External assessment 2021

Multiple choice question book

Earth & Environmental Science

Paper 1

General instruction

- Work in this book will not be marked.

Queensland Government | QCAA Queensland Curriculum & Assessment Authority

Section 1

QUESTION 1

Stimulus redacted

Which properties would the fraction labelled X on the diagram exhibit?

(A) high viscosity and low volatility

(B) low volatility and a low boiling point

(C) high flammability and high volatility

(D) low flammability and a high boiling point

QUESTION 2

Economical gold-bearing layers are most likely located in

(A) a sedimentary sequence with an organic-rich source rock.

(B) fractures and joints surrounding a massive granite body.

(C) joint planes in an exhalative massive sulfide complex.

(D) an alluvial deposit in an igneous granite complex.

QUESTION 3

A rift valley is formed by the interactions of

(A) an oceanic plate subducting beneath a continental plate.

(B) a continental plate subducting beneath an oceanic plate.

(C) two divergent continental plates.

(D) two convergent oceanic plates.

QUESTION 4

Which renewable energy source includes an energy transformation that relies on pressurised gas to drive turbines?

(A) geothermal

(B) fossil fuels

(C) nuclear

(D) solar

QUESTION 5

Mineral sands deposits are formed

(A) in higher porosity reservoir rocks, allowing greater concentrations of ore minerals to precipitate under a cap rock.

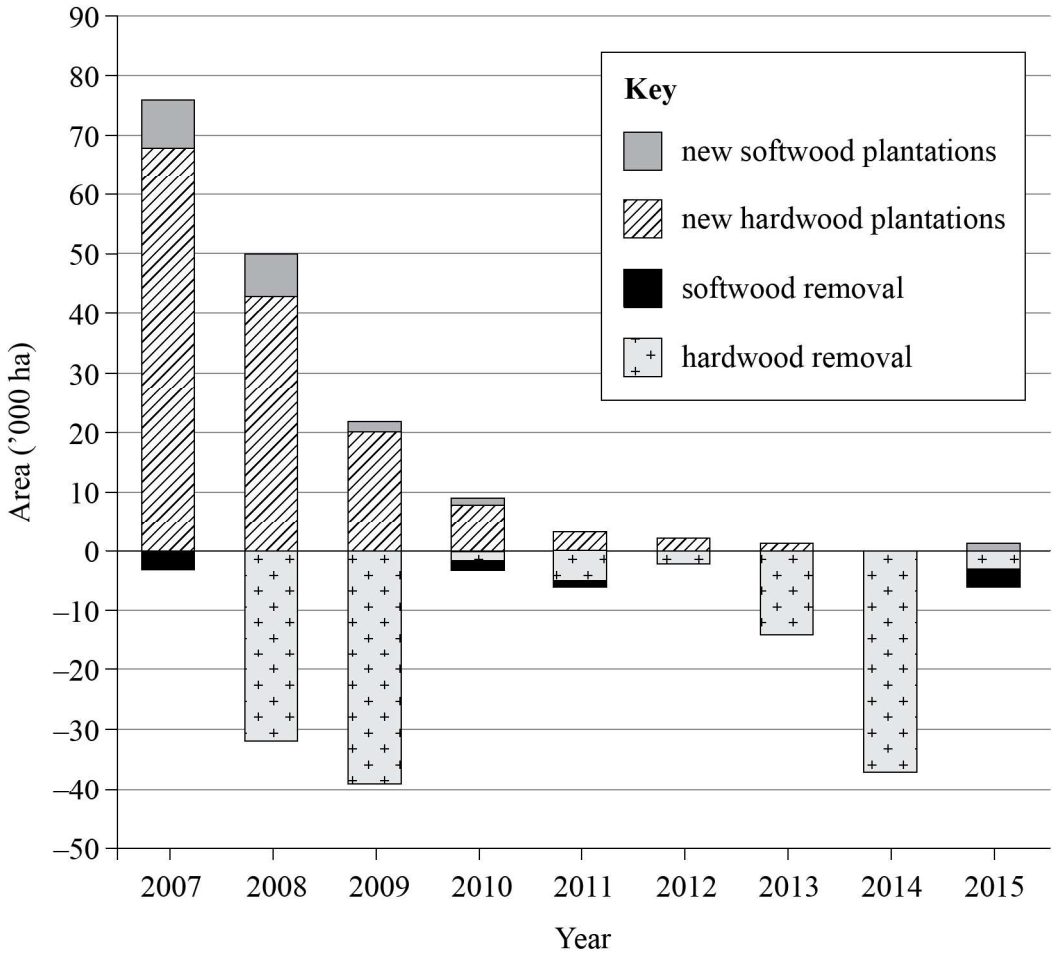
(B) by the weathering of mineral-rich rocks and subsequent dissolution of minerals into oceans and streams.

(C) by the physical concentration of eroded mineral grains into placer deposits, due to their specific gravity.

(D) in convergent plate boundaries, causing high-pressure mineral assemblages to form in distinct zones.

QUESTION 6

The graph shows new hardwood and softwood plantations and the removal of trees in a designated region between 2007 and 2015. The region holds pre-2007 plantation reserves of 94 000 ha for hardwood and 89 000 ha for softwood.



Calculate the approximate hardwood plantations remaining at the end of 2013.

(A) 52 000 ha

(B) 93 000 ha

(C) 146 000 ha

(D) 238 000 ha

QUESTION 7

An experiment compared the energy output of a model wind turbine using four different blade shapes.

Blade	First trial (kW h)	Second trial (kW h)	Third trial (kW h)	Mean (kW h)
1	68	79	131	93
2	298	293	356	316
3	271	304	337	304
4	137	179	118	145

Which blade produced the most consistent supply of energy?

(A) 1

(B) 2

(C) 3

(D) 4

QUESTION 8

Which abiotic factor naturally reduces the growth of algal blooms in the waters of temperate lakes?

(A) increasing fish populations

(B) increasing nutrient levels

(C) decreasing temperature

(D) decreasing salinity

QUESTION 9

The principles of ecologically sustainable development support

(A) extracting water from a river system if environmental flows are maintained.

(B) using native forests and hardwood plantations to produce wood products.

(C) using steel rather than timber in all new housing developments.

(D) importing fish from overseas to conserve local fish stocks.

QUESTION 10

Which anthropogenic factor would most likely affect the sustainable population of native biota?

(A) changes to average seasonal rainfall

(B) introduction of a new species for biological control

(C) increased salinity in rivers through saltwater intrusion

(D) planting of grass strips in agricultural systems to reduce erosion

QUESTION 11

The table shows primary environmental data collected and used to make decisions about Fire Danger Index (FDI) values.

Location	Days since last rainfall	Maximum average daytime temperature (°C)	Relative humidity (%)	Wind speed (km/h) and direction	Fuel load (tonne/ha)	Fire Danger Index (FDI)
I	6	30	70	17 NE	1	40
II	9	36	30	4 N	2	52
III	9	35	30	9 N	4	90
IV	5	35	70	10 N	4	70

According to this data, which environmental factors had the greatest influence on determining the Fire Danger Index values?

(A) temperature and fuel load

(B) rainfall and wind speed

(C) humidity and fuel load

(D) rainfall and humidity

QUESTION 12

An increase in the melting of Arctic ice caps would slow down ocean circulation due to

(A) water layers of different salinities in the ocean.

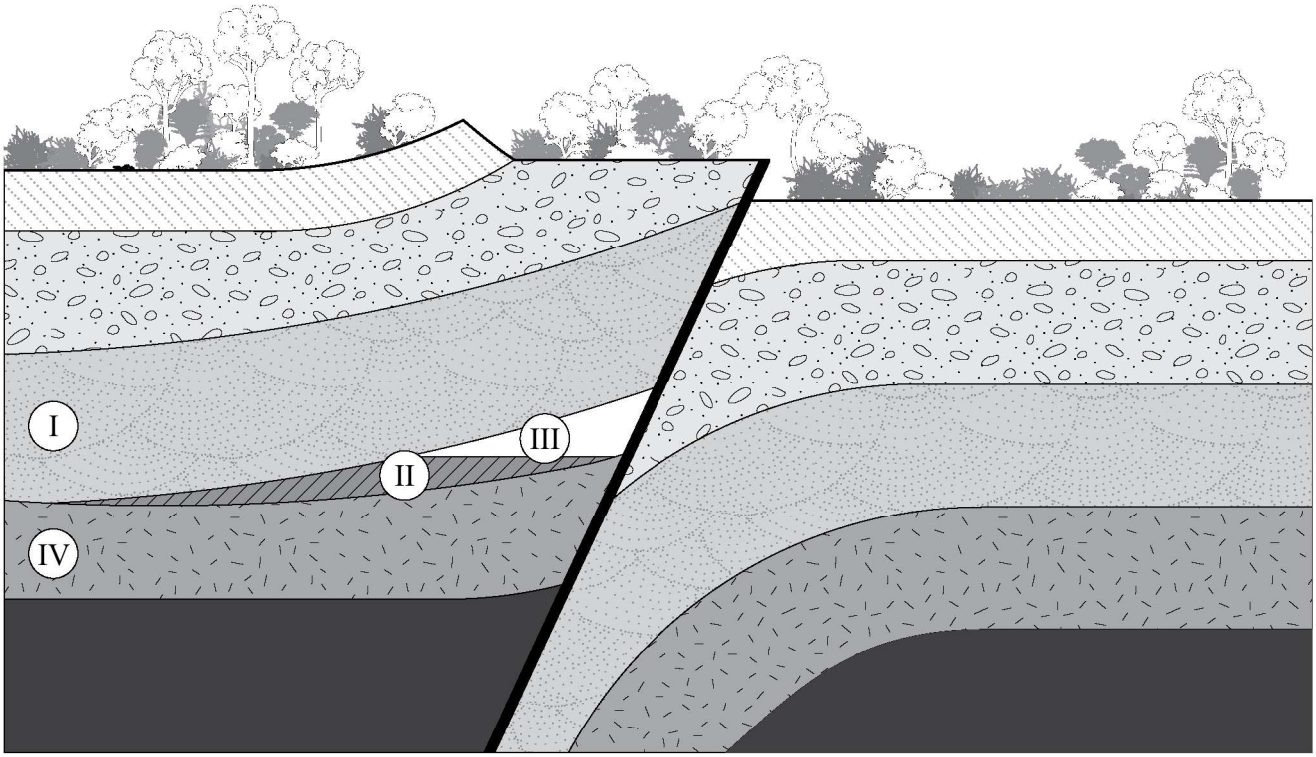
(B) higher air temperatures in the Arctic.

(C) the slower flow rate of cold water.

(D) denser water entering the ocean.

QUESTION 13

In which two locations would you most likely find oil and water, respectively?



	Locations	
(A)	II	IV
(B)	II	III
(C)	III	II
(D)	IV	II

QUESTION 14

Hyperspectral imaging is mostly used in mineral and energy resource exploration to

(A) detect changes in the magnetic fields surrounding ore bodies at depth.

(B) identify gravitational anomalies associated with certain mineral assemblages.

(C) outline water courses associated with fractures and joint patterns in igneous complexes.

(D) detect changes in vegetation growing in different soil types that are affected by the underlying geochemistry.

QUESTION 15

Volcanic ejecta can affect global climate. Following a large-scale eruption, sulfur dioxide aerosols in the atmosphere convert to sulfuric acid in the stratosphere. This results in

(A) the Earth's lower atmosphere cooling.

(B) a decrease in reflection of solar radiation.

(C) a decrease in atmospheric carbon dioxide.

(D) the Earth's atmosphere warming due to acid rain.

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References

Question 1

Knott, T 2004, *File:Crude Oil Distillation.png* (diagram), Wikimedia Commmons, https://en.wikipedia.org/wiki/Fractional_distillation#/media/File:Crude_Oil_Distillation.png

Question 6

Graph adapted from Downham, R & Gavran, M 2019, 'Australian plantation statistics 2019 update', ABARES technical report 19.2, Canberra, May. CC BY 4.0. https://doi.org/10.25814/5cc65ae71465f

Question 13

Image modified from: *Petroleum trap*, Wikipedia, https://en.wikipedia.org/wiki/Petroleum_trap#/media/File:Fault_line.svg CC BY-SA 3.0