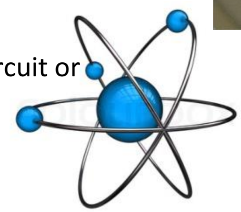
National 5 Physics Learning Outcomes

Unit 1 Electricity and Energy

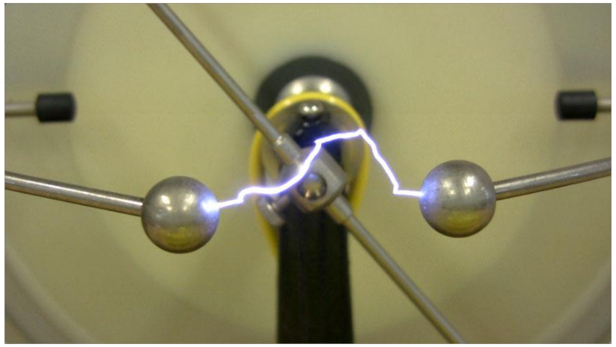
Key Area: electrical charge carriers and electric fields

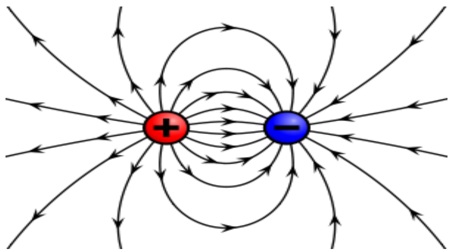
- State that there are 2 types of charge: positive(+) and negative (-)
- State that charges that are the same are called like charges
- State that charges that are not the same are called opposite charges
- State that like charges repel each other
- State that opposite charges attract each other
- Describe a simple model of an atom that includes: protons (+), electrons (-) and neutrons (=)
- Be able to draw electric fields for; point charges, pairs of charges, parallel plates.
- State that in an electric field, charged objects and particles experience a force
- Carry out calculations involving the relationship between charge, current and time
- State that electrons are free to move in a conductor
- State that electrical current is a flow of charges around a circuit or through a conductor



Key Area: potential difference (voltage)

- State that the voltage of a supply is a measure of the energy given to each charge in the circuit
- State that the units of voltage and potential difference are the Volt(V) or Joules per Coulomb(JC^{-1})
- State that like charges repel each other
- State that opposite charges attract each other
- Explain both DC and AC in terms of current and voltage.



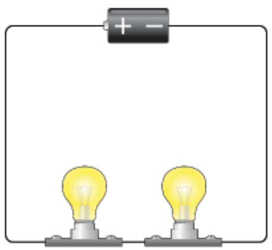


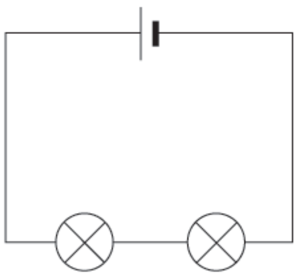
National 5 Physics Learning Outcomes

Unit 1 Electricity and Energy

Key Area: practical electrical and electronic circuits

- ○ Draw and identify circuit symbols for: a cell, battery, resistor, fuse, switch, lamp, ammeter and voltmeter in a circuit
- ○ Draw circuit diagrams to show the correct positions of an ammeter and voltmeter in a circuit
- ○ State that in a series circuit current is the same at all points
- ○ State that the sum of the voltages across the components in a series circuit is equal to the supply voltage
- ○ State that the sum of the currents in a parallel circuit is equal to the supply current
- ○ State that the potential difference (voltage) across components connected in parallel is the same for each component
- ○ Carry out calculations involving resistors connected in series
- ○ Carry out calculations involving resistors connected in parallel





Key Area: Ohm's law

- ○ State that V/I for a resistor remains constant for different currents
- ○ Carry out calculations involving the relationship between potential difference (voltage), current and resistance

Key Area: electrical power

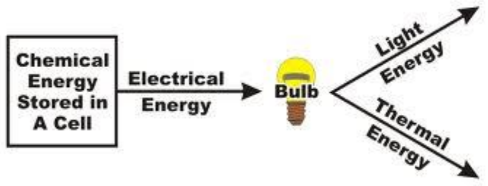
- ○ State that power is the electrical energy transferred each second
- ○ State that the P= IV
- ○ Carry out calculations involving the relationships between, power, energy, time, current and potential difference
- ○ Explain the equivalence between IV, I^2R and $\frac{v^2}{R}$
- ○ Carry out calculations involving the relationships between power, current, voltage and resistance

National 5 Physics Learning Outcomes

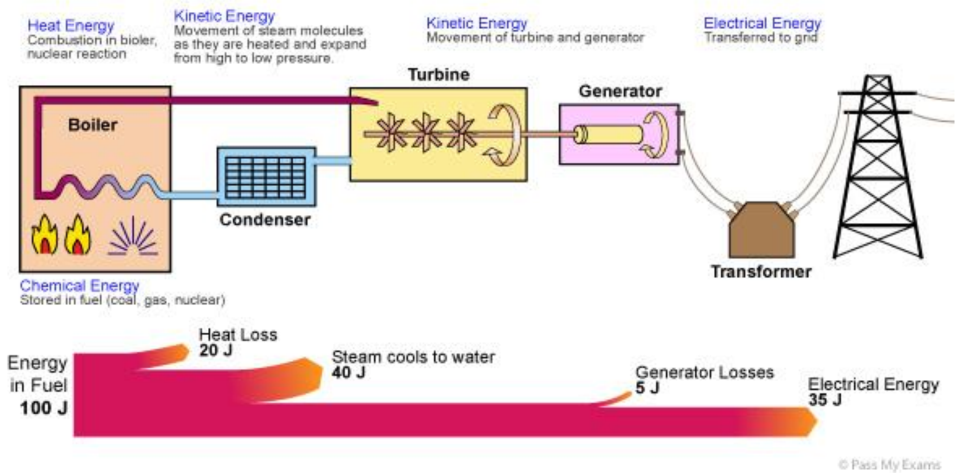
Unit 1 Electricity and Energy

Key Area: conservation of energy

- Give examples of devices where an energy conversion takes place and state the conversion
- State that the resistance of a thermistor decreases with increasing temperature
- State that the resistance of an LDR decreases with increasing light level
- Carry out calculations involving V=IR for a thermistor and LDR
- Be able to draw the symbol for an LED
- State that an LED only lights when current flows through it in a specific direction
- Draw a working circuit containing an LED
- State that the resistor in series with an LED is there to limit the current to protect the LED
- Be able to draw an n-channel enhancement MOSFET
- Be able to draw an NPN Transistor
- State that transistors can be used as electronic switches
- Explain the operation of a transistor switching circuit



- State that work done is a measure of the energy transferred
- Carry out calculations involving the relationship between, work done, force and distance
- Carry out calculations involving the relationship between, change in gravitational potential energy, gravitational field strength, mass and height
- Carry out calculations involving the relationship between, kinetic energy, mass and velocity
- Carry out calculations involving the relationship between, work done, power and time.

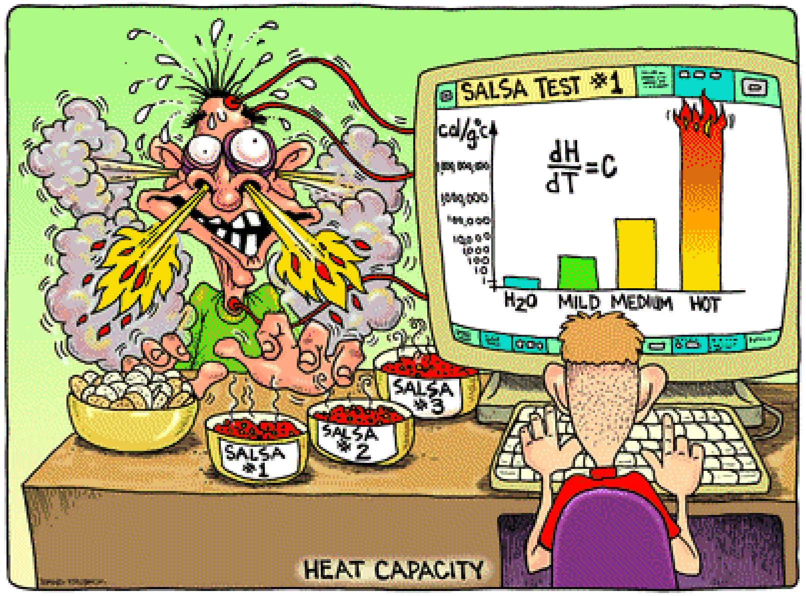


National 5 Physics Learning Outcomes

Unit 1 Electricity and Energy

Key Area: specific heat capacity

- Use the following terms correctly in context: temperature, heat, Celsius
- State that the temperature of a substance is a measure of the average kinetic energy of the particles in the substance
- State that heat is transferred from high temperature objects to low temperature objects by: conduction, convection and radiation
- State that the heat loss every second from a hot object is dependent on the temperature difference between the object and its surroundings
- State that the same mass of different materials requires different quantities of energy to change their temperature by 1 degree Celsius
- Carry out calculations involving: energy, mass, specific heat capacity and temperature change
- State that energy is gained or lost by a material when its state changes
- State that a change in state of a material does not involve a change in the materials temperature
- Carry out calculations involving: energy, mass and specific latent heat
- Use the following terms correctly in context: specific heat capacity, change of state, latent heat of fusion, latent heat of vaporisation



National 5 Physics Learning Outcomes

Unit 1 Electricity and Energy

Key Area: gas laws and the kinetic model

- State that pressure if the force per unit area, when a force acts at right angles to a surface.
- State that 1 Pascal is equal to 1 Newton per metre squared
- Carry out calculations involving pressure, force and area
- Describe how the kinetic model accounts for the pressure exerted by a gas
- State that the pressure exerted by a fixed mass of gas at constant temperature is inversely proportional to its volume
- State that the pressure exerted by a fixed mass of gas at constant volume is directly proportional to its temperature measured in kelvins (K)
- State that the volume of a fixed mass of gas at constant pressure is directly proportional to its temperature measured in kelvins (K)
- Carry out calculations to convert temperatures in ^{0}C to K and vice versa
- State the general gas equation
- Carry out calculations involving pressure, volume and temperature of a fixed mass of gas using the general gas equation
- Explain what is meant by absolute zero of temperature
- Explain the pressure – volume, pressure – temperature and volume – temperature laws in terms of the kinetic model.