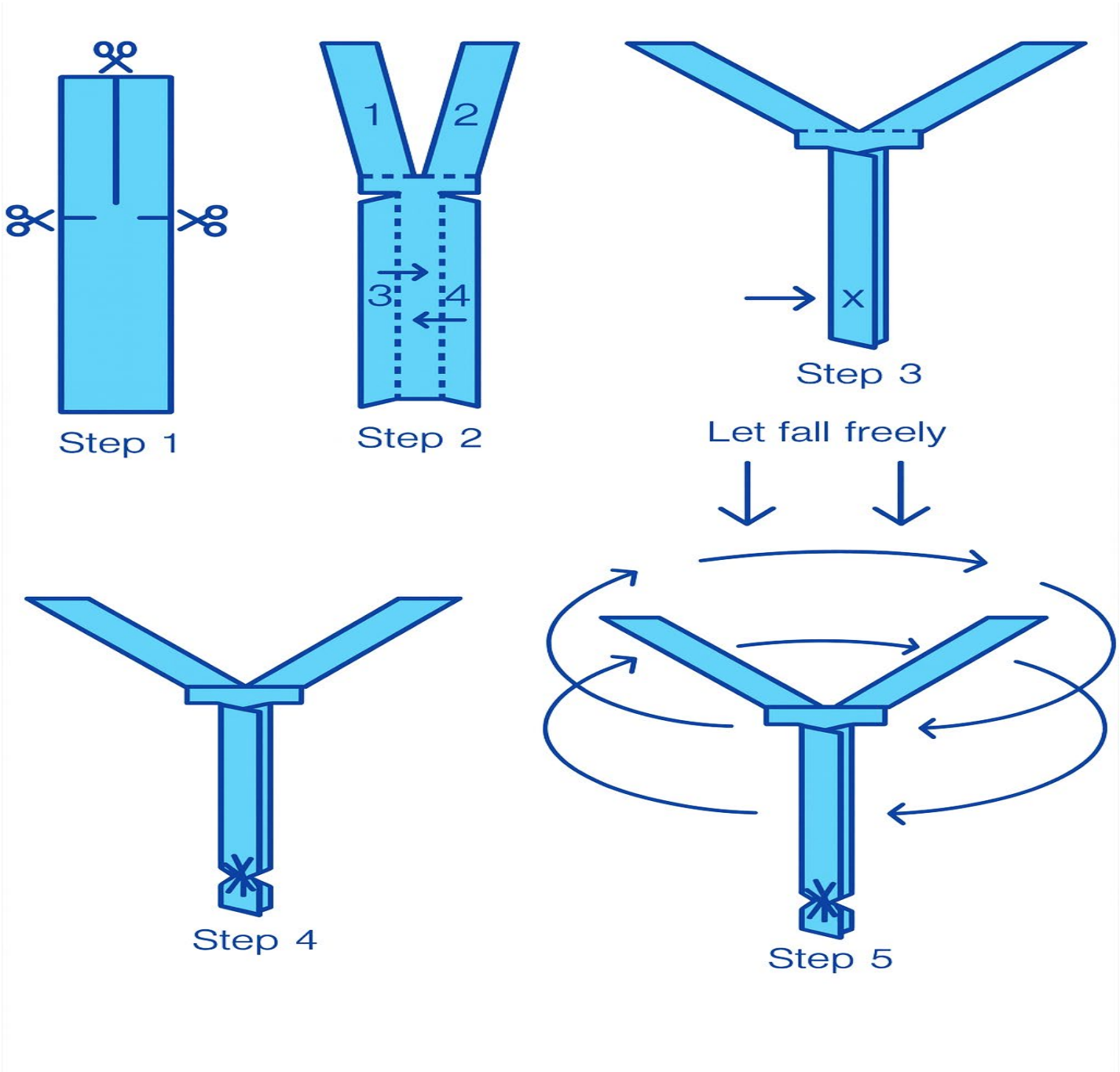
Why does this work?

When you let go of the nut, it swings down like a pendulum and pulls the string. As the nut swings, the string wraps itself around the pencil, and the mug gets held up instead of falling to the ground.

It's like magic, but it's really science! The swinging nut and the wrapping string work together to save the mug from dropping.

Tip:

You always want to use a PLASTIC mug so it won't break.



Paper Helicopter

What you need:

- A strip of paper (about 2 inches wide and 5 inches long)
- Scissors

What to do:

1. Take your strip of paper.
2. Use scissors to make three cuts:
    - One cut down the middle, about halfway down the strip.
    - Two more cuts near the middle, each about one-third of the way from the sides.
3. Fold along the dotted lines:
    - Bend flap 1 forward and flap 2 backward, but both should point up (not down!).
    - Fold flaps 3 and 4 over each other at the bottom.
4. Twist the lower end of the stem at point "x."
5. Hold your paper helicopter high above your head and let it go. Watch it spin and glide down like a real helicopter!

Tip:
If you want, practice with something soft first so you don’t have to worry about breaking anything.

Why does the Paper Helicopter spin and glide down?

When you drop your paper helicopter, air pushes against the flaps at the top. Because one flap is bent forward and the other is bent backward, the air makes the helicopter spin as it falls. The spinning slows it down, so it doesn’t drop straight to the ground. Instead, it glides gently, just like the blades of a real helicopter!

It’s like magic, but it’s really science! The spinning helps the helicopter stay in the air longer and land softly. You can try changing the size or shape of the flaps to see what happens—maybe your helicopter will spin faster or slower!



Screaming Ghost

What you need:

- A round balloon
- A hex nut (the kind you use with bolts)

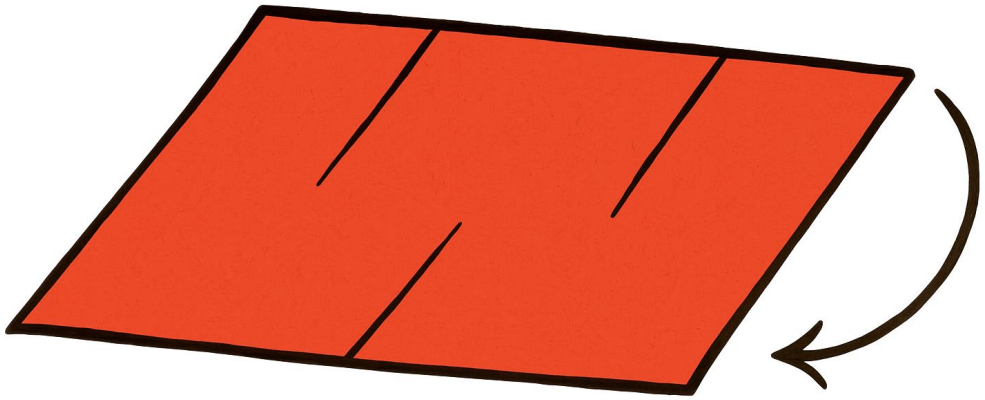
What to do:

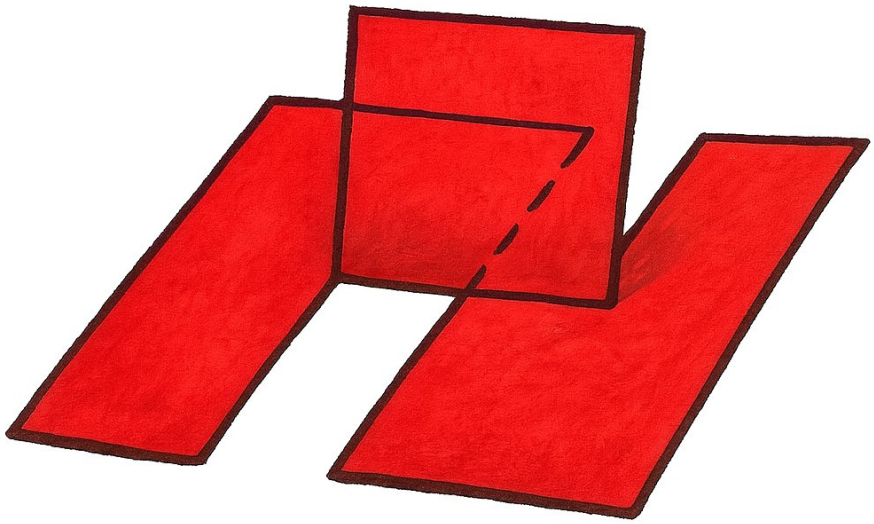
1. Carefully push the hex nut into the balloon. Make sure it goes all the way in so it doesn't fall out when you blow up the balloon.
2. Blow up the balloon, but don't make it too big or it might pop! Tie the end so the air stays inside.
3. Hold the balloon with the neck (the part you tied) in your palm, like you're holding a bowling ball.
4. Swirl the balloon in a circle with your hand. The hex nut will start to roll around inside the balloon.
5. Listen! Do you hear a funny squealing or "screaming" sound? That's the hex nut making noise as it spins!
6. Try using your other hand to steady the balloon. See how long you can keep the hex nut spinning—maybe 10 seconds or more!
7. Try changing the size of the balloon or using a marble instead of a hex nut. Does the sound change? What happens with different objects?

Why does this work?

When you swirl the balloon, the hex nut inside starts to spin around really fast. Its bumpy edges rub against the inside of the balloon and make it shake. That shaking makes a funny squealing or "screaming" sound! If you use a different object, like a marble, the sound might change because it's shaped differently. The faster you spin the balloon, the louder and longer the ghost screams!

It's not magic—it's science making spooky sounds!





Impossible Paper Trick

What you need:

- A rectangle of paper (about 9 inches by 6 inches is good)
- Scissors

What to do:

1. On one long side of the paper, make two cuts straight in to the middle—one at 3 inches and one at 6 inches.
2. On the other long side, make one cut straight in to the middle at 4.5 inches.
3. Lay the paper flat. Fold over the middle flap to make a hinge, then fold it back.
4. Hold the paper by the two short sides, with the flap away from you. Twist one of the L-shaped ends halfway around (180 degrees).
5. Lay the paper flat again and fold the flap down both ways to make a hinge.
6. The flap should now stand up, with half of the cut-away on each side. It looks like an impossible shape!

Show your friends and ask:
Can you explain how this works? It looks like magic!



Magic Arc

What you need:

- Paper
- Scissors

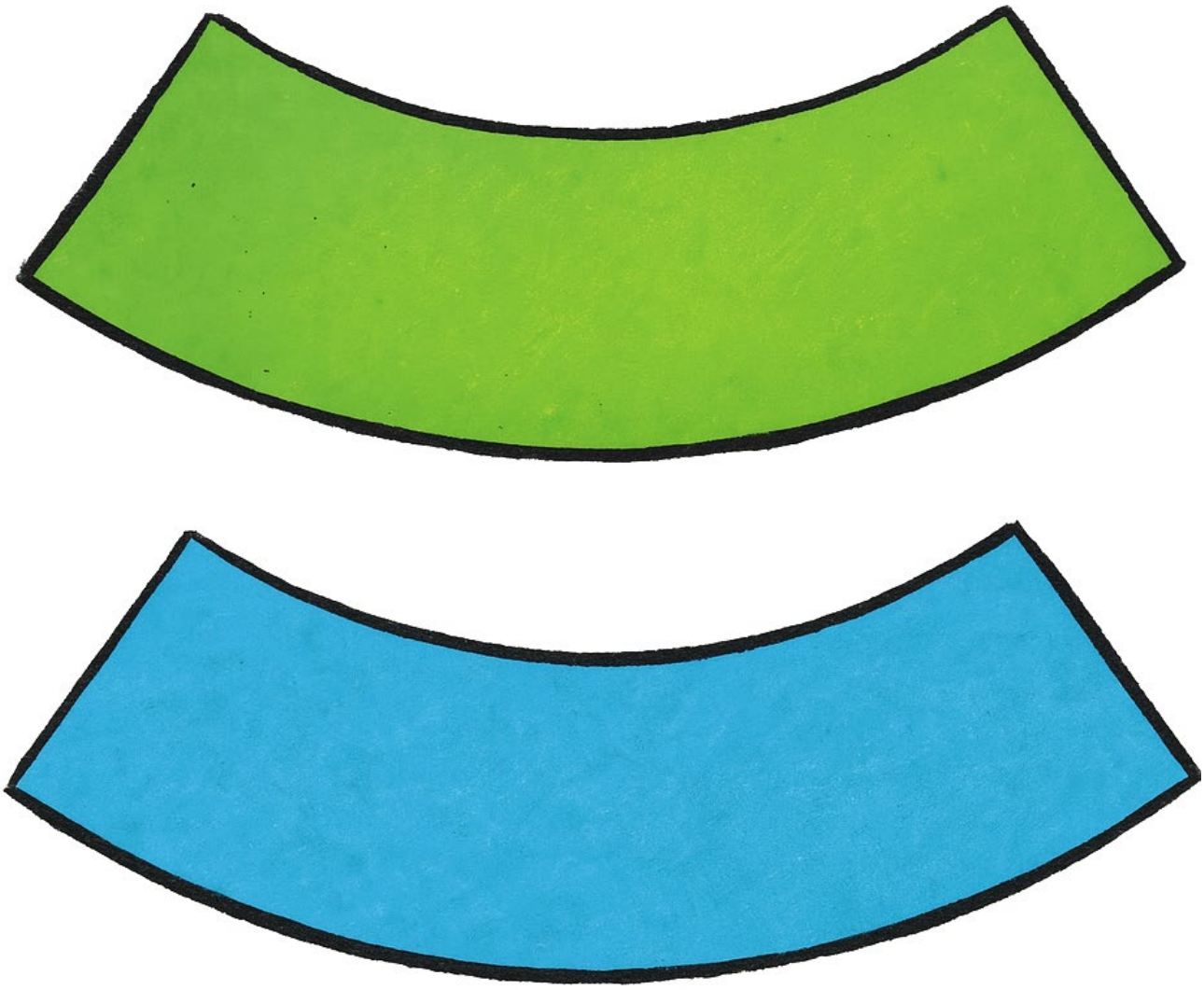
What to do:

1. Fold a piece of paper in half.
2. Cut a rainbow shape (an arc) out of the paper.
3. Make another arc that is the same size as the first one.
4. Hold one arc above the other and ask your friends, “Which arc is bigger?”
5. The bottom arc will always look bigger than the top one, even though they are exactly the same size!
6. Switch the arcs around and see if the other one looks bigger now.

Why is this amazing?
It’s a baffling optical illusion! What you see is not always what you get. The arcs are the same size, but your eyes trick you into thinking one is bigger.

Show your friends and ask:
Can you explain how this works? It looks like magic!

Here’s a pattern so you can make your own.





Magic Pendulum

What you need:

- A heavy washer, a big button, or a ring
- About 10–12 inches of string or yarn
- Print out the picture above.

What to do:

1. Tie your weight to one end of the string.
2. Tie a small knot at the other end so you have something to hold.

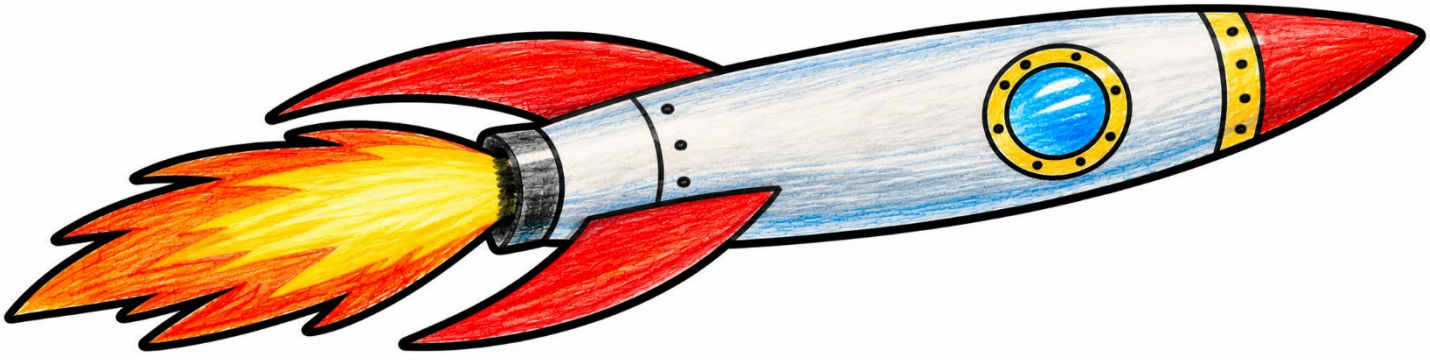
How to Do the Magic Trick

1. Put the paper on a table.
2. Hold the knot between your thumb and finger.
3. Let the weight hang over the middle of the **+**. Try to keep it as still as you can.
4. Have someone ask you a **yes-or-no** question, like, "Do you like pizza?"
5. Don't say the answer out loud. Just **think** about it.
6. Watch closely! The pendulum will slowly begin to swing toward **YES** or **NO** all by itself. It looks like magic!

Why does this work?

It's not really magic—it's **science!** When you think about an answer, your brain sends tiny signals to the muscles in your hand. The movements are so small you don't even notice them, but they're enough to make the pendulum start swinging. Your brain is secretly helping the pendulum move!





Bottle Rocket

What you'll need:

1. Clean, empty squeezable juice bottle
2. Straws: one skinny and one wide enough to slide over it
3. Modeling clay
4. Tape
5. The rocket picture from the previous page

What to do:

1. Add the skinny straw. Push it into the bottle opening. Seal around it with modeling clay so air can't escape.

2. Make the rocket. Plug one end of the larger straw with clay. Cover the end with something soft and round.

3. Add your rocket picture. Tape the rocket to the large straw.

4. Get ready to launch! Slide the large straw over the skinny straw.

Point it up and away from everyone.

3... 2... 1... SQUEEZE!

How Does It Work?

When you squeeze the bottle, air shoots through the skinny straw and pushes against the plugged end of the larger straw.

That push sends your rocket flying!

Try squeezing the bottle faster or using different straw lengths. Which rocket flies the farthest?

Safety first: Never aim your rocket at a person or animal. Always launch it into a clear, open space.