**Unit 1: Physics 1 Tick Sheet**

* Tick column A when you have covered the statement in class.
* Tick column B when you feel you understand the statement
* Tick column C when you are confident you can answer any questions on it.
* In your revision for the P1 exam, concentrate most time on those statements **not** ticked.
* Statements in bold can only appear on the Higher tier paper.

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| P1.1 The transfer of energy by heating processes and the factors that affect the rate at which that energy is transferred | A | B | C |
| compare ways in which energy is transferred in and out of objects by heating and ways in which the rates of these transfers can be varied |  |  |  |
| evaluate the design of everyday appliances that transfer energy by heating, including economic considerations |  |  |  |
| evaluate the effectiveness of different types of material used for insulation, including U-values and economic factors including payback time |  |  |  |
| evaluate different materials according to their specific heat capacities. |  |  |  |
| P1.1.1 Infrared radiation | A | B | C |
| **a)** All objects emit and absorb infrared radiation. |  |  |  |
| **b)** The hotter an object is the more infrared radiation it radiates in a given time. |  |  |  |
| **c)** Dark, matt surfaces are good absorbers and good emitters of infrared radiation. |  |  |  |
| **d)** Light, shiny surfaces are poor absorbers and poor emitters of infrared radiation. |  |  |  |
| **e)** Light, shiny surfaces are good reflectors of infrared radiation |  |  |  |
| P1.1.2 Kinetic theory | A | B | C |
| **a)** The use of kinetic theory to explain the different states of matter. |  |  |  |
| **b)** The particles of solids, liquids and gases have different amounts of energy. |  |  |  |
| P1.1.3 Energy transfer by heating | A | B | C |
| **a)** The transfer of energy by conduction, convection, evaporation and condensation involves particles, and how this transfer takes place. |  |  |  |
| **b)** The factors that affect the rate of evaporation and condensation. |  |  |  |
| **c)** The rate at which an object transfers energy by heating depends on:  ■ surface area and volume  ■ the material from which the object is made  ■ the nature of the surface with which the object is in contact. |  |  |  |
| **d)** The bigger the temperature difference between an object and its surroundings, the faster the rate at which energy is transferred by heating. |  |  |  |
| P1.1.4 Heating and insulating buildings | A | B | C |
| **a)** U-values measure how effective a material is as an insulator. |  |  |  |
| **b)** The lower the U-value, the better the material is as an insulator. |  |  |  |
| **c)** Solar panels may contain water that is heated by radiation from the Sun. This water may then be used to heat buildings or provide domestic hot water. |  |  |  |
| **d)** The specific heat capacity of a substance is the amount of energy required to change the temperature of one kilogram of the substance by one degree Celsius.  *Energy transferred = mass x specific heat capacity x temperature change*  E = m x c x θ |  |  |  |
| P1.2 Energy and efficiency | A | B | C |
| compare the efficiency and cost effectiveness of methods used to reduce ‘energy consumption’ |  |  |  |
| describe the energy transfers and the main energy wastages that occur with a range of appliances |  |  |  |
| interpret and draw a Sankey diagram. |  |  |  |
| P1.2.1 Energy transfers and efficiency | A | B | C |
| **a)** Energy can be transferred usefully, stored, or dissipated, but cannot be created or destroyed. |  |  |  |
| **b)** When energy is transferred only part of it may be usefully transferred, the rest is ‘wasted’. |  |  |  |
| **c)** Wasted energy is eventually transferred to the surroundings, which become warmer. The wasted energy becomes increasingly spread out and so becomes less useful. |  |  |  |
| **d)** To calculate the efficiency of a device using:  efficiency = useful energy out  X 100%  total energy in  efficiency = useful power out  X 100%  total power in |  |  |  |
| P1.3 The usefulness of electrical appliances | A | B | C |
| compare the advantages and disadvantages of using different electrical appliances for a  particular application |  |  |  |
| consider the implications of instances when electricity is not available. |  |  |  |
| P1.3.1 Transferring electrical energy | A | B | C |
| **a)** Examples of energy transfers that everyday electrical appliances are designed to bring about. |  |  |  |
| **b)** The amount of energy an appliance transfers depends on how long the appliance is switched on and its power. |  |  |  |
| **c)** To calculate the amount of energy transferred from the mains using:  Energy transferred = power x time  E = P x t |  |  |  |
| **d)** To calculate the cost of mains electricity given the cost per kilowatt-hour. |  |  |  |
| P1.4 Methods we use to generate electricity | A | B | C |
| evaluate different methods of generating electricity |  |  |  |
| evaluate ways of matching supply with demand, either by increasing supply or decreasing demand |  |  |  |
| compare the advantages and disadvantages of overhead power lines and underground cables. |  |  |  |
| P1.4.1 Generating electricity | A | B | C |
| **a)** In some power stations an energy source is used to heat water. The steam produced drives a turbine that is coupled to an electrical generator.  Energy sources include:  ■ the fossil fuels (coal, oil and gas) which are burned to heat water or air  ■ uranium and plutonium, when energy from nuclear fission is used to heat water  ■ biofuels that can be burned to heat water. |  |  |  |
| **b)** Water and wind can be used to drive turbines directly. |  |  |  |
| **c)** Electricity can be produced directly from the Sun’s radiation. |  |  |  |
| **d)** In some volcanic areas hot water and steam rise to the surface. The steam can be tapped and used to drive turbines. This is known as geothermal energy. |  |  |  |
| **e)** Small-scale production of electricity may be useful in some areas and for some uses, e.g. hydroelectricity in remote areas and solar cells for roadside signs. |  |  |  |
| **f)** Using different energy resources has different effects on the environment. These effects include:  ■ the release of substances into the atmosphere  ■ the production of waste materials  ■ noise and visual pollution  ■ the destruction of wildlife habitats. |  |  |  |
| P1.4.2 The National Grid | A | B | C |
| **a)** Electricity is distributed from power stations to consumers along the National Grid. |  |  |  |
| **b)** For a given power increasing the voltage reduces the current required and this reduces the energy losses in the cables. |  |  |  |
| **c)** The uses of step-up and step-down transformers in the National Grid. |  |  |  |
| P1.5 The use of waves for communication and to provide evidence that the universe is expanding | A | B | C |
| compare the use of different types of waves for communication |  |  |  |
| evaluate the possible risks involving the use of mobile phones |  |  |  |
| consider the limitations of the model that scientists use to explain how the universe began and why the universe continues to expand. |  |  |  |
| P1.5.1 General properties of waves | A | B | C |
| **a)** Waves transfer energy. |  |  |  |
| **b)** Waves may be either transverse or longitudinal. |  |  |  |
| **c)** Electromagnetic waves are transverse, sound waves are longitudinal and mechanical waves may be either transverse or longitudinal. |  |  |  |
| **d)** All types of electromagnetic waves travel at the same speed through a vacuum (space). |  |  |  |
| **e)** Electromagnetic waves form a continuous spectrum. |  |  |  |
| **f)** Longitudinal waves show areas of compression and rarefaction. |  |  |  |
| **g)** Waves can be reflected, refracted and diffracted. |  |  |  |
| **h)** Waves undergo a change of direction when they are refracted at an interface. |  |  |  |
| **i)** The terms frequency, wavelength and amplitude. |  |  |  |
| **j)** All waves obey the wave equation: *v* = *f*  x λ |  |  |  |
| **k)** Radio waves, microwaves, infrared and visible light can be used for communication. |  |  |  |
| P1.5.2 Reflection | A | B | C |
| **a)** The normal is a construction line perpendicular to the reflecting surface at the point of incidence |  |  |  |
| **b)** The angle of incidence is equal to the angle of reflection. |  |  |  |
| **c)** The image produced in a plane mirror is virtual, upright and laterally inverted. |  |  |  |
| P1.5.3 Sound | A | B | C |
| **a)** Sound waves are longitudinal waves and cause vibrations in a medium, which are detected as sound. |  |  |  |
| **b)** The pitch of a sound is determined by its frequency and loudness by its amplitude. |  |  |  |
| **c)** Echoes are reflections of sounds. |  |  |  |
| P1.5.4 Red-shift | A | B | C |
| **a)** If a wave source is moving relative to an observer there will be a change in the observed wavelength and frequency. This is known as the Doppler effect. |  |  |  |
| **b)** There is an observed increase in the wavelength of light from most distant galaxies. The further away the galaxies are, the faster they are moving, and the bigger the observed increase in wavelength. This effect is called red-shift. |  |  |  |
| **c)** How the observed red-shift provides evidence that the universe is expanding and supports the ‘Big Bang’ theory (that the universe began from  a very small initial point). |  |  |  |
| **d)** Cosmic microwave background radiation (CMBR) is a form of electromagnetic radiation filling the universe. It comes from radiation that was present shortly after the beginning of the universe. |  |  |  |
| **e)** The ‘Big Bang’ theory is currently the only theory that can explain the existence of CMBR. |  |  |  |