

Following energy through devices and chains

Grade 7 science (Year 8 · Class 7) · Test

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

This test checks energy chains, conservation of energy, wasted energy and efficiency. Show your working, give units and use complete sentences for the explanations.

Level: Grade 7 science (Year 8 · Class 7) · **Curriculum:** MS-PS3-5

Time: 45 minutes · 8 questions · Total: 20 marks · Calculator allowed

Question 1 Conservation of energy (2 marks)

State the law of conservation of energy and give one example of a wasted energy transfer.

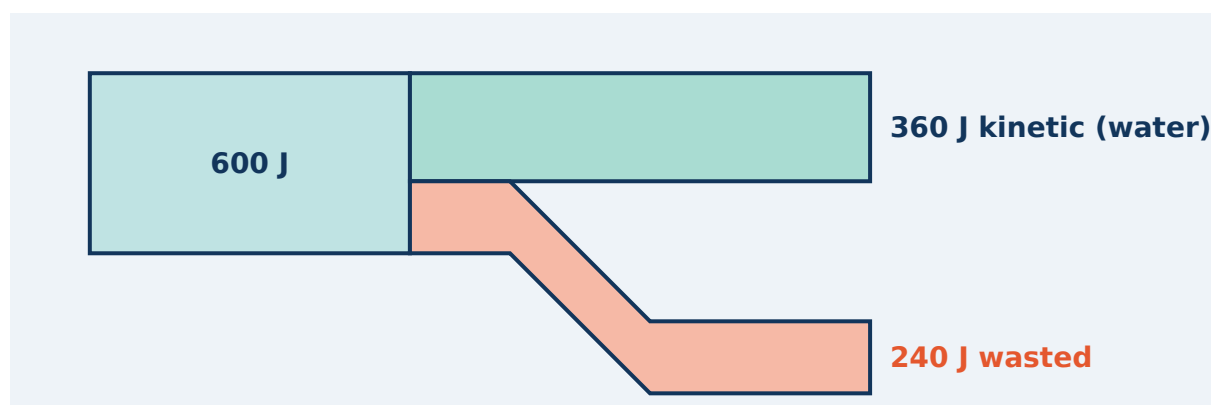
Question 2 Radio chain (3 marks)

A battery radio plays music.

- Write the energy chain from the battery to the sound. (2 marks)
- Name one wasted output. (1 mark)

Question 3 Water pump Sankey (3 marks)

The Sankey diagram shows a small water pump.



Sankey diagram of the pump.

- State the useful energy output. (1 mark)
- State the wasted energy. (1 mark)
- Calculate the efficiency of the pump. (1 mark)

Question 4 Gas ring (3 marks)

A gas ring gives out 3000 J of thermal energy every second. Of this, 1800 J heats the pan and the rest heats the room.

- a. Write the formula for efficiency. (1 mark)
- b. Calculate the efficiency of the ring. (2 marks)

Question 5 Hard to reuse (2 marks)

Explain why wasted thermal energy from a laptop cannot be collected and used again.

Question 6 Compare two devices (3 marks)

Device A takes in 50 J and gives 40 J of useful energy. Device B takes in 40 J and gives 36 J of useful energy.

- a. Calculate the efficiency of each device. (2 marks)
- b. State which device wastes less energy. (1 mark)

Question 7 Impossible claim (2 marks)

An inventor says a machine takes in 200 J and always gives out 250 J of useful energy. Explain why this cannot be true.

Question 8 Insulating a kettle (2 marks)

Suggest how adding a layer of insulation to the outside of a kettle changes its efficiency, and explain why.