

Energy stores, Sankey diagrams and efficiency

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

Name: _____ Date: _____ Class: _____ Mark: ____ / 20

This test checks your knowledge of energy stores, conservation, Sankey diagrams and efficiency. Show your working for every calculation and include units. Use $g = 9.8 \text{ N/kg}$. The total is 20 marks.

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

Time: 40 minutes · 8 questions · Total: 20 marks · Calculator allowed

Question 1 Energy stores (2 marks)

Name the main energy store in each case.

- a. A stretched spring. (1 mark)
- b. Petrol in a tank. (1 mark)

Question 2 Conservation (1 mark)

State the principle of conservation of energy. (1 mark)

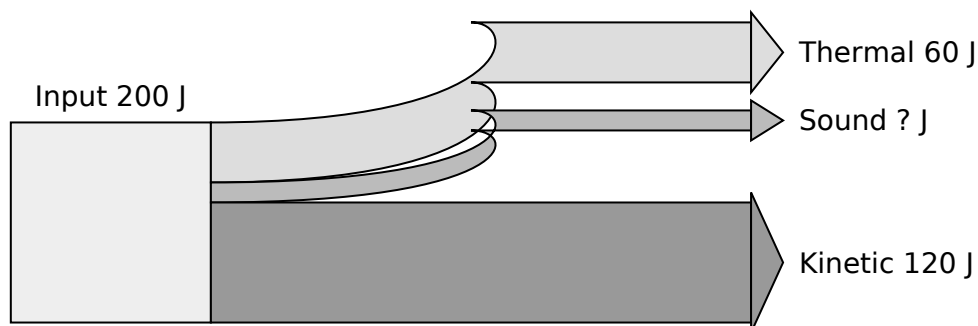
Question 3 Water pump (3 marks)

A pump motor takes in 2500 J of electrical energy and gives out 1750 J of useful energy.

- a. Calculate the wasted energy. (1 mark)
- b. Calculate the efficiency as a percentage. (2 marks)

Question 4 Electric drill (4 marks)

The Sankey diagram shows the energy flow for an electric drill.



Energy flow for an electric drill.

- Calculate the energy wasted as sound. (1 mark)
- Calculate the efficiency of the drill. (2 marks)
- State what happens to the wasted energy. (1 mark)

Question 5 Boiler (3 marks)

A boiler is 80 % efficient and delivers 24 MJ of useful thermal energy.

- Calculate the energy input from the fuel. (2 marks)
- Calculate the energy wasted. (1 mark)

Question 6 Reducing waste at home (3 marks)

A family wants to reduce wasted thermal energy in their house.

- Name two measures they could take. (2 marks)
- Explain how one of your measures reduces the energy wasted. (1 mark)

Question 7 Two machines (3 marks)

Machine A takes in 500 J and gives out 400 J of useful energy. Machine B takes in 800 J and gives out 600 J of useful energy.

- Calculate the efficiency of each machine. (2 marks)
- State which machine is more efficient. (1 mark)

Question 8 Impossible claim (1 mark)

An inventor says a machine is 105 % efficient. Explain why this is impossible. (1 mark)