1.6 Reducing Tectonic Hazard Risk: Monitoring, Prediction, Protection, Planning: Test Pack

AQA 8035 · Calculators not allowed · about 15 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Give one example of a monitoring instrument used to detect signs of volcanic unrest.

(Total for Question 1 is 1 mark)

2 State the difference between 'monitoring' and 'prediction' as they are used when reducing the risk from tectonic hazards.

(Total for Question 2 is 1 mark)

3 Name TWO protective design features that can make buildings more resistant to earthquake shaking.

(Total for Question 3 is 2 marks)

4 Explain how government building regulations, as a planning strategy, help to reduce earthquake risk, and how this differs from a physical protective design feature such as a base isolator.

(Total for Question 4 is 3 marks)

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5 Describe how GPS ground-deformation sensors help scientists monitor tectonic activity and how this reduces hazard risk for communities near active faults or volcanoes.

(Total for Question 5 is 3 marks)

6 Explain how patterns from historical records and statistical analysis can be used to predict future tectonic events. Give up to FOUR linked points.

(Total for Question 6 is 4 marks)

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Mark scheme · 1.6 Reducing Tectonic Hazard Risk: Monitoring, Prediction, Protection, Planning: Test Pack

Question 1

any one monitoring instrument, e.g. seismometer, tiltmeter, gas-emission sensor (SO2), GPS/ground-deformation sensor, oe — **B1**

Answer: Seismometer (also accept tiltmeter, gas-emission sensor, GPS ground-deformation sensor).

Question 2

monitoring is the ongoing measurement of warning signs using instruments, whereas prediction uses that data (with historical patterns) to forecast when, where or how big a future event might be, oe — **B1**

Answer: Monitoring is the continuous measurement of warning signs using instruments; prediction uses this data, together with historical patterns, to forecast when, where or how large a future event might be.

Question 3

one protective design feature, e.g. base isolators, cross-bracing, reinforced concrete frames, shear walls, automatic gas shut-off valves, oe — **B1**

a second distinct protective design feature, oe — **B1**

Answer: For example, base isolators and cross-bracing (also accept reinforced frames, shear walls, automatic gas shut-off valves).

Question 4

building regulations are legal minimum construction standards set by government, oe — **B1**

they are enforced through planning permission and inspection before and during construction, so unsafe buildings should not be approved, oe — **B1**

this differs from a feature like a base isolator, which is a physical engineering feature fitted to an individual building, whereas a regulation is a policy that REQUIRES such features to be used, oe — **B1**

Answer: Building regulations are legal minimum construction standards set by government and enforced through planning permission and inspection before and during construction. This differs from a base isolator, which is a physical engineering feature fitted to one building; a regulation is instead the policy that requires such features to be used.

Question 5

GPS sensors measure small movements and deformation of the Earth's surface over time, oe — **B1**

ground deformation can indicate stress build-up on faults or magma movement under a volcano, oe — **B1**

detecting deformation allows scientists to warn authorities and plan evacuations or close hazardous areas, reducing risk to communities, oe — **B1**

Answer: GPS sensors measure small movements and deformation of the Earth's surface; such deformation can indicate stress build-up on faults or magma movement beneath a volcano, so detecting it allows scientists to warn authorities and plan evacuations or area closures, reducing risk to communities.

Question 6

historical records show timing and frequency of past earthquakes or eruptions in an area, oe — **B1**

statistical analysis of recurrence intervals can estimate the probability of another event in a given time period, oe — **B1**

combining past patterns with current monitoring increases confidence in short-term forecasts or risk assessments, oe — **B1**

these probability-based predictions allow planners to set building standards, land-use policies and preparedness levels for likely times or zones, reducing impacts, oe — **B1**

Answer: Historical records provide data on timing and frequency of past earthquakes or eruptions; statistical analysis of recurrence intervals estimates the probability of another event in a time period. Combined with current monitoring, this improves forecasts and risk assessments, allowing planners to set building standards, land-use policies and preparedness levels for likely times or zones, reducing impacts.

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