

4.1 Energy transfers and thermal transfer

Name: _____ Class: _____ Date: _____

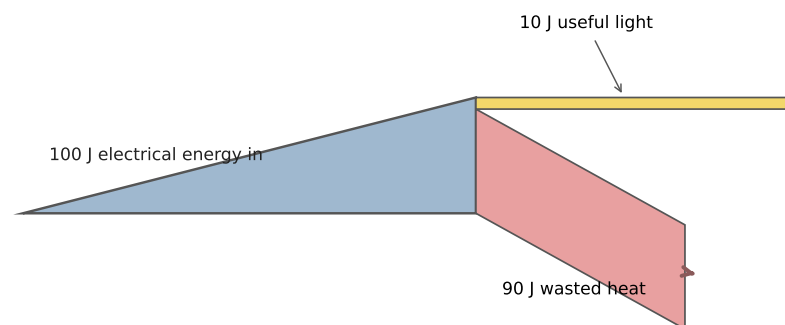
Total: 20 marks

Objective

Cover energy transfers and thermal transfer (4.2–4.10): stores and pathways, conservation, efficiency and Sankey diagrams, conduction, convection, radiation and insulation. Original IGCSE-level practice.

1 Key knowledge and worked examples

■ Efficiency from the diagram



$$\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy output}} \times 100\%$$

Worked check. A motor taking 800 J and giving 560 J of useful motion: $560/800 \times 100 = 70\%$ – the other 240 J warms the surroundings.

■ Three transfer methods

conduction: heat passes along a solid; particles vibrate and pass energy to neighbours



metals conduct best



convection: hot fluid rises, cooler fluid sinks — a circulating current



radiation: infrared waves need no medium; dark, dull surfaces emit and absorb best

2 Practice

2.1 Name three energy stores and two transfer pathways. [5]

2.2 State the principle of conservation of energy. [1]

2.3 A device uses 2000 J and gives 500 J of useful output. Calculate the efficiency. [2]

2.4 Name the thermal transfer that works in a vacuum. [1]

2.5 Which surface absorbs radiation best: matt black or shiny silver? [1]

3 Exam-style questions

3.1 Explain how a radiator heats a whole room by convection. [3]

3.2 Explain why a metal spoon in hot soup warms at the far end, naming the transfer process. [3]

3.3 Describe two features of a house that reduce heat loss and name the transfer each reduces. [4]
