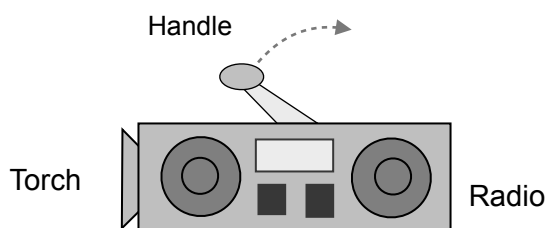
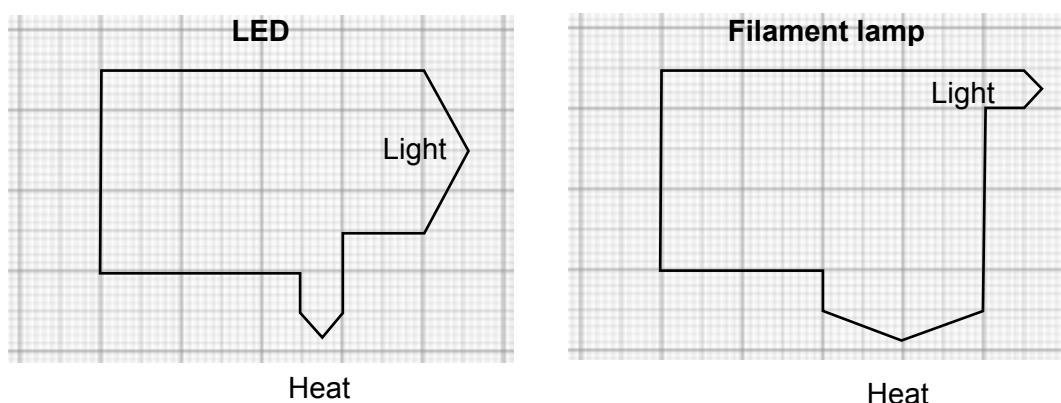


- 1 The diagram shows a wind-up radio and torch called a Tordio. The handle is turned to charge a battery inside the Tordio.



- 1 (a) (i) The manufacturer had a choice between a filament lamp or an LED for the torch. They used information provided by the two Sankey diagrams shown below.



Explain in detail why the manufacturer decided to go for the LED and not the filament lamp.

Use information given in the Sankey diagrams in your answer.

[4 marks]

LED is more efficient. [1]

LED is 80% efficient. [1]

Less energy wasted or transferred as heat. [1]

Four times more energy transferred as useful / light by LED. [1]

Tordio needs to be wound less for LED. [1]

- 1 (a) (ii) In order to charge the internal battery, the handle on the torch radio has to be turned. Some of the energy used to turn the handle is not transferred to the battery.

Suggest why some of the energy is not transferred to the battery?

[2 marks]

Energy transferred as sound [1] or heat [1].

- 1 (b) During trials of the Tordio, the manufacturers gathered some data on the energy transfers of the speakers.

Energy input = 200 joules

Energy transferred as sound = 192 joules

Wasted energy = 8 joules

- 1 (b) (i) Calculate the efficiency of the speakers. **[2 marks]**

192/200 [1]

Efficiency = 96% or 0.96 [2]

The question doesn't ask you to use a particular unit so either of the given is fine.

- 1 (b) (ii) What happens to the wasted energy? **[2 marks]**

Transferred to the surroundings [1]

Surroundings are heated or as heat [1]

(Total 10 marks)

End