Efficiency and energy audits

Core BUILD THE BASICS

C1 **State** the formula for efficiency. **[1]**

C2 E_{in} = 200 J, useful E_{out} = 50 J. **Calculate** η. **[1]**

C3 **State** the most common form of wasted energy. **[1]**

C4 **State** the law of conservation of energy. **[1]**

C5 E_{in} = 1000 J, useful = 750 J. **Calculate** η. **[2]**

C6 **State** why no machine is 100 % efficient. **[1]**

C7 **State** the wasted energy in the lamp Sankey diagram. **[1]**

Stretch GO FURTHER

S1 A 12 V motor draws 2.0 A and gives 18 W of kinetic power. **Calculate** its efficiency. **[3]**

S2 A charger (η = 0.85) feeds a battery that powers a motor (η = 0.7). **Calculate** the overall efficiency. **[2]**

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S3 A 500 W motor is 80 % efficient. **Calculate** its useful output power. **[2]**

S4 **Calculate** the wasted power for S3. **[1]**

S5 **Complete** a Sankey diagram for a motor: 500 J in, 400 J kinetic, 90 J heat, 10 J sound. **[3]**

Exam Ready QUALIFICATIONS SCOTLAND STYLE

E1 **Complete** an energy audit for a 40 W fan: 30 W kinetic, 8 W heat, and sound. Include the sound loss. **[3]**

E2 **Calculate** the efficiency of the fan in E1. **[2]**

E3 **Explain** how improving efficiency helps tackle climate change. **[2]**

E4 A winch at Strathmore harbour (fictional) uses 24 000 J and lifts a load gaining 15 600 J. **Calculate** its efficiency. **[2]**

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E5 **Explain** one way to improve the winch's efficiency. **[2]**

Total: 30 marks. Use the Data Booklet. Show your working and give units.