Mystery Canisters

NATURE OF SCIENCE · INVESTIGATION · ~1 HOUR

Groups work out what's sealed inside six film canisters — without ever opening them. A model for how science really works.

AT A GLANCE — What & why

Each canister hides a single object. Groups investigate using their senses alone, record their evidence, and commit to a best guess. A mock science conference then compares ideas and builds consensus. The catch students never see coming: **the canisters are never opened.** They don't get to find out if they were right — because neither do scientists. Reality has no lid to lift; you build the best explanation the evidence supports and stay open to revising it.

TIMING	GROUPINGS	SETS NEEDED
~1 hour	3–4 students	1 per class

STUDENTS LEAVE UNDERSTANDING

- Scientists build theories from **evidence** — they don't uncover definitive answers.
- Scientific ideas are **tentative**: open to revision as evidence grows.
- Making work public for others to challenge — **peer review** — is quality control.
- Science is a **social and creative** activity.

Skills practised: observation, inference, developing an argument, negotiation, teamwork.

SET-UP

Materials & preparation

Old **35 mm film canisters** are perfect — opaque, identical, snap-lid, and free. No film pots? Small opaque spice tins, pill tubs or lidded party boxes work just as well.

YOU'LL NEED

- **6–8 opaque canisters** (film pots / small tins)
- **One small item** per canister
- Tape + numbered stickers
- Post-it notes & marker pens
- A timer
- Whiteboard / flip-chart paper (class grid)
- One observation sheet per group

What to hide inside

Pick items that **feel different** — vary weight, sound and how they move. One item per pot.

a coin · a marble · a single bead · dried pasta · a small bolt · a cotton-wool ball · a pinch of sand · a die · a paperclip · an eraser

PRO MOVE

Include one "hard" pair that's tough to tell apart through the tube — a light wooden bead vs a cork chunk, say. The disagreement it causes is where the richest discussion happens.

PREP

Before the lesson

- **Seal & number.** Drop one item in each canister, tape the lid so it can't be opened, and number them 1–6. Keep a private record of the contents for yourself — you'll never share it.
- **Observation sheets.** Print one per group (partner sheet), each with a few post-it notes attached for their best guesses.
- **Class grid.** Draw a large grid on the whiteboard or flip-chart — one labelled square per canister — ready for the conference.

RUN IT

The lesson, step by step

1 **Investigate** · 25–30 MIN

Hand each group a canister, an observation sheet and post-its. Give them **2–3 minutes per canister** to sense it (shake, tilt, weigh, listen), note their observations, and agree **one best guess** on a post-it. Call time, rotate the canisters, and repeat until every group has met every canister.

2 **Name the skills** · 5–10 MIN

Ask the class to list everything they *did* to reach a decision. Draw out: observing, inferring, forming a hypothesis, testing, discussing, negotiating, reasoning, using prior knowledge, imagining, drawing conclusions. Then reveal that this list **is** how scientists work — they propose and test ideas, argue them out, and create.

3 **The conference** · 15 MIN

One person per group posts their guesses on the class grid. Where the room agrees, confidence is high. Where it splits, run it like a science conference: groups present their **evidence**, re-examine the canister, and may revise — or hold their ground. Making reasoning public so others can probe it is exactly how **peer review** keeps science honest.

4 **The reveal that never comes** · 5 MIN

Tell them: you will **never** reveal the contents. Sit with the groans. Then land the analogy — scientists can't open reality to check the "true answer" either. They reach the best-supported conclusion on the evidence available, and stay ready to revise it. "Not knowing" is what makes this stick.

PROMPT QUESTIONS

- What material do you think it's made from — and how do you know?
- How much space does it take up? How does it move inside?
- What shape is it? Can you sketch what you picture?
- Which is an **observation** and which is an **inference**?

GO FURTHER

Extensions & differentiation

- **Model it.** Give a support group empty canisters, a balance and a tray of candidate materials so they can test their ideas by re-building — modelling in miniature.
- **Shift the view.** Ask students to note their picture of "science" before and after. Did "not knowing" change it?
- **Real revisions.** Research a case where scientists revised a long-held idea as evidence grew — the changing model of the atom is a clean example.
- **Science in the news.** What makes a study trustworthy? Sample size, who ran it, who funded it, whether it's been reviewed. When is scepticism healthy?
- **Ethics.** Could a funding source shape what gets found, or reported? Where's the line between healthy pressure and bias?

PAIR IT WITH

- The **interactive companion** (mystery-canisters-lab-companion.html) — the thinking half: observation vs inference, the misconception, an exam-style question.
- The **student observation sheet** — the bench sheet where groups record evidence and post their best guess.

ONE RULE ABOVE ALL

Never open the canisters. Ever. The whole lesson lives in that discomfort.

An original Biology by Bradford take on the classic sealed-box / "black box" nature-of-science activity — a long-standing teaching approach for showing that scientists build theories from evidence without ever opening reality to check. Reworked for film canisters, written for your classroom.