The Kitchen Counter Science Lab

12 Hands-On Experiments with Water, Air, Heat, Color, and Paper

Ali Haroon

Ages 8–11



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Safety notice

The activities in this book are intended for children aged 8–11 working under the direct supervision of an adult. Read each activity fully before starting, and follow all safety notes. The author and publisher have made every effort to ensure the activities are safe when carried out as described, but accept no responsibility for any injury, loss, or damage resulting from the use or misuse of the information in this book. Adults are responsible for deciding whether an activity is suitable for their child.

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BEFORE YOU BEGIN

A Note for Grown-Ups

Every experiment in this book uses ordinary kitchen items and safe, simple steps. Children aged 8–11 can do most of the work themselves, but an adult should be nearby for every activity.

Safety first

- Supervise every experiment. Handle any cutting yourself (Experiments 9 and 10).
- Use plastic cups and containers, room-temperature water, and blunt-tip scissors.
- Keep coins, paper clips, raisins, and other small items away from children under 3.
- Food coloring and marker ink can stain. Cover surfaces and wear old clothes.
- Wipe up spills right away to prevent slips.
- Experiment materials are not snacks. Don’t eat or drink anything after it has been used in a test.
- Keep soap and pepper away from eyes, and wash hands after each experiment.

Using this ebook

- Pages marked WRITE-IN PAGE are meant to be filled in. Print them on ordinary paper, or have your child copy the tables into a notebook.
- The book is laid out on 8 × 10 inch pages. It prints well on US Letter or A4 paper; choose “fit to page.”
- Measurements are given in metric units with inches or cups in brackets. Either works.
- “What Usually Happens” at the back of the book describes typical results, so you can help if a test goes wrong.

BEFORE YOU BEGIN

Think Like a Scientist



Ask and predict 1

Start with a question you can test. A prediction is your best guess about what will happen. Write what you expect, and why.

Change one thing 2

Choose one thing to change and keep everything else the same. If you change the paper and the gap of a bridge at once, you won't know which change mattered. Scientists call this a fair test.

Observe and record 3

Watch closely. Write down what you see or measure, even if it surprises you. A surprising result is still a result.

Explain and repeat 4

Use your records to explain what happened. If a result is hard to judge, repeat the test.

Lab rules: Work with a grown-up nearby. · Read all the steps before you start. · Never eat or drink your experiments. · Clean up and wash your hands when you finish.

WARM-UP

Practice With Results

Before your first experiment, practice reading a record. The numbers below are made up for this activity.

Paper bridge	Coins held
Flat sheet	2
Folded sheet	8

Which bridge held more coins? How many more?

What should stay the same if you repeat the test?

Check your thinking

The folded sheet held 6 more coins (8 − 2 = 6). To keep the test fair, keep the paper type, the gap between the cups, the card square, and the kind of coins the same.

EXPERIMENT 1 / ASK & PREDICT

The Paper Bridge

Which shape of paper can hold more coins?

Time: 20 minutes | **Mess level:** Dry | **Science word:** Fair test



You'll need

- 2 matching sheets of printer paper
- 2 identical sturdy plastic cups
- Ruler
- At least 30 identical coins (such as pennies)
- 2 matching 4 cm (1½ in) squares of stiff card cut from a cereal box

Make a prediction

I think the flat / folded bridge will hold more coins because ...

Build and Test

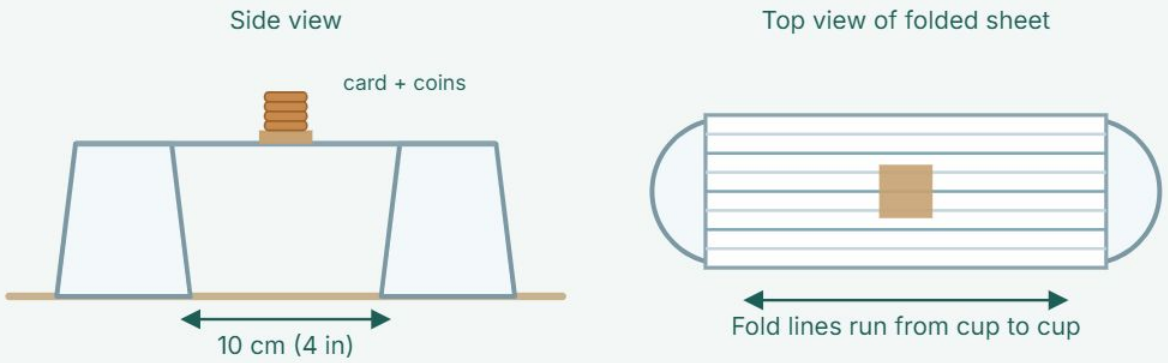
1. Turn the cups upside down. Measure a 10 cm (4 in) gap between their nearest edges. Lay one sheet flat across the gap.

2. Set a card square in the middle of the bridge. If the paper sags to the table under the card alone, record 0 coins. If not, add coins one at a time to the card in a single stack.

3. Stop when the bridge touches the table, slips off a cup, or drops a coin. Count only the coins it held before that happened. If it holds every coin, write “held all ___.”

4. Fold the second sheet back and forth like a fan, with folds about 2 cm (¾ in) wide. Open it slightly. Lay it across the cups so every fold line runs from one cup to the other. Test it the same way with the other card square.

Safety: Coins are a choking hazard for little brothers and sisters. Count them back into a cup when you finish.



Record What Happened

WRITE-IN PAGE — print it or copy the table into a notebook

Write what actually happened, even if it surprises you. Use numbers when you measure and words or sketches when you notice a change.

Bridge	Coins held	What happened as you added coins?
Flat sheet		
Folded sheet		

Which bridge held more coins? How many more?

Did either bridge fail in a way you didn't expect?

Why It Happens

The science

The folds turn the paper into a row of small upright walls. Upright walls are much harder to bend than a flat sheet, so a folded bridge usually holds many more coins. It can still fail early if a fold flattens or an end slips off a cup. If both bridges held every coin, the test could not show which was stronger — you needed more coins.

What changed

The shape of the paper: flat or folded

What stayed the same

Paper type, gap, card square, coins, and where the coins sat

Science word: Fair test — A comparison where you change only one thing and keep everything else the same.

Try one change

Fold a fresh sheet of the same paper with wider folds, about 4 cm (1½ in). Keep everything else the same. Do wide or narrow folds hold more?

In the real world

Cardboard boxes hide a wavy, folded layer of paper between two flat layers. Those folds make a box strong enough to carry heavy things.

EXPERIMENT 2 / ASK & PREDICT

The Dry Paper Dive

Can paper go underwater and come back dry?

Time: 15 minutes | **Mess level:** Splashy | **Science word:** Air



You'll need

- Clear plastic cup
- Deep plastic basin or bucket (deeper than the cup)
- Room-temperature water
- 2 small pieces of dry paper towel
- Towel or tray

Make a prediction

When I push the upside-down cup straight down, I think the paper will ...

Build and Test

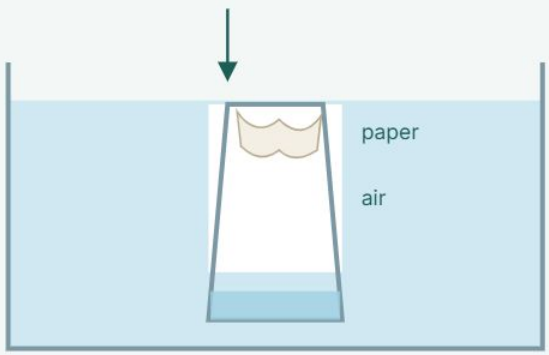
1. Crumple one paper towel piece and press it firmly into the bottom of the cup. Turn the cup upside down over the tray. If the paper falls out, press it in more tightly.

2. Keep the cup upside down and perfectly straight. Push it into the basin until the rim is well below the surface. Hold it there for five seconds.

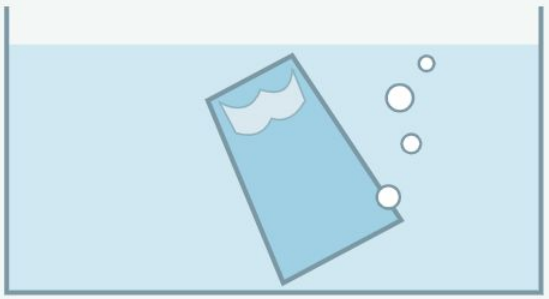
3. Lift it straight up. Dry the outside with a towel, then turn it right-side up and check the paper. Put in a fresh, dry piece.

4. Push the cup down to about the same depth again. This time, tilt it slowly until bubbles escape and water flows in. Lift it out and check the paper.

Safety: Wipe up spills right away so nobody slips.



Straight down: trapped air keeps the paper dry



Tilted: air escapes, water flows in

EXPERIMENT 2 / RECORD

Record What Happened

WRITE-IN PAGE — print it or copy the table into a notebook

Write what actually happened, even if it surprises you. Use numbers when you measure and words or sketches when you notice a change.

Cup position	Bubbles seen?	Paper dry, damp, or wet?
Straight down		
Tilted underwater		

What happened to the paper after some air escaped?

How far up into the cup did the water go when you held it straight?

Why It Happens

The science

The “empty” cup is really full of air. Air takes up space, so when you push the cup straight down, the trapped air keeps most of the water out. The water squeezes the air a tiny bit, which is why water rises only a little way into the cup. When you tilt the cup, air escapes as bubbles and water rushes in to take its place.

What changed

Cup position: straight or tilted

What stayed the same

The cup, basin, depth, and kind of paper

Science word: Air — A mix of gases all around us. You can’t see it, but it takes up space.

Try one change

Use a fresh piece of paper each time. Tilt the cup just a little on one try and a lot on the next. How much tilt does it take to wet the paper?

In the real world

Long ago, workers used giant “diving bells” that worked the same way. A huge upside-down container trapped air so people inside could breathe underwater.

END OF FREE SAMPLE

The Kitchen Counter Science Lab

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