

Energy stores, Sankey diagrams and efficiency

Physics grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · Test answers (mark scheme)

Model answers and mark schemes follow. Award marks for the method, for the correct substitution and for the answer with its unit. Accept equivalent wording, and give follow-through marks when a correct method uses a wrong value from an earlier part.

Level: Physics grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · **Curriculum:** GCSE P1, HS-PS3-4

Question 1 Energy stores (2 marks)

- a. **Elastic potential** energy store.
- b. **Chemical** energy store.

Marking: 1 mark each.

Question 2 Conservation (1 mark)

Energy cannot be created or destroyed; it can only be **transferred from one store to another**, so the total stays the same.

Marking: 1 mark for created/destroyed and transferred.

Question 3 Water pump (3 marks)

- a. $2500 - 1750 = \mathbf{750\ J}$.
- b. Efficiency = $1750 \div 2500 \times 100 = \mathbf{70\ \%}$.

Marking: (a) 1 mark. (b) 1 mark for the ratio, 1 mark for 70 %.

Question 4 Electric drill (4 marks)

- a. $200 - 120 - 60 = \mathbf{20\ J}$.
- b. $120 \div 200 \times 100 = \mathbf{60\ \%}$.
- c. It is transferred to the **surroundings** (spreads out as thermal energy) and cannot be used again.

Marking: (a) 1 mark. (b) 1 mark for the ratio, 1 mark for 60 %. (c) 1 mark.

Question 5 Boiler (3 marks)

- a. Input = $24 \div 0.80 = \mathbf{30 \text{ MJ}}$.
- b. $30 - 24 = \mathbf{6 \text{ MJ}}$.

Marking: (a) 1 mark for the method, 1 mark for 30 MJ. (b) 1 mark.

Question 6 Reducing waste at home (3 marks)

- a. Any two: **loft insulation, double glazing, cavity wall insulation, draught excluders, thicker curtains.**
- b. Example: loft insulation traps air and slows conduction through the roof, so less thermal energy is transferred out of the house and less is wasted.

Marking: (a) 1 mark each measure. (b) 1 mark for a correct explanation about slowing thermal transfer.

Question 7 Two machines (3 marks)

- a. A: $400 \div 500 = \mathbf{80 \%}$. B: $600 \div 800 = \mathbf{75 \%}$.
- b. **Machine A.**

Marking: (a) 1 mark each machine. (b) 1 mark.

Question 8 Impossible claim (1 mark)

It would give out more energy than it takes in, which breaks the conservation of energy; some energy is always wasted, so **efficiency is below 100 %**.

Marking: 1 mark.