Y9 Physics Closure Work Term 5 and 6

Dear Year 9. Keep up with your physics by working through the work below using **revision guides (if you have them) and VLE resources (use FIREFOX (NOT Chrome) to open) on this link:** Y9 2020 Closure Work Term 5 and 6 (up to July)

Or if link doesn't work, log into Westwood College VLE and follow:
Home / Courses / Science / Physics / GCSE AQA 9-1 Physics / Y9 2020 Closure Work Term 5 and 6 (up to July)
This should take you up to the end of July. More work to follow if needed – watch this space!

Note Powerpoints are taken from lessons so you won't be able to use some slides but they have useful information and activities.

Summary of the specification content	Learning outcomes	Suggested timing (hours)	Learning resources	Activities
The changes involved in the way energy is stored when a system changes.	A system is an object or group of objects. Describe, for common situations, the changes involved in the way energy is stored when a system changes. For example: • an object projected upwards • an object accelerated by a constant force • a vehicle slowing down an electric kettle boiling water.	1	VLE resources and powerpoints (see link at top) Energy types: BBC Bitesize – Forms of energy Cyberphysics – Energy Types BBC Bitesize – Energy transfers and efficiency	Describe the changes in energy stores that take place in simple machines and simple systems. Examples could include: • Why are some kitchen appliances given higher energy ratings than others? • Why do the wheels of a bike get very hot when braking hard? • Which type of car is more efficient – petrol or electric? • petrol and electric cars • vehicle braking systems (such as bike brakes) • a ball being thrown upwards

				Describe energy wasted by machines and ways to reduce it. Why does increasing the spring constant make a spring more difficult to stretch? Why does doubling the speed of a vehicle more than double the braking distance?
The amount of energy stored by an object can be calculated. Calculations to include kinetic energy, elastic potential energy and gravitational potential energy. Equations for kinetic energy and gravitational potential energy will **not** be given in the examination.	Calculate the amount of energy stored by a moving object, a stretched spring and an object raised above ground level. The kinetic energy of a moving object can be calculated using the equation: $K.E. =$ $0.5\ x\ mass\ x\ (speed)^2$ $[EK\ = \frac{1}{2}\ m\ v^2]$ Kinetic energy, E_K, in joules, J Mass, m, in kilograms, kg Speed, v, in metres per second, m/s The amount of elastic potential energy stored in a stretched spring can be calculated using the equation: $Elastic\ potential\ energy\ =$ $0.5\ x\ spring\ constant\ x$ $(extension)^2$	2	VLE resources and powerpoints (see link at top) Gravitational potential energy: BBC Bitesize – Work and power Cyberphysics – Energy Types Kinetic energy: BBC Bitesize – Work and power Pass My Exams – Kinetic Energy Gravitational to kinetic energy transfers: BBC Bitesize – Work and power Cyberphysics – Energy Transfers Pass My Exams – Kinetic Energy (links to other types of energy, calculations that can be done using Mini White Boards	Explore questions such as: Is all the gravitational potential energy stored in an object converted to a kinetic energy store by the object as it falls? Calculate: Calculate the amount of energy stored by various objects including moving objects, stretched springs and objects raised above the ground. Calculation of an object's speed given the amount of kinetic energy stored by the object. Calculate the speed of an object, just before impact, when dropped from a given height by equating kinetic energy and gravitational potential energy. Explain the effect on the kinetic energy of an object when the speed and mass increases. In particular what will happen to the kinetic energy when the speed doubles and when the mass doubles? Explain the effect of increasing the spring constant of a spring on the ease that it stretches and on the amount of energy stored in the spring.

	$[Ee = \frac{1}{2} k e^2]$ (assuming the limit of proportionality has not been exceeded) elastic potential energy, E_e, in joules, J spring constant, k, in newtons per metre, N/m extension, e, in metres, m The amount of gravitational potential energy gained by an object raised above the ground level can be calculated using the equation: $g.p.e = mass\ x$ $gravitational\ field\ strength$ $x\ height$ $[Ep = m\ g\ h]$ gravitational potential energy, E_p, in joules, J mass, m, in kilograms, kg gravitational field strength, g, in newtons per kilogram, N/kg height, h, in metres, m			
The way energy is stored in a system can change. This change can be calculated.	Calculate changes in the way energy is stored when a system is changed by: • heating • work done by forces	2	VLE resources and powerpoints (see link at top) Kinetic energy: BBC Bitesize – Specific heat capacity Video clip YouTube: GCSE Science Revision – Specific Heat Capacity	Why are concrete blocks used as thermal storage heaters? Why does a pan of oil heat faster than a pan of water?

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. $E = m \times c \times \theta$	• work done when charge flows. Use calculations to show how the overall energy in a system is redistributed when the system is changed. The amount of energy stored in or released from a system as its temperature changes can be calculated using the equation: $Change\ in\ thermal\ energy = mass\ x\ specific\ heat\ capacity\ x\ temperature\ change$ $[\Delta E = m\ c\ \Delta\theta]$ change in thermal energy, ΔE, in joules, J mass, m, in kilograms, kg specific heat capacity, c, in joules per kilogram per degree Celsius, J/kg°C temperature change, Δθ, in degrees Celsius, °C The specific heat capacity of a substance is the amount of energy required to raise the temperature of one kilogram of			Why does the filling of a pie feel hotter than the pastry even though it has been in the same oven? Describe an investigation to measure the specific heat capacity of one or more materials. The investigation will involve linking the decrease of one energy store (or work done) to the increase in temperature and subsequent increase in thermal energy stored. How much energy is in a crisp? Do some research to find out the published figures and then describe a way to investigate it. • Research different methods for measuring specific heat capacity. • Select suitable apparatus for carrying out the experiment accurately and safely. • Identify possible hazards, the risks associated with these hazards, and methods of minimising the risks.

	the substance by one degree Celsius.			
The total amount of energy in a system remains constant though the way the energy is stored in the system can change. The energy transfers in a system are not always useful. Energy that is transferred in a way that is not considered useful is often described as being wasted. Reducing unwanted energy transfers. Reducing heat loss from a home by use of insulation.	Energy can be transferred usefully, stored or dissipated, but cannot be created or destroyed. Describe examples where there are energy transfers in a closed system, that there is no net change to the total energy. Whenever there are energy transfers in a system only part of the energy is usefully transferred. The rest of the energy is dissipated so that it is stored in less useful ways. This energy is often described as being wasted. Unwanted energy transfers can be reduced in a number of ways, for example, through lubrication and the use of thermal insulation. Describe how the rate of cooling of a building is affected by the thickness and thermal conductivity of its walls. The higher the thermal conductivity of a material, the higher the rate of energy	2	VLE resources and powerpoints (see link at top) Video clips YouTube: GCSE BBC Bitesize Revision Physics 5 Energy Transfer 2 YouTube: How to insulate Your Home: Types of Loft Insulation Episodes of 'Grand Designs' may get students thinking about the design of buildings and insulation. Good examples include: YouTube: Grand Designs – S9E09 The Cambridgeshire Eco Home Cambridgeshire Revisited YouTube: Grand Designs Australia – S04E06 Forest Lodge Eco [Full Episode] Energy changes that take place in a rollercoaster: BBC Bitesize – Gravitational potential energy Pass My Exams – Conservation of Energy & Energy Transfer	Explore questions such as: • Can energy be created or destroyed? • What happens to energy that is lost? • How can we reduce the amount of energy being wasted by a machine? • What is the best way to reduce heat loss in the home? Describe what happens to the electrical energy that goes into an appliance, such as a radio – in terms of energy stores and how the amount of energy in each store changes. Evaluate the use of various types of insulation in the home. Look in particular at the effectiveness of loft insulation, double glazing and cavity wall insulation. The evaluation could be based on cost, U-value, thermal conductivity, payback time or lifetime of the insulation fitted. Design a poster to illustrate the reasons why insulating the home is beneficial for both the homeowner and the environment. Select specific examples and suggest what could happen if insulation was not used in the home. What is the best type of insulation to use in the home? Design a building that will have very low heating bills. Present as a poster.

	transfer by conduction across the material. Students should investigate ways of reducing the unwanted energy transfers in a system.			Investigate ways of reducing the energy loss in a rollercoaster/
Calculating efficiency. How to increase efficiency.	The energy efficiency for any energy transfer can be calculated using the equation: $$efficiency = \frac{useful\ output\ energy\ transfer}{total\ input\ energy\ transfer}$$ Describe ways to increase the efficiency of an intended energy transfer.	1	VLE resources and powerpoints (see link at top) Energy efficiency calculations: BBC Bitesize – Efficiency Efficiency of power stations video clip: YouTube: Which Power Source Is most Efficient? Pass My Exams – Energy Transfer Diagrams and Efficiency Cyberphysics – Sankey diagrams	Explore questions such as: • Which type of power station is the most efficient? • Which type of light bulb would cost the least amount of money to use? Research different types of power station to find out if combustion based power stations are less efficient that either nuclear or wind. Investigate ways of increasing the efficiency of a coal fired power station. Prepare a poster on different types of light bulb. Find out the cost of buying and running the light bulbs in a home for one year. Determine whether energy saving light bulbs will save money over incandescent light bulbs. State the equation used to find efficiency. Calculate the efficiency of a machine as either a decimal or a percentage. Rearrange the equation to determine the total energy put into the machine or the useful energy output.

Energy Resources. Renewable and non-renewable energy resources.	Describe the main energy resources available for use on Earth. These include: • fossil fuels (coal, oil and gas) • nuclear fuel • bio-fuel • wind • hydro-electricity • geothermal • the tides • the Sun • water waves. Distinguish between energy resources that are renewable and energy resources that are non-renewable. Compare the ways that different energy resources are used. The uses to include transport, electricity generation and heating.	1	VLE resources and powerpoints (see link at top) S-cool, the revision website – Non-renewable Energy Sources Cyberphysics – Energy Resources The Energy Story – Chapter 20: Hydrogen and Future Energy Sources Pass My Exams – Electricity Generation Video clip YouTube: Energy Resources	Define renewable energy resource and give examples of them. Define non-renewable energy resource and give examples of them. Explain the advantages and disadvantages of each type of energy resource with respect to other sources, eg the advantages and disadvantages of coal over nuclear power. Research the different types of energy resources that are available to generate electricity. For each type of energy resource find the environmental impacts. Explain why each type of energy resource is used to generate electricity even though it does have these environmental impacts. For a given location determine the best way of generating electricity. Role-play a meeting between a group of local councillors/MPs, local environmental groups and electricity companies trying to get a new power station built. Which type of power station would each group want? How persuasive are each group in getting their choice? Evaluate the use of different energy resources for a given situation, eg generating electricity in remote locations. The evaluation should include ethical and environmental issues.

				Compare the use of different fuels in the generation of electricity, heating homes and transport. Determine the most suitable fuel for a particular use depending on the characteristics of the fuel. Identify the political, social, ethical and economic considerations of choosing fossil fuels or nuclear fuels to generate electricity.