KS5 Curriculum Overview: Environmental Science year 12 paper 1						
Term / Length of Unit	**Outline**	**Assessment**	**Home Learning**	**Communication skills**	**Numeracy**	**End Points**
Autumn 1 Paper 1 Atmosphere	The emphasis should be placed on understanding how anthropogenic activities are inter-connected with physical processes, to formulate management strategies and plan sustainable activities. Supplies of renewable physical resources may be maintained by the control of activities that may cause over-exploitation and by protecting the processes that aid their production. Supplies of non-renewable physical resources may be extended by controlling exploitation and developing improved technologies to harness them.	**Mid and End of unit assessments, year 12**	**Each student is provided with a booklets of pass paper exam questions to be completed weekly Addition reading up and addition notes and research on each topic covered in class**	Wider Reading and Models • Guided Reading using curriculum press, academic magazines and books to support wider knowledge • Academic texts from curriculum press and Google Scholar used for analysis • Key term list for topic • Extended writing • Essay annotations (past student work)	Students could use standard form when dealing with carbon reservoir masses and transfer rates Students could plot atmospheric carbon dioxide levels, atmospheric temperature and solar output over time represented on a graph. Students could consider probability when assessing the various possible causes of climate change. Students could use standard deviation values to assess the significance of fluctuations in ozone levels over Antarctica. Students could calculate the percentage difference between estimated values and real outcomes from computer models of global climate change. Students could use and manipulate an equation to estimate carbon sequestration rates. Students could construct a flow diagram of carbon reservoirs and transfer processes in the carbon cycle. Students could use data on different scenarios of carbon emissions to	<u>Knowledge</u> The atmosphere How atmospheric energy processes involving ultra violet (UV), infrared (IR) and visible light in the stratosphere and troposphere affect life-support systems Global Climate Change Global climate change: how interconnected natural systems cause environmental change Ozone depletion Students should consider the success of tackling ozone depletion and compare this with other environmental issues.

					predict a graph of atmospheric CO_2 concentration.	
Autumn 2 Atmosphere and Hydrosphere	The emphasis should be placed on understanding how anthropogenic activities are inter-connected with physical processes, to formulate management strategies and plan sustainable activities. Supplies of renewable physical resources may be maintained by the control of activities that may cause over-exploitation and by protecting the processes that aid their production. Supplies of non-renewable physical resources may be extended by controlling exploitation and developing improved technologies to harness them.	**Mid and End of unit assessments, year 12**	**Each student is provided with a booklets of pass paper exam questions to be completed weekly Addition reading up and addition notes and research on each topic covered in class**	Wider Reading and Models • Guided Reading using curriculum press, academic magazines and books to support wider knowledge • Academic texts from curriculum press and Google Scholar used for analysis • Key term list for topic • Extended writing • Essay annotations (past student work)	Students could convert data and change the units used in transfer rates, volumes and residence times in the hydrological cycle. Students could estimate results to sense check that the calculated values are appropriate, such as when calculating residence times in different water reservoirs. Students could calculate the mean rate of water transfer between two water reservoirs. Students could interpret data relating to aquifer flow rates. Students could use data on changing transfer rates to calculate changes in the mean water content in an aquifer. Students could analyse a scatter graph of per capita water use against mean GDP to suggest reasons for different rates of water use.	<u>Knowledge</u> **The impact of unsustainable exploitation** Students should understand that the natural hydrological cycle is in a state of dynamic equilibrium. Human activities that alter the rates of processes in the hydrological cycle can lead to changes in residence times and quantities in the reservoirs of the cycle. Students should be able to use the technical terminology related to the hydrological cycle to discuss anthropogenic changes and strategies that may allow sustainable exploitation. Students should be able to explain how human activities change processes in the hydrological cycle. Students should be able to explain the consequences of changes in the hydrological cycle.

					Students could compare storage volumes of natural water reservoirs and transfer rates. Students could construct a flow diagram using data on processes and reservoir storage. Students could calculate the rate of infiltration through rocks with different permeabilities.	**Analysis and evaluation of strategies for sustainable management** Students should use examples of water resources that have been exploited unsustainably. **Ocean currents: the importance of thermohaline circulation in distributing heat and regulating climate** Students should discuss the impacts of changes in thermohaline circulation on the climate of countries around the North Atlantic, including the UK. **Increasing sustainability by treating contaminated water** The methods used to remove the following contaminants: • litter • suspended solids • some metals and odours • organic pollutants • salt • pathogens. **Increasing sustainability by economical use and the exploitation of new sources** Management of water resources: • metering • low water-use appliances • greywater use

						• exploitation of new sources • rainwater catchment • new reservoirs/estuary barrages • unexploited aquifers • inter-basin transfers.
Spring 1 Mineral Resources	The emphasis should be placed on understanding how anthropogenic activities are inter-connected with physical processes, to formulate management strategies and plan sustainable activities. Supplies of renewable physical resources may be maintained by the control of activities that may cause over-exploitation and by protecting the processes that aid their production. Supplies of non-renewable physical resources may be extended by controlling exploitation and developing improved	**Mid and End of unit assessments, year 12**	**Each student is provided with a booklets of pass paper exam questions to be completed weekly Addition reading up and addition notes and research on each topic covered in class**	Wider Reading and Models • Guided Reading using curriculum press, academic magazines and books to support wider knowledge • Academic texts from curriculum press and Google Scholar used for analysis • Key term list for topic • Extended writing • Essay annotations (past student work)	Students could estimate the impact of a change in cut-off ore grade on the abundance of mineral reserves using the exponential trend of Lasky's principle. Students could demonstrate understanding that calculated results can only be reported to the limits of the least accurate measurement, e.g. in estimating lifetimes of mineral reserves. Students could identify trends in mineral use from scatter diagrams of per capita use and mean GDP. Students could estimate the lifespan of reserves of a metal using data on per capita use, population size and current reserves. Students could identify the uncertainties of predictions in mineral reserves using trends in population, per capita use and	<u>Knowledge</u> **Minerals extracted from the lithosphere** The mineral resources extracted from the lithosphere are non-renewable as they are reformed too slowly to be replaced within timescales that would allow human use. Long-term use relies on an understanding of the scientific methods that will increase supplies, extend use and find alternatives for those in restricted supplies. **Geological processes that produced localised concentrations of recoverable mineral deposits** **Reserves and resource** The reserves include the amount of material that can be exploited using

	technologies to harness them.				improvements in extraction technology.	existing technology under current economic conditions. The resource includes all the material that could be exploited technically and economically now or in the future. Lasky's principle **How a range of exploratory techniques work** Exploratory techniques **Factors affecting mine viability** For a mining operation to be viable, a wide range of geological and economic criteria must be met. **Control of the environmental impacts of mineral exploitation** All mining activities impact on the environment, but good site management and post-mining restoration can minimise problems. **Strategies to secure future mineral supplies** As high-grade deposits become depleted, it is important to develop new technologies to find and extract new deposits, including low-grade and less accessible deposits.

						Manufactured products should be designed to minimise the amount of material needed and extend the lifetime of material use.
Spring 2 Mineral Resources and Biochemical cycles	The emphasis should be placed on understanding how anthropogenic activities are inter-connected with physical processes, to formulate management strategies and plan sustainable activities. Supplies of renewable physical resources may be maintained by the control of activities that may cause over-exploitation and by protecting the processes that aid their production. Supplies of non-renewable physical resources may be extended by controlling exploitation and developing improved technologies to harness them.	**Mid and End of unit assessments, year 12**	**Each student is provided with a booklets of pass paper exam questions to be completed weekly Addition reading up and addition notes and research on each topic covered in class**	Wider Reading and Models • Guided Reading using curriculum press, academic magazines and books to support wider knowledge • Academic texts from curriculum press and Google Scholar used for analysis • Key term list for topic • Extended writing • Essay annotations (past student work)	Students could convert values and units used in transfer rates, reservoir mass and residence time in the nitrogen cycle. Students could convert numbers in standard and ordinary form when using masses in biogeochemical cycles. Students could use and manipulate equations of nutrient transfer rates. Students could use data on reservoirs and transfer processes to construct a flow diagram of the nitrogen or phosphorus cycle.	<u>Knowledge</u> **The importance of biogeochemical cycles for living organisms** Many elements have low availability to living organisms. Biogeochemical cycles involve inter-linked processes that allow materials to be recycled and repeatedly re-used. **The carbon cycle including human influences** The processes in the carbon cycle that are affected by human activities Sustainable management of the carbon cycle: methods of counteracting human activities that alter the natural equilibria of the carbon cycle **The nitrogen cycle including human influences** The processes in the nitrogen cycle that are affected by human activities Consequences of changes in nitrogen reservoirs: • eutrophication • global climate change

						• NO_x toxicity • photochemical smogs. Sustainable management of the nitrogen cycle and methods of counteracting human activities that alter the natural equilibria of the nitrogen cycle **The phosphorus cycle including human influences** The processes in the phosphorus cycle that are affected by human activities Sustainable management of the phosphorus cycle and methods of counteracting human activities that alter the natural equilibria of the phosphorus cycle
Summer 1 **Biochemical cycles And soils**	The emphasis should be placed on understanding how anthropogenic activities are inter-connected with physical processes, to formulate management strategies and plan sustainable activities. Supplies of renewable physical resources may be maintained by the control of activities that may cause over-exploitation and by protecting the processes that aid their production.	**Mid and End of unit assessments, year 12**	**Each student is provided with a booklets of pass paper exam questions to be completed weekly Addition reading up and addition notes and research on each topic covered in class**	Wider Reading and Models • Guided Reading using curriculum press, academic magazines and books to support wider knowledge • Academic texts from curriculum press and Google Scholar used for analysis • Key term list for topic • Extended writing • Essay annotations (past student work)	Students could use data on mass and mass change during heating to estimate the percentage water and organic matter composition of soil. Students could demonstrate appropriate numbers of significant figures in calculations of soil water and organic matter content. Students could use the Universal Soil Loss Equation to assess the effectiveness of soil conservation programmes. Students could demonstrate their ability to use data presented in a number of formats and be able to use these data, eg soil erosion rates	<u>Knowledge</u> **How human activities affect soil fertility** Activities that control soil conditions and affect fertility: • aeration of soil by ploughing and drainage • addition of soil nutrients • irrigation • soil compaction, increasing bulk density • pH control. **Causes of soil degradation and erosion**

	Supplies of non-renewable physical resources may be extended by controlling exploitation and developing improved technologies to harness them.				presented in graphs, tables and formulae.	Types of soil erosion: • rain splash • wind blow • surface runoff. **Natural features that reduce erosion:** • vegetation • soil organic matter • high infiltration rate. The Universal Soil Loss Equation (USLE) can be used to estimate erosion rates. **Human activities that cause soil erosion and degradation:** • ploughing vulnerable soils • vegetation removal • overgrazing • reducing soil organic matter • reducing soil biota • cultivating steep slopes • soil compaction by machinery or trampling. **The environmental impacts of soil erosion:** • reduced productivity • sedimentation in rivers and reservoirs • downstream flooding • coastal sedimentation • increased atmospheric particulates • desertification

						• landslides. **Soil management strategies to increase sustainability** Methods that can be used to reduce soil erosion: • long-term crops • contour ploughing • tied ridging • terracing • windbreaks • multi cropping • strip cropping • mulching • increasing soil organic matter.
Summer 2 Soils and research methods	The emphasis should be placed on understanding how anthropogenic activities are inter-connected with physical processes, to formulate management strategies and plan sustainable activities. Supplies of renewable physical resources may be maintained by the control of activities that may cause over-exploitation and by protecting the processes that aid their production. Supplies of non-renewable physical	**Mid and End of unit assessments, year 12**	**Each student is provided with a booklets of pass paper exam questions to be completed weekly Addition reading up and addition notes and research on each topic covered in class**	Wider Reading and Models • Guided Reading using curriculum press, academic magazines and books to support wider knowledge • Academic texts from curriculum press and Google Scholar used for analysis • Key term list for topic • Extended writing • Essay annotations (past student work)	Students could plan a strategy to monitor and reduce soil erosion, within the context of global food supply problems. The practical skills of using equipment within scientific studies are expanded, as appropriate, in detail in the selected methodologies and sampling techniques below.	<u>Knowledge</u> **Working scientifically** Students could plan activities to investigate environmental issues which they could carry out eg: • the impact of soil texture on soil water content • the impact of soil water content on organic matter levels • the effect of slope on rain splash soil erosion • the effect of vegetation cover on rain splash erosion • the impact of soil compaction on soil water levels.

	resources may be extended by controlling exploitation and developing improved technologies to harness them.					Students could plan activities in a range of broader environmental contexts related to soils, including ones where first-hand experience of practical activities may not be possible e.g.: the effect of soil erosion on downstream ecosystems.