GCSE PHYSICS DEFINITIONS

Paper 1

Energy

Conservation of energy	Energy cannot be created or destroyed, just transferred from one form to another or stored.
Dissipated	Energy transferred to surroundings in less useful ways. Often referred to as 'wasted' energy.
Efficiency	Ratio of useful energy output/total energy input. Will be a decimal less than 1. Can be turned in to a percentage by multiplying the decimal by 100. The higher the efficiency, the more energy is transferred usefully.
Elastic potential energy	The energy stored in an elastic object when it is stretched or squashed.
Global warming	When carbon dioxide is given off through the burning of fossil fuels, the greenhouse effect increases leading to an increased global temperature.
Gravitational field strength (g)	How many newtons of force are exerted on each kg of mass. Measured in N/kg. In a question, the value for g will be given.
Gravitational potential energy	The energy stored in an object due to its position in a gravitational field. The higher the object is above the surface of the planet/moon, the more gravitational potential energy it will have. Also dependent on mass.
Joules, J	The unit of energy.
Kinetic energy	The energy that moving objects have. It depends on the mass of the object and it's velocity.
Mass	The amount of matter in an object. Measured in kilograms (kg)
Non- renewable energy resource	An energy resource that will eventually run out e.g. fossil fuels (coal, oil and gas) and nuclear fuel.
Power	The rate at which energy is transferred (how many joules per second are transferred) e.g. a power of 100 W tells you 100J of energy are transferred every second
Renewable energy resource	An energy resource that will not run out (is being or can be replenished as it is used) e.g. bio-fuel, wind, hydro-electricity, geothermal, tidal power, waves and solar power.
Specific heat capacity	The amount of energy needed to increase the temperature of 1 kg of a substance by $1^{o}C$.
Spring constant	Measured in N/m. A measure of how easy it will be o stretch or compress the material. The higher the spring constant, the stiffer the spring.
Sulphur dioxide	Gas given off when coal and oil are burned. This leads to the formation of acid rain.
Thermal conductivity	The higher the thermal conductivity of a material, the higher the rate of energy transfer by conduction across the material.
Watts, W	The unit of power
Weight	The force acting on an object due to gravity. Measured in newtons (N)
Work done	This is the same as energy transferred. Measured in joules.

Electricity

Alternating current (ac)	Current that constantly changes direction.
Ammeter	Used to measure the current flowing through a component/part of a circuit. Must be connected in series.
Current	Flow of electrons/electric charge. Measured in amps (A).
Diode	Will only allow current to flow one way through it.
Direct current (dc)	Current that flows in one direction.
Electric field	The area around a charged object where its force can be felt. The field is strongest when close to the charged object.
Light dependent resistor (LDR)	A light dependent resistor. The resistance decreases as light intensity increases.
Mains electricity	UK mains electricity is an ac supply (used when plugging appliances in). It is 230V and has a frequency of 50 Hz.
National Grid	A system of cables and transformers linking power stations to consumers
Ohmic conductor	A conductor in which the resistance remains constant. This means the current flowing through it will be directly proportional to the potential difference.
Parallel circuit	There are two or more parallel 'branches' providing more than one path the electrons can follow around the circuit.
Potential difference	The potential difference between two points in a circuit is the work done when a coulomb of charge passes between the points. Measured in volts (V). A potential difference is needed for a current to flow.
Resistance	A measure of how easy it is for electrons to flow. Measured in ohms (Ω). If the resistance increases it is harder for electrons to flow so current decreases.
Series circuit	All of the components are in a single loop. There is only one path that electrons can follow around the circuit.
Static electricity	When two insulating materials are rubbed together, the friction causes electrons to move from one object to the other. The object that loses electrons becomes positively charged. The objects that gains electrons becomes negatively charged.
Step - down transformer	Used to decrease the potential difference.
Step - up transformer	Used to increase the potential difference.
Thermistor	A temperature dependent resistor. Resistance decreases as temperature increases.
Voltmeter	Used to measure the potential difference across a component. Must be connected in parallel.
Wires in 3 - core cable	Live wire (blue) - carries the current from the supply to the appliance. Potential difference between the live wire and earth is 230V. Neutral wire (brown) - completes the circuit by carrying the current from the appliance back to the supply. The neutral wire is at or close to 0V. Earth wire (green & yellow) - safety wire which stops the appliance becoming live. The earth wire is at 0V. It only carries current if there is a fault.

Particle Model of Matter

Condensing	Change in state from a gas to a liquid.
Density	Density is defined by the equation mass/volume. It is usually measured in kg/m^3 (can be in g/cm^3).
Evaporating	Change in state from a liquid to a gas.
Freezing	Change in state from a liquid to a solid.
Gas pressure	Pressure is fore per unit area. The pressure of a gas is due to the force the gas particles exert on the walls of the container.
Internal energy	The total kinetic and potential energy of all of the particles that make up the system. Heating increases the energy stored in the system by increasing the energy of the particles. This either increases the temperature or produces a change in state.
Melting	Change in state from a solid to a liquid.
Particle motion in a gas	Particles in a gas move randomly.
Specific heat capacity	The amount of energy needed to increase the temperature of 1 kg of a substance by 1^oC.
Specific latent heat	The energy needed to change the state of 1 kg of a substance with no change in temperature.
Specific latent heat of fusion	The energy needed to change 1 kg of liquid to gas at constant temperature.
Specific latent heat of vaporisation	The energy needed to change 1 kg of solid to liquid at constant temperature.
Sublimation	Change in state from a solid to a gas or a gas to a solid (missing out liquid phase).

Atomic Structure

Activity	The rate at which a source of unstable nuclei decays. Measured in becquerel (Bq).
Alpha particle	Made up of two protons and two neutrons (the same as a helium nucleus). Positively charged. Stopped by paper or skin. Has a range in air of a few cm. Highly ionising.
Alpha scattering experiment	Observations from this practical led to the following conclusions: 1) most alpha particles travelled straight through gold foil which told them the atom was mainly empty space. 2) some alpha particles were deflected by small angles with a small number being deflected by large angles. This told them there was a small central nucleus which was positively charged and where most of the mass was concentrated.
Atomic number	The number of protons in an atom (also the same as the number of electrons in the neutral atom but this isn't the definition - if asked what atomic number represents, mention protons!)
Background radiation	Radiation that is around us all of the time. It comes from both natural sources (e.g. rocks, cosmic rays from space) and man - made sources (e.g. fall out from nuclear weapons testing and nuclear accidents)

Beta particle	A fast moving electron given out by the nucleus (a neutron turns in to a proton and gives out an electron). Negatively charged. Stopped by a few mm of aluminium. Can travel about 1 m in air. Less ionising than alpha particles.
Contamination	The unwanted presence of radioactive atoms either on or in an object (including humans!) These atoms could decay which could cause harm.
Electron	Negatively charged particles which orbit the nucleus. Electrons are arranged at different distances from the nucleus in energy levels. If an electron absorbs electromagnetic radiation, it can move up in to a higher energy level (further from the nucleus). If an electron gives out electromagnetic radiation it moves to a lower energy level (closer to the nucleus).
Gamma ray	Electromagnetic radiation given out by the nucleus. It travels as a wave (is not a particle). Is uncharged. Has an unlimited range in air. Can be reduced by thick lead or concrete.
Half - life	The time it takes for the number of radioactive nuclei in a sample to halve or the time it takes for the count rate/activity of a sample to fall to half its initial value.
Ion	An atom becomes a positive ion if it loses one or more electrons. An atom becomes a negative ion if it gains one or more electrons.
Irradiation	Process of exposing an object to nuclear radiation. The object itself does not become radioactive e.g. sterilising surgical instruments
Isotopes	Isotopes of the same element have the same number of protons but different numbers of neutrons.
Mass number	The number of protons and neutrons in the nucleus.
Neutron	Particles found in the nucleus that have no electrical charge (they are neutral).
Nuclear Fission	The splitting of a large, unstable nucleus in to two smaller nuclei. Two or three neutrons are also given out. Energy is released by the reaction. This is what happens inside a nuclear reactor.
Nuclear Fusion	The joining together of two light nuclei to form a heavier nucleus. In this process, some of the mass may be converted in to energy. This is the process that occurs in stars.
Nucleus	Positively charged, found at the centre of the atom. Contains protons and neutrons. Most of the mass of an atom is found here.
Plum pudding model	This early model suggested that an atom was a ball of positive charge with electrons embedded in it (think chocolate chip muffin!)
Proton	Positively charged particles found in the nucleus of an atom.
Radioactive decay	A random process by which an unstable nucleus changes to become more stable. It does this through the emission (giving out) of an alpha particle, a beta particle and/or a gamma ray.

Paper 2

Forces

Acceleration	A measure of how quickly velocity is changing
Air resistance	The frictional force caused by air on a moving object
Atmospheric pressure	The pressure felt by any surface within the atmosphere, due to air molecules colliding with the surface
Braking distance	The braking distance is the distance a vehicle travels after the brakes are applied until it comes to a complete stop, as a result of the braking force
Conservation of momentum	In a closed-system the total momentum before an event is the same as the total momentum after the event
Contact force	A force acting between/on objects that are touching
Displacement	The straight-line distance and direction from an object's starting position to its finishing position
Distance-time graph	A graph showing how the distance travelled by an object changes over a period of time.
Drag	The frictional force caused by any fluid (a liquid or gas) on a moving object
Elastic deformation	An object undergoing elastic deformation will return to its original shape once any forces being applied to it are removed.
Elastic object	An object which can be elastically deformed
Equilibrium	A state in which all the forces acting on an object are balanced, so the resultant forces are zero.
Fluid	A liquid or gas
Force	A push or a pull on an object caused by interacting with something
Free body diagram	A diagram that shows all the forces acting on an isolated object, the direction the forces are acting and their relative magnitudes
Friction	A force that opposes an object's motion. It acts in the opposite direction to motion.
Gear	A circular disc with teeth round its edge. It can be used to transmit the rotational effect of a force.
Inelastic deformation	An object undergoing inelastic deformation will not return to its original shape once the forces being applied to it are removed.
Inertia	The tendency of an object to remain stationary or continue travelling at a constant velocity
Inertial mass	The ratio between the resultant force acting on an accelerating object and its acceleration
Instantaneous velocity	The velocity of an object at a particular moment in time
Lever	A device that increases the distance between an applied force
Limit of proportionality	The point beyond which the force is applied to an elastic object is no longer directly proportional to the extension of the object

Line of action	A straight line passing through the point at which the force is acting in the same direction as the force
Lubricant	A substance that can flow easily between objects - used to reduce friction
Model	Used to describe or display how an object of system behaves in reality
Moment	The turning effect of a force
Momentum	A property of a moving object that is the product of its mass and velocity
Newton's first law	An object will remain at rest or travelling at a constant velocity unless it is acted on by a resultant force
Newton's second law	The acceleration of an object is directly proportional to the resultant force acting on it, and inversely proportional to its mass
Newton's third law	When two objects interact, they exert equal and opposite forces on each other
Non-contact force	A force that can act between objects that are not touching
Pressure	The force per unit area exerted on a surface
Reaction time	the time taken for a person to react after an event (e.g. seeing a hazard)
Resultant force	A single force that can replace all forces acting on an object to give the same effect as the original forces acting altogether
Scalar	A quantity that has magnitude but no direction
Speed	How quickly an object is travelling
Stopping distance	The distance travelled by a vehicle in the time between the driver seeing a hazard and coming to a stop. It is the sum of the thinking and braking distance
System	The object or group of objects that you are considering
Terminal velocity	The maximum velocity a falling object can reach without any added forces. It’s the velocity at which the resistive forces (drag) acting on the object match the force due to gravity (weight).
Thinking distance	The distance a vehicle travels during the driver's reaction time (before the brakes have been applied)
Upthrust	The resultant force acting awards on an object submerged in a liquid, due to the pressure of the liquid being greater at the bottom or the object that the top
Vector	A quantity which has both magnitude (size) and direction
Velocity	The speed of an object in a given direction
Velocity-time graph	A graph showing how the velocity of an object changes over a period of time
Weight	The force acting on an object due to gravity
Work done	The energy transferred when a force moves an object

Waves

Amplitude	The maximum displacement of a point on a wave from it's undisturbed position (distance from mid - point to peak or mid - point to trough)
Black body	An object that absorbs all of the (infra red) radiation incident on it (it does not reflect or transmit (give out) any radiation)
Compression (longitudinal wave)	The part of a longitudinal wave which is squashed together
Diffuse reflection	Reflection from a rough surface causing scattering
Electromagnetic waves	Waves that are made up of an electric wave and a magnetic wave at right angles to each other. There are 7 electromagnetic waves in the electromagnetic spectrum. They are all transverse and all travel at the same speed in a vacuum (300 000 000 m/s = speed of light)
Focal length	Distance from the centre of a lens to its focal point
Frequency	The total number of waves per second. Measured in hertz (Hz)
Lens	Form an image by refracting light
Longitudinal wave	A wave in which the vibrations are parallel to the direction of energy travel. Sound waves and primary seismic waves are longitudinal
Magnification	The ratio of image height to object height. It has no units as it is a ratio
Period	The time taken for one wave to pass
Rarefaction (longitudinal wave)	The stretched out part of a longitudinal wave
Real image	An image that can be projected on to a screen. Only produced by convex lenses.
Reflection	A wave bouncing back as it hits the boundary between two materials
Refraction	When a wave changes direction as it hits a boundary at an angle and moves to a medium that is more or less optically dense. The change in direction is caused by a change in speed
Seismic waves	A wave which travels through or over the surface of the Earth when an earthquake happens. They give us evidence for the structure of the Earth
Specular reflection	Reflection from a smooth surface in a single direction
Transverse wave	A wave in which the vibrations are at right angles to the direction of energy travel. All electromagnetic waves are transverse waves along with secondary seismic waves
Ultrasound	Sound waves above 20 00 Hz in frequency (above the human range of hearing)
Virtual image	An image that appears to have come from behind the lens. Can be produced by convex and concave lenses
Wavelength	The distance between two successive identical points on a wave (e.g. distance from one peak to the next peak)

Magnetism & Electromagnetism

Alternator	Uses the generator effect to generate an alternating current
Dynamo	Uses the generator effect to generate a direct current
Electromagnet	When a current flows through a wire, a magnetic field is produced around the wire
Generator effect (electromagnetic induction)	If a wire moves relative to a magnetic field, a potential difference is induced across the ends of the wire. If this wire is part of a complete circuit, a current will flow
Induced magnet	A material that becomes a magnet when it is placed in a magnetic field
Magnetic field	The area around a magnet where its force can be felt
Motor effect	When a current carrying wire is placed in an external magnetic field, the magnetic field around the wire and the external field exert a force on each other
Permanent magnet	A magnet that produces its own magnetic field
Solenoid	A coil of wire. It has the same magnetic field pattern as a magnet when a current flows through it
Step - down transformer	Decreases the input voltage
Step - up transformer	Increases the input voltage

Space Physics

Big Bang Theory	The suggestion that the universe expanded from a very small region that was extremely hot and dense
Dwarf planet	A body in orbit around the Sun, that is approximately spherical, is not a satellite of another planet but does not meet other criteria to make it a planet
Fusion	The joining together of two lighter nuclei to form a larger nucleus
Main sequence star	A star during the stable period of its lifetime where the force of gravity pulling the star in are balanced by the outwards force created form the pressure of the fusion reactions are balanced
Milky Way	The name of our galaxy
Nebula	A cloud of gas and dust where new stars are formed
Red - shift	The observed increase in the wavelength of light received from distance galaxies. The further away the galaxy, the faster they are moving away so the bigger the red - shift
Satellite	An object that orbits a star or planet. Can be natural (e.g. the Moon) or man made (e.g. communication satellites)
Sun	The only star in our solar system
Supernova	The explosion of a massive star. This distributes the elements throughout the universe