

Can paper stay dry underwater?

Ages 4–7 with a grown-up · 10–15 minutes · Use evidence for hidden air

<https://kiddos.ai/explorations/learning-with-gina-and-ollie/can-paper-stay-dry-underwater>

Wonder together

Wet? Or dry? Paper is tucked inside. The opening goes down first.

Materials

A small stable clear plastic tub, a short rigid hole-free clear plastic cup, paper towel, water and a towel under the tub.

Adult setup – read before trying

Adult stays within arm's reach throughout. Use only water deep enough to cover the small inverted cup; no glass or large bucket. Keep faces, younger children and pets away. Wedge dry paper firmly at the dry cup's closed bottom, leaving air space. Wipe spills and empty the tub immediately afterward.

Try together

1. Tuck dry paper firmly at closed bottom of dry plastic cup.
2. Turn mouth down; lower and lift straight without tilting. Dry the rim, then check the paper.
3. Repeat and tilt underwater to observe escaping air and entering water. Adult stays beside the activity and empties tub afterward.

Keep the comparison clear

Keep fixed: Cup, paper placement, water tub and careful handling.

What changes: Cup orientation: straight down, then deliberately tilted underwater.

Look for: Dry the rim before checking the paper. On the tilted test, look for bubbles leaving and water entering.

Explain with care

Air already inside the inverted cup takes up space. Tilting lets some air escape so more water can enter.

Air is compressible, not a solid lid or vacuum. Leaks, splashes, loose paper or drips may wet it; a tiny tilt may not immediately wet the whole towel.

Talk about it

Wet? Or dry? Paper is tucked inside. The opening goes down first.

Answer cue: Welcome a guess before reading the result. No correct prediction is required.

What left the cup when it tilted?

Answer cue: Air escaped as bubbles while water entered.

Was an apparently empty cup really empty?

Answer cue: It held air, even though we could not see the air directly.

A parent move: Pause before tilting for a second prediction; reset if a splash confuses the observation.

Start simply: The adult performs both immersions while the child chooses straight or tilted.

Explore further: Repeat carefully with dry equipment and explain what the bubbles show.

Return to it: Recall this cup when talking about another place air takes up space.

In the classroom

Flexible 20-minute small-group session; pause or shorten as needed.

3 min • Wonder

Read pages 1–2. Invite a prediction with words, pointing or a sketch; keep the result hidden.

4 min • Notice the story

Read pages 3–5. What left the cup when it tilted? Separate the observation from the explanation.

9 min • Try together

Use the materials and adult setup on this guide, then follow the activity steps in this guide. Dry the rim before checking the paper. On the tilted test, look for bubbles leaving and water entering.

4 min • Make meaning

Was an apparently empty cup really empty? Invite a drawing, a description or an adult-written note. Pause before tilting for a second prediction; reset if a splash confuses the observation.

Understanding check

Was an apparently empty cup really empty?

Answer guidance: It held air, even though we could not see the air directly.

Participation choices: The adult performs both immersions while the child chooses straight or tilted.

Accept pointing, words, a drawing or adult-directed action. Use the story alone if the activity is unsuitable.

Words to explore

air — The mixture of gases around us; it takes up space.

bubble — A pocket of gas surrounded by liquid.

Full adult notes and honest limits

Use a small, stable clear plastic food tub and a short, rigid clear plastic cup with an intact closed base and no holes. Do not use glass or a large bucket. An adult prepares room-temperature water only deep enough to cover the small inverted cup, places the tub on a stable waterproof surface at comfortable reach, and stays within arm's reach throughout. Keep younger children and pets away; never leave standing water unattended. Use a towel beneath the tub, keep faces above and away from the water, wipe spills promptly and empty the tub immediately after the activity. Children can point, predict or direct instead of handling water. Begin with a dry cup and dry paper towel. Crumple enough paper to wedge firmly at the closed bottom so it stays put when turned over; leave most of the cup's space open. Turn the opening straight down. Lower it slowly until submerged without tilting, then lift it vertically out again. Dry the outside and rim before touching the paper so drips do not spoil the check. The paper should remain dry if air is retained and the paper is well above the rim. If it gets wet, notice that result without blame: check for a tilt, a leaky cup, loose or low-hanging paper, splashes or drips. Reset with a dry cup and dry paper. For the second test use the same cup, paper placement and tub; lower it again, then tip it sideways under water until bubbles escape. Water enters as the air leaves and may wet the paper as the cup fills. Do not promise that a tiny tilt immediately wets the whole towel. Pause before the tilt to welcome another prediction. Compare the orientation and resulting air/water movement; do not call an accidental splash evidence about trapped air. The small amount of water that can rise inside a straight cup compresses the trapped air slightly; air is not an impenetrable solid lid and is not the same as a vacuum. The simplified diagram shows air and water regions, not literal air color or scale-perfect compression. No live family trial or measured learning gain is claimed. In a small group, an adult holds the tub while children take turns directing straight/tilted tests and drawing what the bubbles reveal, with no ranking of guesses. The invitation to *Where Did My Water Go?* is related reading about another water question; its shipping story teaches the water cycle and does not include this trapped-air experiment.

Related reading

Where Did My Water Go? is a separate water-cycle adventure. This activity investigates trapped air.

Scientific sources

acs-air-really-there — <https://www.acs.org/content/dam/acsorg/education/resources/k-8/science-activities/solidsliquids/gases/air/air-science-for-kids.pdf>

nasa-dunked-napkin — <https://www.nasa.gov/stem-content/dunked-napkin/>

science-world-invisible-air — https://www.scienceworld.ca/wp-content/uploads/attachments/8_TWOS_BSLH2_Air%20Up%20There.pdf

nasa-glenn-boyles-law — <https://www1.grc.nasa.gov/beginners-guide-to-aeronautics/boyles-law/>

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App Store: <https://apps.apple.com/app/id6720721998>

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