

Failing the climate test: exam boards and the climate emergency

Introduction to the project

[Teach the Future](#) is a youth-led organisation, campaigning to greatly improve climate education in the UK. We aim to repurpose the UK education system, in order to ensure that students understand the causes and effects of the climate and ecological crisis, as well as the solutions.

Teach the Future's 'Failing the climate test: exam boards and the climate emergency' is an analysis of exam papers which aims to evaluate the proportion of questions in major UK school examinations, which include themes of climate change, sustainability, and the environmental impact of human actions. It also aims to highlight which subtopics within these are included the most often in exam papers, and which are included less often. Exam papers are said to follow the national curriculum but when teachers have many competing priorities, and students, teachers and schools have pressures on exam results, teachers have shared that the papers influence what they teach in the classroom. Topics that regularly appear in papers are much more likely to be taught. Teachers also use exam papers as revision resources and for mock assessments. Therefore, even if sustainability and climate topics are embedded into the national curriculum but not in exam papers, then not all students may have the opportunity to learn about it.

We chose to focus our research for this report on GCSE (National 5 in case of SQA) Combined Science, Biology, Chemistry, and Geography papers, as these subjects were assumed would be the most relevant to, and contain the most information regarding, climate change and sustainability. However, Teach the Future believes that climate education should be embedded in every subject across the curriculum, in order for all students to understand the interdisciplinary nature of the climate crisis. [Our 'Curriculum for a changing climate' subject reviews](#) have shown how sustainability and climate education can be embedded within the existing English national curriculum for KS3 and KS4. GCSE/ National 5 exams are taken by almost every student in the UK, so we know that these exam papers guide a lot of teaching

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and are seen by a very wide audience. With the summer 2023 GCSE examinations starting today, there could not be a more important time to examine what students are actually being tested on.

Research methods

This research project does not aim to be an academic piece of research, but rather an investigation carried out by a group of young people into what we are being taught and tested on at school, through the influence of exam boards, and how we believe this could be improved.

The exam papers analysed by Teach the Future are from the November 2021 exam series from: [AQA](#), [CCEA](#), [Pearson](#), [OCR](#), [SQA](#) and [WJEC](#). The exceptions from the 2021 exam series were SQA and CCEA, whose summer 2022 papers we analysed, and WJEC, whose 2019 papers we analysed. Young people from Teach the Future (both volunteers and staff members) read through the papers, noting down where questions mentioned climate change, sustainability, or human impacts on the environment. We then analysed the mark schemes, noting down where climate change, sustainability or environmental issues were not explicitly mentioned in the question but where a possible answer to the question could be relevant to these topics.

Our method for analysing the mark schemes involved using the 'Find' tool (ctrl + f) to search the documents for relevant keywords¹. Where these words were present, we then checked to see if the mark scheme allowed answers which were relevant to or mentioned climate change, sustainability, or human impacts on the environment.

Potential weaknesses we identified with our method were the possibility for human errors during research - for example, researchers not noticing or failing to identify a relevant question, or the potential for different researchers to make different judgements as to whether a question was relevant or not. We accepted that a certain margin of error will exist, however we took actions to ensure our findings were as accurate as possible. Firstly, we analysed both exam papers and their related mark schemes, to ensure that any potential relevance to climate change could be identified. We also carried out peer review checks, which involved one paper being selected at random from each exam board and read through by someone other than the person who initially analysed it, in order to identify

¹ Climate, Environment, Sustainability, Sustainable, Emissions, Dioxide, Renewable, Atmosphere, Pollutant, Conserving, Conservation, Biodiversity, Recycling, Solar, Turbine, Global warming, Deforestation, Greenhouse gas, Fossil fuel, Acid rain, Ecosystem

whether mistakes had been made. These checks concluded that overall our analysis had been carried out accurately with only one missed mention of 'environment' being identified.

Missing papers and mark schemes

There were a number of papers which were locked from public view and so we were unable to analyse. These were:

- CCEA Biology foundation unit 2 question paper
- CCEA Biology foundation practical booklet A
- CCEA Biology higher practical booklets A and B
- CCEA Chemistry foundation unit 2 question paper
- CCEA Chemistry foundation practical booklet B
- CCEA Geography paper 1 question paper

There were also a number of mark schemes locked from public view:

- CCEA Biology practical booklet A mark scheme (foundation and higher)
- CCEA Chemistry foundation practical booklets A and B mark schemes
- CCEA Geography paper 2 mark scheme
- Pearson Geography A paper 3 mark scheme
- Pearson Geography B Papers 1, 2, and 3 mark scheme

We contacted CCEA and Pearson to request access to these documents for our research, but neither organisation responded.

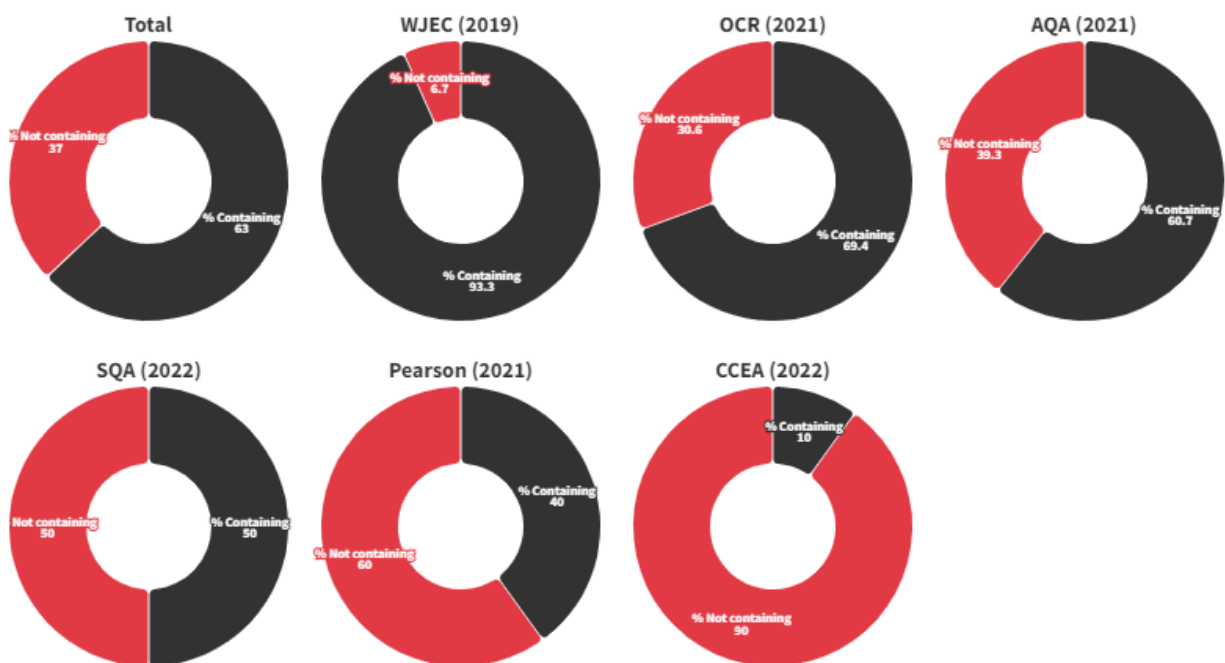
Science

Findings

- Out of **128** papers analysed, **81** were found to contain questions or potential answers mentioning climate change, sustainability or human impact on the environment **(63%)**. This can be further broken down into:
 - **17** out of **28** AQA papers (60.7%)
 - **8** out of **20** Pearson papers **(40%)**
 - **25** out of **36** OCR papers (69.4%)
 - **28** out of **30** WJEC papers (93.3%)
 - **2** out of **4** SQA papers (50.0%)
 - **1** out of **10** CCEA papers (+ 6 which were unavailable to check) (10.0%)
 - **47** out of **74** Combined science papers (63.5%)
 - **16** out of **27** Biology (single science) papers (59.3%)

- **18** out of **27** Chemistry (single science) papers (66.7%)

In the charts below, the colour red indicates the percentage of papers that did not mention climate change, sustainability or human impact on the environment, whilst black indicates the percentage of papers where there was mention.



Key observations regarding topics mentioned in science papers

- There were multiple chemistry questions across exam boards on crude oil and fractional distillation of crude oil. While these questions explored in detail the products of fractional distillation (petrol, diesel, etc), they very rarely mentioned the environmental or social impacts of producing and using these fossil fuels, for example, the greenhouse gases released when petrol is burned. We believe this would be a good opportunity to include links to climate change and sustainability, specifically climate change's causes.
- Physics papers often cover energy efficiency, but usually focus on the economic side of this, as opposed to the environmental benefits of saving energy.
- We recognise that core knowledge is key at this level. Many students at GCSE have studied relatively little science at this point, and specific topics (including those about sustainability and climate change) at a higher level require this core knowledge to understand. While we accept that it's not always possible to put this core knowledge

into the context of climate change, however, we believe that more effort could be put into increasing the amount which is.

Below is a table outlining the science papers containing questions, or potential answers, mentioning, climate change, sustainability, or human impact on the environment, and those which do not.

Exam board	Papers featuring climate change ²	Papers not featuring climate change ¹
AQA (2021)	AQA combined trilogy physics 1F (1 out of 6) AQA combined trilogy physics 1H (1 out of 6) AQA combined trilogy biology 2F (3 out of 7) AQA combined trilogy biology 2H (1 out of 6) AQA combined trilogy chemistry 2F (4 out of 7) AQA combined trilogy chemistry 2H (2 out of 6) AQA combined synergy 1F (4 out of 9) AQA combined synergy 1H (4 out of 8) AQA combined synergy 3F (1 out of 10) AQA combined synergy 3H (1 out of 8) AQA combined synergy 4F (2 out of 10) AQA combined synergy 4H (2 out of 8) AQA Biology 2F (5 out of 11) AQA Biology 2H (2 out of 9) AQA Chemistry 1F (1 out 10) AQA Chemistry 2F (3 out of 10) AQA Chemistry 2H (3 out of 10)	AQA combined trilogy biology 1F AQA combined trilogy biology 1H AQA combined trilogy chemistry 1F AQA combined trilogy chemistry 1H AQA combined trilogy physics 2F AQA combined trilogy physics 2H AQA combined synergy 2F AQA combined synergy 2H AQA Biology 1F AQA biology 1H AQA chemistry 1H
Pearson (2021)	Combined chemistry 2F (1 out of 6) Combined chemistry 2H (1 out of 6) Biology 2F (1 out of 10) Biology 2H (1 out of 10) Chemistry 1F (1 out of 10) Chemistry 1H (1 out of 10) Chemistry 2F (2 out of 10) Chemistry 2H (2 out of 10)	Combined biology 1F Combined biology 1H Combined chemistry 1F Combined chemistry 1H Combined physics 1F Combined physics 1H Combined biology 2F Combined biology 2H

² Papers containing questions, or potential answers, mentioning, climate change, sustainability, or human impact on the environment

		Combined physics 2F Combined physics 2H Biology 1F Biology 1H
SQA (2022)	Biology section 2 (1 out of 18) Chemistry section 2 (2 out of 13)	Biology section 1 Chemistry Section 1
OCR (2021)	Combined gateway 2 (biology foundation) (3 out of 15) Combined gateway 4 (chemistry foundation) (5 out of 18) Combined gateway 8 (biology higher) (2 out of 15) Combined gateway 10 (chemistry higher) (3 out of 17) Combined gateway 12 (physics higher) (1 out of 15) Combined 21st century biology foundation (1 out of 12) Combined 21st century biology higher (1 out of 9) Combined 21st century chemistry foundation (1 out of 10) Combined 21st century chemistry higher (3 out of 9) Combined 21st century physics foundation (1 out of 10) Combined 21st century physics higher (1 out of 10) Combined 21st century combined foundation (2 out of 9) Combined 21st century combined higher (2 out of 8) Biology gateway 2 (foundation) (1 out of 23) Biology gateway 4 (higher) (3 out of 23) Biology 21st century foundation breadth (1 out of 12) Biology 21st century foundation depth (1 out of 8) Biology 21st century higher breadth (1 out of 13) Biology 21st century higher depth (1 out of 7) Chemistry gateway paper 2 (foundation) (2 out of 22) Chemistry gateway paper 4 (higher) (1 out of 23) Chemistry 21st century foundation breadth (1 out of 9) Chemistry 21st century foundation depth (1 out of 9) Chemistry 21st century higher breadth (2 out of 9) Chemistry 21st century higher depth (2 out of 9)	Combined gateway 1 Combined gateway 3 Combined gateway 5 Combined gateway 6 Combined gateway 7 Combined gateway 9 Combined gateway 11 Biology gateway 1 Biology gateway 3 Chemistry gateway paper 1 Chemistry gateway paper 3
CCEA (2022)	Biology foundation unit 1 (1 out of 11)	Biology foundation practical booklet B Biology higher unit 1 Biology higher unit 2 Chemistry foundation unit 1 Chemistry foundation practical booklet A (mark scheme not checked) Chemistry higher unit 1

		Chemistry higher unit 2 Chemistry higher practical booklet A Chemistry higher practical booklet B
WJEC (2019)	Biology foundation unit 1 (1 out of 8) Biology foundation unit 2 (1 out of 7) Biology higher unit 1 (4 out of 9) Biology higher unit 2 (1 out of 9) Chemistry foundation unit 1 (1 out of 11) Chemistry foundation unit 2 (4 out of 9) Chemistry higher unit 1 (1 out of 10) Chemistry higher unit 2 (1 out of 9) Applied science double award foundation unit 1 (1 out of 7) Applied science double award foundation unit 2 (1 out of 8) Applied science double award foundation unit 3 (2 out of 9) Applied science double award higher unit 1 (1 out of 7) Applied science double award higher unit 2 (1 out of 7) Applied science double award higher unit 3 (2 out of 7) Applied science single award foundation unit 1 (5 out of 9) Applied science single award higher unit 1 (3 out of 8) Applied science single award higher unit 2 (1 out of 8) Science double award foundation biology 1 (1 out of 7) Science double award foundation chemistry 1 (2 out of 9) Science double award foundation physics 1 (2 out of 7) Science double award foundation biology 2 (1 out of 8) Science double award foundation chemistry 2 (2 out of 6) Science double award higher biology 1 (1 out of 7) Science double award higher chemistry 1 (2 out of 8) Science double award higher physics 1 (2 out of 6) Science double award higher biology 2 (1 out of 8) Science double award higher chemistry 2 (1 out of 6) Science double award higher physics 2 (1 out of 5)	Applied science single award foundation unit 2 Science double award foundation physics 2

Geography

Findings

- With the exception of CCEA paper 3, all geography papers analysed contained mentions of climate change, sustainability, or the human impact on the environment.

Key observations regarding topics mentioned in geography papers

- Questions are often problem-centred, focussing mainly on the causes and less so on the effects or impacts, whilst some mark schemes explicitly mention students do not get marks for highlighting the impacts of climate change or environmental issues.
- There are very few mentions of the industries that create the majority of greenhouse gas emissions.
- There is much less emphasis on the solutions to the climate and ecological crisis.
- There is much less emphasis on climate justice and the social impacts of climate change - something which Teach the Future strongly promotes.

Below is a table outlining the geography papers containing questions, or potential answers, mentioning, climate change, sustainability, or human impact on the environment, and those which do not.

Paper	Proportion of questions	Topics covered
AQA 1	5 out of 5	<ul style="list-style-type: none">• Climate change due to human actions• Biodiversity• Deforestation• Conservation• The environmental impact of flood management• The environmental impact of tourism
AQA 2	4 out of 6	<ul style="list-style-type: none">• Urban sustainability• Biodiversity• Air pollution• Carbon footprint of food
AQA 3	3 out of 4	<ul style="list-style-type: none">• Renewable energy
Pearson A	5 out of 7	<ul style="list-style-type: none">• Environmental impacts of flooding

1		<ul style="list-style-type: none"> • Global warming • Human impacts on the natural landscape • Renewable energy • Greenhouse gases • The effects of climate change on humans • Varying environmental impacts between countries • The importance of maintaining ecosystems • Deforestation • Sustainable management strategies
Pearson A 2	5 out of 5	<ul style="list-style-type: none"> • Climate change • Environmental impact of development • Fossil fuels • Natural resources and environmental damage • Fracking • Sustainable management of energy resources • Wind power • Renewable and non-renewable energy • Sustainable management of water • Environmental impact of desalination • Environmental impact of industrialisation
Pearson A 3	1 out of 5 (mark scheme not checked)	<ul style="list-style-type: none"> • Impact of flooding on the environment • Managing flooding • Protection of coastlines
Pearson B 1	1 out of 3 (mark scheme not checked)	<ul style="list-style-type: none"> • CO2 in the atmosphere • Human activity causing climate change
Pearson B 2	4 out of 11 (mark scheme not checked)	<ul style="list-style-type: none"> • Human activity causing flooding • UK carbon emissions • Environmental quality of cities and villages
Pearson B 3	4 out of 4 (mark scheme not checked)	<ul style="list-style-type: none"> • How the composition of the atmosphere is regulated by vegetation • Economic development and environmental exploitation • Conservation • Biodiversity • Ecotourism • Deforestation, sustainable forest management

		<ul style="list-style-type: none"> and rainforest conservation • Fossil fuels and biofuels • Biofuels and energy security
SQA	6 out of 20	<ul style="list-style-type: none"> • Renewable energy • Pollution • Effects of climate change on different countries • Humans causing environmental damage
OCR Geographical Themes 1	2 out of 3	<ul style="list-style-type: none"> • Environmentally friendly transport • Recycling waste • Impact of water transfer schemes on ecosystems • Wind power • Impacts of renewable energy • Fracking
OCR Geographical Themes 2	3 out of 3	<ul style="list-style-type: none"> • Threats to coral reef biodiversity • Road congestion and pollution • Greenhouse effect and global warming • Natural causes of climate change
OCR Geographical Themes 3	3 out of 5	<ul style="list-style-type: none"> • Environmental impacts of weather events • Impact of climate change on polar ecosystems • Environmental quality scores and urban regeneration
OCR Enquiring Minds 1	3 out of 5	<ul style="list-style-type: none"> • Sunspots and climate change • CO₂ in the atmosphere • Economic impacts of climate change • Deforestation • Sustainable management
OCR Enquiring Minds 2	3 out of 5	<ul style="list-style-type: none"> • The effect of environmental context on development • Impact of fishing on the environment • Environmentally sustainable approaches to achieving food security • Environmental sustainability of housing developments
OCR	3 out of 4	<ul style="list-style-type: none"> • Climate change and flooding

Enquiring Minds 3		<ul style="list-style-type: none"> • Level of development affecting response to climate change • Global impacts of climate change • Effects of climate change on development
CCEA 1	Paper unavailable	
CCEA 2	1 out of 4 (mark scheme not checked)	<ul style="list-style-type: none"> • Climate change • Carbon footprints • Renewable energy • Ecotourism
CCEA 3	0 out of 8	
WJEC unit 1	3 out of 4	<ul style="list-style-type: none"> • Flooding • Sustainable development • Sea level rise
WJEC unit 2	2 out of 4	<ul style="list-style-type: none"> • Biodiversity • Waste • Sustainable tourism

Conclusion

Our research concluded that inclusion of climate change, sustainability, and human impacts on the environment, in GCSE science and geography papers varies in both quantity and breadth of topics across exam boards.

GCSE science papers covered a range of topics, with greenhouse gases, pollution and global warming appearing regularly in chemistry papers. Biology papers often mention biodiversity and conservation. Relevant physics papers usually concern renewable energy sources. However, it must be noted that over one third of papers analysed contained no mention of climate change related topics, and many of those which did contained only one or two relevant questions. Depending on the exam board and tier, **it would be possible for a student to have sat an entire set of science qualifications without having to have answered more than one question on climate change, sustainability or the environment.** For current students using past papers as a learning and revision tool, and for teachers using these as guidelines for teaching, the lack of questions convey the message that these topics do not require significant learning time or emphasis dedicated to them.

Geography papers were significantly better in their inclusion of these topics, although this may be expected from a subject which specialises in the study of the physical features of the earth. A range of topics were covered across the papers and boards, including sustainable development, renewable energy, and conservation. We noticed however that **questions are often problem-centred, focussing on the causes and effects of climate change, as opposed to solutions**, something which we would like to see more emphasis given to in the future. This is particularly important, as we know that increasing numbers of people are experiencing climate- and eco- anxiety, with a [2021 survey from the University of York and Global Future thinktank](#) reporting that 78% of people felt 'some level of fear about climate change'.

According to [SOS-UK's Schools and Sustainability research from 2019-2021](#), 71% of survey respondents aged 9-18 said that they were interested in learning more about the environment. Teach the Future volunteer Rosa, aged 18, recalls her own climate education at secondary level.

"I didn't take Geography GCSE, so really my only experience of climate education over those two years were a few modules in Chemistry, Biology, and Physics, with the occasional mention in English. I never really thought about how climate education could be included in other subjects until I started volunteering with Teach the Future. Even the climate change education within science was contained to particular modules, treating it as an isolated issue, as opposed to one which is influenced by and affects almost all areas of science."

Teach the Future has also shown how climate education can be embedded into all aspects of secondary education, through its commissioning of the '[Curriculum for a Changing Climate: track changes review of the national curriculum for England](#)' reports. Exam boards can help to ensure that climate education is prioritised and emphasised within education, through its comprehensive inclusion within exam papers. This includes science and geography papers, however it is by no means limited to these subjects. The UK government can also help promote this in England specifically, through the implementation of our [Climate Education Bill](#) which would require exam boards to integrate climate change and sustainability into qualifications, exams and assessments, where appropriate.

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