

ACTIVITIES (KIDS DO)

A1 · Three Spoons Investigation — Card 1

9:45 · 20 min · card: [experiment-cards/01-three-spoons-investigation.pdf](#)

The oration's spoons become the day's first real investigation: how do you actually TELL wood from metal from plastic? Run the senses one at a time, every child on every spoon — **touch** (coldest?), **heft** (heaviest?), **tap** on the table edge (ring, knock, or click?), **finger nail press** (which dents?), **gentle bend** (which flexes?). Strike the tuning fork as the “what a real ring sounds like” reference. As kids struggle to describe what they notice, hand them the words and write each earned word on the board.

Kids should observe: the metal spoon is coldest, heaviest, and rings; the wooden one is warm, light, and knocks; the plastic one is light, smooth, and clicks; a fingernail marks wood easily, plastic barely, metal never.

Say: “Every material has its own ways — its own feel, its own weight, its own voice. Those ways are called its PROPERTIES.”

Failure modes: a dishwasher-warm metal spoon kills the cold-touch moment — stage drawer-cold spoons. Kids bang instead of tap — demonstrate one calm tap, then give turns.

A2 · Material Hunt (sticky-note tagging) — Card 2

10:05 · 25 min · card: [experiment-cards/02-material-hunt-sticky-notes.pdf](#) · legend: [game-components/Material Hunt Legend.pdf](#) (COLOR print, on the whiteboard)

Walk the legend (blue = wood, yellow = metal, pink = plastic, green = glass); the group calls the material for each colour once. Each child takes a pad of all four colours and roams, TAGGING objects with the matching colour — no shouting out; every child works at once. Teacher seeds the book's sneaky finds: zipper pulls, belt buckles, cabinet hinges. Two-minute warning → group tour; wrong tags get re-tested the A1 way (touch, heft, tap) and moved by the child. Harvest one tag of each colour per child onto the board in columns; count each column aloud and write totals.

Kids should observe: a whole room of objects collapsed onto four colours — and one colour “wins” the room.

Say: “Look how many THINGS we found — and how few MATERIALS. Almost everything people make is made from just a handful of materials, used again and again.”

Failure modes: tags on everything including the dog — two rules up front: one tag per object, nothing that breathes. Mixed-material objects cause fights — the rule is *tag the part you touched*, and celebrate the find (most objects are several materials working together). Younger kids tag by colour-of-object — pair a 3-year-old with an older tagger.

A3 · Same-Size Cube Line-Up — Card 3

10:40 · 20 min · card: [experiment-cards/03-same-size-cube-line-up.pdf](#)

Every density cube is the same size and shape — so anything different must come from the MATERIAL. Rank heaviest→lightest, then re-rank by cold-touch, then by tap-sound; notice the metals cluster at the same end every time. Guess each cube's material and check against the swatch-card reference row.

Kids should observe: same size does NOT mean same weight; the “metal-ish” properties (heavy, cold, ringing) travel together.

Say: “The shape is the same, so the shape isn't talking. Everything you feel is the MATERIAL talking.”

Failure modes: cubes roll — work on a towel. A child says the metal cube “is colder” — don’t correct it; write the claim on the board and promise the 11:25 mystery (A4 settles exactly this).

A4 • The Cold-Touch Mystery — Card 5

11:25 • 20 min • card: [experiment-cards/05-cold-touch-mystery.pdf](#)

Nothing is heated, nothing is chilled. Both conductivity blocks sat on the table all morning. **(1)** IR-thermometer each block, a child reads both numbers aloud: **the same number** — write both on the board. **(2)** Everyone touches both: the black one feels icy, the white one doesn’t. Sit in the puzzle: “*The thermometer says SAME. Your fingers say NOT. Who’s lying?*” **(3)** Kids predict which block melts an ice cube faster (most pick the “warm” white one — perfect). **(4)** One cube on each block, same moment, rings on: the cube on the black metal block collapses in about a minute; the other barely changes. **(5)** Resolve: nobody lied — the metal block *moves heat fast*; it pulls heat out of your finger (the icy feeling) and pours its room-warmth into the ice.

Kids should observe: same temperature, different feel; the “cold-feeling” block is the ice’s worst enemy — feels-cold means moves-heat-fast.

Say: “Your finger is not a thermometer. It only feels heat LEAVING. Metal feels cold because it carries your heat away fast — that’s a property, and now you know why the metal spoon felt cold at nine-thirty.”

Failure modes: blocks must be genuinely room-temperature and untouched all morning; IR readings BEFORE the touching (warm hands skew them). Readings a degree apart: say “as close as makes no difference” and let the melt race carry the proof.

EXPERIMENTS (TEACHER RUNS, KIDS PREDICT → WATCH → CALL THE RESULTS)

E1 · Material Stress Test — Card 4

11:00 · 25 min · card: [experiment-cards/04-material-stress-test.pdf](#)

Six matched strips — pine, plastic ruler stock, thin steel, cardboard, acrylic, rubber — through five identical tests while kids call every verdict and the teacher marks the whiteboard chart (materials across the top, tests down the side): **(1) BEND** — flexes back, stays bent, or snaps? **(2) TAP** — dull thud or ringing? **(3) MAGNET** — sticks or not? (only the steel — plant the A-5A seed and move on) **(4) DROP a marble** from 12 inches — bounces, dents, or cracks? **(5) FLOAT** in the basin — floats or sinks? Then read the finished chart both ways: *across a row* (“what is steel like?”) and *down a column* (“which materials snapped?”). The snappers are **brittle**; the spring-backs are **flexible**. Hold up the bent steel strip: metal bends before it ever breaks — that’s why bridges are steel, not glass.

Kids should observe: rubber and plastic flex back; steel bends and stays bent; acrylic snaps clean; wood floats, metals sink; the magnet ignores everything but the steel.

Say: “We didn’t ask my OPINION about these materials — we asked the materials themselves, with the same five questions each. That chart is their answers.”

Failure modes: mismatched strip thickness rigs the bend test — pre-cut truly matched (Prep-Ahead). Wobbly-hand marble drops aren’t fair — brace the ruler vertically on the strip and drop from its top each time. **SAFETY:** acrylic snaps with sharp edges and can spit fragments — teacher does every bend-to-breaking inside the folded towel, wearing safety glasses; kids across the table; nobody handles snapped acrylic edges.

E2 · Hot Chocolate Handle Test — Card 6

11:45 · 15 min · kitchen · card: [experiment-cards/06-hot-chocolate-handle-test.pdf](#)

Make the cocoa (it becomes lunch’s drink). Stand a metal spoon and a wooden spoon in it together; predict which handle will be hot in one minute. Teacher touches first, then each child touches BOTH handles high up. The metal handle is hot; the wooden one is not — same mystery as the black block. Close with the kitchen tour: what are the family’s pans made of? The handles? Why?

Kids should observe: heat climbed the metal spoon and not the wooden one; every pot in the kitchen agrees — metal where the fire is, wood or plastic where the hand is.

Say: “A material that moves heat fast is perfect for the pan and terrible for the handle. One property — two opposite jobs.”

Failure modes: too early = neither handle warm; too late = the metal one can sting — teacher always touches first. Tall mug, handles standing well clear of the liquid.

E3 · The Wrong Tool for the Job — Card 7 — THE CENTREPIECE

12:40 · 30 min · card: [experiment-cards/07-wrong-tool-for-the-job.pdf](#)

A nail-driving contest: same nail, same soft-pine board, four hammers. Kids predict each hammer’s fate (works / bounces / nothing / breaks). **(1) Steel hammer** drives the nail in three swings — hard, strong, heavy. **(2) Plastic toy hammer** bounces off — which property is missing? **(3) Foam hammer** — nothing at all: every property missing except the shape. *Shape is not enough!* **(4) Sugar-glass hammer** — safety glasses on everyone, swing over the towel: it **shatters into shards on first contact**. Don’t rush past the wreckage

— the pieces are sharp glassy shards, not crumbs. That is what **brittle** means. Then the slow failures: the hour-old **paper cup**, sagging and weeping (paper lets water in and goes weak); the **chocolate spoon** stirred into warm cocoa until it slumps and melts away (chocolate can't hold its shape when warm). Close the frame: every one of these had the RIGHT shape and the WRONG material — the material must match the job. Then ask the 9:30 shovel riddle again; now they can answer it.

Kids should observe: the same job succeeds or fails purely on material; the glass hammer doesn't bend or dent — it shatters, because glass is brittle; each failure is missing a *nameable* property.

Say: "Nobody would ever really make a glass hammer — and now you know WHY nobody would. When grown-ups build things, they are choosing materials on purpose, every single time."

Failure modes: sugar-glass gone sticky/soft = cast too early or stored open (it drinks moisture) — cast 1–2 days ahead max, keep sealed; if it soft-bends instead of shattering, chill it 20 minutes and it turns brittle again. Nails not pre-started = wobbly contest — start every nail during prep. Paper cup failed early — stage the 11:30 understudy cup. Shards are candy and the kids know it — clean reserved shard per child at the end keeps the floor-eating impulse at bay. **SAFETY:** safety glasses on EVERY child and adult before the sugar-glass swing; shatter over the towel/tray; adult-only swings for steel and sugar-glass; full shard sweep before anyone leaves; floor shards go in the bin, not in mouths.

Blindfold Material Guess — guide-only game

1:10 · with poster walk + song · no card — the book's own "fun party game" (p. 81)

Blindfold a child (three blindfolds = quick rotations). Hand them objects from the feely bag and the materials sample cards: "*Don't tell me what it IS — tell me what it's MADE OF.*" Touch, heft, tap by the ear. Pairs version for the olders: one child calls out properties one at a time ("cold... heavy... it rings"); the partner guesses the material. Then the **poster walk**: Poster 1 (find today's four sticky colours, then meet rubber, leather, fibers, stone) · Poster 2 (one cup, five materials — object vs. material in one look) · Poster 3 (find the brittle panel and tell me what happened at 12:40). Sing "**Made of This**" (lyric sheet at the kit root; audio pending).

STRETCH (RANCH, ADULT-RUN — NOT PART OF THE CORE DAY)

Torch the Properties — propane torch (~1,995 °C flame) on matched samples, kids well back and upwind, on gravel/concrete with a water bucket at hand. The teaching numbers, for narration: **WOOD** chars and blackens from ~300 °C but never melts · **GLASS** softens and slumps like honey around ~700 °C · **ALUMINIUM** collapses suddenly at exactly 660 °C · **STEEL** glows orange near 1,000 °C and bends like taffy but does NOT melt — steel needs ~1,500 °C, beyond a hand torch. Punchline: same flame, completely different behaviours — that IS the material's property. Gear: torch + striker, firebrick, tongs, gloves, water bucket.

Tractor drive-over strength test — matched sacrifices on hard ground (pine plank, brick, steel pipe, plastic bucket, tyre-rubber chunk); kids predict each fate from well back, then drive over slowly: brittle shatters, flexible flexes, metal dents. Brick and rigid plastic can shoot fragments — big standoff distance.

PROMPTS & QUESTIONS (USE ALL DAY; BOOK PP. 79–81)

- Why is metal used for door hinges and locks? Why not wood or plastic?
- Why is rubber used for play balls? Why not metal or wood?
- Why is wood most commonly used for broom handles? Why not solid metal bars or stone?
- Why is cement (stone) used for roadways and sidewalks? Why not plastic, metal, or wood?
- Hinges COULD be gold — gold never rusts. So why aren't they? (Cost picks materials too: countless toys are plastic not because plastic is better, but because it is cheaper.)
- What is the blade of a shovel made from? The handle? Why each?
- Pick anything in this room: what material? How can you tell without looking?
- Tricky ones (extension): is this leather real, or plastic pretending? Is this “wood” shelf really wood chips glued together? (We can be fooled — coatings, fake leather, composites — which is why the tests matter.)
- The very first tools were stone. Why stone? What could those people NOT make?
- Your own body uses materials too — hard bone where you need strength, springy cartilage in your ears. What job does each do?

WHAT TO WATCH FOR IN DAILY LIFE (SEND HOME — FROM THE BOOK'S “TO PARENTS”)

- Kitchen, car, yard: “What is this made from? Why that material? What else could work? What would be silly?”
- The shovel question verbatim (p. 81): blade vs. handle — why metal for one and wood for the other?
- Find something metal that feels cold and something wooden beside it that doesn't — same room, same temperature. Which one is fooling your finger?
- Tap a glass, a pot, and the table — three materials, three voices.

- Replay the blindfold game at home — identify objects and materials by feel alone (the book’s own party game).

PREP-AHEAD CHECKLIST

Order early (see Supply List.md):

- Density cube set • conductivity block pair • sticky notes (4 colours) • silicone hammer mould • toy + foam hammers • strip samples • feely bag • sample card set • blindfolds • tuning fork • chocolate spoon.

1–2 days before — cast the sugar-glass hammer (**ADULT ONLY, kids not present**):

- Boil **2 cups sugar + 1 cup light corn syrup + $\frac{3}{4}$ cup water**, no stirring once boiling, to **300 °F on a candy thermometer** (hard-crack). Hot sugar sticks and burns far worse than boiling water — long sleeves, no kids in the kitchen.
- Pour slowly into the silicone hammer mould set level on a tray. Cool 2+ hours, demould gently.
- Store **SEALED** in a zip bag, pressed flat, cool and dry — sugar glass drinks moisture and goes sticky (this is why casting is 1–2 days ahead, not a week).
- Cast a few flat shards from the leftover syrup on parchment — the clean “reserved pieces” the kids eat at the end, and an understudy if the hammer crumbles.

The day before:

- Cut/verify six stress-test strips to matched size and thickness (pine, plastic ruler stock, thin steel, cardboard, acrylic, rubber); file sharp corners.
- Start 4–5 nails upright in the soft pine board (two taps each).
- Print: student-binder PDFs ×5 (B&W) • experiment cards ×1 (B&W) • **Material Hunt Legend ×1 (COLOR)** • posters (12×18 colour) if not yet printed.
- Batteries: IR thermometer (from the A-2 kit). Locate tuning fork, blindfolds, feely bag, sample cards, magnet, marble, basin, safety glasses ×6.
- Confirm three drawer-cold spoons (wood, metal, plastic) + the cloth bag for the oration.

The morning of (before 9:30):

- ~8:30: fill the **paper cup** with water on a tray to sag undisturbed (understudy cup at 11:30).
- Hang the Material Hunt Legend on the whiteboard; rule tally columns beneath it.
- Stage by station: spoons + tuning fork (A1) • sticky pads (A2) • cubes + swatch row on a towel (A3) • strips/magnet/marble/basin/towel/safety glasses (E1) • conductivity blocks untouched + 2 ice cubes in the freezer door (A4) • kettle + cocoa + both spoons (E2) • hammers hidden in a box, pine board, towel, safety glasses, dustpan (E3) • blindfolds + feely bag (1:10).
- Keep the sugar-glass hammer sealed and **HIDDEN** until 12:40 — the reveal is the day’s crown.

REVIEW HOOKS

- **Back:** A-B-1 — this whole day is one giant sort, by material instead of colour or size. A-2 — all of today’s materials are **SOLIDS**; solids hold their shape... until the chocolate spoon got warm, which is A-2’s melting come back to visit.

- **Forward: A-5A next** — the magnet in the stress test grabbed only the steel strip; magnets get their own whole day (“it isn’t metal the magnet loves — it’s iron”). The sink/float test is really *density* — a later lesson earns the real word. **E-1** eventually answers where materials come from (wood from forests, metal from ore) — today’s few materials become E-1’s resource chains.

BOOKS FOR CORRELATED READING (BOOK P. 81)

- Gibbons, Gail. *The Full Scoop*. Holiday House, 2008.
- Mason, Adrienne. *Touch It: Materials, Matter and You*. Kids Can Press, 2005.
- Smith, Penny, and Lorrie Mack. *See How It’s Made*. DK, 2007.
- Titles from the *Start to Finish* series (Lerner) and *Welcome Books: How Things Are Made* (Children’s Press).

Opening Oration — The Three Spoons

Distinguishing Materials • read aloud, ~3 minutes

Prop: Three spoons — one **wood**, one **metal**, one **plastic** — hidden in a cloth bag. Bring them out one at a time at the marked moment, then pass all three around the circle. (Prep: pull the metal spoon from a drawer, not the warm dishwasher.)

This morning I have a riddle for you, and the answer is hiding in your own kitchen.

Think about a shovel — the kind you dig a big hole with. The bottom part, the blade that bites into the dirt, is made of **metal**. But the long handle you hold is made of **wood**. Isn't that strange? Somebody built ONE tool out of TWO different things. Why would they do that? Why not all wood? Why not all metal? Was it an accident? It was not — and by the end of today, you will know the secret.

(Bring out the spoons, one at a time, and hold each up.)

Look — three spoons. A wooden one. A metal one. A plastic one. They are all the same **THING** — a spoon is a spoon. But they are not made of the same **STUFF**. What a thing is made of has a special name: its **material**. The spoon is the object. Wood, metal, plastic — those are materials.

And here is the wonderful part: every material has its own ways. Its own feel, its own weight, its own voice. When these spoons come around the circle, don't just look. **Touch** the metal one — it feels cold. **Heft** them — one heavy, one light as a leaf. **Tap** each one on your knee and listen — the metal one rings, the wooden one knocks, the plastic one clicks. Every material is telling you what it is. You just have to ask with your fingers and your ears.

People who build things know all these secrets. That's why the shovel's blade is metal — digging needs something **HARD** and **STRONG**. And the handle is wood — hands need something light and warm that never gets too cold to hold.

But what happens if you pick the **WRONG** material? What if somebody made a hammer out of **glass**? Today, after lunch, we are going to find out — and I promise you it is the best worst idea you will ever see.

(Pass the three spoons around the circle now — touch, heft, tap, listen.)

A-5 Supply List — Distinguishing Materials

Everything for the full 9:30–2 day. Prices are rough. **Order-ahead flags matter:** the silicone hammer mould must arrive in time to cast the sugar-glass hammer 1–2 days before lesson day.

ALREADY HAVE (TYPICAL HOUSEHOLD)

☐	ITEM	USED IN
☐	Wooden spoon, metal spoon, plastic spoon (drawer-cold)	Oration prop · A1 · E2
☐	Cloth bag (hides the spoons)	Oration
☐	Whiteboard + marker	A2 tally · E1 chart
☐	Real steel hammer	E3
☐	Soft pine board + 4–5 nails	E3
☐	Paper cup (+1 understudy)	E3 slow failure
☐	Kettle, tall mug, cocoa powder	E2 · E3 chocolate spoon
☐	Sugar (2 cups) + light corn syrup (1 cup) + candy thermometer	Sugar-glass casting (prep-ahead)
☐	Zip bag + parchment (store the casting, shard pieces)	E3 prep
☐	Magnet (fridge magnet works)	E1 test 3
☐	Marble + ruler (12-inch drop)	E1 test 4
☐	Basin of water	E1 test 5
☐	Folded towel + big towel/tray + dustpan	E1 · E3
☐	Safety glasses ×6 (kids + adult)	E1 · E3
☐	2 ice cubes	A4
☐	Paper towels	A4
☐	Timer or phone	E2
☐	Soft pine / cardboard scraps (strip stock you may already have)	E1

TO BUY

☐	ITEM	QTY	~PRICE	WHY	ORDER AHEAD?
☐	Same-size density cube set (wood, aluminium, copper, brass, acrylic, PVC...)	1	\$25	A3 — identical shape forces every verdict to come from the material alone	Yes
☐	Ice-melting conductivity block pair (+ retaining rings)	1	\$18	A4 — the cold-touch mystery solved dramatically	Yes
☐	Sticky notes, 4 colours (blue/yellow/pink/green)	1 pack set	\$8	A2 — the tagging hunt; one small pad of each colour per child	Yes
☐	Silicone hammer mould	1	\$10	E3 — casts the breakaway sugar-glass hammer (film-prop method)	YES — earliest deadline (casting is 1–2 days before)
☐	Toy plastic hammer + foam hammer	1 each	\$12	E3 — the bounce and the nothing	Yes
☐	Matched material strip samples (pine, plastic ruler stock, thin steel, cardboard, acrylic, rubber) — or cut your own equal-size pieces	1 set	\$15	E1 — the five-test battery only works on matched strips	Yes
☐	Montessori fabric/texture box or mystery feely bag	1	\$15	Blindfold game (1:10)	Yes
☐	Materials sample card set (real wood, metal, cork, rubber, leather swatches)	1	\$12	A3 reference row • blindfold game	Yes
☐	Kid blindfolds	3	\$6	Blindfold game	Yes

☐	ITEM	QTY	~PRICE	WHY	ORDER AHEAD?
☐	Small tuning fork or metal chime	1	\$8	A1 — the "what a real ring sounds like" reference	Yes
☐	Chocolate spoon (or chocolate mould + chocolate to cast one)	1–2	\$6	E3 slow failure — melts away in warm cocoa	Yes

Total new spend: ~\$135.

CHECK-YOU-OWN-IT NOTES

- **Infrared thermometer** — purchased for A-2 (~\$18). A4 needs it to prove both

blocks are the same temperature. If A-2's was never bought, add it here — the Cold-Touch Mystery leans on the two matching readings.

- **Safety glasses** — any clear ones fit kids well enough for E3; buy a multi-pack

(~\$12) if the craft bin doesn't already hold six.

STRETCH PURCHASES (ONLY IF PURSUING THE RANCH DEMOS — SEE TEACHER GUIDE STRETCH)

☐	ITEM	~PRICE	FOR
☐	Propane torch + striker, firebrick, tongs	~\$40	Torch the Properties (adult-only; temperatures in the guide)
☐	(Tractor, plank, brick, pipe, bucket, tyre chunk assumed if you have them)	—	Drive-over strength test

Tick the box beside each item as it goes in the box. Anything flagged **order ahead** ships — buy it a week before the lesson.