How to use the Geography Expert podcasts to raise attainment.

Currently there are four podcasts available from my website and hosted by most podcast providers including Spotify and Google podcasts.

I have prepared some exam style questions which work alongside my podcasts. They can be given out as in class exercises, homework or revision. I have also provided marking instructions for each of the questions to guide teachers.

If used as a classroom exercise the podcast can be played to the class all at once – they can be given the questions in advance and be asked to make notes while the podcast is played. After the podcast is finished, they can use their notes to answer the questions.

With most pupils having smart phones today they should be able to access a range of podcast platforms or even my website to listen to the podcasts on their own and submit answers to questions as a homework exercise.

After marking the answers I would go over the marking instructions with the class – only by doing this will they see how to improve their responses.

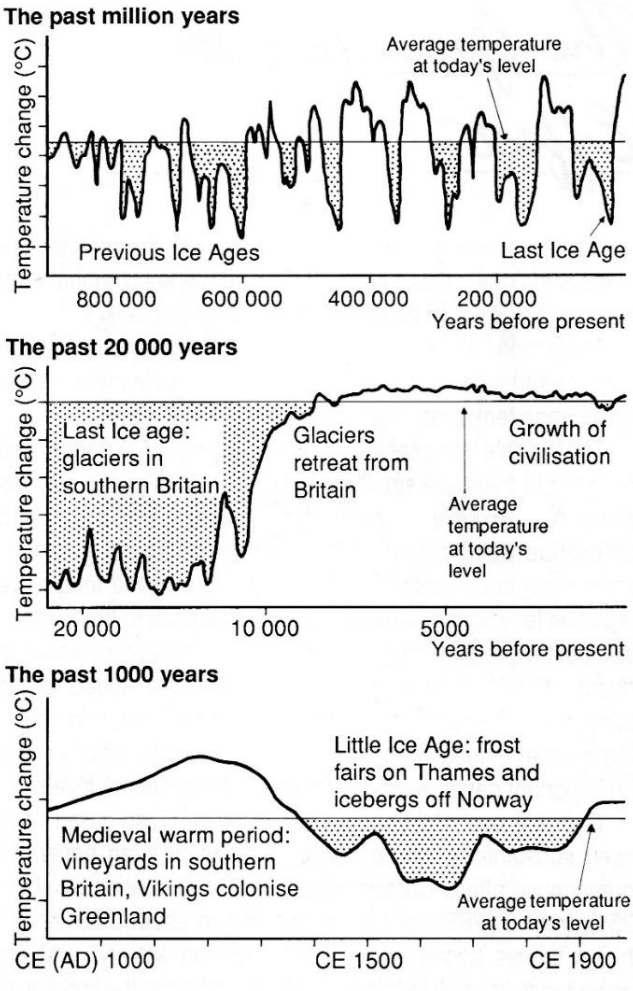
My expertise is this area is that I was a Principal Examiner for Geography for 10 years. I led a writing team to produce questions and marking instructions was well as provided marked questions as a markers guide and had to lead training sessions for hundreds of markers each year.

As well as inspiring young people to enjoy our subject we must never lose sight of the fact they want to gain a qualification. It has been my experience that young people who can see progress in their assessment enjoy the subject even more. Success breeds satisfaction and enjoyment. The more young people that get a taste of examination success in our subject the more will develop a love for the subject beyond school.

Podcast - Climate Change – Historical changes in the Earth's climate

Questions to answer

1. Briefly explain each of the following; pollen analysis, dendrochronology and ocean floor analysis. (6)
2. What did Milankovitch believe controlled the onset of historical glaciations? (7)
3. Examining the different timescales shown in the graphs below. What do the graphs tell you about the earth's climate? (6)



4. Other than astronomical theories what theories have been proposed to explain past climate change. Describe two theories, giving examples to illustrate their possible impact. (6)

Marking Instructions - **Climate Change – Historical changes in the Earth's climate**

One mark for brief correct point, two marks for more developed points. The most common correct points are listed below but credit should be given to any correct point.

1. **Each tick** ✓ indicates a possible mark **(only two marks per topic)**
   Pollen analysis is concerned with examining the pollen found in sediments ✓
   particularly peat bogs which preserve the pollen grains for a long time✓
   This analysis can identify the past vegetation of an area✓
   Past climates can be inferred because many plant species have particular climatic requirements✓

   Dendrochronology is the study of growth rings of tree trunks ✓
   thick rings indicate a favourable climate and thin rings indicate poor conditions. ✓
   Each ring represents one year's growth. ✓
   To obtain an accurate climatic reconstruction using this method, cores are taken from a number of trees and their rings cross-matched, to enable rings to be dated. ✓

   Ocean floor sediment analysis is an isotopic method of obtaining information about past climates. ✓
   The remnants of tiny organisms buried in sediment, their skeletons containing $^{16}0$ and $^{18}0$ ✓
   The relative proportions of these indicate the temperature of the sea water at the time. ✓
   Higher ratios of $^{18}0$ to $^{16}0$ indicate warmer temperatures. ✓

2. Milankovitch to argue that very low phases of insolation occurred when three astronomical cycles aligned✓✓
   glaciations would occur at these points ✓
   the shape of the earth's orbit around the sun ✓

the angle of tilt of the earth ✓
the time of year when the earth is closest to the sun✓
all change through time✓

3. Regardless of scale all graphs show considerable swings in climate✓
   The second graph shows a gradual warming after the last Ice Age (10 000 years ago) until around 5000 BP ✓
   From 5000 BP to 3000 BP, conditions in northern Europe were warmer than today and mild all year round. ✓
   The third graph shows there was a medieval warm period followed by climatic worsening which started about 1300 AD✓
   The very cold period between 1550 and 1750 is known as the 'Little Ice Age', when glaciers in Northern Europe started to re-advance and the River Thames froze over frequently. ✓✓
   After 1800 the climate warmed ✓
   The first graph shows several ice ages over the last million years. ✓

4. At least two of the following need to be mentioned; Volcanic eruptions, Rossby wave movements and Plate tectonics for full marks – One mark for each correct point. No more than four marks for any one of the possibilities. (I have provided detail for the two most likely scenarios mentioned)
   Explosive volcanic eruptions are a major cause of natural temperature reductions on a short-term scale, of less than ten years. ✓
   Large volcanic eruptions affect the climate by injecting sulphur dioxide gas into the upper atmosphere,
   which reacts with water to form clouds of sulphuric acid droplets. ✓✓
   These clouds reflect sunlight back to space, preventing its energy from reaching the Earth's surface, thus cooling it, along with the lower atmosphere. ✓✓

   Another theory of climatic change is based on possible shifts in Rossby waves ✓

This could cause a redistribution of temperature along lines of latitude without causing a fall in average temperature. ✓
Under certain conditions could cause an increase in snowfall to the point where a glaciation would proceed. ✓✓
A change in the path of Rossby waves can under certain conditions cause areas of high pressure to remain almost stationary for days or weeks. ✓

Podcast - Climate Change an Introduction

5. What has been the main cause of Global Warming since 1850? Explain in some detail the possible impacts of global warming. (12)

6. What can be done to reduce the greenhouse gasses that are put into the atmosphere? Describe 5 possible actions that might help. (10)

7. If we stopped producing greenhouse gasses tomorrow, why would our climate continue to warm? (4)

Marking Instructions - **Climate Change – Climate Change an Introduction**

One mark for brief correct point, two marks for more developed points. The most common correct points are listed below but credit should be given to any correct point. Marks can be split between the two parts of the question 6/6, or 5/7 or 4/8, depending on the detail in any one part of the answer

5. ***Main Causes.***

Over the past 100 years, levels of anthropogenic greenhouse gases have risen substantially, giving rise to concern over an enhanced greenhouse effect. ✓✓

This explosion of fossil-fuel use is tied to the industrial, political and social changes in the 20th century. ✓

Humans have access to energy for manufacturing, heating and transport. ✓

Fossil fuels also transformed agriculture, mining and waging war with nitrogen-based fertilisers and explosives. ✓✓

Oil refineries created a range of chemical industries producing everything from soap and cosmetics to plastic and paint. ✓✓

Exploitation of the tropical forests was made easier by the petrol driven chainsaw✓

Impacts:

Warming will become more obvious in middle latitudes✓

Warming temperature trends already detected in many regions of the world have been attributed to human influence. ✓

Temperature-sensitive climate variables, such as Arctic sea✓ ice, also show detected trends attributable to human influence. ✓

Warming over the Arctic in winter will be greater than the global average. ✓

This means there will be further shrinking and thinning of Arctic sea ice cover, decrease in northern spring-time snow cover✓ and melting of near surface permafrost. ✓

Rainfall will very likely increase in high and some of the mid latitudes and will decrease in the subtropics. ✓✓

Since 1880 sea levels have risen by about 23 centimetres; most of this rise is largely due to the expansion of sea water because of higher temperatures. ✓✓

A study by Khan, Wahr et alia in 2007 showed that there was rapid ice melt in the south-eastern Greenland ice sheet, between 2001-2006, causing a land uplift of 35mm. ✓✓
Even a 30 centimetre rise in sea level would necessitate a strengthening of Britain's coastal defences✓
If a greater rise in sea level were to occur, a number of coastal lowlands would be threatened with inundation. ✓
Wildlife in general is very sensitive to changes in temperature✓ and the rapid changes envisaged in a greenhouse world could wipe out up to 100 species a day. ✓
Developing countries which rely on single cash crops for much of their earnings could be the worst affected if these crops failed✓✓

6. Any five of the following or other correct answers. One mark for mentioning the reduction action and a further mark for correct elaboration.

   a. Use alternative refrigerants to Fluorocarbons ✓
   Enormous volumes of CFCs and HCFCs remain in circulation✓ Replacement chemicals, mainly hydrofluorocarbons (HFCs), have minimal effect on the ozone layer, but their capacity to warm the atmosphere is 1,000 to 9,000 times greater than that of carbon dioxide✓

   b. Reduce Food Waste ✓
   A third of the food produced does not make it from farm or factory to the table. ✓
   The food we waste contributes roughly eight percent of total anthropogenic greenhouse-gas emissions. ✓

   c. Encourage a plant rich diet✓
   Livestock accounts for nearly 15 percent of global greenhouse gases emitted each year✓
   The production of meat and dairy contributes many more emissions than growing crops. ✓

d. Preserve and replant (tropical) forests (which take in carbon dioxide and breath out oxygen). ✓
Forests lost to agricultural expansion or human settlement, discharges carbon dioxide into the atmosphere. ✓
Tropical forest loss is responsible for 16 to 19 percent of greenhouse-gas emissions caused by human activity. ✓

e. Carbon capture initiatives

i) increasing biological uptake e.g. forestry, wetlands and agriculture ✓

ii) increasing inorganic reactions with rocks, carbon storage underground or on the surface✓

iii) engineering direct capture from the atmosphere✓

Wetland, peatland and coastal habitat restoration rely on the restoration or construction of high-carbon-density ecosystems as a mechanism of extracting CO_2 from the atmosphere. ✓✓

Coastal wetlands (mangrove, tidal marsh and seagrass) sustain the highest rates of carbon sequestration✓ per unit area of all natural systems, primarily because of their comparatively high productivity and preservation of organic carbon within sedimentary substrates✓

Biochar use in agriculture. **Biochar** is produced by thermal decomposition of biomass in the absence of oxygen, known as pyrolysis✓

Biochar is relatively resistant to decomposition, thus carbon can be stored in the soil for an extended period of time. ✓

Biochar also providing a range of soil fertility and soil quality side effects. ✓

Increasing natural inorganic reactions involved in weathering of rocks might be accelerated to extract and store carbon. ✓

Approaches to accelerate weathering involve spreading fine-grained minerals or waste products from industry over large areas of land. ✓

Resulting storage of carbon would be in stable carbonate minerals at the earth surface, or as stable bicarbonate ions in the ocean. ✓

Bury CO_2 from industry and power production deep in rock storage. ✓
Take CO_2 *directly out of the atmosphere*✓
In 2012, a team of international researchers and engineers began injecting carbon dioxide (CO2) into porous basalt rock, formed from cooling lava, at an underground test site in southwest Iceland.

f. Use alternatives to fossil fuels for heat and power production✓
Wind Power - wind turbines supply 3.7 percent of global electricity. ✓
In many countries, wind is now less expensive than coal-generated electricity.
Solar Power✓
Energy storage and more flexible grids that can manage the variability of production from PV farms will also be integral to solar's success. ✓
Solar could rise from two percent of the global electricity mix to meet 20 percent of global energy needs by 2027✓

g. Stop subsidising fossil fuels✓
Globally, for every $1 spent to support renewable energy, another $6 are spent on fossil fuel subsidies. ✓
h. **Silvopasture** – combining trees in areas for pasture✓
This is integration of trees and pasture or forage into a single system for raising livestock, from cattle and sheep to deer and ducks. ✓
Rather than seeing trees as a weed to be removed, silvopasture integrates them into a sustainable and symbiotic system. ✓
Silvopastoral systems sequester carbon in both the biomass above ground and the soil below✓. Pastures that are strewn or crisscrossed with trees sequester five to ten times as much carbon as those of the same size that are treeless. ✓
i. Reduce emissions from transport✓
The entire transport sector which includes air, sea and land transport accounts for around 15% of all anthropogenic greenhouse gas emissions. ✓

Governments can have an impact in this sector via taxation✓ – increasing the cost of short-haul flights or of running a car with a petrol engine. ✓
They can also introduce incentives to buy electric cars or use public transport. ✓

7. Any four correct statements.
Many man-made greenhouse gases will persist long after emissions have ceased. ✓
Concentrations of greenhouse gases would not return immediately to their pre-industrial levels if emissions were halted. ✓
Methane concentration would return to values close to pre-industrial level in about 50 years✓
N_2O concentrations would need several centuries✓
CO_2 would essentially never come back to its pre-industrial level on time scales relevant for our society. ✓
Changes in emissions of short-lived contaminants like aerosols on the other hand would result in nearly instantaneous changes in their concentrations. ✓
The oceans have a very large capacity of absorbing heat and a slow mixing between the surface and the deep ocean. ✓
This means that it will take several centuries for the whole ocean to warm up and to reach equilibrium. ✓
The surface ocean (and hence the continents) will continue to warm until it reaches a surface temperature in equilibrium. ✓
Eliminating all emissions to zero would therefore, after a short warming, ✓ lead to a near stabilisation of the climate for multiple centuries. ✓ This is termed the commitment from past emissions. ✓
The inertia of the climate system would delay the temperature response, the long-term global temperature is largely controlled by total CO_2 emissions that have accumulated over time, irrespective of the time when they were emitted. ✓✓

Podcast – World Population Distribution

8. Explain the difference between population distribution and population density. (4)

9. Describe in simple terms the world's population distribution. (6)

10. What factors influence the distribution of the world's population? (7)

11. Explain why reference to the past has to be made in order to understand present day population distribution. (4)

Podcast – Population and Migration an Introduction.

12. Why are the terms developed and developing countries not as useful as they once were? (4)

Marking Instructions - **– World Population Distribution and Population and Migration an Introduction.**

One mark for brief correct point, two marks for more developed points. The most common correct points are listed below but credit should be given to any correct point.

8. Population density is a measure of the average number of people per unit area (usually 1 square kilometre) ✓
   Western Europe has a population density of 178 per km²✓
   This hides wide variations on either side of the average: from 14 persons per km² in Norway to 509 persons per km² in the Netherlands. ✓✓
   The population distribution within any given area is usually uneven, with large numbers of people living in some parts and very few in others. ✓
   The world's population is very unevenly distributed. Russia for example takes up 11% of the world's land area but is home to less than 2% of the world population. ✓✓
   The two most populous countries China and India are home to more than 36% of the world's population. ✓✓

9. The most densely populated areas are in Eastern Asia, Southern Asia, Western Europe and Eastern North America✓✓
   There are also significant concentrations of people in Africa (areas such as the Nile valley) ✓ and coastal South America.✓
   More than half of the world's population lives in Asia, ✓ which is overall the most densely populated continent✓
   Western Europe is more densely populated large area.✓
   Densely populated areas tend to be relatively flat with a moderate climate. ✓
   Hot deserts, mountainous regions, very cold regions and wet tropical forests support relatively few people. ✓✓

10. There are a number of factors (human as well as physical) which influence population distribution.
    The influence of physical factors such as latitude, relief, continentality, water supply, soil quality, seasonal variations in temperature and precipitation, and availability of mineral resources is greater in some places than in others ✓✓

People exert some control over their habitat✓
Human factors which might influence population distribution include type of economy, level of technology, disease, historic and social influences. ✓✓
Over 60% of the world's population live within 450 km of the sea. Both physical and human factors are involved here✓.
The range of temperatures and in particular the low winter temperatures of the interior of the Asian and North American continents has tended to discourage human settlement there✓.
The economic importance of coastal locations for trade and communications is a factor which attracts people✓.
The most comfortable climate for people to live in is probably within the temperature range of 10°C to 30°C ✓
Some very harsh environments such as the Sahel of Africa have relatively high populations. ✓ But, in general, people prefer to avoid harsh environments. ✓
Other physical factors such as soil fertility can have an influence on population distribution. ✓
The fertile alluvial soils of South-East Asia and the Nile delta in North Africa support very dense agricultural populations.✓

11. Factors which were important in the past have influenced present-day population distribution but changes in their relative importance will have an influence on future patterns. ✓
Social horrors such as 'the holocaust' (the attempted extermination of Jews in the Second World War) can have long-lasting effects on population distribution, with many survivors migrating to new countries. ✓✓
Changes in technology continue to influence the location of industry, and hence population. ✓
The settlement pattern established in the UK during the **Industrial Revolution** of the 19th century was influenced by the coalfield location of industries and the importance of London as a commercial centre✓✓.
This has been reinforced by the consumer-orientated industries of the twentieth century, which have to be sited near to population concentrations✓✓
population inertia means that most population distributions are only fully explained by reference to the past.✓

12. The terminology **developed** and **developing countries** seems a little dated✓ and hides the fact that countries vary greatly economically, industrially, educationally and in terms of health and welfare. ✓

The World Bank has said these terms were less relevant and would be phasing out their use. ✓

An alternative term **low and middle-income country** (**LMIC**) can be used to convey the fact a country is developing. ✓

Many countries would have been considered as developing 40 years ago but because of economic progress in the last four decades are often referred to as **Newly industrialised countries (NIC)** ✓– these would, for example, include, China, India, Thailand, Indonesia, Turkey, Mexico and Brazil. ✓

The **least developed countries (LDC's)** are designated as such by the UN because of their low socioeconomic development and they have the lowest **Human Development Index (HDI)** ratings✓. Countries in Sub-Saharan Africa and least developed in Asia fall into this category✓.