Pearson Edexcel International GCSE

English Language A

Paper 1: Source Booklet – Extract from the Edexcel Anthology

Tuesday 2 June 2015 – Morning

Paper Reference
4EA0/01R

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PEARSON

Climate Change: The Facts

Adapted from an article published in *The Guardian* newspaper supplement – Science Course Part III: The Earth (in association with the Science Museum)

The subject of global warming has become impossible to ignore. But what are its implications? And is mankind really to blame?

Twenty years ago global warming was a fringe subject – it seemed absurd that we could be having an effect on the Earth's climate. Today global warming has become a political hot potato and the majority of scientists agree that it is a reality and here to stay.

What is global warming?

Extra carbon dioxide [CO2] in the atmosphere enhances a natural process known as the greenhouse effect. Greenhouse gases, such as carbon dioxide, absorb heat and release it slowly. Without this process, Earth would be too cold for life to survive.

Over the past 200 years mankind has increased the proportion of greenhouse gases in the Earth's atmosphere, primarily by burning fossil fuels. The higher levels of greenhouse gases are causing our planet to warm – global warming.

Is global warming really caused by humans?

Since 1958 scientists at the Mauna Loa Observatory in Hawaii have taken continuous measurements of atmospheric carbon dioxide. The levels go up and down with the seasons, but overall they demonstrate a relentless rise.

Bubbles of gas from ice cores and the chemical composition of fossil shells provide us with a record of atmospheric carbon dioxide going back millions of years. There have been warm periods in the past where carbon dioxide was at levels similar to those seen today. However, the rate of change that we see today is exceptional: carbon dioxide levels have never risen so fast. By 2000 they were 17% higher than in 1959.

Accompanying this rapid increase in carbon dioxide we see a rise in average global temperatures. Warming in the past 100 years has caused about a 0.8C increase in global average temperature. Eleven of the 12 years in the period 1995–2006 rank among the top 12 warmest years since 1850.

There is little doubt that humanity is responsible for the rapid rise in carbon dioxide levels. The rise in temperatures that has accompanied our fossil fuel addiction seem too much of a coincidence to be just chance. Most people now agree that our actions are having an effect on Earth's climate.

How hot will it get?

Estimates from some of the world's best climate scientists – the Intergovernmental Panel on Climate Change (IPCC) – suggest that the average global temperature will have risen between 2.5C and 10.4C by 2100.

Whether it will be the lower or upper end of this estimate is unclear. Currently, oceans and trees are helping to mop up some of the heat by absorbing carbon dioxide, but eventually they will reach capacity and be unable to absorb more. At this point the atmosphere will take the full load, potentially pushing temperatures sky high.

Is it just carbon dioxide we need to worry about?

No. Carbon dioxide is just one of a number of greenhouse gases, which include water vapour, methane, nitrous oxide and ozone. Livestock farming (farting cows) and rice paddy farming (rotting vegetation) have contributed to higher levels of methane in the atmosphere.

What is more, methane has a nasty sting in its tail. Although it only hangs around in the atmosphere for about 10 years, it is far more potent as a greenhouse gas, trapping about 20 times as much heat as carbon dioxide.

What are tipping points?

A steady rise in greenhouse gases won't necessarily cause a steady rise in global temperatures. Earth's climate is highly complicated and scientists fear that many delicate thresholds exist, which once passed could trigger a dramatic change. These thresholds have become known as "tipping points".

One potential trigger could be the release of methane from methane clathrate compounds buried on the sea floor. Currently these deposits are frozen, but if the oceans warm sufficiently they could melt, burping vast quantities of methane into the atmosphere. Scientists fear that this sudden release may cause a runaway greenhouse effect.

How will global warming affect us?

Although average global temperatures are predicted to rise, this doesn't necessarily mean that we'll be sitting in our deckchairs all year round. The extra energy from the added warmth in the Earth's atmosphere will need to find a release, and the result is likely to be more extreme weather.

If we stop emitting CO_2 now will it get better straight away?

Unfortunately not. Research shows that we are already committed to an average global temperature rise of nearly 1C, lasting for at least the next 500 years.

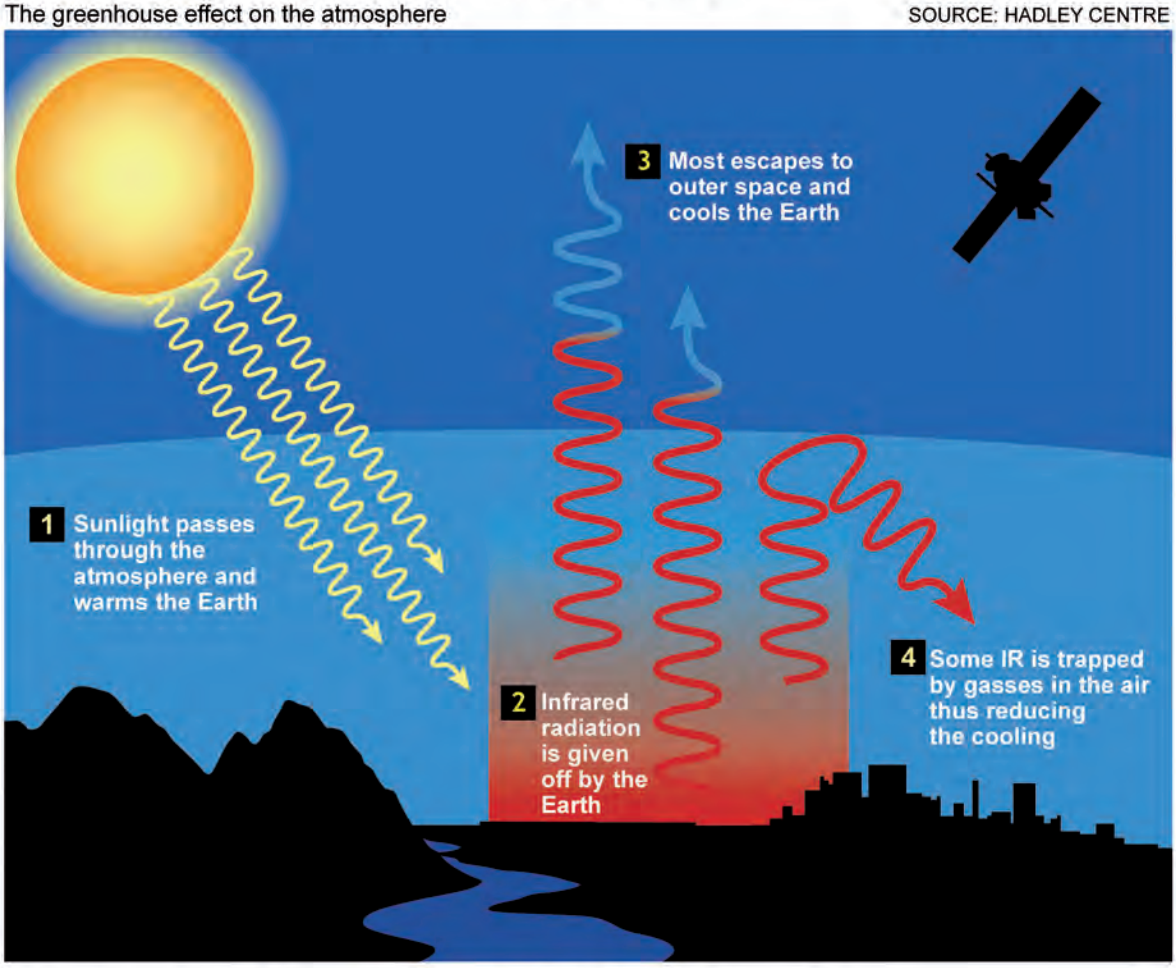
Kate Ravilious

What is global warming?

What determines the temperature of the earth?

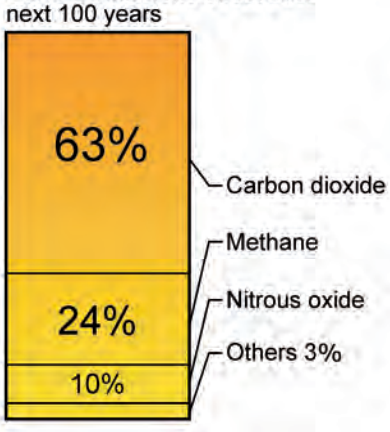
The greenhouse effect on the atmosphere

SOURCE: HADLEY CENTRE



CO_2 is the major contributor to global warming

Current emissions effect over next 100 years



Projection of global average temperature 2100