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|  | **Paper 1 Key terms**  In this booklet you will find **key terms** that you have used in science this year; these will be useful to learn for your Year 11 Mock  You need to try and learn and **remember** all the key terms, with their definitions. One way of doing this is to make each one into a **revision card**, with the term on one side and its definition on the other – look at this example:    Write the key term on one side  Write what it means on the back    🗸 Use this table to record how many revision cards you have made, then   practise using them – ask a friend to test you!   |  |  |  | | --- | --- | --- | | **Physics**  **Topic** | **I have made revision cards** | **I have practised using the revision cards at least 10 times** | | **P1 Energy Part 1** |  |  | | **P1 Energy Part 2** |  |  | | **P2 Electricity Part 1** |  |  | | **P2 Electricity Part 2** |  |  | | **P3 Particle Model of Matter** |  |  | | **P4 Atomic Structure Part 1** |  |  | | **P4 Atomic Structure Part 2** |  |  |   **☺ Good luck – from Fulford School Science Department ☺** |  |

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| **GSCE Physics** | **Topic P1 Energy - Part 1** |

**Five key terms**

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| **Renewable energy resource** | A **renewable** energy resource is one that **can** be replaced or **replenished**. |  |
| **Non-renewable energy resource** | A **non-renewable** energy resource is one that **cannot** be replaced or **replenished**. |  |
| **Biofuel** | **Renewable** energy resources created from either plant products (e.g. wood) or animal dung.  **Burnt** to produce electricity like fossil fuels. |  |
| **Joule** | The unit of **energy** stored by an object (**J**). |  |
| **Carbon dioxide** | **Greenhouse** **gas** that contributes to **global** **warming**. Emitted as a product of combustion of **fossil** **fuels** and **biofuels**. |  |

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| **Five key ideas** | | Energy cannot be created or destroyed, only transferred from one place to another. **Energy stores** are locations where energy can be said to be stored.  This is known as the **conservation of energy law**. | Energy pathways are the physical processes which cause the energy stores to empty and fill:   1. **Mechanically** - an object accelerates or deforms due to a force acting on it 2. **Electrically** - work done by moving charges 3. **By heating** - energy transferred from a hotter to a colder object, when distorted by forces or when an electric current is passed through them 4. **By radiation** – all objects emit and absorb radiation – e.g. as they emit radiation their thermal energy store decreases. | |
| Elastic potential energy is associated with objects which are compressed (squashed) or extended (stretched)  **EE = ½ x spring constant (N/m) x extension2 (m)** | | Kinetic energy is the energy associated with a moving object  **EK = ½ x mass (kg) x velocity2 (m/s)** | Gravitational potential energy is the energy associated with anything that has mass and is inside a gravitational field.  **EP = mass (kg) x gravitational field strength (N/kg) x height (m)** | |
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| **GSCE Physics** | **Topic P1 Energy - Part 2** |

**Five key terms**

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| **Specific Heat Capacity** | The **energy required** to raise the temperature of **1kg** of a material by **1oC** | **E** = **m** x **c** x **Δθ** |
| **Power** | The rate of energy transfer, measured in Watts. | **Power** = **Energy transferred**  **time** |
| **Watt** | The unit of **power** for an object (**W**).  **1 W = 1 J/s** |  |
| **Efficiency** | A measure of how much **energy** (or **power**) is **usefully transferred** in a system. | **Effic.** = **Useful energy out**  **Total energy in** |
| **Insulator** | Materials with a **low** **rate** of **thermal** **conductivity** (or rate of energy transfer) |  |

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| **Five key ideas** | The total energy output from an object will be the same as the energy input, but energy can be transferred out usefully or not usefully (wasted).  **Less usefully transferred** or **wasted** energy is often dissipated (spreads out) into the thermal energy stores of the surroundings. | The **specific** **heat** **capacity** of materials can be found practically. For any practical investigation the variables involved fit in to three categories;  **Independent** variable =  The variable that I will **change**  **Dependent** variable =  The variable that I will **measure**  **Control** variable(s) =  The variable(s) that I will **keep the same** |
| **Efficiency** is a measure of how much **useful** **energy** is transferred out of an object from the **total** **amount** of energy you transferred into it.  Efficient devices transfer **more** energy to where we want it to go and transfer **less** heating up the surroundings. | **Thermal** **conductivity** is a measure of how quickly energy is transferred through a material by **conduction**.  Thermal **conductors** are materials with a **high** thermal conductivity.  Thermal **insulators** are materials with a **low** thermal conductivity. | Methods of thermal energy transfer;   1. **Conduction**: Vibrating particles collide with their neighbours and transfer energy. 2. **Convection**: Warm fluids (faster moving molecules) becomes less dense and rise. 3. **Radiation**: The transfer of thermal energy by waves that can travel through air or even through empty space. |

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| **GSCE Physics** | **Topic P2 Electricity - Part 1** |

**Five key terms**

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| **Charge, Q** | A material property, measured in Coulombs (C). |  |
| **Current, I** | The flow of charge, measured in Amps (A) |  |
| **Potential difference, V** | The difference in potential energy per unit of charge between two points in a circuit, measured in Volts (V) |  |
| **Resistance, R** | A measure of how **difficult** it is for **charge** **to** **flow** around a circuit. |  |
| **Series & Parallel** | Two methods for connecting components together in a circuit |  |

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| **Five key ideas** | We use symbols to represent circuit components rather than drawings of what the components look like, this is to keep the diagram simple, for example;    Battery    Bulb    Resistor | When components are connected in a **single loop of wire**, we call it a *series* circuit.    When components are connected in **multiple** **branches** of wires, we call it a *parallel* circuit. |
| The total **resistance** in a **series** combination is the **sum** of the individual resistances.  **RT = R1 + R2 + R3 + …**  The total resistance in a **parallel** combination is **less** **than** the **smallest** **individual** resistance in the combination.  **RT < R1 RT < R2 RT < R3** | **Current** is the same **everywhere** along a **series** combination;  **IT = I1 = I2 = I3 = …**  Current **splits** among branches of **parallel** combinations.  The total current flowing **into** a junction is **equal** to the total current flowing **out** of a junction;  **IT = I1 + I2 + I3 + …** | The total **potential** **difference** from the power supply is **shared** across the components in a **series** combination;  **VT = V1 + V2 + V3 + …**  Potential difference on **each** **branch** is the **same** as the **total** power supply in a **parallel** combination.  **VT = V1 = V2 = V3 = …** |

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| **GSCE Physics** | **Topic P2 Electricity - Part 2** |

**Five key terms**

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| **Electrical power** | The **power rating** of an appliance is given on the back of the appliance.  Power rating is the **rate** at which an appliance transfers energy. | Power = Energy  Time |
| **National Grid** | The **National Grid** is the system of cables, transformers and pylons that carry electricity from power stations all across the country |  |
| **Transformers** | The potential difference of an alternating current (a.c.) can be changed using a device called a **transformer** | PC8_gfx_transformer_stepup |
| **Fuse** | Part of a plug that is designed to break under high current as a safety precaution. |  |
| **Alternating current** | AC stands for “**Alternating Current**” – The current is constantly **changing direction**. | the signal is a wavy line |

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| **Five key ideas** | In electric circuits, the components are being used to **transfer energy**.  All electrical devices transfer energy from one store to another via an **electrical pathway**.  Electrical power is the rate at which a component transfers energy, the **power rating** of an appliance is given on the back of the appliance. | A transformer contains two coils that are wound around a soft **iron core**  A **step-up transformer** has more turns on the secondary coil and so **increases potential difference**.  A **step-down transformer** has fewer turns on the secondary coil and so **decreases potential difference**. |
| Cells and batteries **direct current (D.C.)** is current which always passes in the same direction. This is supplied by **cells** and **batteries**.  An **alternating current (A.C.)** is one which is constantly changing direction. **Mains** **electricity** is an A.C. supply.  In the UK it has a **frequency** of 50 cycles per second (**50 hertz**) and a **p.d.** of about **230** **volts**. | The **National Grid** is the system of cables, transformers and pylons that carry electricity from power stations all across the country.  A **step-up transformer** raises the **voltage**, but the **current** doesn’t go up as much.  **Current** makes wires **hot** so reducing the current reduces the wasted energy, improving the **efficiency** of the national grid system.  The **step-down** transformer **reduces** the **voltage** to a **safe** working level used in our home. | Earth wires create a safe route for the current to flow through if the live wire touches the metal casing of an appliance.  You would get an electric shock if the live wire inside an appliance came loose and touched the metal casing.  The earth terminal is connected to the metal casing so that the current goes through the earth wire instead of causing an electric shock.  A strong current surges through the earth wire because it has a very low resistance. This breaks the fuse and disconnects the appliance. |

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| **GSCE Physics** | **Topic P3 Particle Model of Matter** |

**Five key terms**

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| **Density** | Density is defined as the **mass** per **unit volume** of a material. |  |
| **Specific Heat Capacity, c** | The **specific heat capacity** of a substance is the **amount of energy** required to raise the temperature of **1 kg** of a material by **1 °C**. | **E = m c Δθ** |
| **Specific Latent Heat, L** | The **specific latent heat** of a substance is the **amount of energy** required to **change the state** of **1 kg**of the substance with **no change in temperature**. | **E = m L** |
| **Internal energy** | The **internal energy** of a system is the total **kinetic energy** and **potential energy** of all the particles in the system. |  |
| **Gas pressure** | Gas pressure is the force exerted by a gas on a specific area. |  |

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| **Five key ideas** | | The particles in solids, liquids and gases have **kinetic** energy because they are always moving. If you increase the **temperature**, you increase the mean kinetic energy of the particles.  They also have **potential** energy because their motion keeps them separated. This opposes the forces trying to pull them together. The particles in **gases** have the most **potential energy** because they are furthest apart.  The **internal energy** of a system is the total **kinetic energy** and **potential energy** of all the particles in the system. | Particles in a gas move in random directions at all times.  The particles in a gas collide with each other and the walls of their container without losing any of their kinetic energy.  The temperature of the gas is related to the average kinetic energy of the molecules. As the kinetic energy of the molecules increases, so does the temperature of the gas. | |
| Each substance has a value called its specific latent heat, describing how much energy is needed to change state of 1kg of the substance.  When a change of state occurs, any heat energy supplied breaks the bonds between molecules.  No change in temperature occurs during this time. | | The greater the temperature the greater the average kinetic energy and hence the speed of the particles (Kinetic energy = ½ m v2).  Increased temperature of the gas increases average kinetic energy and increases speed of the particles, which increases the collisions of the particles with the cylinder wall.  There is more force on the container over a certain area and therefore a greater pressure. |  | |
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| **GSCE Physics** | **Topic P4 Atomic Structure - Part 1** |

**Five key terms**

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| **Ion** | An **ion** is formed when an atom either **loses** or **gains** an **electron**. |  |
| **Isotope** | Atoms with the **same** number of **protons** but a **different** number of **neutrons** are called isotopes. |  |
| **Alpha** | **2** **protons** and **2** **neutrons**. **High** ionising power, **low** penetration. |  |
| **Beta** | A **high**-**energy** **electron**. **Medium** ionising power, **medium** penetration. |  |
| **Gamma** | An **electromagnetic** **wave**. **Low** ionising power, **high** penetration. |  |

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| **Five key ideas** | Half-life is the **average time** it takes for the **number** **of** **nuclei** (and the **activity**) of a radioactive sample to **halve**. |  |
| **Radioactive elements** have an **unstable nucleus**.  The atoms give off radiation in a random process called **radioactive decay**.  Activity is the **rate** at which a source of unstable nuclei **decays**.  Activity is measured in **Becquerels** **(Bq)**. | Radiation can **ionise** cells (electrons get knocked off atoms, leaving ions) which causes **cellular** **damage**. | Rutherford fired alpha particles at gold foil and made the following conclusions from his observations;   |  |  | | --- | --- | | **Observation** | **Conclusion** | | Most alpha particles went straight through the foil | Atoms are mostly empty space | | A few were deflected through large angles | The nucleus is positively charged, very small compared to the size of the atom and contains most of the mass | | Very few were reflected straight back | |

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| **GSCE Physics** | **Topic P4 Atomic Structure - Part 2** |

**Five key terms**

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| **Background radiation**  **(PHY only)** | Background radiation is the radiation that is around us all the time at a safe level. |  |
| **Irradiation** | Irradiation is the process of exposing an object to nuclear radiation.  **The irradiated object does not become radioactive.** |  |
| **Contamination** | Radioactive contamination is the unwanted presence of radioactive atoms on other materials and usually comes from touching or handling radioactive substances. |  |
| **Fission**  **(PHY only)** | **Nuclear fission** is a reaction where a large unstable nucleus (e.g Uranium or Plutonium) splits into smaller nuclei releasing large amounts of energy. |  |
| **Fusion**  **(PHY only)** | Nuclear fusion is the joining together of two small, light nuclei to create one heavy nucleus, releasing large amounts of energy |  |

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| **Five key ideas** | The risk of **contamination** can be reduced by **avoiding touching the source**.  The risk of **irradiation** can be reduced by **increasing distance from the source**. | **Radiotherapy** is the treatment of cancer using ionising radiation. This could be in the form of a gamma source outside the body which would be targeted at a tumour inside the body.  To avoid damaging healthy cells up to 200 different beams of gamma radiation are carefully directed onto the tumour, **at the correct dosage**, thereby reducing the risk of damaging healthy cells. |
| Peer-review is where other scientists check results and scientific explanations to make sure the experiments have been done in a sensible way before the results are published.  This helps to prevent false claims being published. The findings are then shared in peer-reviewed journals or at conferences. | Atoms contain huge amounts of energy, and there are two ways in which this energy can be released. Einstein predicted this with his famous equation E=mc2  One way is to **split** large atomic nuclei in a process called **nuclear fission**.  Another way is to **join** smaller nuclei together in a process called **nuclear fusion**. | When radiation enters living cells it can ionise atoms an molecules within them (removes electrons to form ions). This can lead to tissue damage.   * **Lower doses** cause minor damage, which doesn’t kill the cells but DNA is often susceptible to damage and mutant cells can then divide uncontrollably – which is cancer.   **Higher doses** tends to kill the cells completely causing radiation sickness, vomiting, tiredness and hair loss. |