

Energy and Energy Transfers

Energy stores, transfers, efficiency, the cost of electricity and energy resources.

Name _____ Date _____ Class _____

Learning objective: I can describe energy stores and transfers and calculate efficiency and energy costs.

✓ I can name energy stores ✓ I can calculate efficiency ✓ I can compare energy resources

1 Energy stores Match each energy store to an example.

1 kinetic	☐	A food, fuel or a battery
2 gravitational potential	☐	B a stretched elastic band
3 chemical	☐	C a book on a high shelf
4 elastic potential	☐	D a hot cup of tea
5 thermal	☐	E the centre of an atom (in the Sun)
6 nuclear	☐	F a moving bicycle

2 Transfers and conservation Use the word bank.

Word bank: dissipated radiation stored joules watts destroyed

- Energy is measured in _____ (J).
- Energy cannot be created or _____; it is only transferred between stores.
- Energy that spreads out into the surroundings and is less useful is said to be _____.
- Energy can be transferred by heating, by _____ (light and sound), electrically or mechanically.

3 Describe the transfers

- A torch is switched on. Describe the energy transfer. [2 marks]

- A ball is dropped from a height. Describe the energy transfer as it falls. [2 marks]

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Efficiency = useful energy output ÷ total energy input × 100% · **Energy (kWh)** = power (kW) × time (h) ·
Cost = energy (kWh) × price per kWh

4 Efficiency Show your working.

- 1 Total input 100 J, useful output 20 J. Efficiency = ?

2 Total input 60 J, useful output 45 J. Efficiency = ?

- 3 Total input 2000 J, useful output 1700 J. Efficiency = ?

5 Paying for electricity Show your working.

- 1 a 2 kW kettle used for 0.5 hours. Cost at 30p per kWh?

- 2 a 0.1 kW television used for 4 hours. Cost at 30p per kWh?

- 3 a 3 kW heater used for 2 hours. Cost at 30p per kWh?

6 Energy resources Write **renewable** or **non-renewable**, and give one disadvantage.

Resource	Renewable?	One disadvantage
coal		
wind		
solar		
natural gas		

7 Explain it

- 1 A car engine is about 30% efficient. Where does most of the wasted energy go? [2 marks]

- 2 Suggest **two** ways a family could reduce the energy their home wastes. [2 marks]

Answer Key

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Question	Answers
1 Energy stores	1 F; 2 C; 3 A; 4 B; 5 D; 6 E
2 Transfers and conservation	1 joules; 2 destroyed; 3 dissipated; 4 radiation
3 Describe the transfers	1. Chemical store of the battery → transferred electrically → light (radiation) and some thermal energy (heating the surroundings). 2. Gravitational potential store → kinetic store (some dissipated to the surroundings by air resistance/sound).
4 Efficiency	1. $20 \div 100 \times 100 = 20\%$ 2. $45 \div 60 \times 100 = 75\%$ 3. $1700 \div 2000 \times 100 = 85\%$
5 Paying for electricity	1. $2 \times 0.5 = 1$ kWh; $1 \times 30\text{p} = 30\text{p}$ 2. $0.1 \times 4 = 0.4$ kWh; $0.4 \times 30\text{p} = 12\text{p}$ 3. $3 \times 2 = 6$ kWh; $6 \times 30\text{p} = 180\text{p}$ (£1.80)
6 Energy resources	coal – Renewable?: non-renewable , One disadvantage: releases carbon dioxide (and sulfur dioxide) when burned wind – Renewable?: renewable , One disadvantage: does not generate when there is no wind; some people think turbines spoil the view solar – Renewable?: renewable , One disadvantage: no electricity at night; less on cloudy days natural gas – Renewable?: non-renewable , One disadvantage: releases carbon dioxide; will run out
7 Explain it	1. It is dissipated to the surroundings as thermal energy (heating the engine and air) and some as sound. 2. Any two: loft or cavity wall insulation; double glazing; draught excluders; LED bulbs; turning devices off standby; turning the thermostat down.

Teaching note: unit prices are for practice only. Accept other valid disadvantages, e.g. the visual impact of solar farms. Efficiency can never be more than 100%.