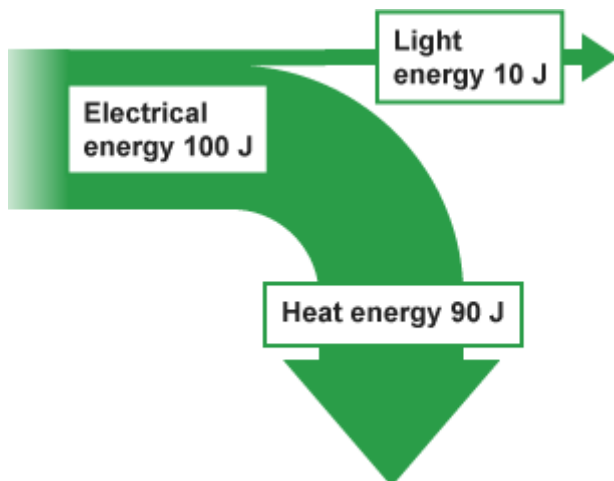
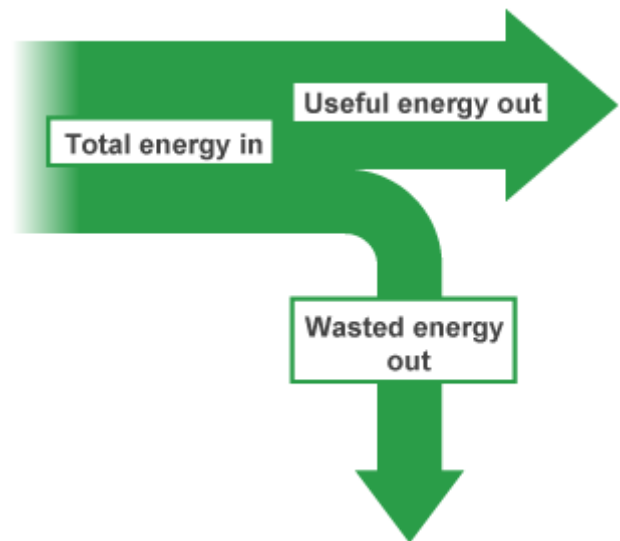


What is a Sankey diagram?

Sankey diagrams summarise all the *energy transfers* taking place in a process.

The thicker the line or arrow, the greater the amount of energy involved.

Sankey diagrams can be drawn on graph paper to show the relative values of total, useful and wasted energy.



This Sankey diagram for an electric *filament* lamp shows that most of the electrical energy is transferred as heat energy rather than light energy.

The Principle of Conservation of Energy

Key fact - Energy can be changed from one form to another but cannot be created or destroyed. The total amount of energy does not change.

In the above Sankey diagram, note that 100 J of electrical energy is supplied to the lamp.

Of this, 10 J is transferred to the surroundings as useful light energy.

The remainder, 90 J (100 J – 10 J) is transferred to the surroundings as wasted heat energy.

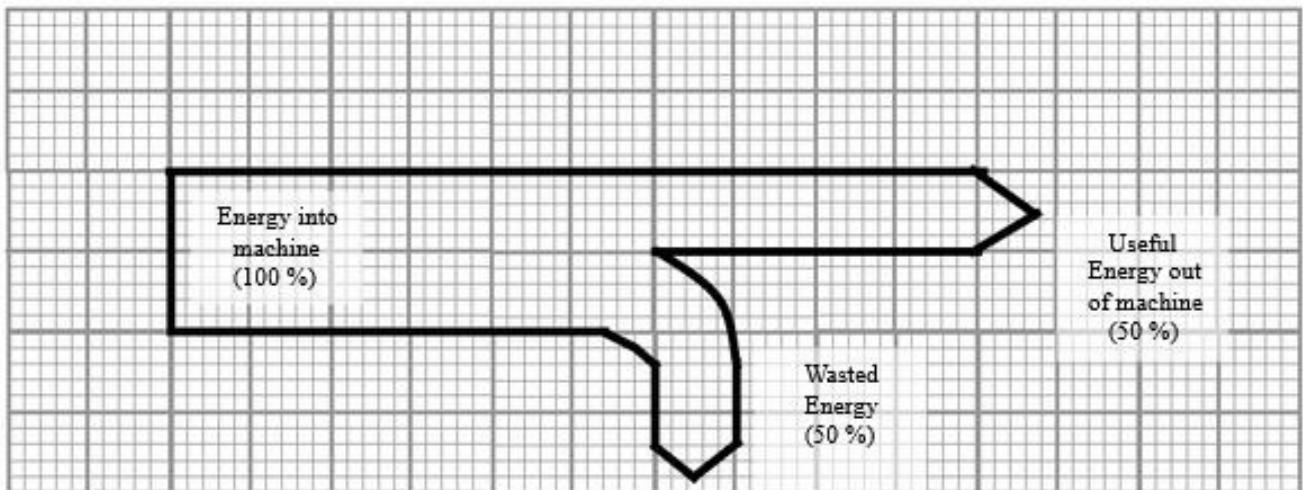
The energy transfer to light energy is the useful transfer. The rest is 'wasted'.

It is eventually transferred to the surroundings, making them warmer. This 'wasted' energy eventually becomes so spread out that it becomes very difficult to do anything useful with it.

Classwork

A Sankey diagram shows you how well a machine uses energy. In other words, it tells you if it uses it efficiently (without much waste) or inefficiently (with a lot of waste).

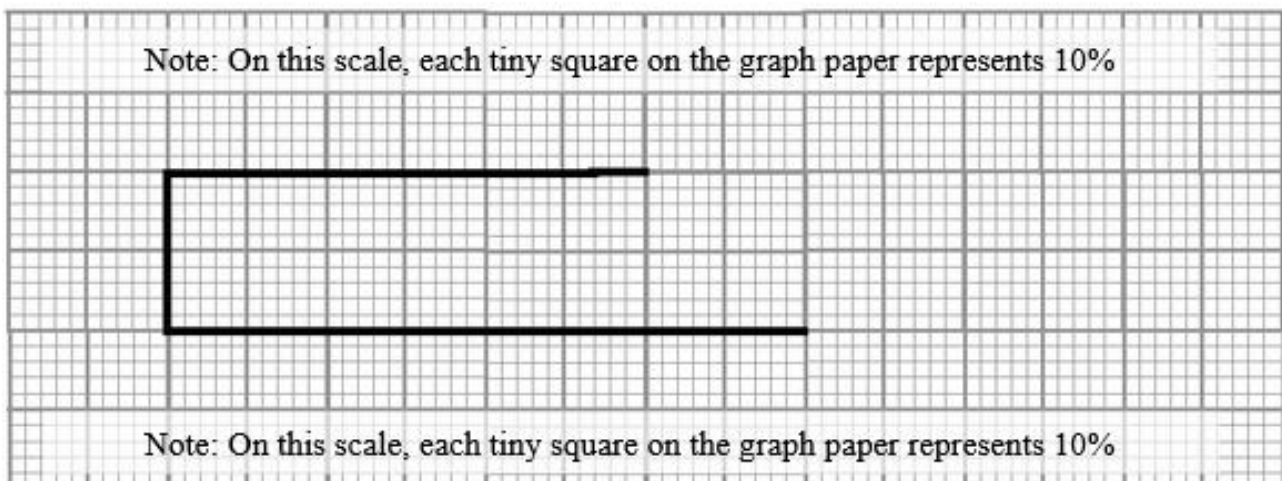
The thickness of the arrows shows how much energy is involved. (The length of the arrows does not matter in a Sankey Diagram.) Useful energy transfers are shown going left to right. Wasteful energy transfers are shown going upwards.



1. Write in these labels on the diagram above:

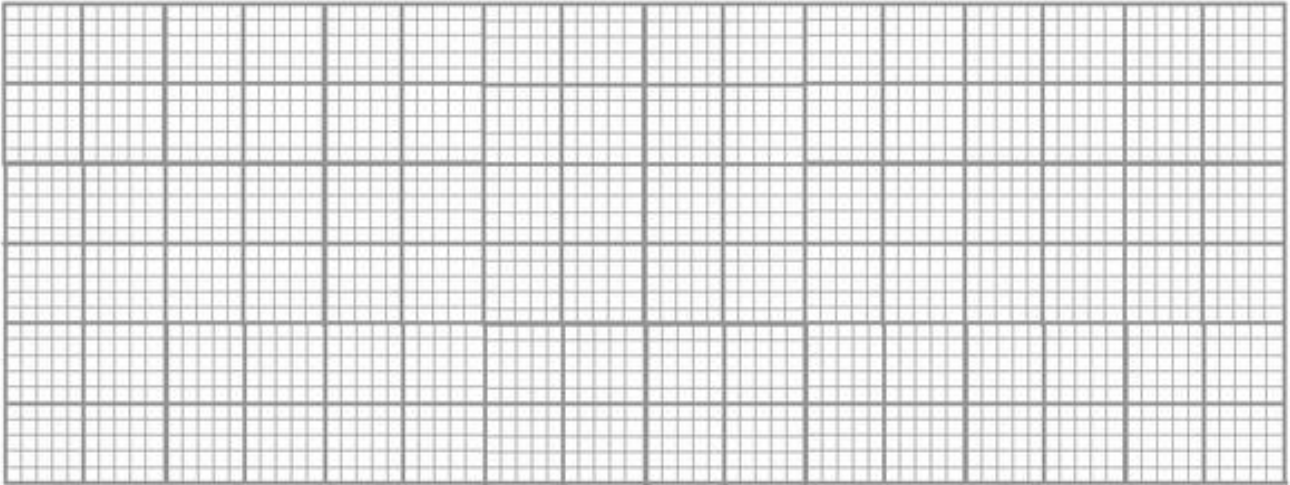
- INPUT ENERGY
- USEFUL OUTPUT ENERGY
- WASTED OUTPUT ENERGY

2. A normal filament bulb transfers 10% of energy as light (useful) but 90% as heat energy (wasted). Draw a Sankey diagram in the space below.



Remember to label it with: INPUT ENERGY, USEFUL OUTPUT ENERGY, WASTED OUTPUT ENERGY

3. An energy efficient bulb transfers 40% of the energy as useful light energy.
- How much energy is transferred as heat?
 - Draw a Sankey Diagram in the space below

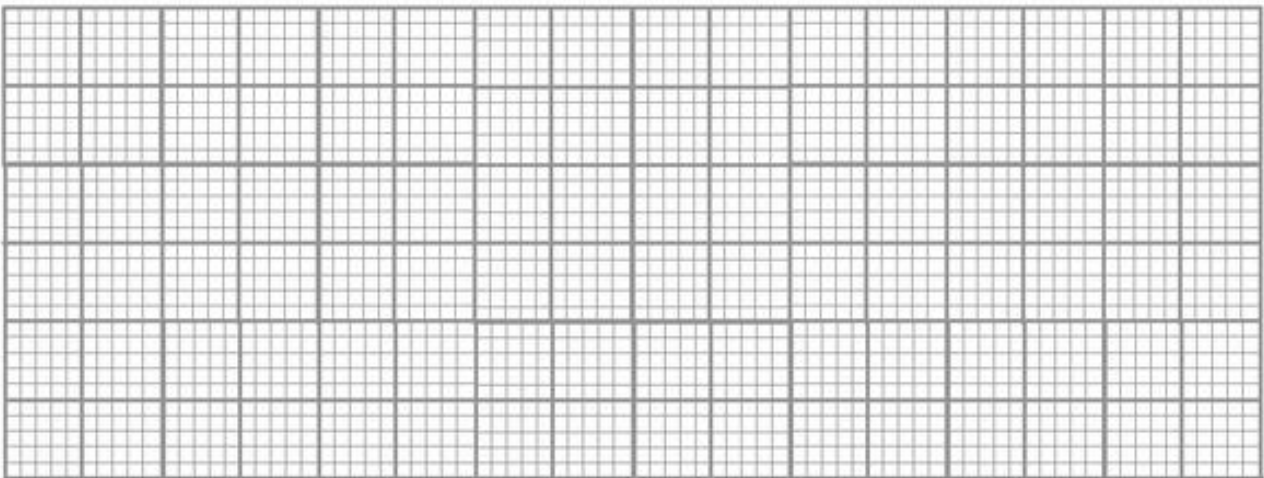


Remember to label it with: INPUT ENERGY, USEFUL OUTPUT ENERGY, WASTED OUTPUT ENERGY

4. A team of scientists test an “old banger” car. They find out that only 10% of the energy is transferred as kinetic energy (useful) and 70% is transferred as heat energy (wasted).
- How much energy is wasted as sound?
 - Draw a Sankey Diagram in the space below

Label the arrows with input energy, useful output energy (kinetic), wasted output energy (heat), wasted output energy (sound)

5. A team of scientists test a brand new hybrid car. They find out that 40% of the energy is transferred as kinetic energy (useful) and 55% is transferred as heat energy (wasted).
- How much energy is wasted as sound?
 - Draw a Sankey Diagram in the space below



Remember to label each of the arrows!!!