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Plate tectonics in the National Curriculum (England, Scotland, Wales & Northern Ireland)

Plate Tectonic Stories

Science (Key Stage 2-3/Second & Third Level)	
National Curriculum in England	Key Stage 2 Year 3; Rocks Pupils should be taught to: compare and group together different kinds of rocks on the basis of their appearance and simple physical properties Key Stage 3 Scientific attitudes Pupils should be taught to: understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review Chemistry; Earth and atmosphere Pupils should be taught about: the composition of the Earth; the structure of the Earth; the rock cycle and the formation of igneous, sedimentary and metamorphic rocks
Scottish Curriculum for Excellence	Second Level Materials: Having explored the substances that make up Earth's surface, I can compare some of their characteristics and uses. SCN 2-17a Third Level Materials: Through evaluation of a range of data, I can describe the formation, characteristics and uses of … minerals and basic types of rocks. SCN 3-17a
National Curriculum for Wales	Key Stage 2 The Sustainable Earth They should be given opportunities to study: a comparison of the features and properties of some natural and made materials; the properties of materials relating to their uses; how some materials are formed or produce
Northern Ireland National Curriculum	Key Stage 2 The World Around Us; Strand 3: Place Ways in which people, plants and animals depend on the features and materials in places and how they adapt to their environment: how the use of materials relates to their properties (S&T); about the origins of materials (S&T); Key Stage 3 Pupils should have the opportunity to learn about: Chemical and material behaviour: Structures, properties, uses of materials

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Geography & Social Studies (Key Stage 2-3/Second & Third Level)

National Curriculum in England	Key Stage 2 Human and physical geography Pupils should be taught to: describe and understand key aspects of: physical geography, including: mountains, volcanoes and earthquakes. Key Stage 3 Human and physical geography Pupils should be taught to: understand, through the use of detailed place-based exemplars at a variety of scales, the key processes in: physical geography relating to: geological timescales and plate tectonics; rocks, To understand how human and physical processes interact to influence and change landscapes, environments and the climate
Scottish Curriculum for Excellence	Second Level, People, place and environment I can describe the major characteristic features of Scotland's landscape and explain how these were formed. SOC 2-07a I can describe the physical processes of a natural disaster and discuss its impact on people and the landscape. SOC 2-07b Third Level People, place and environment Having investigated processes which form and shape landscapes, I can explain their impact on selected landscapes in Scotland, Europe and beyond. SOC 3-07a Fourth Level People, place and environment I can explain how the interaction of physical systems shaped and continue to shape the Earth's surface by assessing their impact on contrasting landscape types. SOC 4-07a
National Curriculum for Wales	Key Stage 2 Geography, Investigating Pupils should be given opportunities to: 1: observe and ask questions about a place, environment or a geographical issue. Pupils develop their geographical skills, knowledge and understanding through learning about places, environments and issues. Pupils should be given opportunities to: • carry out – investigations of 'geography in the news', topical events and issues in the local area and the wider world • ask and answer the questions – where is this place/environment? What is it like and why? What is happening and why? – how is this place the same as or different from other places/environments and why? Is it always the same? Why is it changing? Key Stage 3 Pupils should be given opportunities to: study the hazardous world: global distribution, causes, and impacts of extreme tectonic and other hazardous events

Northern Ireland National Curriculum	Key Stage 2 The World Around Us; Strand 2: Movement and energy How movement can be accelerated by time and natural events such as wars, earthquakes, famine and floods; Positive and negative consequences of movement and its impact on places, people and interdependence. • how natural events can impact on the environment and habitats of animals (S&T) (G); • the effects of natural disasters and / or extreme weather on places and people who live there (G); • about the impact of significant natural disasters in the past (H); Key Stage 3 Environment and Society Pupils should have the opportunity to learn about: physical processes of landscape development: the interrelationships between physical and human environments; the dynamic nature of physical and human environments;

GCSE, SQV and A-Levels

GCSE Geography	AQA: 3.1.1.1 Natural hazards Natural hazards pose major risks to people and property. Definition of a natural hazard. Types of natural hazard. Factors affecting hazard risk. 3.1.1.2 Tectonic Hazards Earthquakes and volcanic eruptions are the result of physical processes. Plate tectonics theory. Global distribution of earthquakes and volcanic eruptions and their relationship to plate margins. Physical processes taking place at different types of plate margin (constructive, destructive and conservative) that lead to earthquakes and volcanic activity. WJCE Eduqas Geography A: 1.1.1. What makes landscapes distinctive in the UK? An overview of the distribution of major types of landscape in the UK to include the relationship with geology (for example, upland and lowland regions) 3.1.1 How do tectonic processes work together to create landform features at different scales? An overview of the global distribution of tectonic activity and its link to plate movement and boundaries. Large scale processes (convection, subduction and divergence) at constructive and destructive margins. Resulting large scale features to include rift valleys and ocean trenches. The concept of volcanic hotspots (for example Hawaii). Processes which result in distinctive volcanic landscape features: Larger scale features to include shield volcanoes, stratovolcanoes, and caldera. Smaller scale features to include cinder cones, lava tubes and geysers. 3.2.1 What are the impacts of tectonic processes? Impacts of earthquakes, tsunami and volcanic activity on health, infrastructure, and economy. Physical and human factors that increase vulnerability to tectonic hazards: physical factors to include the magnitude of volcanic eruptions and earthquakes. The characteristics and scale of pyroclastic flows, lava flows, lahars and ash clouds.

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GCSE Geography	**Edexcel Geography A:** 1.1 There are geological variations within the UK a. Characteristics and distribution of the UK's main rock types: sedimentary (chalk, sandstone) igneous (basalt, granite), metamorphic (schists, slates). (1) b. The role of geology and past tectonic processes in the development of upland (igneous and metamorphic rocks) and lowland (sedimentary rocks) landscapes. (2) **Edexcel Geography B:** 1.7 Earth's layered structure, and physical properties is key to plate tectonics a. Earth's layered structure (including the asthenosphere), with different composition and physical properties (temperature, density, composition, physical state) (7) b. How the core's internal heat source (through radioactive decay) generates convection, the key foundation for plate motion. 1.8 There are different plate boundaries, each with characteristic volcanic and earthquake hazards a. Distribution and characteristics of the three plate boundary types (conservative, convergent and divergent) and hotspots. (8) b. Causes of contrasting volcanic (volcano type, magma type/lava flows and explosivity) and earthquake hazards, including tsunami (shallow/deep, magnitude).(9) 1.9 Tectonic hazards affect people, and are managed, differently at contrasting locations a. Primary and secondary impacts of earthquakes or volcanoes on property and people in a developed and emerging or developing country. b. Management of volcanic or earthquake hazards, in a developed and emerging or developing country including short-term relief (shelter and supplies) and long-term planning (trained and funded emergency services), preparation (warning and evacuation; building design) and prediction. (10) **OCR Geography A:** 1.1.1 The physical landscapes of the UK have distinctive characteristics. Overview of the distinctive characteristics of these landscapes including their geology, climate and human activity. **OCR Geography B:** 1.2. How do plate tectonics shape our world? a. What processes occur at plate boundaries? • The structure of the Earth and how it is linked to the processes of plate tectonics including convection currents. • The processes that take place at constructive, destructive, conservative and collision plate boundaries as well as hotspots. • How the movement of tectonic plates causes earthquakes, including shallow and deep focus, and volcanoes, including shield and composite. b. How can tectonic movement be hazardous? • A case study of a tectonic event that has been hazardous for people, including specific causes, consequences of and responses to the event.
GCSE Geology	**WJCE Eduqas Geology:** 2.2 Plate Tectonics c. The lithosphere is divided into a number of rigid 'tectonic plates' which move relative to one another by mechanisms not yet completely understood. d. With new evidence, plate tectonic theory developed from continental drift.

	• Continental drift was proposed by Wegener (1915) • Evidence for sea floor spreading was discovered by Hess (1960) Vine and Matthews (1963) J. Tuzo Wilson (1965). Analyse the evidence for plate tectonics [jigsaw pattern fit, fossil distributions, heat flow, magnetic stripes, age of the ocean floor, Global Positioning System (GPS) data]. e. There is a range of evidence supporting the theory of plate tectonics and the direction and rate of plate movements. Use maps to interpret the global distributions of present day earthquakes, volcanic activity and mountain belts in the context of processes at or near to plate boundaries. f. The relative movements between plates produce a range of magmatic types, structures and topography identified at different types of plate boundary. • Divergent plate boundaries [basalt extrusion, sea floor spreading, the origin of basaltic magma by partial melting of the upper mantle, ocean ridges, high heat flow, rift valleys, abyssal plain] e.g. Mid-Atlantic Ridge. • Conservative plate boundaries [earthquake activity, transform faults] e.g. San Andreas fault zone. • Convergent plate boundaries: 1. oceanic-oceanic [island arc/trench systems] e.g.Java-Sumatra/Caribbean. 2. oceanic-continental [active continental margins; subduction zones, Benioff zone, partial melting producing andesitic and granitic magmas] e.g. the Andes. 3. continental-continental [mountain building, folding, thrust faulting, partial melting of the crust producing granites, associated regional metamorphism] e.g. the Himalaya.
SQA	National 4 Geography Physical Environments The learner will be required to give evidence of: • straightforward descriptions and brief explanations demonstrating knowledge and understanding, which is mainly factual, of physical environments and weather drawn from Scottish and/or UK-wide contexts National 5 Geography Global Issues Environmental hazards • the main features of earthquakes, volcanoes and tropical storms • causes of each hazard • impact of each hazard on people and the landscape • management – methods of prediction and planning, and strategies adopted in response to environmental hazards
A/AS Level Geography	AQA Geography AS/A-Level: 3.3.1.2 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 sea-floor 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. 3.3.1.3 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, randomness, magnitude, frequency, regularity and predictability of hazard events. 3.3.1.4 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.

A/ASLevel Geography	Edexcel Geography A-Level: 1.1 The global distribution of tectonic hazards can be explained by plate boundary and other tectonic processes. a. The global distribution and causes of earthquakes, volcanic eruptions and tsunamis. (1) b. The distribution of plate boundaries resulting from divergent, convergent and conservative plate movements (oceanic, continental and combined situations). c. The causes of intra-plate earthquakes, and volcanoes associated with hot spots from mantle plumes. 1.2 There are theoretical frameworks that attempt to explain plate movements. a. The theory of plate tectonics and its key elements (the earth's internal structure, mantle convection, palaeomagnetism and sea floor spreading, subduction and slab pull). b. The operation of these processes at different plate margins (destructive, constructive, collision and transform). (2) c. Physical processes impact on the magnitude and type of volcanic eruption, and earthquake magnitude and focal depth (Benioff zone). WJCE Eduqas Geography AS/A Level 1.3.1 Tectonic processes •Characteristics of the Earth's structure including core, mantle and crust and the boundaries between them • Mechanisms of plate movement including internal heating within the Earth, convection currents, ridge push and slabpull •Plate distribution and the processes operating at different margins including diverging, converging and conservative margins; and tectonic activity at hot spots 1.3.2 Tectonic hazards • Global distribution of tectonic hazards and their link to tectonic processes
A-Level Geology	WJCE Eduqas Geology AS/A Level Topic 2: Surface and internal processes of the rock cycle Key Idea 2: The formation and alteration of igneous and metamorphic rocks result from the Earth's internal energy c. Partial melting of rock at depth to form magma occurs in a number of different interplate and intraplate tectonic settings: • beneath divergent plate margins - partial melting of mantle rocks generates basaltic magma • near to convergent plate margins - partial melting of subducted oceanic lithosphere and overlying lithospheric wedge generates andesitic magma • in mantle plumes (hotspots) - partial melting of mantle rocks generates basaltic magma • in deeply buried lower continental crust during orogeny – melting and assimilation of crustal material generates granitic magma. Topic 4: Earth structure and global tectonics Key Idea 2: The Earth's internal heat is the underlying cause of lithospheric plate motions that control global geological processes a. The uppermost part of the mantle and the overlying crust form a rigid outer shell of the Earth known as the lithosphere, forming tectonic plates, underlain by a weaker upper mantle zone known as the asthenosphere. The asthenosphere is evidenced by the seismological low velocity zone (LVZ). b. The lithosphere consists of several plates in relative motion. Three types of plate boundary are recognised; divergent, convergent (involving subduction) and conservative. There is a relationship between seismicity, volcanicity and plate boundaries. f. The various elements of the rock cycle may be linked directly to plate tectonic processes: • Igneous - basaltic magmatism at oceanic spreading centres; basaltic and andesitic magmatism at convergent margins; granitic magmas in orogenic belts • Sedimentary - erosional processes and depositional environments influenced by tectonic movements •Regional metamorphism in subduction zones and orogenic belts at plate boundaries.

	OCR Geology AS/A-Level Module 3: Global tectonics 3.2 Plate tectonics 3.2.1 The plate tectonics paradigm Plate tectonics is a thermodynamically driven process which involves the mantle and the lithosphere. Learners should be able to demonstrate and apply their knowledge and understanding of: (a) the transfer of energy from within the Earth which drives the Earth's internal geological processes (b) (i) the evidence from earthquake seismology data for the nature of lithospheric plates (aseismic interiors and boundaries defined by seismic activity) (d) how the global distribution of geological features of the same age provides evidence to reconstruct historical plate movement (g) subduction zones, lithospheric plates (cold thermal boundary) and mantle plumes which act as the active limbs of the convection cells which transfer energy from within the Earth (h) how gravity and differences in density result in ridge push at mid-ocean ridges (i) the relative importance of slab pull at subduction zones and ridge push at mid-ocean ridges as mechanisms driving the movement of tectonic plates (j) (i) how the plate tectonic paradigm emerged from previous, gradually more sophisticated models (geosynclines, continental drift, active mantle convection carrying passive tectonic plates) (ii) interpretation of these and other examples of such developing models.