External assessment 2022

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

The cross-section of land shows the layer profile and the location of an oil and gas reserve.
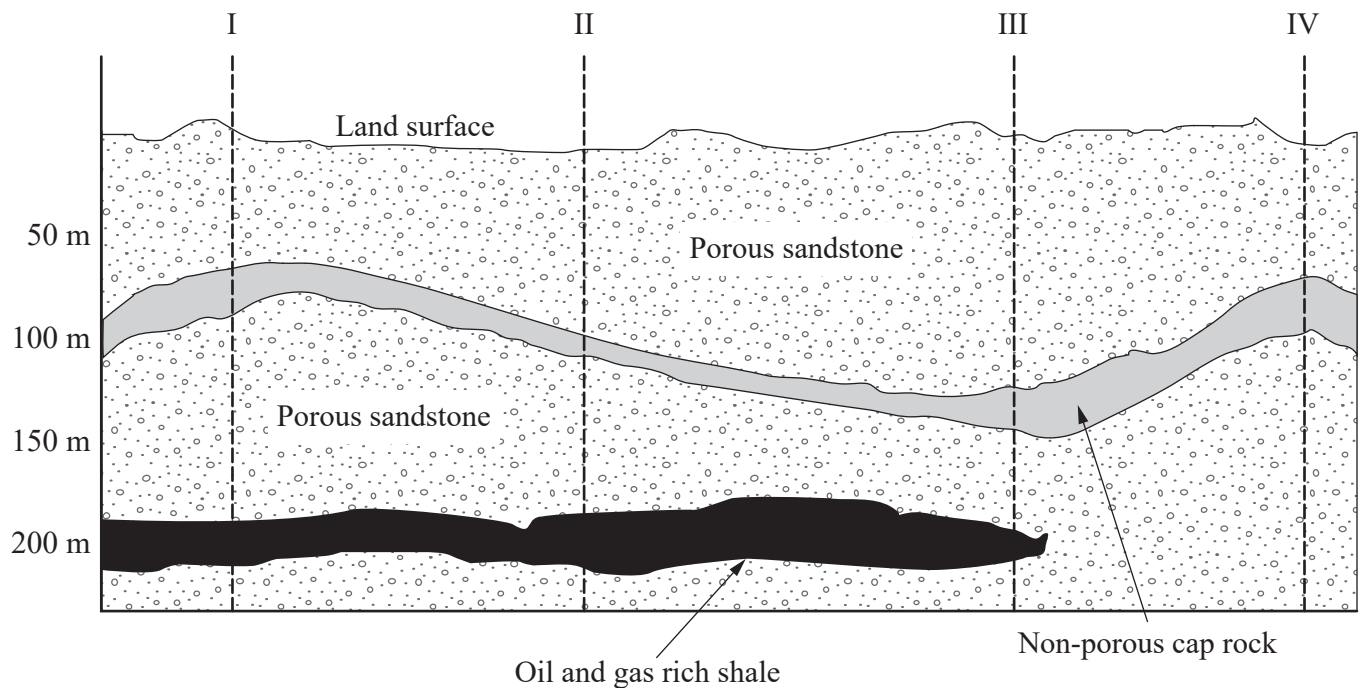
Where is the most suitable location to extract crude oil?

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

QUESTION 2

Stoping is the process of extracting an ore or mineral

- (A) found close to the Earth's surface.
- (B) from the bottom of an artificial pond.
- (C) from an underground mine, leaving behind an open space.
- (D) across a horizontal plane, creating arrays with natural supporting columns.

QUESTION 3

In which geological setting are you least likely to find volcanos?

    (A)   intraplate hotspots

    (B)   divergent boundaries

    (C)   transform boundaries

    (D)   convergent boundaries

QUESTION 4

The amount of incoming solar radiation, as measured on the Earth's surface, is least affected by the

    (A)   axial tilt of Earth relative to the sun.

    (B)   shape of Earth's orbit around the sun.

    (C)   activity of sunspots on the sun's surface.

    (D)   gradual shift in the orientation of Earth's axis of rotation.

QUESTION 5

Land clearing can reduce the frequency, magnitude and intensity of

    (A)   floods.

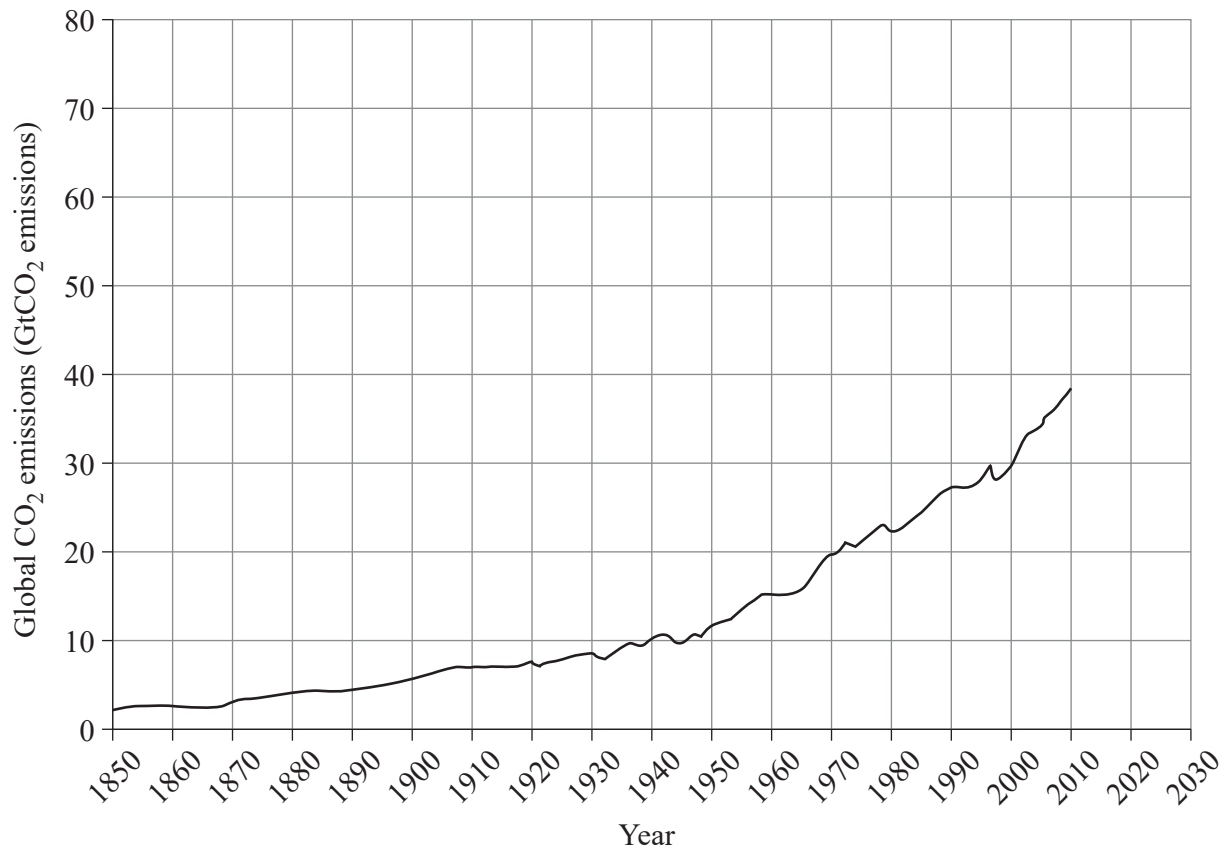   (B)   droughts.

    (C)   bushfires.

    (D)   landslides.

QUESTION 6

Which option best describes the effect of dam provisioning?

	Water availability downstream	Water quality of dam
(A)	High	High
(B)	High	Low
(C)	Low	High
(D)	Low	Low

QUESTION 7

The graph shows total global carbon dioxide ($GtCO_2$) emissions from burning fossil fuels and deforestation.

If the trend since 2000 continues, $GtCO_2$ emissions in 2030 will be approximately
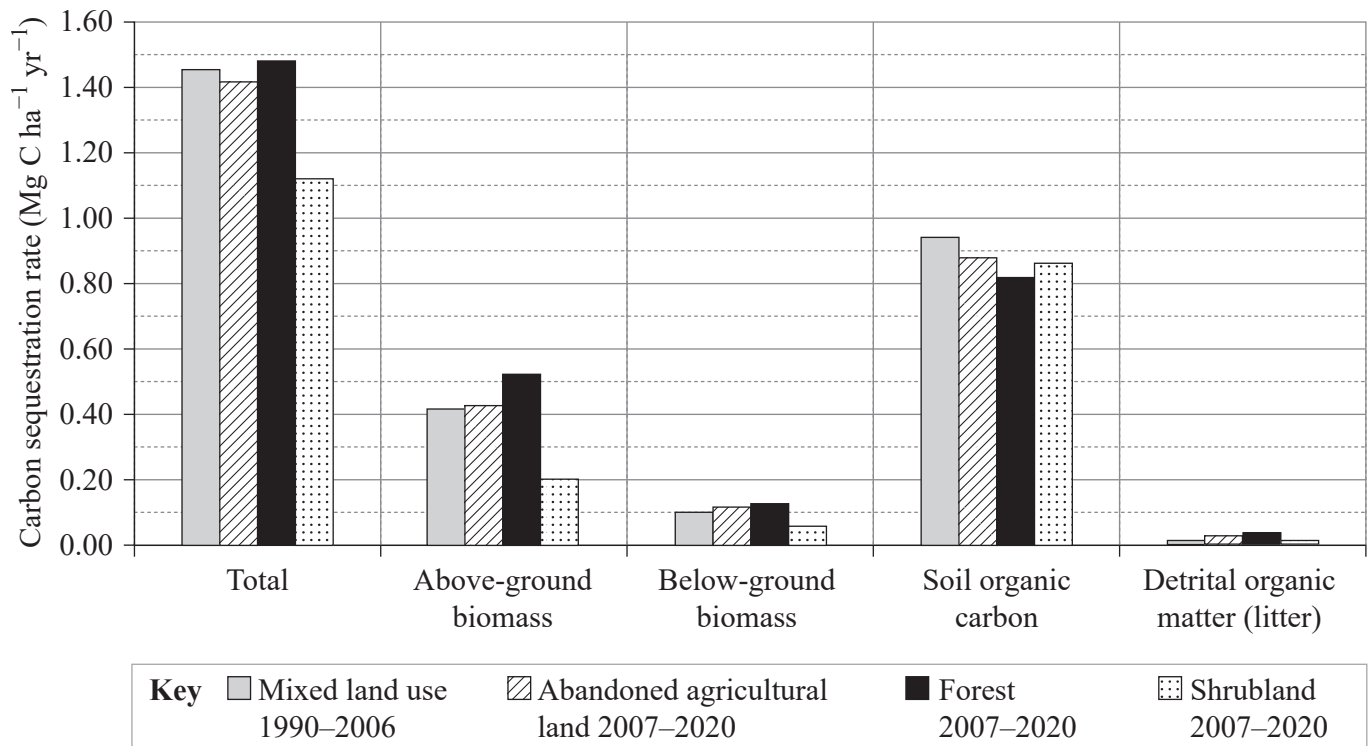
(A) 72

(B) 62

(C) 51

(D) 43

QUESTION 8

The most likely trigger for a large-scale tsunami is

(A) iceberg calving.

(B) a tropical cyclone.

(C) a submarine landslide.

(D) an undersea volcanic eruption.

These questions refer to the study by Sil et al. (2017) of carbon sequestration and carbon pools in a large area of mixed land use between 1990 and 2020.

Carbon sequestration rate (Mg C ha^{-1} yr^{-1})

Total | Above-ground biomass | Below-ground biomass | Soil organic carbon | Detrital organic matter (litter)

Key ☐ Mixed land use 1990–2006 ☒ Abandoned agricultural land 2007–2020 ■ Forest 2007–2020 ⊡ Shrubland 2007–2020

QUESTION 9

It can be inferred from the graph that

(A) the amount of forest has increased since 2006.

(B) abandoned agricultural land increased the amount of forest.

(C) shrubland litter was the least effective at converting its carbon into below-ground biomass.

(D) the carbon sequestration rate from highest to lowest is soil, above-ground biomass, below-ground biomass and litter.

QUESTION 10

What percentage of carbon sequestration does shrubland above-ground biomass contribute to shrubland's total carbon sequestration rate?
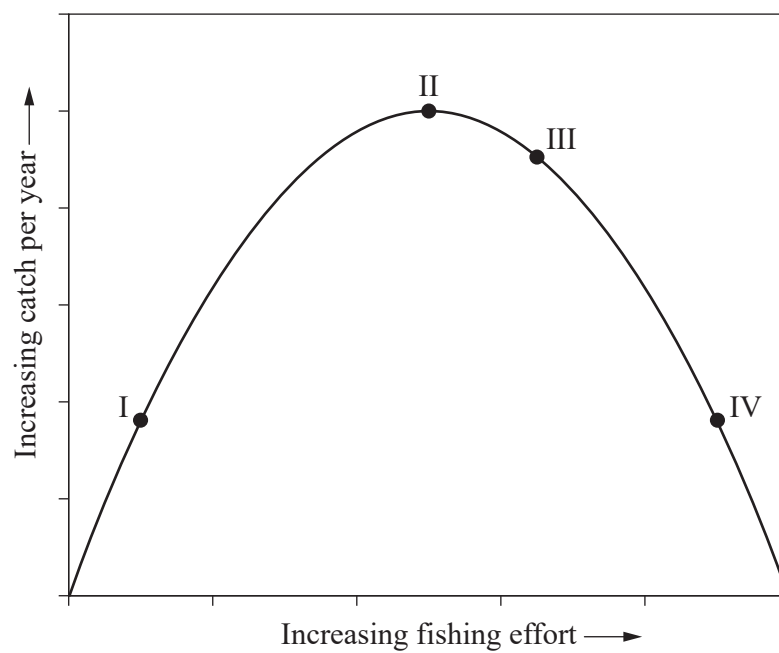
(A) 0.18%

(B) 3.7%

(C) 9.0%

(D) 18.0%

QUESTION 11

Which substrate has the highest run-off rate during a flood event?

(A) silt

(B) clay

(C) sand

(D) loam

QUESTION 12

The graph shows a yield curve for fishing.

Aboriginal peoples' and Torres Strait Islander peoples' traditional harvest is best represented by

(A) I.

(B) II.

(C) III.

(D) IV.

QUESTION 13

A farmer has land affected by high salinity. Which solution would have the most impact on reducing it?

(A) pump deep groundwater out

(B) plant shallow-rooted crops

(C) reduce surface drainage

(D) initiate deep tillage

QUESTION 14

Fracking causes gas to be released after

(A) drilling into rock and exposing layers to intense heat.

(B) injecting water, sand and chemicals into rock layers.

(C) injecting hot water into soft shale reserves.

(D) drilling into subsurface gas reserves.

QUESTION 15

The table shows the abundance of benthic foraminifera species recorded at four sites after a major oceanic oil spill.

Species	Pre-spill average (% abundance ± % error)	Distance from oil spill (km)			
		5	25	50	100
		% abundance			
1	27 ± 5	10	15	30	30
2	15 ± 5	10	14	12	13
3	14 ± 5	25	15	10	12
4	39 ± 5	40	36	38	40
5	5 ± 5	15	20	10	5

Which species have definitely been affected by the oil spill?

(A) 1 and 3

(B) 3 and 5

(C) 1, 3 and 5

(D) 1, 2, 3, 4 and 5

References

Question 7

Data derived and/or adapted from Friedlingstein, P et al. 2019, 'Global Carbon Budget 2019', *Earth System Science Data*, vol. 11, no. 4, pp. 1783–1838, https://essd.copernicus.org/articles/11/1783/2019. This work is distributed under the Creative Commons Attribution 4.0 License.

Questions 9 and 10

Adapted from Figure 4 in Sil, A et al. 2017, 'Analysing Carbon Sequestration and Storage Dynamics in a Changing Mountain Landscape in Portugal: Insights for management and planning', *International Journal of Biodiversity Science, Ecosystem Services & Management*, vol. 13, no. 2, pp. 82–104, www.tandfonline.com/doi/full/10.1080/21513732.2017.1297331. Licensed Creative Commons Attribution Licence 4.0.