Energy stores and transfer pathways

Student activity • observation and reasoning

YEAR 10 / LESSON 20 / PHYSICS + SCIENCE (DOUBLE AWARD)

The question

How can you track energy without treating it as something that disappears?

Compare a small pendulum, a clockwork toy and a low-voltage lamp using energy-store diagrams.

Equipment

- Small pendulum on a secured stand, clockwork toy and tray
- Low-voltage battery, matching lamp, switch and insulated leads
- Energy-diagram cards and booklet

Keep clear of pendulum paths and use small low swings. Do not overwind toys. Use only staff-checked low-voltage battery circuits with matched lamps; avoid short circuits, switch off between observations and let warm lamps cool. No matches, mains heaters or high-voltage equipment are used.

Course coverage: Shared Physics / Double Award: 4.1–4.3. Stores, transfers and conservation.

Plan, model or apparatus sketch

Draw a labelled setup or force diagram; include the measured quantities.

Method and reasoning

Read the whole sequence before starting

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1. Observe a small securely attached pendulum released from a low height. Identify changes in gravitational and kinetic stores as it swings; stay outside its path.

2. Wind a small clockwork toy gently and let it move on a tray. Trace energy from your chemical store through mechanical work into an elastic store, then motion and thermal stores.

3. Observe a staff-checked low-voltage battery-and-lamp circuit. Explain electrical transfer from the battery's chemical store and radiation/heating from the lamp.

4. Draw a system boundary for each example. Identify energy transferred to the surroundings rather than claiming that the energy is used up.

5. Match magnetic, electrostatic and nuclear stores to supplied diagrams, without building high-voltage or radioactive demonstrations.

6. Compare useful outputs with less useful transfers to the surroundings. Explain why a pendulum eventually stops even though total energy is conserved.

Cleanup

- Switch off circuits, allow lamps to cool, unwind toys safely and return cards.

Record your evidence

Blank spaces are for your own work

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Reference and task data

Energy is measured in joules. Stores describe where energy resides in a model; pathways describe how it transfers. Electrical working and heating are transfer processes, not substances stored inside objects. Light carries energy by radiation; sound transfers energy mechanically through a medium. Useful and wasted describe the chosen purpose, not whether energy exists.

Station	Stores before / after	Transfer pathways
Pendulum		
Clockwork toy		
Battery lamp		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Which stores exchange energy in a pendulum?

2. What store is increased when a toy spring is wound?

3. What store supplies a battery lamp?

4. Is electrical transfer itself an energy store?

5. Why does a pendulum’s swing diminish?

6. Is energy destroyed when surroundings warm?