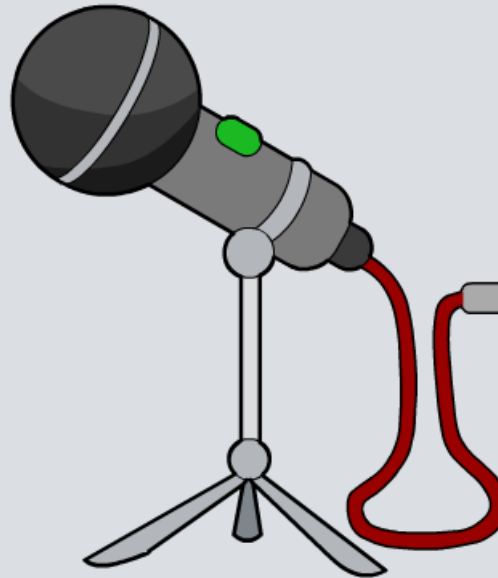


## Energy Transfers



# What is a useful energy transfer?

Many household objects are designed to transfer energy from one form into another useful form.

What energy transfer is an **electric fan** designed to carry out?



electrical  
energy



kinetic  
energy



# What is a useful energy transfer?

What energy transfer are these **speakers** designed to carry out?



**electrical  
energy**



**sound  
energy**



# What is a useful energy transfer?

What energy transfer are **wind turbines** in a wind farm designed to carry out?



**kinetic  
energy**



**electrical  
energy**



# What is a useful energy transfer?

What energy transfer is a **hydroelectric power station** designed to carry out?



**gravitational potential energy** → **electrical energy**



What are the useful energy transfers for these devices?

Device	Input energy	Output energy
kettle	?	?
solar cell	?	?
catapult	?	?
coal fire	?	?
light bulb	?	?

light



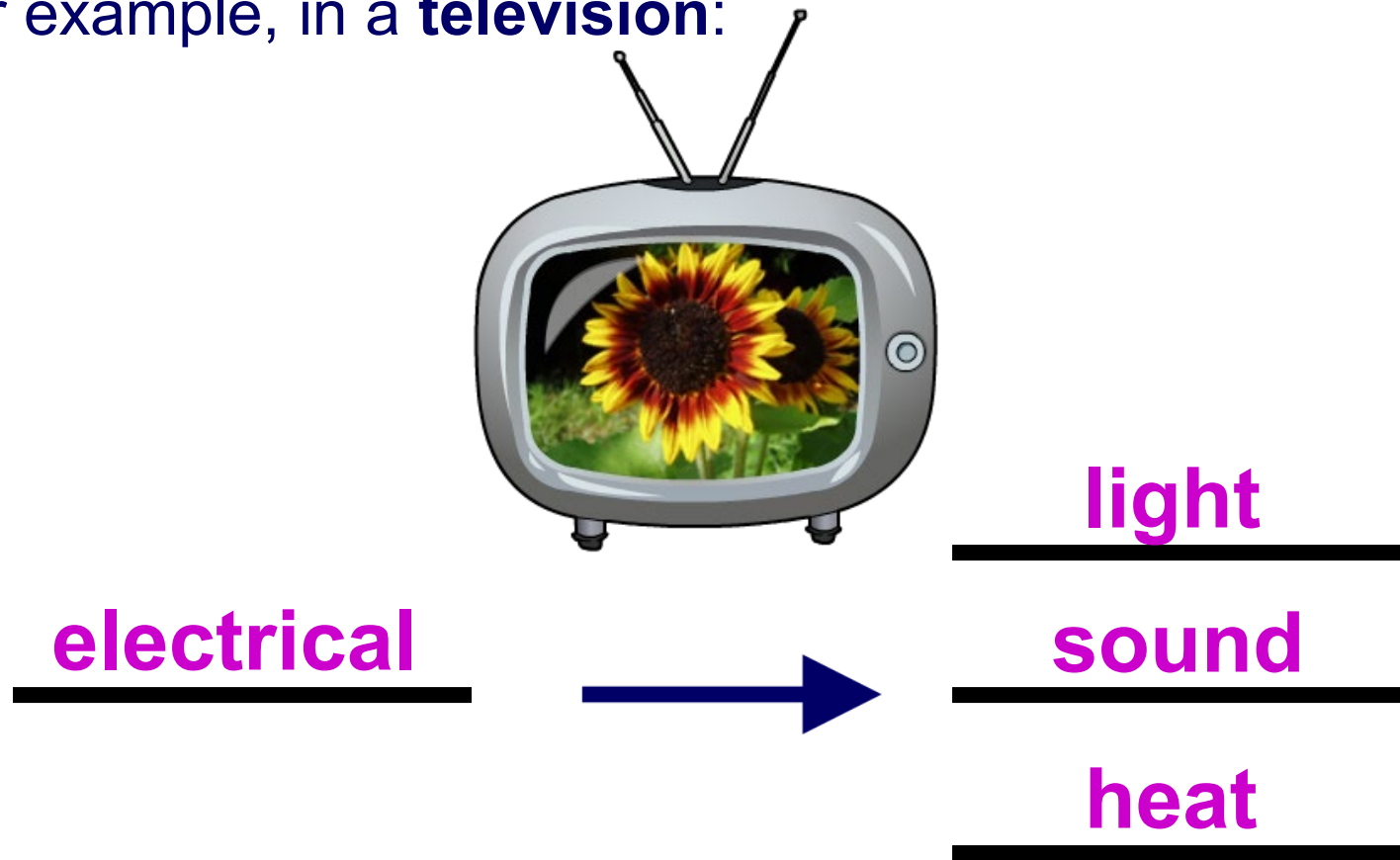
solve



# Energy transfer in a television

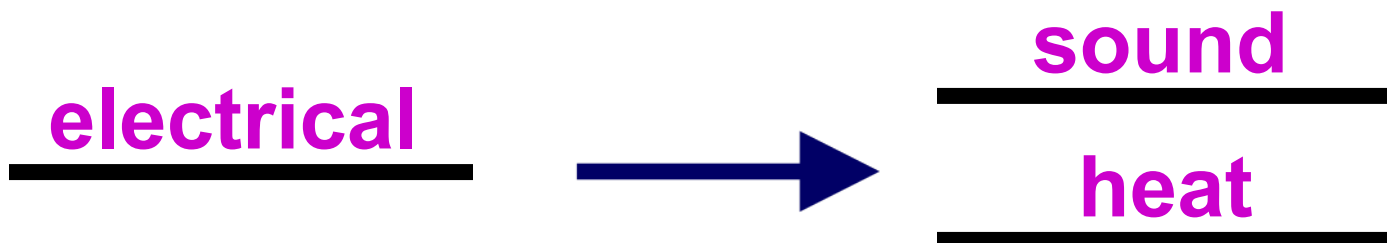
An energy transfer diagram shows the input and output energies for a device. This includes all the useful and wasted forms of energy.

For example, in a **television**:



# Energy transfer in a radio

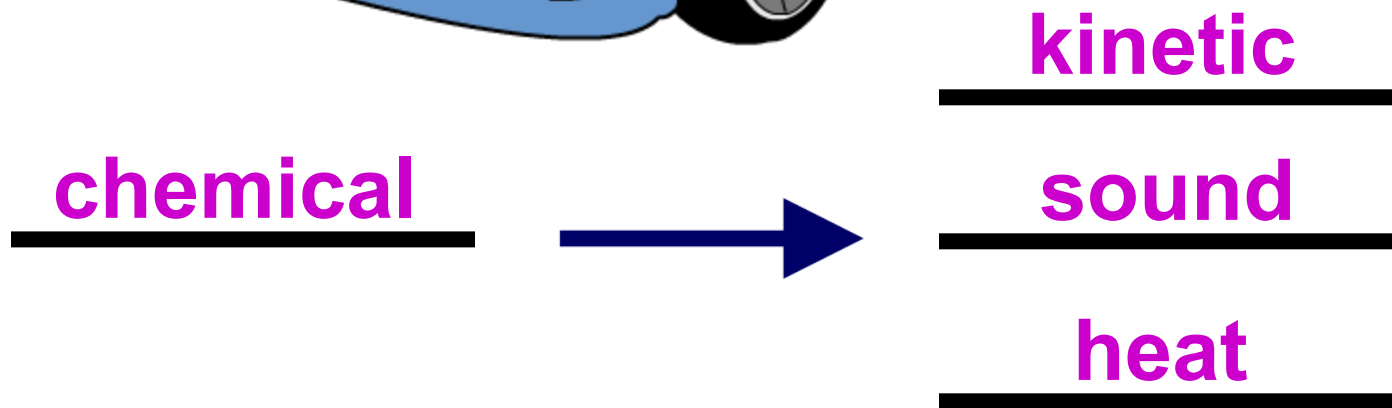
What are the main energy transfers in a **radio**?  
(Don't forget the wasted energy.)





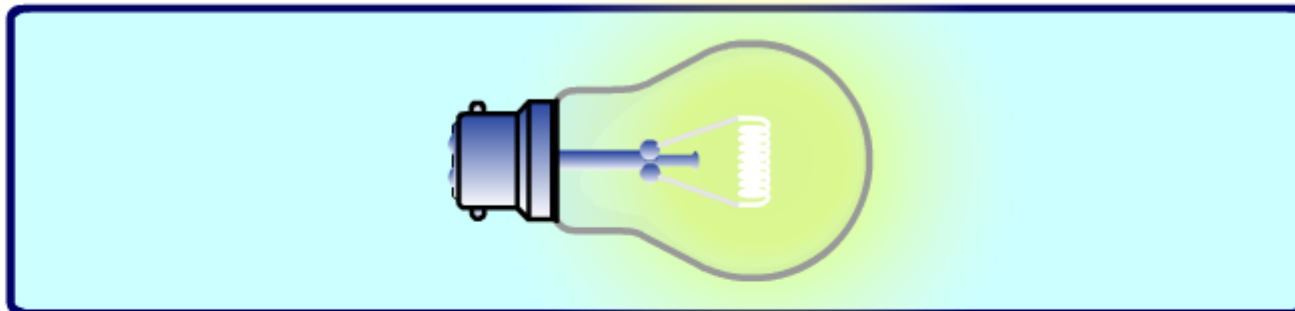
# Energy transfer in a car engine

What are the main energy transfers in a **car engine**?  
(Don't forget the wasted energy.)



What are the input and output energies for each situation?

1



**Input**

heat

light

sound

kinetic

electrical

elastic

chemical

gravitational

**Output**

heat

light

sound

kinetic

electrical

elastic

chemical

gravitational



# How can we represent energy transfers?

All the energy transfers (useful and wasted) that are associated with a device can be represented by a **Sankey diagram**.

A Sankey diagram uses arrows to represent all the output energies.

The thickness of each arrow is proportional to the amount of energy involved at that stage.

How does the energy use in these light bulbs compare?

