Scheme of work

Physical geography: Hazards

This resource is a scheme of work for our accredited AS and A-level Geography specifications (7036, 7037). It is not exhaustive or prescriptive, it is designed to suggest activities and resources that you might find useful in your teaching.

3.1 Physical geography

Physical option

3.1.5 Hazards

Specification content Week Number	**Subject-specific skills development**	**Learning outcomes**	**Suggested learning activities (including ref to differentiation and extension activities)**	**Resources**
Week 1 **The concept of hazard in a geographical context** • Nature, forms and potential impacts of natural hazards (geophysical, atmospheric and hydrological). Hazard perception and its economic and cultural determinants. • Characteristic human	Use of key subject specific and technical terminology. To identify **connections** and interrelationships between different aspects of geography. Labelling and annotation of diagrams.	An overview of the concept of the terms '**hazard**', '**natural hazard**' and '**disaster**' as used by geographers. Students to be able to identify examples of different types of natural hazards, including: • geophysical • atmospheric • hydrological. Students will understand that natural hazards have common characteristics:	Small group discussion/Q&A followed by feedback – what does the term 'hazard' mean? What natural hazards are students familiar with? What is a disaster? Students to use textbooks or the internet to identify types of each category of hazard. Class discussion to identify common features that help define events as natural	Introductory article on "natural hazards" 5 minute video clip on how natural hazards affect humans Definitions of types of hazards and excellent links to further information on each List of natural hazards experienced in different countries around the world. National Geography feature length

responses – fatalism, prediction, adjustment/adaptation, mitigation, management, risk sharing – and their relationship to hazard incidence, intensity, magnitude, distribution and level of development. • The Park model of human response to hazards. The Hazard Management Cycle.	Identifying, finding and using a variety of sources of geographical information. Using models in geography. Research skills.	• each has clear origins and distinctive effects • little or no warning • exposure to the risk may be involuntary • most damage and loss of life occurs shortly after the hazard, but impacts may last into the future • their scale and impact requires an emergency response. Students to understand the terms '**risk**' and '**vulnerability**' with reference to natural hazards. Students to be able to identify and understand factors influencing the perception of natural hazards, including: • socio-economic status • level of education • employment status • religion, cultural background • family situation • past experience • personal values and personality. Students to understand three key responses to natural hazards: • fatalism • adaptation • fear. Students to understand the	hazards. Ensure students have definitions of key terms used so far. Small group discussion - Why might populations be vulnerable to natural hazards and exposed to risk? Opportunity to use textbooks or the internet to research a model of vulnerability; students to draw/construct a mind-map or model identifying the variables that affect vulnerability. Paired/small group discussion with feedback for students to identify factors that influence people's perception of natural hazards. Opportunity to ask students to explain the three key responses to natural hazards. Q&A to establish that students can define primary and secondary (short term and long term) impacts of natural hazards. Opportunity for independent research task. Students given a brief to research and create a short report on the key ideas relating to the management of natural	documentary on the world's "top 10" natural disasters US Homeland Security has summarized different types of natural hazards. These links are also useful for mitigation and response. Short introduction on concept of risk with links to academic resources on risk perception An introduction to risk perception Article about 'Living with risk' in the Philippines as the result of natural hazards RGS discussion of natural hazards and resilience with videos and diagrams Useful list of hazards terminology from United Nations Some interesting links and resources on hazards, risks and mitigation from the World Bank A short academic article on generic hazard management but includes original version of a disaster management diagram that is widely repeated online Interesting information about risk assessment and responses to hazards, including an interpretation of the "disaster, or hazard, response curve" - Park (1991).

		difference between primary and secondary (short term and long term) impacts of natural hazards. Students to understand key ideas relating to the management of natural hazards, including: • community preparedness/risk sharing • integrated risk management • mitigation • monitoring • prediction • prevention • protection • reconstruction • rehabilitation • relief • resilience. Students to understand and be able to explain the Park Response Model and the Hazard Management Cycle. Students to understand the terms '**distribution**', '**frequency**' and '**magnitude**' as they are used by geographers in relation to natural hazards. It is vital that these generic themes relating to the concept of 'hazards' are reinforced throughout the following on volcanic, seismic, storm and fire hazards.	hazards (listed in previous column). They should also find a copy of a model of the 'process of risk management', the Park Response Model and The Hazard Management Cycle and give a written explanation of each. This could be presented as a wall display, PowerPoint/Prezi presentation, video/animation (to share on the VLE), or written report. Short discussion/Q&A to ensure students can define the key terms relating to distribution, frequency and magnitude of natural hazards. Various opportunities above to assess learning with a range of exam style questions and peer assessment.	An entertaining TED talk about managing hazard response
Week 2-3	Use of key subject specific and technical	Opportunity to discuss the age of the Earth and assess students' prior	Paired/small group discussion followed by feedback – how	Simple interactive diagrams of the structure of the earth and plate tectonics

Plate tectonics • Earth structure and internal energy sources. Plate tectonic theory of crustal evolution: tectonic plates; plate movement; gravitational sliding; ridge push, slab pull; convection currents and seafloor spreading. • Destructive, constructive and conservative plate margins. Characteristic processes: seismicity and vulcanicity. Associated landforms: young fold mountains, rift valleys, ocean ridges, deep sea trenches and island arcs, volcanoes. • Magma plumes and their relationship to plate movement.	terminology. Opportunities to develop skills such as drawing, labelling and annotating diagrams. Online research into plate tectonic theory. Construct and annotate a range of graphs and use statistical skills. Developing extended writing skills. Using atlas maps. Producing annotated maps. Practicing exam style questions. Including the use of peer assessment. Conducting independent and group research tasks. Making links within, across and beyond this area of the specification.	knowledge of the structure of the Earth. Opportunity to use internet/audio-visual resources to briefly explore early theories (pre-plate tectonics) of the formation of the Earth and its structure. Students to understand the structure of the Earth and internal energy sources, including: - Internal structure and the characteristics of: • crust • lithosphere • asthenosphere • mantle • outer core • inner core - The distribution of the major tectonic plates and plate boundaries. - Internal sources of heat, including: • residual heat from Earth's formation • radioactive decay of elements in the core. Students to understand the characteristics and origin of continental and oceanic crust. Students to be able to describe and explain the nature of plate movement, including: - Speed and direction of movement of the major plates	old is the Earth? How did it form? What is the structure of the Earth? Opportunity for a short research task: using a range of textbook and internet resources students to produce a short report/set of notes/display/electronic presentation to include information, notes and diagrams covering the structure of the Earth. Students produce annotated sketches explaining the different characteristics of continental and oceanic crust and their origin. Possibly annotate a map indicating the distribution of different ages of crust. Students annotate a map of plate boundaries to indicate the direction and speed of movement of the major tectonic plates. Using a range of resources students to produce detailed annotated diagrams to explain plate movement. An opportunity for students to research different theories and then peer teach to each other. Using an atlas/textbook/	Background to plate tectonic theory with a multiple choice quiz and extra reading More sophisticated background information on drivers of plate movement (ridge push, slab pull etc.) Excellent map and summary of types of plate boundaries and other areas of tectonic theory with interactive maps and video/animation clips: Short introductory video on plate boundaries and theory from National Geographic, with some questions and extra reading

		- The evolution of various theories to explain plate movement. To include: • gravitational sliding • ridge push • slab pull • convection currents • sea floor spreading (possibly paleomagnetism). Students to understand that the movement of tectonic plates gives rise to different plate margins: • destructive • constructive • conservative. Students to be able to describe and explain the characteristic processes associated with each type of plate margin, including: • seismicity • vulcanicity. Whilst learning about each type of plate boundary students should also understand the range of landforms that are associated with each type of plate boundary, including: • young fold mountains • rift valleys • ocean ridges • deep sea trenches • island arcs • volcanoes. Students should understand that movement of magma within the	internet resources students to produce an annotated map to locate the different kinds of plate margins. Q&A/discussion to ask students what kinds of processes they would expect to find at each type of margin, and why, including seismicity and vulcanicity. Students to add a tracing overlay to their map of plate boundaries to indicate the distribution of earthquakes and volcanoes. Opportunity to assess learning with exam style questions to explain the nature of plates, plate boundaries, plate movement and associated processes. Opportunity for small group research task. Each student given one landform associated with a different type of plate margin to research. The group then produces a display/report/ electronic presentation/set of revision notes etc. that describes the distribution of, describes the characteristics of and explains the formation of the range of landforms listed. Opportunity to direct students to short articles to	

		mantle is not as simple as some easier/older texts may suggest and that, although still valid and relevant, earlier ideas of simple convection cells are only part of the explanation. Students should understand the theory and proposed role of magma plumes. It may suffice to focus on the idea of Hot Spots as proposed by J T Wilson in the 1960s or more able students may wish to engage with the more recent and broader debate that exists about the nature and role of magma plumes.	research the idea of magma plumes and "hot spots". Students could illustrate this with detailed annotated maps/cross-sections through the island chain of Hawaii and remnant seamount chains to help explain hot spots and their relationship to plate movement. Some students may be able to research more detailed academic articles to explore the more recent debate in the literature.	The contemporary academic literature has quite a debate about the idea of "magma plumes". Resources below signpost A-level students to the traditionally accepted view of J T Wilson (1969) of magma plumes linked to hot spot volcanoes, followed by some information that highlight that the debate exists: Video about magma plumes and hotspots in the Hawaiian Islands Information and diagrams explaining 'How volcanoes work' Brief overview of mantle thermal plumes CT scans link deep mantle plumes with volcanic hotspots Debate over the 'question of mantle plumes'
Week 3-4 **Volcanic hazards** • The nature of vulcanicity and its relation to plate tectonics: forms of volcanic hazard: nuées ardentes, lava flows, mudflows, pyroclastic and ash fallout, gases/acid rain, tephra. Spatial distribution,	Use of key subject specific and technical terminology. Opportunities to develop skills such as drawing, labelling and annotating diagrams. Online research into volcanic hazards.	Students to understand that most volcanic activity is associated with plate tectonic processes and occurs along plate boundaries. Students to be able to describe the distribution of volcanic activity as being mainly associated with: • ocean ridges and sea floor spreading • destructive plate boundaries and	Opportunity for students to research the distribution of volcanic events and annotate a base map of the Earth accordingly (may have been done above). Mapping activity completed in previous lesson – students to ensure their maps are accurate, detailed and	Range of websites and online resources covering the nature of volcanic hazards: Hazard information about volcanoes in the USA Factsheet on volcano hazards Details on hazardous events caused by volcanic activity Geohazards information on volcanoes

magnitude, frequency, regularity and predictability of hazard events. • Impacts: primary/secondary, environmental, social, economic, political. Short and long-term responses: risk management designed to reduce the impacts of the hazard through preparedness, mitigation, prevention and adaptation. • Impacts and human responses as evidenced by a recent volcanic event.	Construct a range of graphs and use statistical skills. Developing extended writing skills. Using atlas maps. Producing annotated maps. Practicing exam style questions. Including the use of peer assessment. Conducting independent and group research tasks. Making links within, across and beyond this area of the specification. Engage with remotely sensed satellite data.	subduction zones • rift valleys • intraplate vulcanicity - hot spots. Students should understand that the nature of volcanic events and volcanic features are the result of a combination of factors, including: - type of plate boundary – constructive, destructive or intraplate - nature of magma, ie • viscosity – silica, gas and water content • explosivity – Volcanic Explosivity Index • acidic → basic, rhyolitic → andesitic → basic. Ensure students understand what is meant by 'spatial distribution', 'magnitude and frequency' in relation to volcanic events. Reinforce previous map work locating volcanic activity and the Volcanic Explosivity Index. Introduce idea of how familiar a population is and active, dormant and extinct. Students should be able to describe, explain and assess the impact of a range of volcanic hazards, including: - primary hazards (impacts) • ash • lava flows • nuées ardentes	complete. Students to use textbooks/online resources to research the nature of different types of magma and produce a classification table to help compare each type. Ensure students have notes on the key ideas around magnitude and frequency of volcanic events. There is an opportunity here, or elsewhere, for students to explore how the experience of these ideas will vary from place to place and so links to 'experience of place' in the Changing Places unit. Opportunity for a small group research task – each group is given the list of volcanic hazards and individuals research one/two. This information is shared within their group and possibly with the class as a whole. Opportunity to produce a short report/wall display/electronic presentation etc. Paired/small group discussion – how can the impacts of volcanic hazards be categorized? Students to try and think of examples of	Brief summary of some volcanic hazards relating to an eruption in Auckland New Zealand Simple interactive map of earthquakes, volcanoes and plate boundaries Interactive map of earthquakes, volcanoes and plate boundaries linking to further information about different features A range of resources on volcanoes, including podcasts and presentations Live and up-to-date information on volcanic activity in the USA Magnitude and frequency of volcanic eruptions, including diagrams showing the explosivity index Interactive presentation on predicting volcanic eruptions Article on development of new method for predicting volcanic eruptions Short video clip on predicting volcanoes Short video clip on predicting volcanic eruptions in Iceland Information on effects of volcanic events Detailed academic article on the effects and consequences of very large explosive

		• pyroclastic events • tephra • volcanic gases - secondary hazards (impacts) • acid rain • climate change • flooding • tsunamis. Students to understand volcanic hazards can be categorised (possible opportunity to discuss the usefulness of classification in geography). Categories to include: • primary/secondary • environmental, social, economic, political. Students to understand that responses to volcanic hazards can be categorised as 'short and long-term'. Students to appreciate that risk management is designed to reduce the impacts of volcanic hazards via: • preparation • mitigation • prevention • adaptation. Students to develop a detailed understanding of one recent volcanic event (to be chosen by individual students/centres). Students must be able to: • describe the spatial and temporal setting of the event	each. Continuation of discussion above to ask, what is meant by short and long-term responses? In pairs students to think of examples of each. Opportunity for a group discussion and mind-mapping activity. Ask students to discuss the following terms in relation to managing volcanic hazards, and to suggest examples of each: • preparation • mitigation • prevention • adaptation. Students to be given clear instructions and guidance about creating a detailed case study of one recent volcanic event. Students could be encouraged to be creative in the method used to present their findings, but as a guide it should include the information listed in previous column.	volcanic eruptions + 60 mins lecture from the Open University on various impacts of volcanoes 45 minute documentary covering most aspects of volcanic activity Human response to volcanoes: Key facts about preparing for a volcanic eruption Short video on responses in Congo as a low income country Some links and ideas about teaching about response to a volcano Open University information about mitigating the effects of volcanoes worldwide, with links to mitigating volcano impacts National Geographic information on living with/adapting to volcanoes Short but in-depth academic article on living with volcanoes and potential opportunities for sustainable livelihoods Resources for specific case studies will depend on those chosen by the individual student/centre.

		• describe and explain the association of the event to plate boundaries and plate movement • assess the perception of the event, and the factors affecting those perceptions at a range of scales – eg, magnitude, frequency, population characteristics etc. • explain the causes of the event • explain and assess the impacts of the event • explain, assess and justify the response to the event – including the factors affecting this response.		
Week 5-6 **Seismic hazards** • The nature of seismicity and its relation to plate tectonics: forms of seismic hazard: earthquakes, shockwaves, tsunamis, liquefaction, landslides. Spatial distribution, randomness, magnitude, frequency, regularity, predictability of hazard events. • Impacts: primary/secondary; environmental, social,	Use of key subject specific and technical terminology. Opportunities to develop skills such as drawing, labelling and annotating diagrams. Online research into seismic hazards. Construct a range of graphs and use statistical skills. Developing extended writing skills.	Students to understand that much seismic activity is associated with plate tectonic processes and occurs along plate boundaries. Students to be able to describe the distribution of seismic activity as being mainly associated with: • destructive plate boundaries – and subduction zones • conservative plate margins/transform faults. Students should understand that the nature of seismic events and resulting hazards is the result of a combination of factors, including: • type of plate boundary –	Opportunity for students to research the distribution of seismic activity and annotate a base map of the Earth accordingly (may have been done above). Mapping activity completed in previous lesson – students to ensure their maps are accurate, detailed and complete. Students discuss factors affecting the nature of an earthquake including type of plate boundary, nature of plate movement and focus	British Geological Survey summary of many of the key ideas around seismicity and earthquakes Short introductory video to earthquakes from National Geographic Brief summary of some earthquake/seismic hazards Overview of the four main earthquake hazards More detailed information on types of earthquake hazards, with diagrams Simple video clip on types of seismic wave

economic, political. Short and long-term responses; risk management designed to reduce the impacts of the hazard through preparedness, mitigation, prevention and adaptation. • Impacts and human responses as evidenced by a recent seismic event.	Using atlas maps. Producing annotated maps. Practicing exam style questions, including the use of peer assessment. Conducting independent and group research tasks. Making links within, across and beyond this area of the specification. Engage with remotely sensed satellite data.	constructive, destructive or conservative • nature and rate of movement • depth of focus. Ensure students understand what is meant by 'spatial distribution', 'magnitude and frequency' in relation to seismic events. Reinforce previous map work locating seismic activity and the scales used to measure the magnitude of seismic events, including: • Richter Scale • Mercalli Scale • Moment Magnitude Scale. Students should be able to describe, explain and assess the impacts of seismic hazards, to include: - Primary hazards (impacts) • Earthquakes • Shockwaves • Ground shaking • Ground rupture - Secondary hazards (impacts) • Soil liquefaction • Landslides/avalanches • Tsunamis • Fires • Effects on people and the built environment. (Students should also understand the almost randomness associated	depth. Opportunity for students to research the different scales used to measure the magnitude or scale of seismic events including Richter Scale, Mercalli Scale and Moment Magnitude Scale. Ensure students have notes on the key ideas around magnitude and frequency of seismic events. There is an opportunity here, or elsewhere, for students to explore ideas of how the experience of these concepts will vary from place to place and so links to 'experience of place' in the Changing Places unit. Opportunity for a small group research task: each group is given the list of seismic hazards and individuals research one/two. This information is shared within their group and possibly with the class as a whole. Opportunity to produce a short report/wall display/electronic presentation etc. Paired/small groups discussion – how can the impacts of seismic hazards be categorized? Students to try	Computer animation of the *travel* of seismic waves (shockwaves) following an earthquake in California 16-page summary information sheet on many aspects of tsunamis Short introductory video on tsunamis from National Geographic Brief video explaining the 'anatomy of a tsunami' Short summary of liquefaction with two video clips Prof. D. Petley's Landslide blog: some interesting blogs, with great images and illustrative examples USGS maps, magnitude, statistics and details of current/recent seismic events Short animation on techniques and scales for measuring earthquakes Brief summary of Richter, MM and Mercalli Scales Excellent simple statistics of earthquake magnitude and frequency British Geological Survey discussion about whether earthquake activity is increasing Information about the long term trends of earthquakes

		with some seismic hazards). Students to understand that seismic hazards can be categorized (possible opportunity to discuss the usefulness of classification in geography). Categories to include: • Primary/secondary • Environmental, social, economic, political. Students to understand that responses to seismic hazards can be categorized as 'short and long-term'. Students to appreciate that risk management is designed to reduce the impacts of seismic hazards via: • preparation • mitigation • prevention • adaptation. Students to develop a detailed understanding of one recent seismic event (to be chosen by individual students/centres). Students must be able to: • describe the spatial and temporal setting of the event • describe and explain the association of the event to plate boundaries and plate movement • assess the perception of the event, and the factors affecting those	and think of examples of each. Continuation of discussion above to ask what is meant by short and long-term responses? In pairs, students to think of examples of each. Opportunity for a group discussion and mind-mapping activity. Ask students to discuss the following terms in relation to managing seismic hazards, and to suggest examples of each: • preparation • mitigation • prevention • adaptation. Students to be given clear instructions and guidance about creating a detailed case study of one recent seismic event. Students could be encouraged to be creative in the method used to present their findings, but as a guide it should include the information listed in previous column.	The Geological Society information on predicting, forecasting and mitigating earthquakes Short video from Harvard Museum of Natural Science on predicting earthquakes Dara O'Briain's Science Club: short video clip on predicting earthquakes including crowd sourcing data Overview and definitions of hazards, and their primary and secondary impacts More detailed information on some of the impacts of earthquakes Earthquake Country Alliance information and resources about preparing for, surviving and recovering from earthquakes Detailed booklet with guidelines on preparing for, responding to and recovering from earthquakes Article about '7 ways the response to a devastating earthquake has changed' An excellent list of resources to help prepare for and respond to earthquakes Short Geological Society article on hazard mitigation Resources for specific case studies will depend on those chosen by the individual

		perceptions at a range of scales – eg, magnitude, frequency, population characteristics etc. • explain the causes of the event • explain and assess the impacts of the event • explain, assess and justify the response to the event including the factors affecting this response.		student/centre.
Week 7-8 **Storm hazards** • The nature of tropical storms and their underlying causes. Forms of storm hazard: high winds, storm surges, coastal flooding, river flooding and landslides. Spatial distribution, magnitude, frequency, regularity, predictability of hazard events. • Impacts: primary/secondary, environmental, social, economic, political. Short and long-term responses: risk management designed to reduce the impacts of the hazard through preparedness, mitigation, prevention	Use of key subject specific and technical terminology. Opportunities to develop skills such as drawing, labelling and annotating diagrams. Online research into storm hazards. Construct a range of graphs and use statistical skills. Developing extended writing skills. Using atlas maps. Using weather maps. Producing annotated maps. Practicing exam style questions, including	Students to understand that the nature of tropical storms is determined by their origins within the tropics. To be able to explain the causes of tropical storms, to include: • ocean location where sea temperatures are above 27°c • ocean depth of at least 70m to provide moisture and latent heat • a location beyond 5° north and south of the equator where the effect of the Coriolis force is greatest • low level convergence of air • rapid outflow of air in the upper atmosphere. Students to be able to describe the distribution of tropical storms, noting their different names in	Opportunity for students to use textbook/internet resources to ensure they have detailed notes to explain the underlying causes of tropical storms. Opportunity for students to research the distribution of tropical storms and annotate a base map of the Earth accordingly. Students discuss factors affecting the nature of hazards posed by tropical storms. Opportunity for students to research how the scale and magnitude of tropical storms is measured including the Saffir-Simpson Scale. Ensure students have notes on the key ideas around magnitude and frequency of	Good summary information on tropical storms from the Met Office Life cycle of hurricanes and tropical storms Short introductory video on tropical storms from National Geographic Summary from National Hurricane Center of some impacts of tropical storms Information on tropical storms and how to assess/categorise their impacts United States Department of Labor information on hurricane preparedness and response Various links to resources on preparing for, responding to and recovering from hurricanes Information on predicting tropical storms Information with diagrams on tracking and

and adaptation. • Impacts and human responses as evidenced by two recent tropical storms in contrasting areas of the world.	the use of peer assessment. Conducting independent and group research tasks. Making links within, across and beyond this area of the specification. Engage with remotely sensed satellite data.	different oceans. Ensure students understand what is meant by 'spatial distribution', 'magnitude and frequency' in relation to tropical storms. Reinforce previous map work locating storms and the scale used to measure the magnitude/intensity of tropical storms - The Saffir-Simpson Scale. Students should understand that the nature of tropical storm hazards relates to the marine and coastal locations involved, and hazards include: • high winds • storms surges • coastal flooding • river flooding • landslides. Students should be able to describe, explain and assess the specific nature of these impacts of tropical storms. Students to understand tropical storm hazards can be categorized (possible opportunity to discuss the usefulness of classification in geography). Categories to include: • primary/secondary • environmental, social, economic, political. Students to understand that responses to storm hazards can be categorised as 'short and long-	tropical storms. There is an opportunity here, or elsewhere, for students to explore ideas of how the experience of these concepts will vary from place to place and so links to 'experience of place' in the Changing Places unit. Opportunity for a small group research task: each group is given the list of hazards posed by tropical storms and individuals research one/two. This information is shared within their group and possibly with the class as a whole. Opportunity to produce a short report/wall display/electronic presentation etc. Paired/small groups discussion – how can the impacts of tropical storm hazards be categorized? Students to try and think of examples of each. Continuation of discussion above to ask what is meant by short and long-term responses? In pairs students to think of examples of each. Opportunity for a group discussion and mind-mapping activity. Ask students to discuss the following terms in	forecasting tropical storms How tropical storms are forecast by the National Hurricane Center Live imagery mapping tropical storm activity around the world Short article about adapting to tropical storms Resources for specific case studies will depend on those chosen by the individual student/centre.

		term'. Students to appreciate that risk management is designed to reduce the impacts of tropical storm hazards via: • preparation • mitigation • prevention • adaptation. Students to develop a detailed understanding of **TWO** recent tropical storms from **contrasting areas of the world** (to be chosen by individual students/centres). Students must be able to: • describe the spatial and temporal setting of the tropical storms • assess the perception of the tropical storms, and the factors affecting those perceptions at a range of scales – eg, magnitude, frequency, population characteristics etc. • explain the causes of the tropical storms • explain and assess the impacts of the tropical storms • explain, assess and justify the response to the tropical storms – including the factors affecting this response.	relation to managing storm hazards and to suggest examples of each: • preparation • mitigation • prevention • adaptation. Students to be given clear instructions and guidance about creating detailed case studies of **two** recent tropical storms. Students could be encouraged to be creative in the method used to present their findings, but as a guide it should include the information listed in previous column.	

Week 9 and 10 **Fires in nature** • Nature of wildfires. Conditions favouring intense wild fires: vegetation type, fuel characteristics, climate and recent weather and fire behaviour. Causes of fires: natural and human agency. • Impacts: primary/secondary, environmental, social, economic, political. Short and long-term responses; risk management designed to reduce the impacts of the hazard through preparedness, mitigation, prevention and adaptation. • Impact and human responses as evidenced by a recent wild fire event.	Use of key subject specific and technical terminology. Opportunities to develop skills such as drawing, labelling and annotating diagrams. Online research into fire hazards. Construct a range of graphs and use statistical skills. Developing extended writing skills. Using atlas maps. Producing annotated maps. Practicing exam style questions, including the use of peer assessment. Conducting independent and group research tasks. Making links within, across and beyond this area of the specification. Engage with remotely sensed satellite data.	Students to understand that the nature of wildfires is determined by the geographical characteristics of the area affected. To be able to explain the causes/conditions leading to **intense** wildfires, to include: • vegetation type • fuel characteristics • climate • recent weather • fire behavior. Students to be able to describe the distribution of wildfires. Students to understand the causes of wildfires, including: • natural agency • human agency . Students should be able to describe, explain and assess the specific nature of impacts of wildfires. Students to understand wildfire hazards can be categorised (possible opportunity to discuss the usefulness of classification in geography). Categories to include: • primary/secondary • environmental, social, economic, political. Students to understand that responses to wildfire hazards can be categorised as 'short and long-term'.	Opportunity for students to use textbook/internet resources to ensure they have detailed notes to explain the underlying causes of **intense** wildfires. Opportunity for students to research the distribution of wildfires and annotate a base map of the Earth accordingly. Students to research the main causes of wildfires, including human and natural agency. Findings could be used to develop a class debate about the relative importance of each. Students discuss factors affecting the nature of hazards posed by wildfires. Opportunity for a small group research task: each group to research hazards posed by wildfires and individuals research one/two. This information is shared within their group and possibly with the class as a whole. Opportunity to produce a short report/wall display/electronic presentation etc. Paired/small group discussion – how can the impacts of wildfire hazards be	National Geographic photo gallery and summary of wildfires Natural Disasters Association information about wildfires Overview of wildfires Interactive global map of wildfires spanning from March 2000 to January 2016 Accounts of wildfires on each of the different continents Simple introductory information on many aspects of wildfires Information on 'how wildfires work' Causes of wildfires Causes and effects of wildfires and solutions for dealing with them Earth Unplugged video on causes of wildfires SciShow video on the science behind wildfires Environmental impacts of forest fires: Short article on the environmental effects of wildfires

		Students to appreciate that risk management is designed to reduce the impacts of wildfire hazards via: • preparation • mitigation • prevention • adaptation. Students to develop a detailed understanding of **ONE** recent wildfire event (to be chosen by individual students/centres). Students must be able to: • describe the spatial and temporal setting of the wildfire • assess the perception of the wildfire, and the factors affecting those perceptions at a range of scales – eg, magnitude, frequency, population characteristics etc. • explain the causes of the wildfire • explain and assess the impacts of the wildfire • explain, assess and justify the response to the wildfire – including the factors affecting this response.	categorized? Students to try and think of examples of each. Continuation of discussion above to ask what is meant by short and long-term responses? In pairs students to think of examples of each. Opportunity for a group discussion and mind-mapping activity. Ask students to discuss the following terms in relation to managing wildfire hazards, and to suggest examples of each: • preparation • mitigation • prevention • adaptation. Students to be given clear instructions and guidance about creating detailed case studies of **one** recent wildfire event. Students could be encouraged to be creative in the method used to present their findings, but as a guide it should include the information listed in previous column.	CBS article on the long term environmental impacts Social and economic impacts of wildfires: Article summarizing the economic impacts of wildfires Wildfires and health: Information on research into the effects of wildfires on respiratory health Long distance impacts of wildfires on health and climate change Managing wildfires: Factsheets on how to respond to the various hazards associated with wildfires Information on managing wildfires from the US Forest Service Canadian perspective on how to manage wildfires Preventing wildfires: Recommended methods of preventing wildfires in California National Geographic wildfire safety tips Information on forest fire prevention Adapting to wildfires: Lecture on adapting to wildfires in California, with a video, podcast and

				PowerPoint Article on living in areas prone to wildfires Article on learning to live with wildfires, including diagrams Resources for specific case studies will depend on those chosen by the individual student/centre.
Week 11 **Case study 1** Case study of a multi-hazardous environment beyond the UK to illustrate and analyse the nature of the hazards and the social, economic and environmental risks presented, and how human qualities and responses such as resilience, adaptation, mitigation and management contribute to its continuing human occupation.	Collect, analyse and interpret a range of qualitative and quantitative data from a range of secondary sources. Report writing.	Much of what is taught here will depend on the multi-hazardous environment chosen. Students should understand the idea that some locations are multi-hazardous environments and are exposed to more than one category of natural hazard. Students should be able to identify areas of the world that are vulnerable to multiple natural hazards. Once a multi-hazardous environment has been selected (probably a small country or region within a larger country) students must be able to: - Describe and assess the nature of the hazards - Assess and explain the social, economic and environmental risks presented by the hazards - Explain how local populations remain able to live in the	Opportunity for group discussion – what is meant by the term 'multi-hazardous environment'? Can students identify possible natural hazards? Opportunity for students to engage with GIS and/or online mapping tools to locate and identify multiple hazard locations Students should reflect on how they completed the case studies above, then be given clear instructions and guidance about creating a detailed case study of **one** multi-hazardous environment. Students could be encouraged to be creative in the method used to present their findings, but as a guide it should include the information listed in previous	Resources for specific case studies will depend on those chosen by the individual student/centre. Some resources that relate to multi-hazardous environments: Excellent interactive map of live/recent natural hazard events across the world Interesting maps and data on global distribution of different natural hazards Discussion of some issues surrounding the approach taken in multi-hazardous environments Information on multi-hazard mapping using GIS Article on the multi-hazardous environment of the Pacific Northwest

Case study 2 Case study at a local scale of a specified place in a hazardous setting to illustrate the physical nature of the hazard and analyse how the economic, social and political character of its community reflects the presence and impacts of the hazard and the community's response to the risk.	Collect, analyse and interpret a range of qualitative and quantitative data from a range of secondary sources. Report writing.	environment due to their: • Human qualities • Responses – resilience, adaptation, mitigation and management. Much of what is taught here will depend on the hazardous setting chosen. Ensure students understand that if Case Study 1 related to a small country or region within a larger country then Case Study 2 must relate to a *smaller* **local** scale place – a named place/location. Students should understand that the nature of a hazard, its impacts and the response to it is very much place specific and that a range of factors in that place will determine these. Once a specified place at a local scale in a hazardous setting has been selected (probably named settlement, or maybe *very* small island) students must be able to: - Describe and analyse how the following affects the impacts of the hazard and the community's response to the risk: • The economic, social and political character of the community	column. (There are opportunities for students to work together, or independently) Opportunity to discuss what factors at a local scale affect the nature of a natural hazard, its impacts and responses to it in relation to the local community. Students should reflect on how they completed the case studies above, then be given clear instructions and guidance about creating a detailed case study of **one** local place in a hazardous setting. Students could be encouraged to be creative in the method used to present their findings, but as a guide it should include the information listed in the previous column. (There are opportunities for students to work together, or independently).	Resources for specific case studies will depend on those chosen by the individual student/centre.

Quantitative and qualitative skills

Students must engage with a range of quantitative and relevant qualitative skills, within the 'Hazards' theme. Students must specifically understand simple mass balance, unit conversions and the analysis and presentation of field data.

Making connections

Students must consider connections between the subject matter studied and be able to apply their geographical knowledge and understanding in different contexts including within a unit, between units and to novel situations, ie. geographical contexts beyond the specification.