# *Physics Paper 1 Checklist- Trilogy*

| Key Point | 1 | 2 |
|---|---|---|
| **Throughout – change the subject of an equation, change units, perform multi-step calculations** | | |
| **Energy** | | |
| Name the different types of energy 'store' and describe how energy is transferred between them | | |
| Identify ways in which energy is transferred – doing work, current flowing, radiation | | |
| Identify where energy is wasted and describe where this goes | | |
| Calculate the efficiency of devices | | |
| Use Sankey diagrams to represent energy transfers or calculate efficiency | | |
| Define and calculate kinetic energy | | |
| Define and calculate gravitational potential energy | | |
| Use values for GPE to calculate maximum theoretical velocity of a raised object using KE equation | | |
| Explain why theoretical velocity will not normally be reached | | |
| Calculate the elastic potential energy in a stretched or squashed object | | |
| Use and manipulate the specific heat capacity equation to calculate energy/mass/temperature change/specific heat capacity given the others | | |
| Define specific heat capacity | | |
| Describe practical procedures to measure specific heat capacity | | |
| Calculate power using P=E/t or P=Work done/t | | |
| Describe the relationship between watts and joules | | |
| Define a 'closed system' and explain what happens to total energy when energy transfers happen in a closed system | | |
| Describe ways to reduce unwanted energy transfers | | |
| Describe methods to investigate the effectiveness of different insulators | | |
| Describe factors that affect the thermal conductivity of a building | | |
| Describe the use, reliability and environmental impacts of renewable and non-renewable energy resources | | |

| Electricity | | |
|---|---|---|
| Describe what is meant by an electric current and calculate it using Q=It | | |
| Describe what is meant by resistance and calculate values for it using Ohm's Law | | |
| Calculate current, voltage and resistance in series and parallel circuits | | |
| Recognise, describe and explain the shape of current-voltage graphs for a filament bulb, ohmic resistor and a diode | | |
| Use and recognise the symbols for all the circuit components covered | | |
| Calculate electrical power using E=PT, $P=I^2R$, P=VI and perform multi step calculations to do this | | |
| Calculate energy transferred using E = Q x V | | |

| | | |
|---|---|---|
| Describe and explain uses of LDRs – e.g switching on lights when it gets dark | | |
| Recognise, describe and explain the shape of IV graphs for filament lamp, diode, thermistor and LDR | | |
| Label the features and describe the safe operation of a 3 pin plug | | |
| Explain the difference between direct and alternating pd | | |
| Calculate electrical power and energy transferred for given appliances | | |
| Describe the features of the National Grid | | |
| Describe and explain the production of static electricity and sparking | | |
| Interpret and explain evidence on how charged objects can exert forces of attraction and repulsion, at a distance | | |
| Describe the production of an electric field around a charged object and draw the pattern | | |
| **Particle theory** | | |
| Describe density in terms of particle arrangement | | |
| Use Density = mass/volume to calculate values and use the correct units | | |
| Explain the term 'internal energy' | | |
| Describe differences in particle arrangement and energy in solids, liquids and gases | | |
| Explain what happens to particles during a change of state | | |
| Use the equation E=mL to calculate mass, specific latent heat or energy | | |
| Distinguish between specific heat capacity and specific latent heat | | |
| Define the terms specific latent heat, latent heat of fusion, latent heat of vaporisation | | |
| Explain the term 'gas pressure' and explain how temperature affects this | | |
| Use pv=c to calculate pressure (in Pascals) or volume ($m^3$) | | |
| Calculate changes in pressure using $P_1 \times V_1 = P_2 \times V_2$ | | |
| Explain how increasing pressure can affect the temperature of a gas | | |

| | | |
|---|---|---|
| **Atoms and Nuclear Physics** | | |
| Label the parts of an atom and state approximate sizes of the atom and the nucleus | | |
| Explain what might cause changes in distance of electrons from the nucleus | | |
| Describe the plum pudding model of the atom and how the atomic model has changed over time – e.g Rutherford's scattering experiment | | |
| Compare the plum pudding model with the modern model of the atom | | |
| Describe what is meant by an isotope and compare given isotopes | | |
| Describe the properties and origins of alpha, beta and gamma radiation | | |
| Describe how radiation levels are measured and give the unit | | |
| Complete nuclear equations for alpha and beta decay | | |
| Describe what is meant by the half-life of a radioactive isotope and obtain values for this from a decay curve | | |
| Choose an appropriate source for a particular purpose, given some information | | |
| Explain the difference between contamination and irradiation and compare the hazards of each | | |

| | | |
|---|---|---|
| Describe the sources of background radiation and factors that can affect levels | | |
| Describe the use of radiation in medicine for exploration or treatment | | |
| Evaluate the risks involved in nuclear medicine techniques | | |
| Explain the processes of nuclear fission and fusion | | |

# *Physics paper 2 Revision Checklist - Trilogy*

| Key Point | 1 | 2 |
|---|---|---|
| **Forces** | | |
| Name contact and non-contact forces and describe their interaction | | |
| Define scalar and vector quantities and give examples of each | | |
| Calculate resultant forces | | |
| Define weight and use w=mxg to calculate any one of those values | | |
| Define 'centre of mass' | | |
| Draw free body diagrams to scale including **resolving forces at different angles** | | |
| Know the equation to calculate work done and apply this to find work done, force or distance | | |
| Describe the relationship between joules and newton-metres and convert between them | | |
| Give examples of forces involved in stretching or compression and explain the difference between elastic deformation and inelastic deformation | | |
| Describe the features of a graph of force applied versus the extension of a spring | | |
| Know Hooke's Law (f = ke) and apply it in stretching or compression scenarios | | |
| Calculate work done during stretching or compressing using $e= ½ k x e^2$ | | |
| **Motion** | | |
| Interpret distance-time graphs to calculate velocity and total distance moved | | |
| Explain the difference between distance and displacement | | |
| Know typical values for speed for walking, running, cycling and sensible values for car, train and airplane speeds | | |
| Describe the difference between velocity and speed and calculate them using s=d/t | | |
| **Describe circular motion in terms of speed and direction** | | |
| Interpret distance time graphs to find speed, **including drawing a tangent if the object is accelerating** | | |
| Describe what is meant by acceleration | | |
| Calculate the acceleration or deceleration of an object using a=v-u/t, using negative values to represent deceleration | | |
| Use uniform acceleration equation to calculate acceleration, velocity or distance | | |
| Know that acceleration under gravity is 9.8 $m/s^2$ | | |
| Interpret velocity-time graphs to calculate acceleration, velocity **and total distance/displacement** | | |
| Describe the change in forces that occur during free fall of an object through a fluid | | |
| Define terminal velocity | | |
| Apply Newton's first law to predict the effect of balanced and unbalanced forces on stationary and moving objects | | |
| **Explain what is meant by 'inertia' and find inertial mass using f=ma** | | |
| Use Newton's second law (f=ma) to calculate force, mass or acceleration | | |
| Apply Newton's third law to equilibrium situations – ie describe how forces exerted by two objects interacting are equal and opposite | | |

| | | |
|---|---|---|
| Define the terms stopping distance, thinking distance and braking distance and know how speed affects overall stopping distance | | |
| Explain how reaction time can affect thinking distance and how this can be measured | | |
| Describe physical factors that can affect braking distance – condition of tyres, road etc | | |
| Explain why large decelerations are dangerous **and estimate values forces involved in deceleration of road vehicles** | | |
| **Describe what is meant by momentum and calculate values from an equation** | | |
| **Explain what is meant by 'conservation of momentum' and apply this in calculations** | | |

| **Waves** | | |
|---|---|---|
| Describe the origin and properties of longitudinal and transverse waves and give examples | | |
| Calculate frequency of waves using frequency = number of waves/time and use Hz as the unit | | |
| Use the wave equation to calculate wave speed, frequency or wavelength including using standard form | | |
| Describe properties of all EM waves | | |
| Name the 7 EM waves and describe their uses and dangers | | |
| Link uses of EM waves to their properties | | |
| Describe three things that can happen to waves when they meet an object | | |
| Explain what happens to waves as they travel into more or less dense materials | | |
| Label a diagram to show refraction of light, including the normal and angles of incidence and refraction | | |
| Describe ways of measuring wave speed– e.g ripple tank, waves on a string | | |
| Describe how to measure the speed of sound and know it's approximate value in air | | |
| Explain how radio waves are generated by oscillating charges in the transmitter and how this generates a current in the receiver | | |
| Explain how microwaves can be used to communicate with satellites and how microwaves of a different wavelength can be used to cook food | | |
| Explain how IR radiation emission and absorption is affected by surface and describe an investigation to measure this | | |
| Explain some of the dangers of EM waves and how the radiation dose is measured | | |

| **Magnetism & electromagnetism** | | |
|---|---|---|
| Describe the force between two poles of a magnet | | |
| Describe the difference between permanent and induced magnets | | |
| Explain how a current produces a magnetic field and how a solenoid can increase the strength | | |
| Explain how the interaction of a magnetic field induce by a current and a magnetic field between a horseshoe magnet can produce movement of the wire | | |
| Explain the motor effect and use Flemings left hand rule to predict direction of movement | | |
| Describe factors that can affect the size of the force acting on a wire and use F=BIl to calculate it | | |
| Explain how an electric motor can produce a turning effect | | |