technology

Inside one simple system: a closer look

Lesson at a glance

Hold up a closed handheld torch and take quick guesses about the hidden parts. Groups then examine an adult-prepared opened torch or labelled internal photo sheet, matching component cards to switch, battery, contacts, bulb and casing. After tracing the complete path and settling battery and casing placements as a class, lock the IPO map on the flow-builder interactive. Pupils draw and label the system on the Investigation Journal page.

Learning objectives

- Identify the main components of one simple electrical system and the job each does
- Connect components to the system's inputs, processes and outputs

Before the bell — prep

Night before: open one safe torch per group or print the labelled internal photo sheets; print component-card sets and torch outline sheets. Demo torch stays closed at the start. Push desks into groups of three or four. No mains devices.

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Materials

Item	Qty	Per	Source	Low-cost substitute
adult-prepared opened simple battery torch or labelled internal photo sheet (internals visible: switch, battery bay, contacts, bulb)	1	group	provided printable	labelled internal photo sheet of an opened simple torch as the primary examine object for every group
component cards (switch, battery, contacts or wires, bulb or LED, casing)	1	group	provided printable	write the five component names on sticky notes
Investigation Journal page	1	pupil	provided printable	plain paper with a quick drawn frame for a labelled diagram
simple torch outline sheet (support)	1	pupil needing support	provided printable	light pencil sketch of a torch body on plain paper before the lesson for pupils who need a frame to label
spare AA or AAA batteries for torches	1	class	supermarket	use labelled internal photo sheets if batteries are unavailable

Safety watch-point

Only adult-approved, unplugged devices. No mains items. Pupils do not force casings open; screwdrivers only if you pre-opened and supervise.

Teaching moves

- **Getting Started:** Hold up a switched-off handheld torch without opening it. Pin three or four pupil guesses about inside parts on the board, then stop — full looking waits for the explore step.
- **Parts that do a job:** Keep the board work short: name the component as the new word and give a one-line IPO reminder only. Then talk them across in 30–40 seconds with I wonder / I predict / I test, and send groups to tables.
- **Explore inside a safe system:** Circulate with prompts: What can you press or slide? Where is power stored? What gives light? How might parts connect? Early finishers sketch a quick arrow path from switch to bulb on scrap paper.
- **Observe how the parts connect:** Back to the same opened torch or photo sheet, and this time insist pupils point as they speak while tracing switch → battery → contacts → bulb. Then ask what fails if the battery is removed or the switch stays open. Keep it to talk-and-point — the drawn diagram comes later.
- **Settle the tricky placements:** Whole-class only: lock switch as input and battery as process power (not input). Agree one casing decision — under process or supporting part beside the map — write it on the board and leave it up through the journal step.
- **Map the system on the board:** Drive the flow-builder interactive in explore mode with IPO layout. Drag switch to Input, battery and contacts to Process, bulb to Output. Spend most of the step on consequence talk: what fails if a process card is missing?
- **Record your system map:** Leave the class IPO map and casing decision visible. Before the summary each pupil needs at least a torch outline, three labelled components and IPO marked. Call the drawers gently to a halt at minute 6 so the summary is not squeezed out; unfinished detail can finish later on the same page.

What it should show

Shared map: switch = input; battery and contacts/wires = process (power and path); bulb or LED = output. Casing is support/structure — either under process or beside the IPO map if justified. A group calling the battery the input has mixed power store with user control; revoice using what they saw on the opened torch.

Misconceptions & interventions

- **The battery is the input because it 'goes into' the torch.** — Point back at the opened torch: the input is the control action (pressing or sliding the switch). The battery is the power store that, with the contacts, makes the process possible.
- **The casing does no real job because it does not light up.** — Ask what would happen if the shell were gone — parts would not stay touching. Affirm casing as support/structure holding the path in place.
- **Any single part lighting or powering means the path does not need to be complete.** — Have them trace finger-path again: switch open or a missing contact breaks the loop, so the bulb stays dark even if the battery is present.

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Differentiation

Emerging	Developing	Proficient
• Hand the simple torch outline sheet so the pupil labels and marks IPO on a pre-drawn frame. • Offer spoken starters: The switch is the input because… The bulb is the output because…	• Add a short job note in their own words for one component once three labels and IPO marks are done.	• Stretch on the journal page: mark casing per the class decision, add a dashed electricity-path arrow, or explain what fails first if contacts are missing.

Cross-curricular hook

English oral language: pupils justify placements with because-clauses from evidence on the opened torch or photo sheet.