1.3 Plate Tectonics: Structure of the Earth and Types of Plate Margin: 30-minute Pack

AQA 8035 · Calculators not allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 State the type of plate margin represented by the San Andreas Fault in California, where two plates slide past one another.

(Total for Question 1 is 1 mark)

2 Give THREE differences between oceanic crust and continental crust that are relevant to plate margin processes.

(Total for Question 2 is 3 marks)

3 Explain ONE reason why volcanic activity is uncommon at conservative (transform) plate margins, using the physical processes at that margin type.

(Total for Question 3 is 3 marks)

4 Describe the role of convection currents in the mantle in the movement of tectonic plates, in the context of plate tectonics theory.

(Total for Question 4 is 2 marks)

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5 Give TWO pieces of evidence from geology or geophysics that supported the development of plate tectonics theory.

(Total for Question 5 is 2 marks)

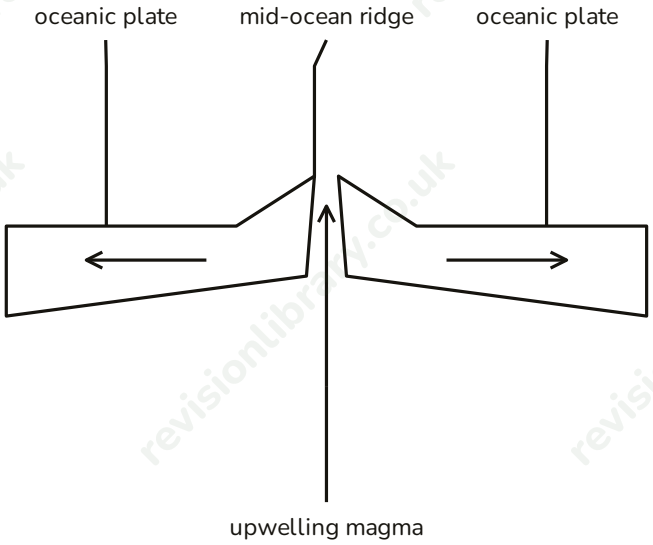
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6 Figure 1 (descriptive): The map shows dense clusters of earthquakes and volcanoes around the Pacific Ocean rim (the Pacific Ring of Fire), a band of activity across southern Europe into western Asia (the Alpide belt), and a line of activity along the mid-Atlantic ridge. Large areas in the central Pacific Ocean interior and most of continental interiors such as central Australia show very few events. Describe the global distribution of earthquakes and volcanoes shown in Figure 1.

(Total for Question 6 is 4 marks)

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7 Constructive plate margin: a cross-section of a mid-ocean ridge where two oceanic plates move apart shows several features. Explain five features/processes of the cross-section, including: rising magma, new oceanic crust formation, fissure volcanoes, shallow earthquakes and the direction of plate movement.



(Total for Question 7 is 5 marks)

8 Explain how movement at a named plate margin causes an earthquake or volcanic eruption.

(Total for Question 8 is 6 marks)

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Mark scheme · 1.3 Plate Tectonics: Structure of the Earth and Types of Plate Margin: 30-minute Pack

Question 1

conservative (transform) plate margin **B1**

Answer: Conservative (transform) plate margin.

Question 2

oceanic crust is generally thinner than continental crust, oe **B1**

oceanic crust is denser and composed mainly of basalt, continental crust is less dense and composed mainly of granitic rocks, oe **B1**

oceanic crust is younger on average and is recycled at subduction zones, while continental crust is older and is not easily subducted, oe **B1**

Answer: Oceanic crust is thinner than continental crust; oceanic crust is denser and basaltic while continental crust is less dense and more granitic; oceanic crust is generally younger and is recycled at subduction zones, whereas continental crust is older and resists subduction.

Question 3

states that transform margins involve plates sliding past each other rather than creating or destroying crust, oe **B1**

explains that without subduction there is no significant melting of plate material to form magma, oe **B1**

links to consequence that therefore major volcanic arcs do not form at transform margins, oe **B1**

Answer: Transform margins involve plates sliding past each other, not creating or destroying crust; because there is no subduction or significant addition of heat and pressure to produce large volumes of magma, major volcanic arcs do not form at transform boundaries.

Question 4

mantle convection explained: heating near the core causes rock to become less dense and rise, then cool and sink, oe **B1**

these circulating flows drag or push the base of tectonic plates, causing them to move relative to each other, oe **B1**

Answer: Heat from the core heats mantle rock, which becomes less dense and rises, then cools and sinks, producing convection cells; these circulating flows transfer force to the base of tectonic plates and cause plates to move.

Question 5

matching coastlines and rock sequences on different continents, e.g. fit of South America and Africa, oe **B1**

distribution of earthquakes and volcanoes along plate boundaries, or evidence from magnetic stripes on the ocean floor, oe **B1**

Answer: Matching coastlines and rock sequences on different continents; distribution of earthquakes and volcanoes along plate boundaries or magnetic stripes on the ocean floor.

Question 6

identifies Pacific Ring of Fire as a major concentration zone, oe **B1**

identifies another concentration such as the Alpide belt (southern Europe to western Asia) or the mid-Atlantic ridge, oe **B1**

notes that events are concentrated along plate boundaries rather than interior regions, oe **B1**

states an area with few tectonic events, e.g. central Pacific, central Australia, oe **B1**

Answer: Earthquakes and volcanoes are concentrated along plate boundaries, especially the Pacific Ring of Fire around the Pacific Ocean, and the Alpide belt from southern Europe into western Asia or along the mid-Atlantic ridge; continental interiors such as central Australia and large parts of the central Pacific have few events.

Question 7

rising magma at the ridge explained as material from the mantle filling the gap, forming new crust, oe **B1**

new oceanic crust formation explained as magma cooling to form basaltic crust at the ridge, oe **B1**

fissure volcanoes or shallow volcanic activity explained as eruptions along the ridge where plates separate, oe **B1**

shallow, low-magnitude earthquakes explained as caused by tensional forces and fracturing of the crust during separation, oe **B1**

direction of plate movement (plates moving apart) explained as driven by mantle convection currents, ridge push or slab pull, oe **B1**

Answer: Features: rising magma at the ridge (mantle upwelling filling the gap), formation of new oceanic crust as magma cools, fissure volcanoes/volcanic activity along the ridge, shallow earthquakes from tensional fracturing, and plates moving apart driven by mantle convection.

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Question 8

Level 3 A detailed, well developed explanation that names the Nazca and South American plate margin and describes subduction of the denser oceanic Nazca Plate beneath the continental South American Plate. Explains either how friction locks the plates, stress accumulates and sudden slip releases energy to cause an earthquake, or how fluids released from the slab lower the melting point of the overlying mantle, forming magma that rises and erupts on the continental plate. Clear causal links for either hazard can earn full marks; both hazards are not required. **5-6**

Level 2 A clear explanation that mentions subduction at the named margin and gives either a credible account of earthquake generation or of magma formation and volcanism, with some development of the processes. **3-4**

Level 1 A simple or partial statement about the named margin, such as 'the oceanic plate sinks and causes earthquakes' or 'magma forms and causes volcanoes', with limited explanation of how or why. **1-2**

Level 0 No relevant content. **0**

Indicative content:

- The margin named: Nazca Plate subducting beneath the South American Plate, a convergent oceanic-continental margin.
- Subduction process: the denser Nazca oceanic plate sinks beneath the lighter continental plate at the subduction zone.
- Earthquake generation: friction locks the plates while continued movement causes stress to build up; sudden slip releases stored energy as seismic waves, producing an earthquake. Earthquakes can also occur deeper within the sinking slab.
- Magma formation and volcanism: fluids released from the subducting slab lower the melting point of the overlying mantle, causing partial melting and forming magma.
- Magma ascent: magma is less dense so it rises through cracks in the continental crust and can erupt to form a volcanic arc on the continental plate.
- Causal chain: link subduction to either locking, stress accumulation and sudden slip, or fluid-induced mantle melting, magma ascent and eruption. A developed explanation of either hazard can earn full marks.

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