Activities (full instructions)

Building-inspector round

Each child ties a washer to a string — their own plumb bob to keep. The round: certify walls VERTICAL (bob hangs parallel to the wall), surfaces HORIZONTAL (marble stays put; the torpedo level's bubble centers; a water glass's surface lies flat). Anything leaning goes on the reject list. Tally on the worksheet; most correct certifications earns the inspector badge (the torpedo level, held for the day).

Globe down-under

Figurine stickers stand on the globe here, in Australia, at the poles. Ask each figurine's "down" and let the children reason every arrow to the same center BEFORE confirming. The tricky case: a flying bird — gravity still pulls it down while its wings push air down for lift; BOTH forces present (C-7 callback).

String-swing orbit

Teacher swings a soft ball on a string in a flat circle: the string is the inward pull. LET GO — it flies off straight (C-5's inertia). Earth's gravity is the moon's string: an orbit is falling around, forever, without landing.

Harness flying (rig-dependent)

If the ceiling-hook rig is available, re-rig and REUSE it — do not buy. Adult-run with the standing safety talk. The felt lesson: the rope's upward hold against gravity's constant pull; let go a little slack and the pull answers instantly.

SAFETY

Harness flying is ADULT-run on the proven rig only, safety talk first, one flyer at a time. The drop race lands on bare floor, never near feet. The oil jar rides a tray. Plumb-bob strings stay out of little siblings' reach after the round.

Common Misconceptions

- "People in Australia are upside down" → everyone's down points to the same center; nobody hangs.
- "Heavy falls faster" → the drop race settles it: same instant. (Feathers are C-6's air story, not gravity's.)
- "The balloon escapes gravity" → the heavier air sinks and SHOVES it up; gravity is pulling harder than ever — on the air.
- "The moon just hangs there" → it is falling around us forever; the string-swing release shows what would happen if gravity let go.

STRETCH (ranch, adult-run)

(1) The water-level: 25 ft of clear tubing filled with water — its two ends ALWAYS rest at the same height, around corners, across the yard: horizontal at yard scale, the tool old builders leveled foundations with. (2) Plumb-bob audit of a real outbuilding: is the old barn still vertical? Measure the lean in inches and report. (3) If rigged, harness flying as the day's opener rather than mid-morning.

Review Hooks

- Notebooks: the globe with every down-arrow meeting in the middle.

- All week: certify one wall or shelf a day with the take-home plumb bob.
- Night sky: find the moon and say what it is doing (falling around us, forever).

Prep-Ahead Checklist (night before)

□ tie one washer-and-string plumb bob per child □ check the torpedo level's bubble; marble in pocket □ clear jar of water + A-9 pipette + cooking oil on a tray □ pick the two same-size, different-weight balls and test the tie □ figurine stickers on the globe (here, Australia, poles) □ soft ball on a string for the orbit swing □ if flying: re-rig the harness, inspect every link, rehearse the safety talk

BFSU D-1 · TEACHER

Opening Oration — The Pull With No Off Switch

read aloud, 2–3 minutes • a homemade plumb bob dangles from your fist throughout

PROP: a plumb bob — a heavy washer on a string. Hold it up as you begin and let it hang dead still. Pass it at the marked moment so every child watches it find vertical.

"Right now, this very second, something invisible is holding onto you. It held you all night. It will hold you every day of your life, and it has never once let go of anything. Watch." *(hold up the plumb bob; let it settle)* "See how the string points? Not sideways. Not crooked. Straight down — perfectly — every single time. That invisible puller is called **gravity**, and this little tool is how builders have listened to it for five thousand years."

"But here is the question that puzzled sailors and children forever: down… toward WHERE? If a child in Australia — on the far bottom of the world — drops an apple, which way does it fall? Does she fall off?" *(let them argue a moment)* "She does not. Her apple falls DOWN — and her down and your down both point to the very same place: **the center of the Earth**. Gravity pulls everything toward the middle. That is why the world has no edge to sail off, and no bottom to fall from. Every 'down' on Earth meets at one point, thousands of miles beneath your shoes."

"Today you will become building inspectors. Gravity gives builders their only two honest directions: **vertical** — lined up with this string — and **horizontal** — flat across, the way still water lies. You will certify this house wall by wall. You will weigh gravity's pull on your own body in pounds. You will race a heavy ball against a light one and discover something Galileo had to argue about. And at the end I will tell you the most honest thing in all of science…" *(pass the bob)* "…which is that nobody — nobody in the world — knows WHY gravity pulls. Not yet. Maybe one of you will be the one to find out."

BFSU D-1 · TEACHER

D-1 Supply List — Gravity I

Everything for the full 9:30–2 day. **Almost everything is owned or household** — the level is the one real purchase, and it is a tool for life.

Already Have (owned / household / prior kits)

☐	Item	Used in
☐	**The ceiling-hook climbing-harness rig (owned)**	Harness flying — REUSE; never buy
☐	Globe + figurine stickers	Down-under Socratic
☐	Bathroom scale	The weigh-in
☐	Pipettes (A-9 kit) + clear jar + cooking oil	The oil-drop float
☐	A marble + a water glass	Horizontal certifying
☐	Soft ball + string	The orbit swing
☐	A dozen droppable objects	The oops-drop survey

TO BUY

☐	Item	Qty	~Price	Why	Order ahead?
☐	Torpedo level	1	$8	The inspector's badge — and a real tool for life	No (hardware store)
☐	Heavy washers + string	—	$4	One plumb bob per child, theirs to keep	No
☐	Golf ball + hollow plastic ball	1 pair	$3	The drop race — only if not on hand	No

Total new spend: ~$15.

Check-you-own-it notes

- The harness rig exists and is proven — inspect it, never replace it.
- Drop-race balls must be the SAME SIZE and compact — that keeps air resistance (C-6's story)

out of gravity's experiment.

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