

External assessment

Multiple choice question book

Earth & Environmental Science

Paper 1

General instruction

- Work in this book will not be marked.



Queensland
Government

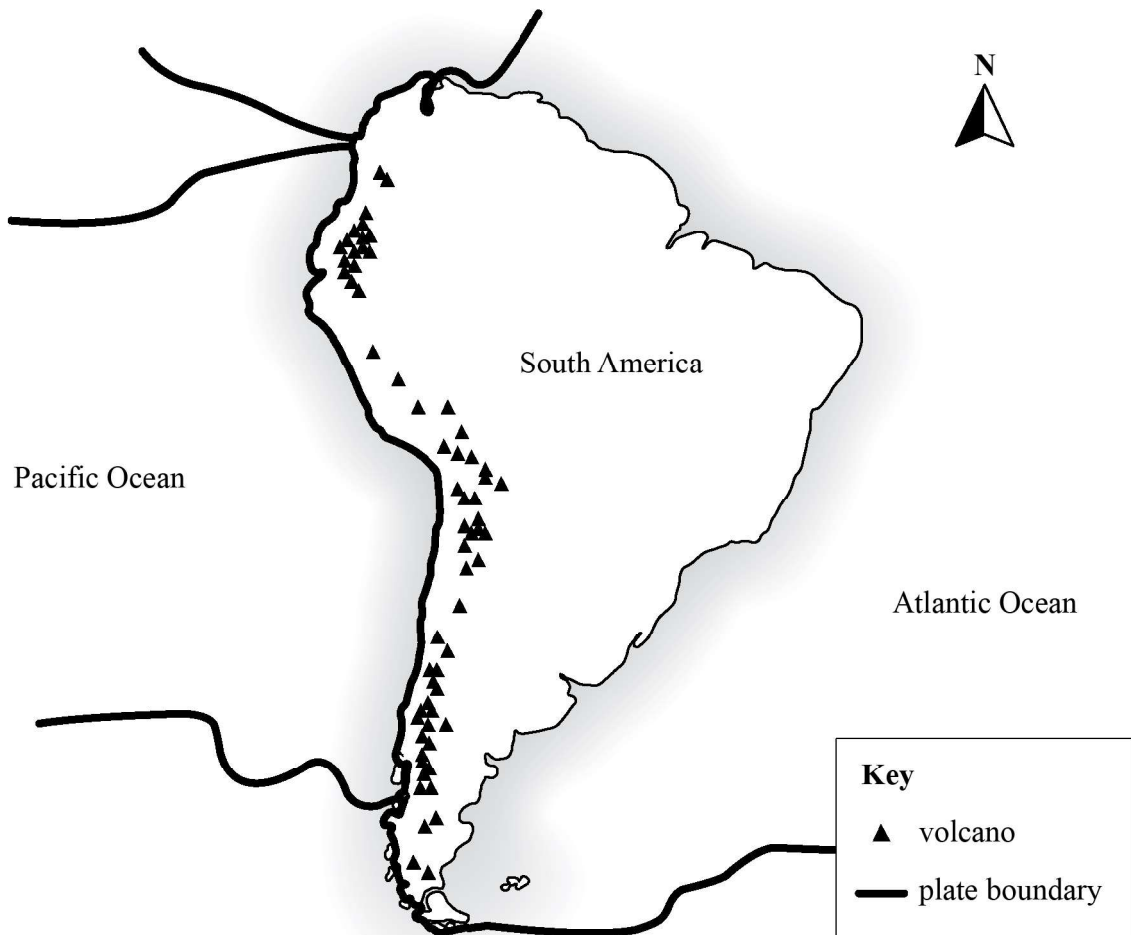


Queensland Curriculum
& Assessment Authority

Section 1

QUESTION 1

Identify the most likely reason for volcanoes being located down the western side of South America on the map.



- (A) two tectonic plates diverging, resulting in exposing the asthenosphere
- (B) two tectonic plates colliding, causing the Earth to crack along the continental coast
- (C) the heavier oceanic plate subducting under the lighter continental plate, resulting in a volcanic arc forming along the continental coast
- (D) the continental plate cracking due to pressure and moving under the oceanic plate, making the continent grow larger through the formation of volcanoes

QUESTION 2

As a method of resource extraction, stoping would be best used for

- (A) an evenly distributed low concentration gold deposit at a depth of 50 to 500 m.
- (B) base metals in a massive deposit at a depth greater than 500 m.
- (C) a petroleum reservoir in an anticlinal trap at 500 m depth.
- (D) high concentration mineral sand deposits at 500 m depth.

QUESTION 3

In which two locations would the process of fracking occur?

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View Figure 8 at https://www.researchgate.net/figure/Geological-schematic-representation-of-natural-gas-resources-distribution-in-the-Ghadames_fig4_315672236

- (A) I and III
- (B) I and IV
- (C) II and III
- (D) IV and VI

QUESTION 4

Fossils of aquatic organisms containing higher-than-average levels of oxygen-18 isotopes indicate that the climate was once cooler than it is today, because

- (A) oxygen-18 isotopes concentrate at lower temperatures.
- (B) oxygen-16 isotopes concentrate at lower temperatures.
- (C) oxygen-18 isotopes evaporate readily at lower temperatures.
- (D) oxygen-16 isotopes evaporate readily at lower temperatures.

QUESTION 5

Which of the following describes how a tsunami is formed?

- (A) A series of large waves is produced at a divergent boundary.
- (B) A slow build-up of pressure in the lithosphere results in the release of molten rock.
- (C) Pressure is released when tectonic plates meet at a continental transform boundary.
- (D) A disturbance in the Earth's oceanic crust causes the release of a large amount of energy in the hydrosphere.

QUESTION 6

Iron is most often formed within higher concentration bands because

- (A) high rainfall leads to the concentration of iron ore due to leaching.
- (B) higher porosity reservoir rocks allow high concentrations of iron ore to precipitate under a cap rock.
- (C) zones within convergent plate boundaries cause high-pressure mineral assemblages to form in distinct zones.
- (D) the high density of iron leads to it being concentrated in the deeper parts of channels found within sedimentary basins.

QUESTION 7

What is the minimum requirement for maintaining a sustainable flow of water in a river system?

- (A) maintaining the level of water extraction below annual recharge
- (B) stabilising the riparian vegetation along the river system
- (C) constructing flood levees to control water flow
- (D) maintaining biodiversity in the river ecosystem

QUESTION 8

The table shows the effect of average maximum air temperatures during January on average crop yields for two varieties of two crops.

Year	January average maximum air temperature (°C)	Average crop yield (t/ha)			
		Crop X		Crop Y	
		Variety 1	Variety 2	Variety 1	Variety 2
2000	29.1	7.4	8.5	0.9	0.9
2001	31.7	8.3	8.0	0.6	1.5
2002	30.1	8.1	8.0	0.7	1.1
2003	30.8	8.2	7.8	0.7	1.3
2004	29.2	7.3	8.6	0.9	1.1
2005	29.0	7.5	8.5	0.9	0.9
2006	27.2	7.5	7.4	1.3	1.2
2007	28.5	7.6	8.2	1.0	1.1
2008	30.1	8.0	7.9	0.6	1.2
Mean		7.8	8.1	0.8	1.1

Predict which variety of which crop is most likely to be productive and adapt to increasing average air temperature.

- (A) Crop X, Variety 1
- (B) Crop X, Variety 2
- (C) Crop Y, Variety 1
- (D) Crop Y, Variety 2

QUESTION 9

In a regional river system, which of the following is most likely to increase the risk of salinity?

- (A) lower water extraction from the river system
- (B) increased nutrient run-off from pastures
- (C) an algal bloom in the river system
- (D) long periods of drought

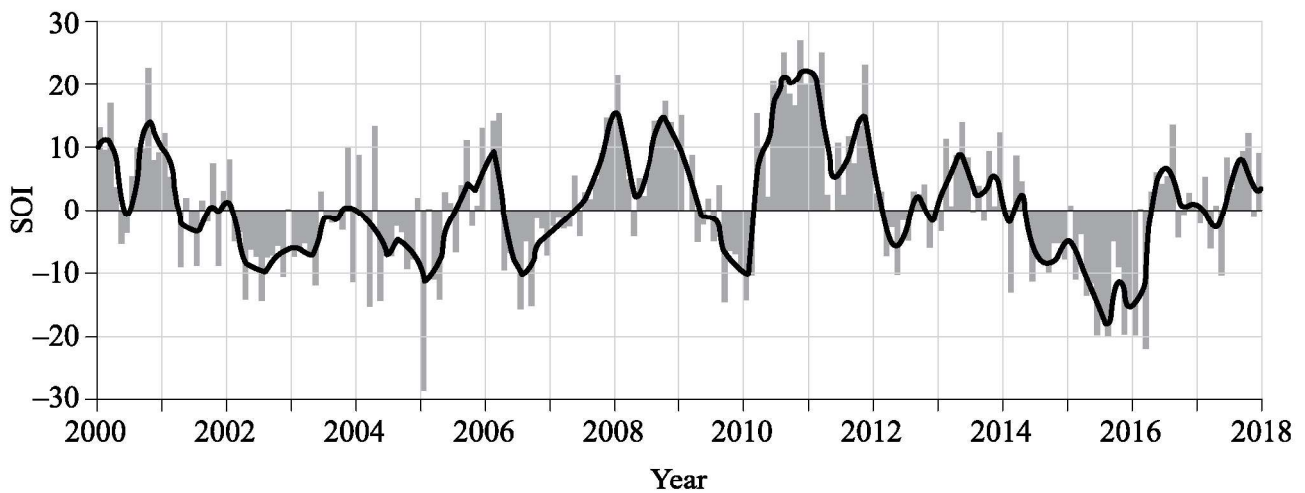
QUESTION 10

Which of the following is an example of an ecosystem-supporting service?

- (A) carbon sequestration
- (B) provisioning of food and water
- (C) cycling and purification of water
- (D) providing a habitat for plants and animals

QUESTION 11

This graph shows recorded Southern Oscillation Index (SOI) values for Australia from 2000 to 2018.



A survey of an area in eastern Australia showed that there was an increase in invasive plant species, lower native vegetation cover, shallow soil depth and signs of erosion. During which year was this survey most likely taken?

- (A) 2009
- (B) 2011
- (C) 2013
- (D) 2016

QUESTION 12

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View Figure 1: Mechanical flotation cell at <https://www.911metallurgist.com/equipment/laboratory/flotation-machines/>.

Which of the following best describes the ore separation process used in this flotation machine?

	Ore slurry input at	Air pumped in at	Ore exits at	Tailings exit at
(A)	IV	I	V	III
(B)	I	IV	V	III
(C)	IV	I	III	V
(D)	II	IV	III	V

QUESTION 13

A long-term increase in deep ocean temperatures is likely to

- (A) decrease oceanic circulation and cause an increase in sea levels.
- (B) increase oceanic circulation and cause an increase in storm frequency.
- (C) increase oceanic circulation and reduce the local impact of global warming.
- (D) decrease oceanic circulation and lead to equatorial regions becoming cooler.

QUESTION 14

These figures show different methods of sampling that can be used to measure an unknown variable.

Which scenario would create the most effective program to monitor changes in soil pH associated with groundwater movement from a mining operation moving away from the central sector?

(A) grid sampling with bulking

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To view image A), see Figure 1: Sketch of standard and alternative sampling strategies, <https://www.semanticscholar.org/paper/Soil-pH-Mapping-with-an-On-The-Go-Sensor-Schirrmann-Gebbers/64b7fb4111c379ede5000a76f22cde5923db83e2>

Every six years

(B) spatially dense sampling

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To view image B), see Figure 1: Sketch of standard and alternative sampling strategies, <https://www.semanticscholar.org/paper/Soil-pH-Mapping-with-an-On-The-Go-Sensor-Schirrmann-Gebbers/64b7fb4111c379ede5000a76f22cde5923db83e2>

Every six years or more often

(C) targeted sampling with bulking

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To view image C), see Figure 1: Sketch of standard and alternative sampling strategies, <https://www.semanticscholar.org/paper/Soil-pH-Mapping-with-an-On-The-Go-Sensor-Schirrmann-Gebbers/64b7fb4111c379ede5000a76f22cde5923db83e2>

Every six years

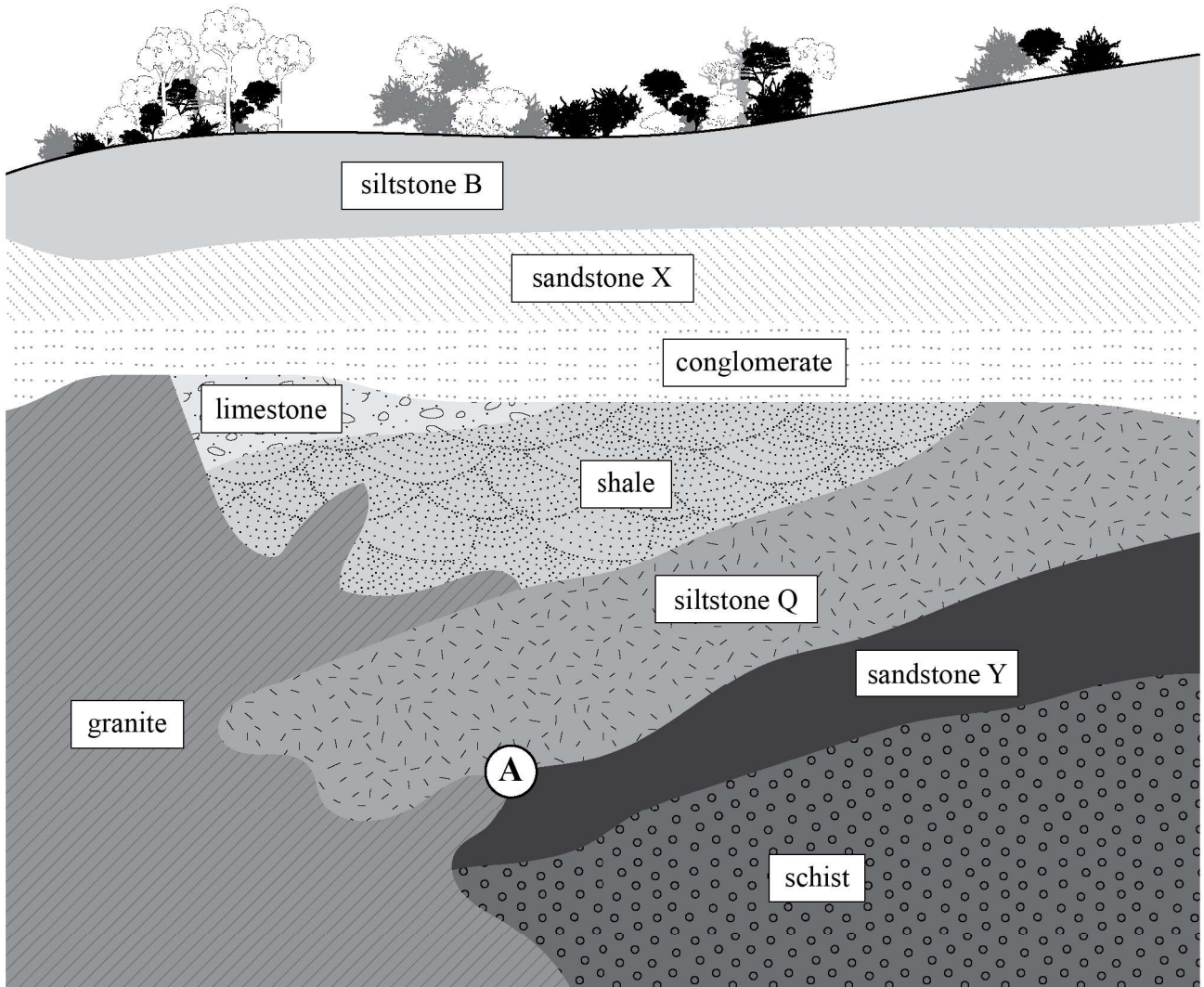
(D) frequent sampling at a few representative monitoring plots

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To view image D), see Figure 1: Sketch of standard and alternative sampling strategies, <https://www.semanticscholar.org/paper/Soil-pH-Mapping-with-an-On-The-Go-Sensor-Schirrmann-Gebbers/64b7fb4111c379ede5000a76f22cde5923db83e2>

Every year

QUESTION 15



What is the most likely type of mineral resource to be found at location A?

- (A) banded iron ore
- (B) mineral sands
- (C) bauxite
- (D) gold

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References

Question 1

Adapted from Winter, J. D. 2010, *Principles of igneous and metamorphic petrology*, Pearson Education Inc., New Jersey.

Adapted from 2014, *Major plates of the lithosphere: Earth's tectonic plates*, 'Chapter 5: Lesson 5', Study.com, <https://study.com/academy/lesson/major-plates-of-the-lithosphere-earths-tectonic-plates.html>.

Question 3

Adapted from Elfigih, O, *Geological schematic representation of natural gas resources distribution in the Ghadames Basin, NW Libya*, ResearchGate, https://www.researchgate.net/figure/Geological-schematic-representation-of-natural-gas-resources-distribution-in-the-Ghadames_fig4_315672236.

Question 11

Adapted from 2018, *Timeline of monthly Southern Oscillation Index (SOI) values since 1876*, Bureau of Meteorology, <http://www.bom.gov.au/climate/influences/timeline/>. Used under the Creative Commons Attribution Australia Licence <https://creativecommons.org/licenses/by/3.0/au/>.

Question 12

Adapted from *Figure 1: Mechanical flotation cell*, 911 metallurgist process equipment, <https://www.911metallurgist.com/equipment/laboratory/flotation-machines/>.

Question 14

Adapted from Schirrmann, M, Gebbers, R, Kramer, E, and Seidel, J 2011, *Figure 1: Soil pH mapping with an on-the-go sensor*, Sensors, vol. 11, <https://www.semanticscholar.org/paper/Soil-pH-Mapping-with-an-On-The-Go-Sensor-Schirrmann-Gebbers/64b7fb4111c379ede5000a76f22cde5923db83e2>.

Question 15

Adapted from Dawes, R and Dawes, C 2013, *Lab: Geologic time*, Principles of physical geology, <https://academic.csc.edu/mleite/wvc/Labs/GeoTimeLab.html>. Used under a Creative Commons Attribution 3.0 licence <https://creativecommons.org/licenses/by-nd/3.0/us/>.



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