



Physics Paper 1









for Combined Science

The Basics Booklet

Units:





| Name | Value | Symbol |
|------------------------------|-------|--------|
| Energy | | |
| Mass | | |
| Speed | | |
| Spring Constant | | |
| Extension | | |
| Height | | |
| Gravitational Field Strength | | |
| Temperature Change | | |
| Specific Heat Capacity | | |
| Power | | |
| Time | | |

Give the names of the different types of energy stores

| | | | |
|--|--|---|--|
|  | |  | |
|  | |  | |
|  | |  | |
|  | |  | |

What is the first Law of Thermodynamics:

Give the energy transfers in the following examples:

| | | | |
|----------------------------|--|---|--|
| An electric kettle | |  | |
| A battery powered torch | |  | |
| A skydiver diving | |  | |
| A car crashing into a wall | |  | |

Define the following Key Words

System

Kinetic Energy

Elastic Potential Energy

Gravitational Potential Energy

Specific Heat Capacity

Power

Closed System

Dissipated

Renewable

Non-Renewable

Give the equation that links the following variables:

Kinetic Energy, Mass, Speed

Elastic Potential Energy, Extension, Spring Constant

Gravitational Field Strength, Gravitational Potential Energy, Height, Mass

Change in Thermal Energy, Mass, Specific Heat Capacity, Temperature Change

Energy Transferred, Power, Time

Power, Time, Work Done

Efficiency, Total Power Input, Useful Power Output

Efficiency, Total Input Energy Transfer, Useful Output Energy Transfer

Key Terms

Electric Current

National Grid

Units

Measurement

Unit

Symbol

Charge Flow

Current

Time

Potential Difference

Resistance

Power

Energy Transferred

Circuit Symbols

Switch (open)

LED

Switch (closed)

Lamp

Cell

Fuse

Battery

Voltmeter

Diode

Ammeter

Resistor

Thermistor

Variable Resistor

LDR

Equations

Complete the equations that link these terms:

Charge flow, Current & Time:

Current, Potential Difference & Resistance:

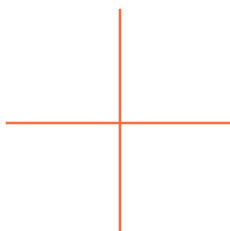
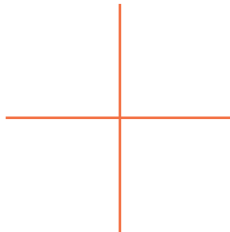
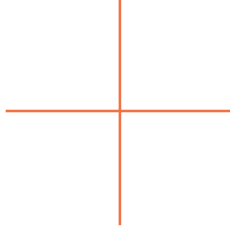
Current, Potential Difference & Power:

Current, Potential Difference & Resistance:

Energy Transferred, Power & Time

Charge Flow, Energy Transferred & Potential Difference:

Resistors

| | Graph | Description |
|-----------------|---|-------------|
| Ohmic conductor |  | |
| Filament Lamp |  | |
| Diode |  | |

Thermistor



Use:

LDR



Use:



Circuit Rules Give the rules for current, potential difference, and resistance in these circuits:

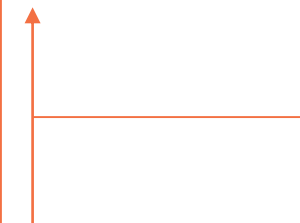
| Series Circuit | | Parallel Circuit | |
|----------------------|--|----------------------|--|
| Current | | Current | |
| Potential Difference | | Potential Difference | |
| Resistance | | Resistance | |

What type of supply is the mains electricity in the UK?

Alternating potential difference

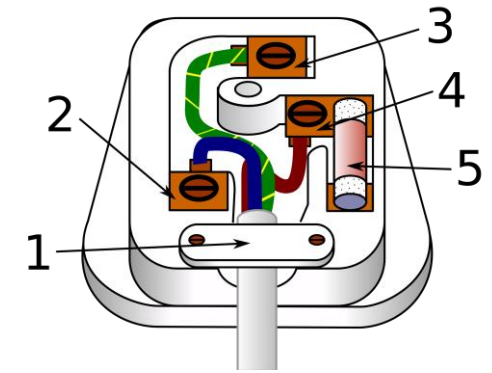
Direct potential difference

What is the frequency of the UK domestic electricity supply?



What is the potential difference of the UK domestic electricity supply?

Mains Electricity



| | Live | Neutral | Earth |
|----------------------|------|---------|-------|
| Colour | | | |
| Use | | | |
| Potential Difference | | | |

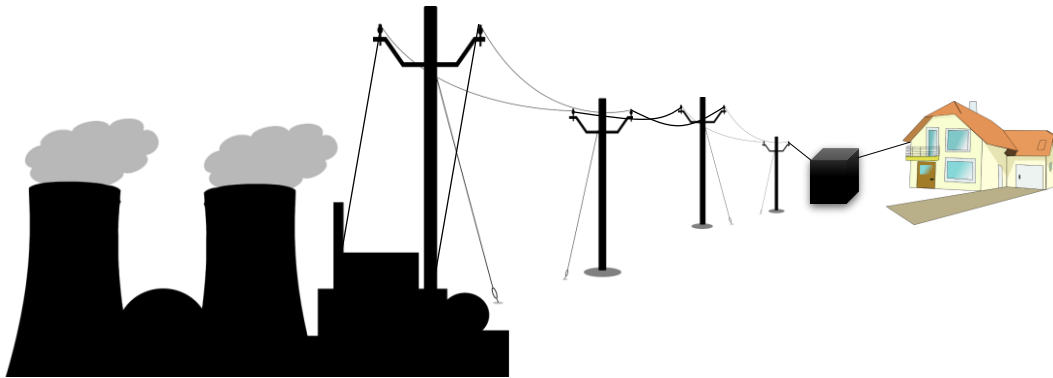
Energy Transfers

Give the energy transfers in the following devices:

| Device | Input | Useful output | Waste output |
|------------------------|-------|---------------|--------------|
| Battery operated torch | | | |
| Mains electric fan | | | |
| Mains electric heater | | | |

The National Grid

Label the key parts:



Define what each of these transformers do:

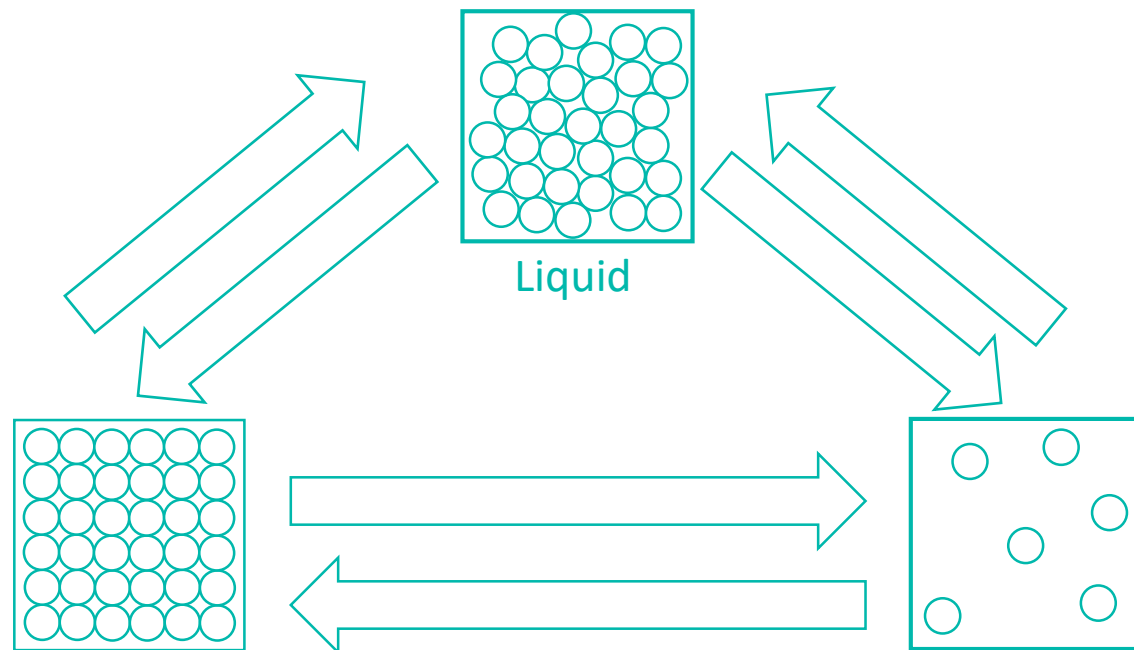
Step Up
Transformers

Step Down
Transformers

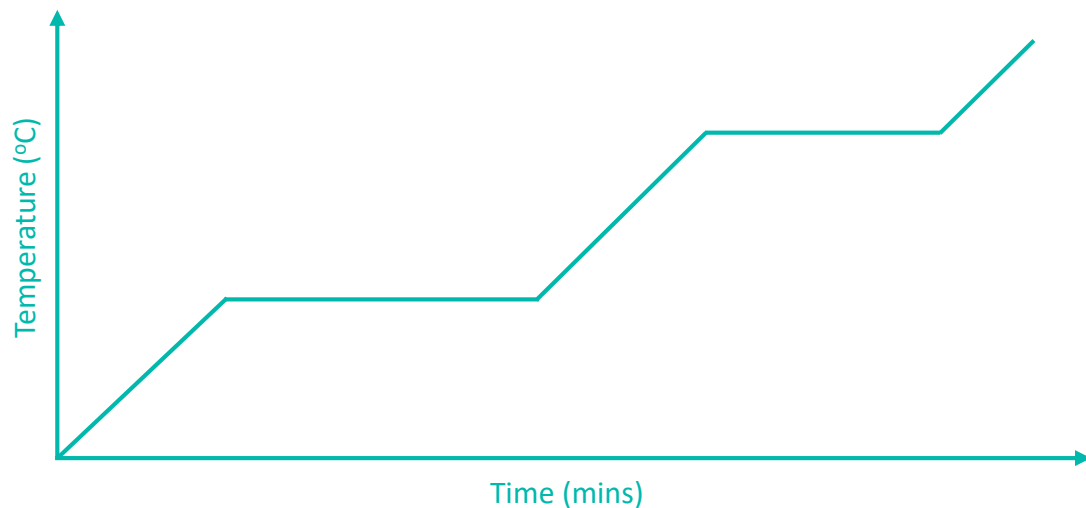
Units:

| Name | Value | Symbol |
|------------------------|-------|--------|
| Density | | |
| Mass | | |
| Volume | | |
| Thermal Energy | | |
| Specific Heat Capacity | | |
| Temperature Change | | |
| Specific Latent Heat | | |

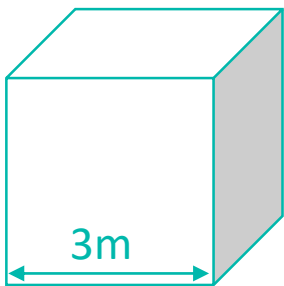
Draw a diagram to model a solid, liquid and gas. Give the name of the state changes:



Label the graph with the key information it shows:



Calculate the density of the following cube with a mass of 2.7kg:



Density: _____ Unit: _____

Define the following Key Words

Density

Physical Change

Internal Energy

Kinetic Energy

Potential Energy

Specific Heat Capacity

Specific Latent Heat

Specific Latent Heat of Vaporisation

Specific Latent Heat of Fusion

Give the equation that links the following variables:

Density, Mass and Volume

Change in Thermal Energy, Mass, Specific Heat Capacity & Temperature Change

Energy for a Change of State, Mass, Specific Latent Heat

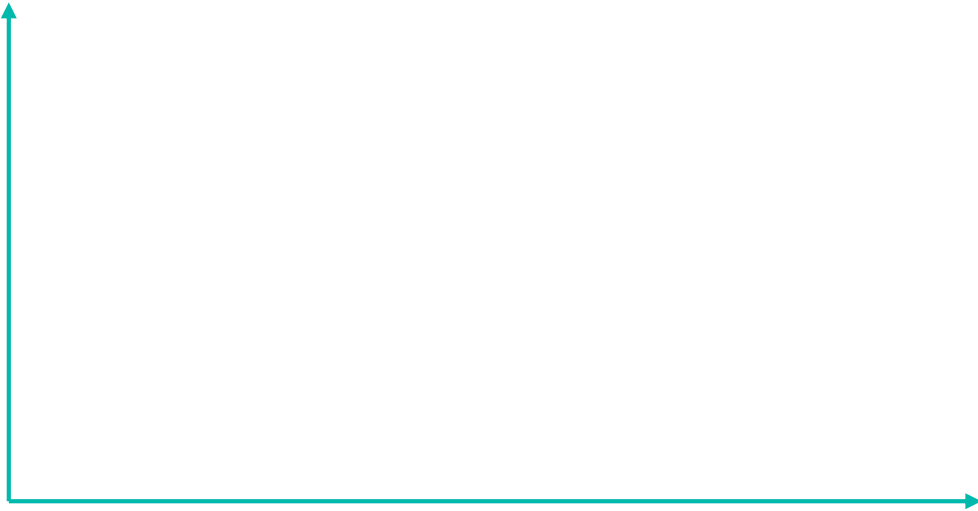
Compare Specific Latent Heat & Specific Heat Capacity

| | Specific Latent Heat | Specific Heat Capacity |
|--------------------|----------------------|------------------------|
| Temperature Change | | |
| State Change | | |
| Energy Used | | |

Particle Motion in Gases

The molecules of a gas are in constant _____ motion.

Draw the relationship between the temperature of a gas and its pressure at a constant volume:



Describe the relationship between the temperature of a gas and its pressure at a constant volume:

Explain the relationship between the temperature of a gas and its pressure at a constant volume:

How much heat energy is required to raise the temperature of 5kg of aluminium by 10°C. The specific heat capacity of aluminium is 900 J/kg°C.

Energy: _____

Calculate the Specific Heat Capacity of Brass. It takes 7768J of heat energy to heat 0.9kg of solid brass from 10°C to 33°C. Give your answer to 3 significant figures.

Specific Heat Capacity: _____

How much heat energy does it take to turn 350g of boiling water into steam. The specific latent heat of fusion of ice is 335,000J/kg. The specific latent heat of vaporisation is 2,260,000J/kg

Heat Energy: _____

How much energy is needed to freeze 500 grams of water at 0°C?

Energy: _____

Key Terms:

Mass Number

Atomic Number

Isotope

Ion

Activity

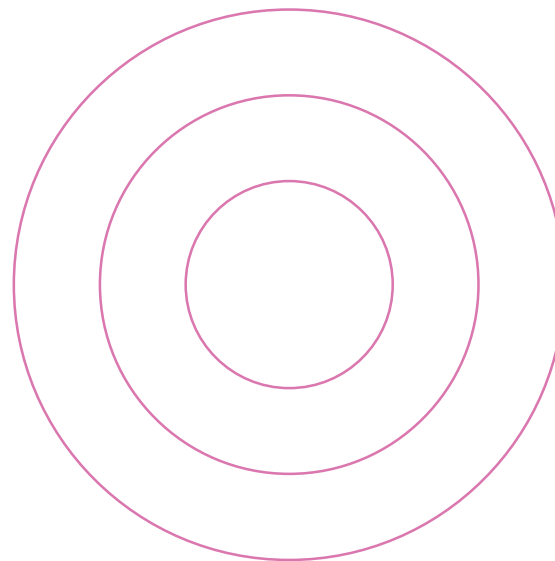
Half Life

Contamination

Irradiation

Peer Review

Complete and label the diagram showing the structure of an atom.



Labels

Nucleus
 Proton
 Electron
 Neutron

Fill in the missing gaps for the following atoms:

| Element | Atomic Mass | Number of protons | Number of neutrons | Number of electrons |
|---------|-------------|-------------------|--------------------|---------------------|
| Lithium | | | | |
| Argon | | | | |
| Calcium | | | | |
| | 20 | | | |
| | | 30 | | |
| | | | | 36 |

Complete the end of the sentences below:

All atoms of the same element have the same number of

An isotopes of an element has a different number of

An ion is an element that has lost or gained an

Number the sentences in the correct order:

The discovery of the proton

The development of the plum pudding model

The nucleus becomes an accepted scientific idea

Niels Bohr suggested that electrons orbit the nucleus at specific distances

The discovery of the electron

James Chadwick provides evidence to show the existence of the neutron

Give the number to the following facts

The radius of an atom in metres

The charge on an electron

The atomic number of Sodium

The mass number of Sodium

The number of neutrons in Sodium

The mass of a proton

The number of electrons in an alpha particle

The number of protons in a helium nuclei

Which type of nuclear radiation is this?

Electromagnetic radiation from the nucleus

This consists of two neutrons and two protons, it is the same as a helium nucleus

The most penetrating type of radiation

The least ionising type of radiation

A high speed electron ejected from the nucleus as a neutron turns into a proton

The most ionising type of radiation

Complete the nuclear equations:



Which type of nuclear radiation is this?

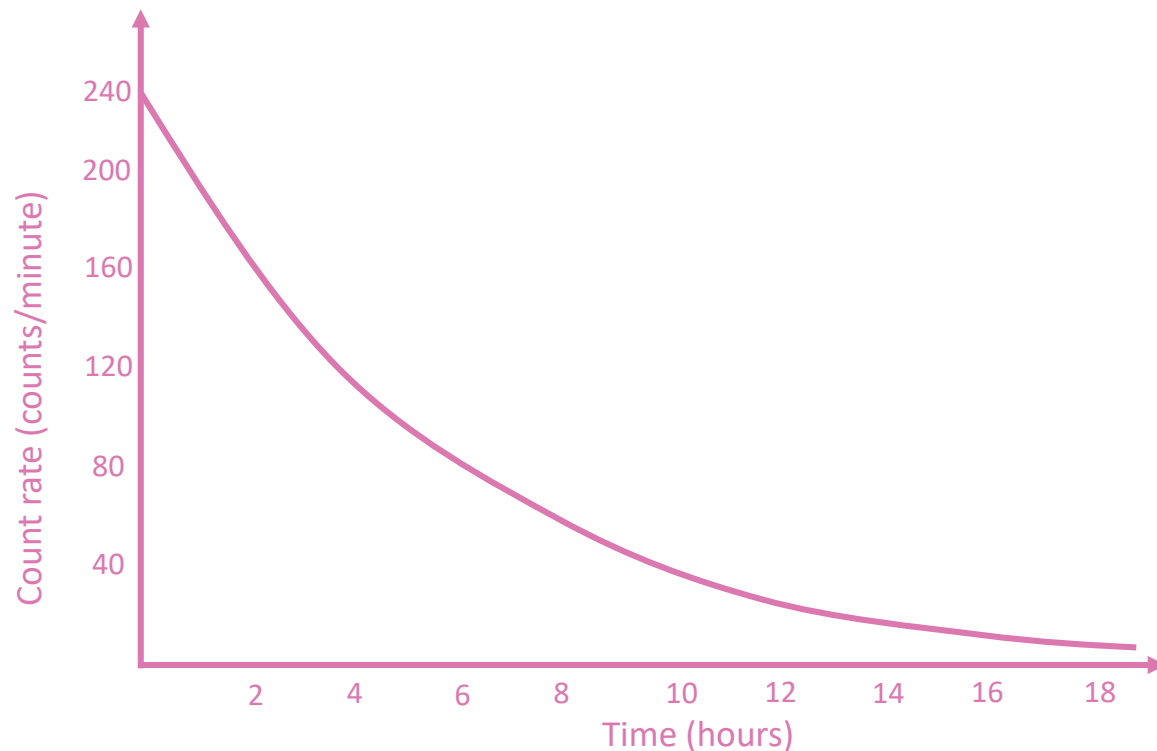
The emission of this type of radiation causes:

The charge of the nucleus to increase but the mass stays the same

The mass and the charge of the nucleus do not change

The charge of the nucleus and the mass decrease

Calculate the half life of the following radioactive isotope.



The half life of Technetium-99m is 6 hours. 12mg of Tectetium-99m is injected into a patient and starts to decay into Technetium-99.

Calculate the amount of Technetium 99m present in the patient after 24 hours.

Calculate the amount of Technetium-99 in the patient after 48 hours.