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Geography Scheme of Learning

Year 10 – Term 2 and Term 3/Unit 1 – Living with the physical environment/The challenge of natural hazards - Weather Hazards and Climate Change

Intent – Rationale

Living with the physical environment is about physical processes and systems, how they change, and how people interact with them at a range of scales and in a range of places. Weather hazards includes a study of the global atmospheric circulation to help understand global patterns of weather and climate. Then we study the causes and effects of tropical storms and UK weather hazards/extreme weather events. The section on climate change looks at the natural and human causes, impacts and strategies to manage it.

Sequencing – what prior learning does this topic build upon?	Sequencing – what subsequent learning does this topic feed into?
• Year 7 – Weather and climate in the UK • Year 7 – Extreme global concerns – Climate Change • Year 9 – Resource management - challenges of water insecurity/food miles and impact on climate change	• Year 11 – Ecosystems • Year 10 – sustainable urban development • Year 12 – Coasts (storm surges & coastal flooding) • Year 12/13 – Water and water insecurity (drought and floods) • Year 13 – Carbon and carbon insecurity (climate change)
What are the links with other subjects in the curriculum?	**What are the links to SMSC, British Values and Careers?**
• Science – climate change	• Spiritual development 2 – a sense of enjoyment and fascination in learning about themselves, others, and the world around them. • Spiritual development 4 - willingness to reflect on their experiences; who can remember the Beast from the East or recent heatwaves? Who can remember decisions made at COP26? • Moral development 2 – an understanding of consequences of behaviour and actions – climate change • Moral development 3 – investigating and offering reasoned opinions about moral and ethical issues. Should the

	moratorium on fracking be lifted? Importance of renewable energy? • Careers – GB4a in discussion, h) using ArcGIS to investigate tropical storms • Careers – role of meteorologists, climatologists, scientists, engineers, aid organisations, governments, farmers etc.
What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?	**What are the opportunities for developing mathematical skills?**
• Wideworld Magazine • GeoActive articles • *No one is too small to make a difference; Greta Turnberg* **FROM THE LIBRARY** *Climate revealed*-551 *Climate Change*-551 *Flood: The World Reacts*-550 *Global Climate Change*-363.73 *Climate, Water and Agriculture in the Tropics*-551.57 *Tropical Savannahs*-551 Horrible Geography – Stormy Weather	• Interpretation of trends in hurricanes • Use of Saffir-Simpson Scale • Interpretation of climate data graphs

Weather Hazards and Climate Change Scheme of Learning

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Year 10 – Term 2 and term 3

Intent – Concepts

What knowledge will students gain and what skills will they develop as a consequence of this topic?

Know

- Global atmospheric circulation helps determine patterns of weather and climate
- Tropical storms develop because of particular physical conditions and have significant effects on people and environments
- The UK is affected by a number of weather hazards, and extreme weather events have impacts on human activity
- Climate change is a result of natural and human factors, and has a range of effects
- Managing climate change involves both mitigation and adaptation.

Apply

- Be able to suggest likely climate conditions based on knowledge of the atmospheric circulation model
- Be able to write a weather forecast based on knowledge of how conditions change with the passage of a tropical storm
- Be able to classify primary and secondary impacts of a tropical storm
- Suggest the most appropriate responses to managing the threats caused by tropical cyclones (decision-making)
- Interpret climate data over time to judge the significance of climate change
- Classify mitigation and adaptation strategies used to manage climate change

Extend

- Understand the role of Coriolis force in determining global wind patterns
- Predict future hurricane trends based on current data, and assess the reliability of those forecasts
- Evaluate the extent to which primary or secondary impacts are more significant for a particular tropical storm
- Evaluate evidence for whether the UKs weather is becoming more extreme
- Predict future trends in global warming and likely consequences
- Assess the relative importance of mitigation and adaptation strategies to manage climate change

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What subject specific language will be used and developed in this topic?	What opportunities are available for assessing the progress of students?
Economic impact The effect of an event on the wealth of an area or community. **Environmental impact** The effect of an event on the landscape and ecology of the surrounding area. **Extreme weather** This is when a weather event is significantly different from the average or usual weather pattern and is especially severe or unseasonal. This may take place over one day or a period of time. A severe snow blizzard or heat wave are two examples of extreme weather in the UK. **Global atmospheric circulation** The worldwide system of winds, which transports heat from tropical to polar latitudes. In each hemisphere, air also circulates through the entire depth of the troposphere which extends up to 15 km. **Immediate responses** The reaction of people as the disaster happens and in the immediate aftermath. **Long-term responses** Later reactions that occur in the weeks, months and years after the event. **Management strategies** Techniques of controlling, responding to, or dealing with an event. **Monitoring** Recording physical changes, such as tracking a tropical storm by satellite, to help forecast when and where a natural hazard might strike. **Planning**	Assessment will take 3 main forms: 1. In starters, plenaries and during the lessons – formative assessment and retrieval practice to reinforce prior knowledge e.g., word searches, bingo, memory recall, definition matches etc. 2. For homework -tasks that require students to research new knowledge (e.g., a UK extreme weather event – Beast from the East) or apply existing knowledge to exam-style Qs (e.g., Qs from CGP book) 3. Summative assessments – past exam paper Qs in test or exam conditions, either as end-of-unit tests or in Y10 or Y11 formal exams.

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Actions taken to enable communities to respond to, and recover from, natural disasters, through measures such as emergency evacuation plans, information management, communications and warning systems. **Prediction** Attempts to forecast when and where a natural hazard will strike, based on current knowledge. This can be done to some extent for tropical storms (and volcanic eruptions, but less reliably for earthquakes). **Primary effects** The initial impact of a natural event on people and property, caused directly by it, for instance buildings being partially or wholly destroyed by a tropical storm. **Protection** Actions taken before a hazard strikes to reduce its impact, such as educating people or improving building design. **Secondary effects** The after-effects that occur as indirect impacts of a natural event, sometimes on a longer timescale, for instance impact on access to potable water can lead to spread of disease. **Social impact** The effect of an event on the lives of people or community. **Tropical storm (hurricane, cyclone, typhoon)** An area of low pressure with winds moving in a spiral around the calm central point called the eye of the storm. Winds are powerful and rainfall is heavy.	

Intent – Concepts

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Lesson title	Learning challenge	Higher level challenge	Suggested activities and resources
1. Global atmospheric circulation	What is global atmospheric circulation?	How does the global atmospheric circulation system work?	Starter: quiz on hottest and coldest parts of earth Teacher explanations of why hot at the equator and what atmospheric pressure is. Watch video No 1 here: https://www.metoffice.gov.uk/learning/atmosphere/global-circulation-patterns Outline the model – diagram and handout. Explain the different cells. Watch video No 2 here: https://www.metoffice.gov.uk/learning/atmosphere/global-circulation-patterns Explain how weather is affected by high or low pressure. Plenary: gap fill task about the 3 cells.
2. Global atmospheric circulation continued…	How does the global atmospheric circulation system affect the world's weather?	How does the Coriolis Effect influence global wind patterns?	Starter: refresher quiz from last lesson Consolidation Tasks: describe and explain the climate characteristics at the equator, 30º, 60º and the Poles using the 3-cell model. Extension: explain why the belts of pressure move north and south at different times of the year. Teacher explanation of global wind patterns, and how Coriolis Effect alters the 'expected' pattern, and Jet Streams. Consolidation Tasks: Complete p9 CGP exam practice, then P23 Oxford – Q2-5 and the Practice Q. Plenary: discuss this Q: 'explain how the global atmospheric circulation system affects the weather and climate of the tropics.

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3. Tropical Storms: distribution and formation	What are tropical storms and how do they form?	Why don't tropical storms form at the equator?	Starter: whiteboards – what do you know about tropical storms? Define tropical storms: cyclones, hurricanes and typhoons Mark distribution on a map and describe the distribution. Teacher explanation of how they form. Watch video clip: https://www.youtube.com/watch?v=SSx_gisp24w Draw an annotated diagram to explain their formation. Plenary: list 5 things learnt new today. Homework: look up how tropical storms are named and categorised (Saffir-Simpson scale).
4. Tropical storms: structure and features	What are the key characteristics of tropical storms?	Identify the key features on a satellite image.	Starter: how much can you remember about tropical storms? "Just a minute"activity in pairs. Outline the structure of a tropical storm e.g. eye, eye wall, spiralling cloud bands etc. Video shows flight through the eye wall: https://www.youtube.com/watch?v=a-SnxC-BkPo (careers link). Annotate a satellite image of a tropical cyclone to apply knowledge of features. Explain how long tropical cyclones last for and why they 'die' once over land. Pop-up hurricane activity: students create 3D model of hurricane to show its key features and visualise it better. Plenary: Cut-and-stick – sequence of formation to consolidate.
5. The effects of tropical storms	What are the primary and secondary impacts of tropical storms?	Can I write a weather forecast for a tropical cyclone?	Starter: ask what you would see, hear & feel in a hurricane; show images to add ideas. Explain the 3 key effects: heavy rain, strong winds and storm surges. Then complete a table to shoe primary and secondary effects of tropical cyclones. Use Oxford p29 as a guide (minus the place-specific detail).

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			Write a weather forecast based on a satellite image of a hurricane. Plenary: classify the effects into primary or secondary. Homework: Research the '3Ps' for tropical storms: Prediction, Protection and Planning, for LICs and HICs.
6. Case Study: Cyclone Aila – May 2009, Bangladesh.	What were the causes and effects of Cyclone Aila?	Evaluate which were worse – primary or secondary effects.	Starter: consider possible responses to tropical cyclones in the short- and long-term – preparation for DVD. Introduce Bangladesh – why is it vulnerable to tropical cyclones? DVD – Cyclone Aila. Students complete template to gather information on the causes and effects.
7. Case Study: Cyclone Aila – May 2009, Bangladesh	What were the responses to Cyclone Aila?	Evaluate the effectiveness of the responses – how well prepared was Bangladesh?	Starter: recap key impacts of Cyclone Aila from last lesson. DVD – Cyclone Aila. Students complete template to gather information on the responses. Classify the key effects and responses on the sheet. Peer assessment of homework on the 3Ps. Consolidation if required. Plenary: Discuss this exam Q: For a tropical storm you have studied, assess the extent to which primary effects are more significant than secondary effects. [9 marks + 3 SPaG] Homework – complete the Q.
8. The effects of climate change on tropical storms.	How will climate change affect tropical storms?	How reliable is the current evidence for changes?	Starter: recap conditions needed for formation of tropical storms, then suggest which could change with climate change. Summarise these key potential changes. Is there any evidence of changes now? Students look at various data – maps, graphs, photos, satellite images – and answer Qs on each one. See resource sheet. Go over answers. Plenary: sum up findings. Discuss reliability of the evidence.

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9. Issue Evaluation Practice	What is the Issue Evaluation?	How do I justify a decision?	Starter: outline Paper 3 – Issue Evaluation and skills involved. Students work in groups of 4 to go through a resource booklet (OCR GCSE Paper summer 2014????) – in filing cabinet in C4 and tasks. Apply knowledge gained in the topic and practice making and justifying a decision about the best way to manage tropical cyclones in Bangladesh. Plenary: share ideas – what was the most popular decision?
10. Weather Hazards in the UK.	What is extreme weather? What impacts can it have?	Why does the UK sometimes experience extreme weather?	Starter: whiteboards – what do we mean by extreme weather? Can you name any examples in the UK? Define 'extreme weather' and explain the difference between weather and climate. Draw a spider diagram of extreme weather experienced in the UK and some of the likely secondary effects. Possible video clips could include these: https://www.youtube.com/watch?v=dHlkkc2nBeo 2014 storms; https://www.theguardian.com/uk-news/2019/nov/10/uk-weather-severe-flood-warnings-remain-in-place-in-yorkshire 2019 Floods Explain why the UK gets extreme weather sometimes: meeting point of different air mass, and at the boundary of the Ferrel and polar cells. Plenary:
11. Case Study of an Extreme Weather Event in the UK: Beast from the East or Somerset Levels Floods or the July 2022 heatwave	What were the causes, effects and responses to a UK extreme weather event?	Evaluate the impacts – which were worse? – and the responses – how effective were they?	Starter: reminder – what extreme weather events does the UK face? Students undertake independent research of an example of a recent extreme weather event in the UK to illustrate: ☐ causes ☐ social, economic and environmental impacts

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			☐ how management strategies can reduce risk: immediate and long-term responses Resources: Pumpkin DVD and Oxford p34-5 – Somerset levels floods; IT room and resource sheet for Beast from the East. Plenary: evaluate the main impacts of the chosen weather event.
12. Extreme weather in the UK	Is weather in the UK becoming more extreme?	What role does the jet stream play in UK weather?	Starter: consider some historical events – have we always had extreme weather? Look at evidence of extreme weather events: https://www.bbc.co.uk/teach/ten-of-the-worst-weather-events-that-shook-britain/zfk2kmn http://www.metoffice.gov.uk/news/in-depth/indicators *(evidence of global warming)* https://www.metoffice.gov.uk/public/weather/climate-extremes/#?tab=climateExtremes *(climate extremes)* Explain the role of the jet stream in affecting UK weather – what is the jet stream? http://www.metoffice.gov.uk/learning/wind/what-is-the-jet-stream And how can it cause our weather to 'get stuck'? Link to warming in the Arctic. Students create a timeline using the cut-and-stick statements of extreme weather examples. Complete the Q: Is the UK's weather is becoming more extreme? Give evidence to back up your points. Plenary: sum up key points from the lesson.
13. Climate Change: evidence	What evidence is there for climate change from the beginning of the quaternary period?	Which pieces of evidence are the most reliable? Why?	Starter: what links the pictures? (all evidence for climate change) Define 'quaternary period' in the context of geological time.

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			Analysis of graphs showing temperature fluctuations on different timescales – shows climate has always changed. How do we know? What evidence can be used to show temperature changes? Slides of info then use Cambridge p54-55 – students to summarise key pieces of evidence from the past and more recently. Plenary: summarise key points.
14. Climate Change: natural causes	What are the natural causes of climate change?	How do Milankovitch cycles link to climate change?	Starter: think about natural causes of climate change – link back to evidence for past fluctuations in the quaternary. Explain the 3 key causes with diagrams: changes in earth's orbit (Milankovitch cycles), sunspot cycles and volcanic activity. Students explain the causes in their own words. Extension: research Mount Tambora's impacts on the world. Could it ever happen again? Yellowstone supervolcano?? Plenary: True or false?
15. Climate change: human causes	What are the human causes of climate change?	What's the difference between the greenhouse effect and global warming?	Starter: what do you know about man-made climate change? Whiteboards. Explain the difference between the greenhouse effect and global warming, and how the greenhouse effect works. Then identify the main greenhouse gases and explain how global warming can occur. Look at graph showing the increase in CO2 compared to global temperature change – what's the link? Using Cambridge p56-7 students explain how human activities can lead to the 'enhanced greenhouse effect': burning fossil fuels, change in agriculture and deforestation. Plenary: think about our own carbon footprint – how do we as individuals contribute? What could we do to reduce our

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			carbon footprint? What might happen if we don't make changes?
16. Impacts and responses to climate change	What are the potential impacts of climate change? How can we manage the causes and impacts?	Which approach is best: mitigation or adaptation?	Starter: Does the image show evidence of climate change? Students suggest impacts of climate change on whiteboards. Cut-and-stick activity: arrange the potential impacts around maps of the UK and the world then colour-code into positive and negative impacts. Could watch video clips of impacts e.g., sea level rise, ice sheets melting, glaciers retreating. Are there more positives or negatives? Discuss how we could tackle global warming – 2 broad approaches of mitigation and adaptation. Suggest possible solutions. In pairs students research and prepare mini presentations on the different strategies. Complete for homework. Plenary: Do we think HICs or LICs will suffer the most from global warming? But who is mostly responsible for climate change?
17. Managing climate change	What are the different mitigation and adaptation strategies?	Which strategies are best?	Starter: recap meaning of mitigation and adaptation. Students give mini presentations on the different strategies. Students make brief summery notes on A3 template. Plenary: debate whether mitigation or adaptation is best. Can we really reverse global warming? Discuss Greta Thunberg and Extinction Rebellion – can these individuals/ organisations help us solve the 'climate crisis?'
18. End-of-unit test.			