



Year 9 Annual Exam for Physics

5P	☐ Atoms have a positive nucleus (protons and neutrons) and negative electrons in orbital shells. ☐ The chemical properties and element name are defined by the number of protons in the nucleus. ☐ Particles carry charge and mass, which are conserved quantities. ☐ Particles interact with each other via forces such as gravity, electrostatic and strong nuclear. ☐ All force interactions produce equal and opposite forces on both bodies. ☐ Newton's laws: unbalanced forces on an object make it accelerate (change velocity). ☐ Systems of particles store energy in different ways. ☐ Without enough energy we cannot do things. We can count up the energy in a system in joules. ☐ There are 5 common ways that energy is stored in a system (+ other ways) ☐ Energy is a conserved quantity. ☐ Energy can be transferred between stores along any one of 4 different energy pathways. ☐ The rate of energy transfer is called power. ☐ The proportion of usefully transferred energy is called efficiency. ☐ When a force is acts on a body over a distance, it increases the energy store of that body, called 'Work Done'. ☐ Use WD to describe energy transfers, where $WD = Fd$ ☐ Energy is not 'lost' when objects cool down but is dissipated to the surroundings ☐ The rate of dissipation depends on insulation material/thickness and on temperature difference to the surroundings. ☐ A valid experiment only changes the independent variable.
6P	☐ Describe the 3 states of matter using kinetic theory, with the spacing, movement and forces between particles as key knowledge for each state. ☐ Use kinetic theory to explain the material properties of S,L,G such as 'can flow' or 'fixed shape'. ☐ Density is a material property and is how much mass is packed into a particular volume, for example, grams per cubic centimetre. ☐ Know the equation for density and methods for measuring the density of regular, irregular and fluid materials. ☐ Internal (thermal) energy is the kinetic store of energy in the moving particles and a potential store of energy in the forces between them. ☐ Temperature is proportional to average kinetic energy. ☐ Describe what happens when a S/L/G is heated graphically. ☐ Heat transfer can happen through a solid by conduction. ☐ The conductivity of a material is how quickly it conducts energy and is affected by many factors. ☐ Application to home insulation ☐ SHC (c) is a material property and describes how many joules are stored in the internal store of energy of 1kg, when it is heated by 1 deg. C. ☐ Use the equation for SHC. ☐ Learn a method for measuring and fairly comparing the SHC of two materials." ☐ Latent heat (E) is the total energy associated with a change in state. ☐ The specific latent heat of a material (L) is the energy needed to change the state of 1kg of it without a change in temperature, where $E=mL$ ☐ Application to heating/cooling graphs.



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7P	☐ Weight is the force due to gravity between objects with mass, and decreases with distance, where $W=mg$ ☐ The weight of an object acts through its centre of mass. ☐ When work is done against gravity, the GPE store of energy increases, where $GPE = mgh$ ☐ I am able to calculate the turning effect (moment) of a force acting on a lever. ☐ I can explain in terms of work done how levers can multiply forces without creating new energy. ☐ I can apply the principle of moments. ☐ Elastic objects return to their original shape after deformation and store energy as elastic potential energy. ☐ Hooke's law: Extension is directly proportional to force applied (tension) if the limit of proportionality is not exceeded, $F=kx$. ☐ Elastic potential energy is the work done to stretch a spring and can be calculated using $EPE = 0.5kx^2$. ☐ A description of the energy transfers and forces involved in a bungee jump scenario, including supporting calculations." ☐ Speed is a rate of change in distance, where $s=d/t$. ☐ Velocity is speed in a given direction. ☐ We learn how to rearrange equations to change the subject. ☐ A systematic error is wrong by the same amount each time. ☐ Resultant force is the sum of the forces acting on a single body, represented by force arrows on a free body force diagram. ☐ N2: acceleration is proportional to resultant force and inversely proportional to mass. $\Sigma F=ma$.
8P	☐ All waves have a frequency, wavelength, wavespeed, amplitude and time period. ☐ $f=1/T$ ☐ Waves are either longitudinal or transverse, mechanical or electromagnetic. ☐ All waves carry energy and information from A to B through oscillations in a medium. ☐ Wavespeed (v) = frequency (f) x wavelength (λ) ☐ Waves in water speed up as the water gets deeper can be investigated. ☐ Measuring f and λ for water waves and waves on a string can be used to calculate the wavespeed of the wave.