



**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

SEPTEMBER 2022

GEOGRAPHY P1

MARKS: 150

TIME: 3 hours

This question paper consists of 17 pages.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of TWO SECTIONS:
SECTION A:
QUESTION 1: Climate and Weather (60)
QUESTION 2: Geomorphology (60)
SECTION B:
QUESTION 3: Geographical Skills and Techniques (30)
2. Answer all THREE questions.
3. ALL diagrams are included in the QUESTION PAPER.
4. Leave a line between subsections of questions answered.
5. Start EACH question at the top of a NEW page.
6. Number the answers correctly according to the numbering system used in this question paper.
7. Do NOT write in the margins of the ANSWER BOOK.
8. Draw fully labelled diagrams when instructed to do so.
9. Answer in FULL SENTENCES, except when you have to state, name, identify or list.
10. Units of measurement MUST be indicated in your final answer, e.g. 1 020 hPa, 14 °C and 45 m.
11. You may use a non-programmable calculator.
12. You may use a magnifying glass.
13. Write neatly and legibly.

SPECIFIC INSTRUCTIONS AND INFORMATION FOR SECTION B

14. A 1 : 50 000 topographical map (2530BD MBOMBELA) and an orthophoto map of a part of the mapped area are provided.
15. The area demarcated in RED/BLACK on the topographic map represents the area covered by the orthophoto map.
16. Show ALL calculations. Marks will be allocated for this.
17. You must hand in the topographic and the orthophoto map to the invigilator at the end of this examination session.

SECTION A: CLIMATE AND WEATHER AND GEOMORPHOLOGY**QUESTION 1: CLIMATE AND WEATHER**

1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (1.1.1 to 1.1.8) in the ANSWER BOOK, example 1.1.9 D.

1.1.1 Mid-latitude cyclones occur throughout the year but affects South Africa mostly in ...

- A summer.
- B winter.
- C spring.
- D autumn.

1.1.2 The various stages of development of a mid-latitude cyclone are referred to as ...

- A frictional drag.
- B veering.
- C cyclogenesis.
- D backing.

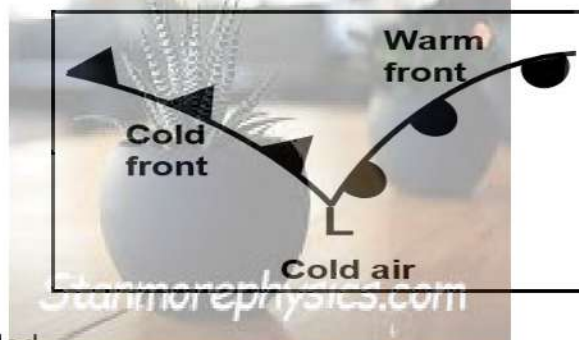
1.1.3 The wind belt that drives the mid-latitude cyclone is referred to as the ...

- A north east trades.
- B south west trades.
- C easterlies.
- D westerlies.

1.1.4 Cumulonimbus clouds are associated with the ... of the mid-latitude cyclone.

- A cold sector
- B warm sector
- C cold front
- D warm front

1.1.5 The mid latitude-cyclone below is in the ... stage.



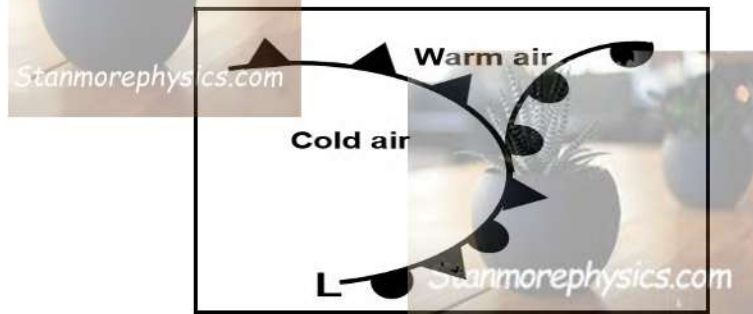
- A occluded
- B mature
- C dissipation
- D formative

- 1.1.6 A characteristic of the dissipating/degeneration stage, shown below, is when the ...



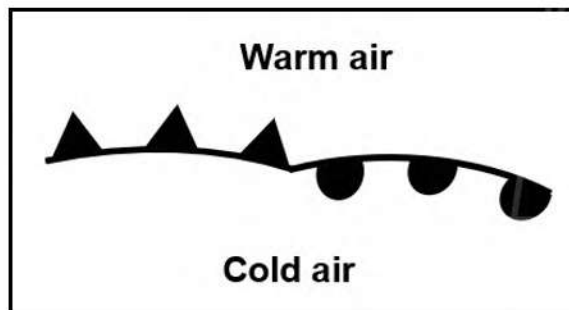
- A warm air has been uplifted.
- B mid-cyclone has moved over the sea.
- C cold air has been uplifted.
- D wind is veering.

- 1.1.7 The occlusion below can be identified as a warm front occlusion because ...



- A the cold front has caught up with the warm front.
- B the coldest air is found behind the cold front.
- C all the warm air has been uplifted.
- D of the symbol closest to the apex.

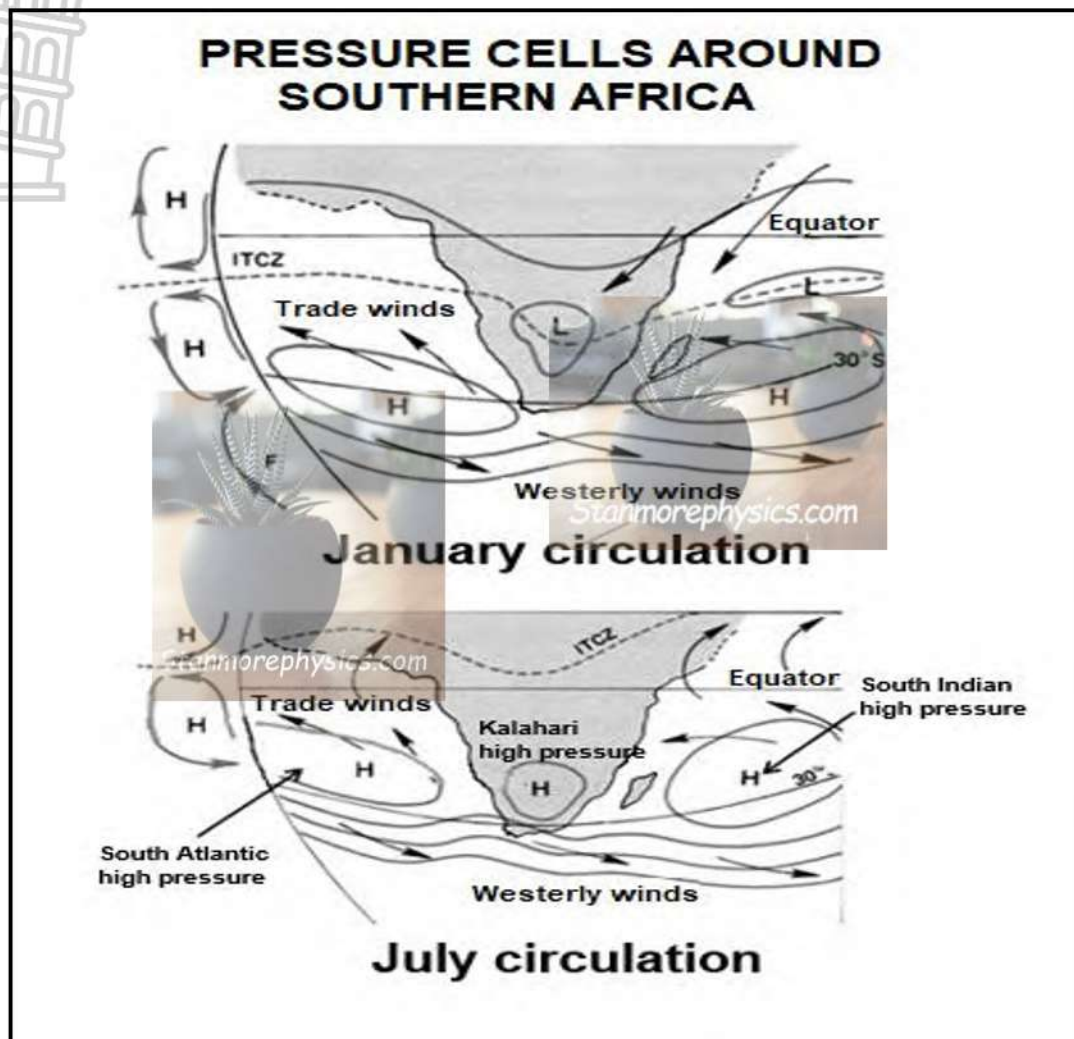
- 1.1.8 The wave stage below develops because of/a ...



- A cold front that undercuts a warm front.
- B warm air that moves over cold air.
- C frictional drag.
- D wind shear.

(8 x 1) (8)

- 1.2 Refer to the map showing pressure cells around Southern Africa in January and July. Choose the correct word(s) from those given in brackets. Write only the word(s) next to the question numbers (1.2.1 to 1.2.7) in the ANSWER BOOK.



[Source: learnmindset.africa.com]

- 1.2.1 The high-pressure cell change position in January and July because of the movement of the (ITCZ/tropic of cancer).
- 1.2.2 A (coastal/heat) low is located over the land in January.
- 1.2.3 The high-pressure cells move more (south/north) in July.
- 1.2.4 The Indian Ocean high-pressure cell carries more moisture to the east coast in (July/January).
- 1.2.5 Berg winds would be a common occurrence in (January/July).
- 1.2.6 In January the (South Indian/South Atlantic) high pressure cell ridges over the south-east coast of South Africa.
- 1.2.7 Less subsidence over the interior in (July/January) causes the inversion layer to develop above the escarpment. (7 x 1) (7)

1.3 Refer to the extract on Tropical Cyclone Ana.

MODERATE TROPICAL STORM ANA DOES NOT POST ANY DIRECT THREAT TO SOUTH AFRICA

This weekend saw the first tropical system of the 2021/22 tropical cyclone season for the Southwest Indian Ocean Basin.

Towards the end of last week, a tropical low began rapidly intensifying over the open ocean to the northeast of Madagascar, northwards of Mauritius and Reunion islands.

'Over the weekend, the system turned gradually from east to west over central and northern Madagascar, temporarily losing intensity due to surface friction with the landmass, as well as the absence of the release of latent heat energy from the ocean surface (the main energy driver for tropical cyclones).

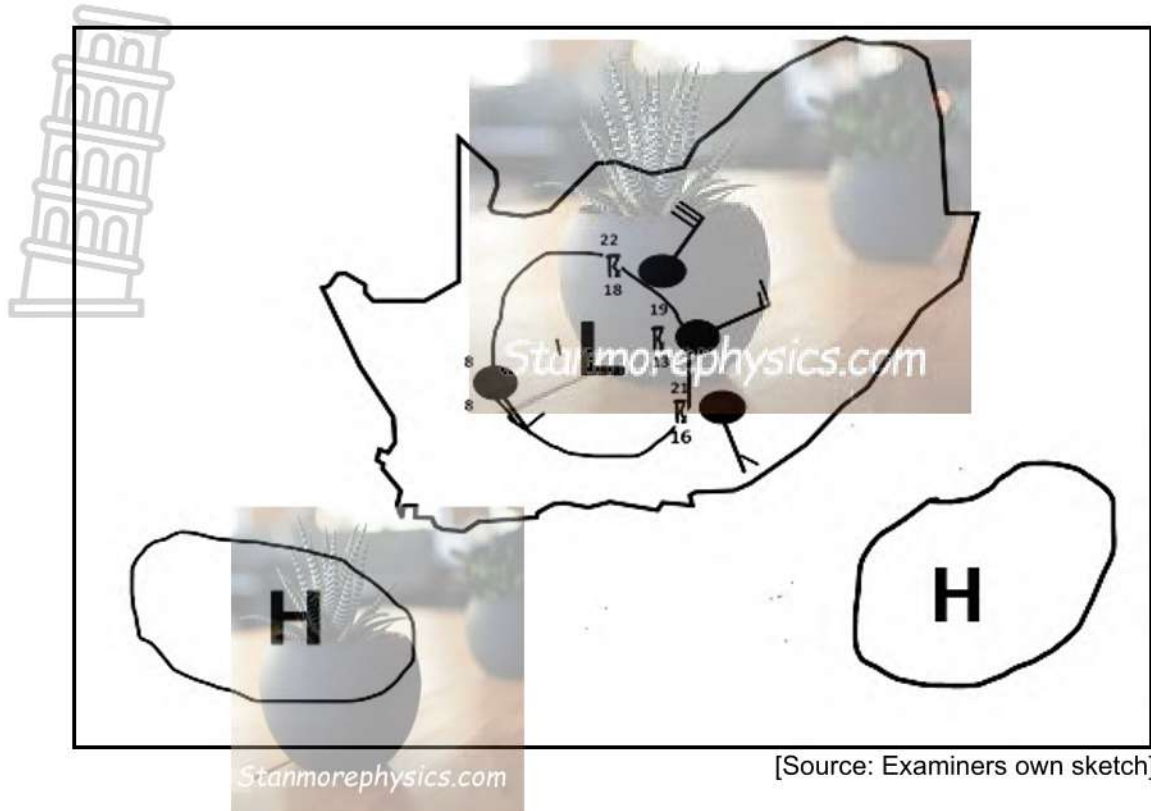
'Overnight, the system continued to intensify, reaching Moderate Tropical Storm intensity in the early hours of Monday morning, leading to its official naming of 'Ana'.

'The system tracked westwards and by local sunrise on Monday morning, was lying just off the northern Mozambican coastline between Angoche and Mogincual. The system then tracked in an easterly direction.

[Adapted from zululandobserver.co.za]

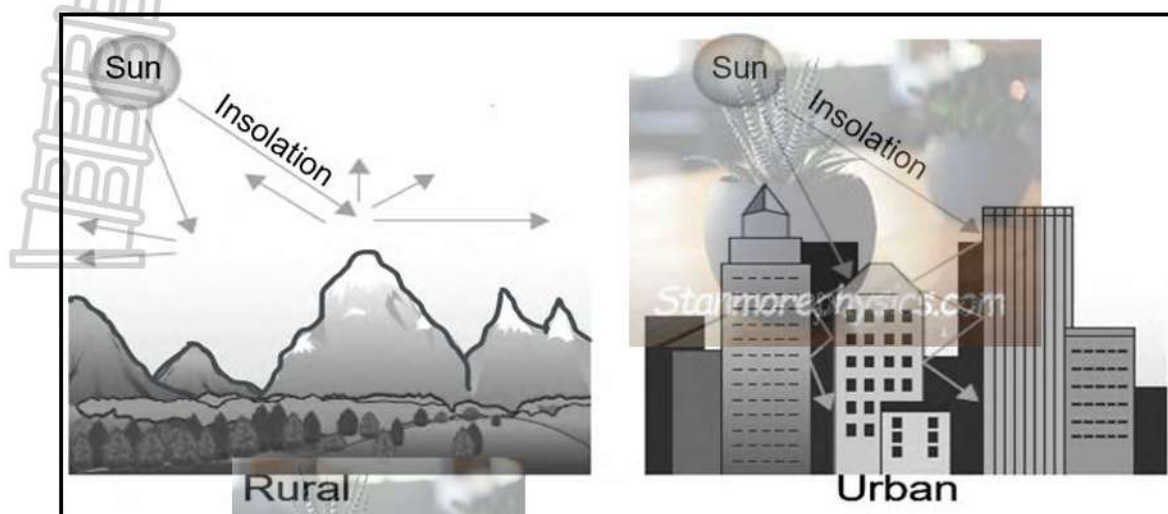
- 1.3.1 How does the name of the tropical cyclone suggest that it was the first of the 2021/22 tropical cyclone season? (1 x 1) (1)
- 1.3.2 State ONE island listed in the article that would be affected by the tropical cyclone. (1 x 1) (1)
- 1.3.3 Why are these islands effected by a tropical cyclone? (1 x 1) (1)
- 1.3.4 How does latent heat intensify (strengthen) the tropical cyclone? (2 x 2) (4)
- 1.3.5 Account for the tropical cyclone tracking in an easterly direction. (2 x 2) (4)
- 1.3.6 Explain the negative economic impact of strong winds on the coastal infrastructure of Mozambique. (2 x 2) (4)

1.4 Refer to typical line thunderstorm conditions in South Africa.



- 1.4.1 What are *line thunderstorms*? (1 x 2) (2)
- 1.4.2 How do line thunderstorms differ from general thunderstorms experienced over South Africa? (1 x 1) (1)
- 1.4.3 State evidence from the sketch to show that line thunderstorms are prevalent over the central part of South Africa. (2 x 1) (2)
- 1.4.4 What role did the South Atlantic high-pressure cell play in the development of a moisture front in the middle of the sketch? (1 x 2) (2)
- 1.4.5 Explain the significance of the north east winds in the formation of line thunderstorms. (2 x 2) (4)
- 1.4.6 Why would line thunderstorms have a negative environmental impact in the eastern half of the country? (2 x 2) (4)

- 1.5 Refer to the sketches showing the difference between rural and urban climates.



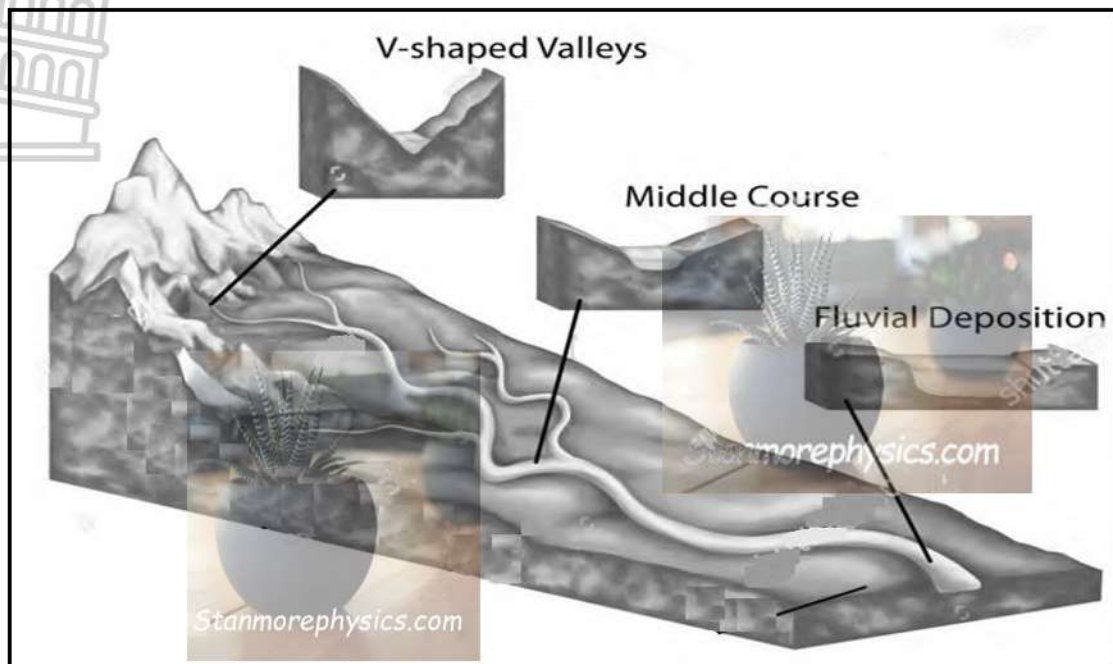
[Source: publichealthnotes.com]

- 1.5.1 The climatic element illustrated in the sketch is (wind/temperature). (1 x 1) (1)
- 1.5.2 How does this climatic element (answer to QUESTION 1.5.1) affect the amount of humidity in rural regions? (1 x 2) (2)
- 1.5.3 Explain how the different shapes and density of buildings (in the sketch) contribute to the city having higher temperatures. (2 x 2) (4)
- 1.5.4 In a paragraph of approximately EIGHT lines, explain how urban planners could put strategies in place regarding the shapes and density of buildings in order to reduce the higher temperatures. (4 x 2) (8)

[60]

QUESTION 2: GEOMORPHOLOGY

- 2.1 Refer to the sketch, which shows river profiles. Complete the statements in COLUMN A with the options in COLUMN B. Write only **Y** or **Z** next to the question numbers (2.1.1 to 2.1.8) in the ANSWER BOOK, example 2.1.9 Y.

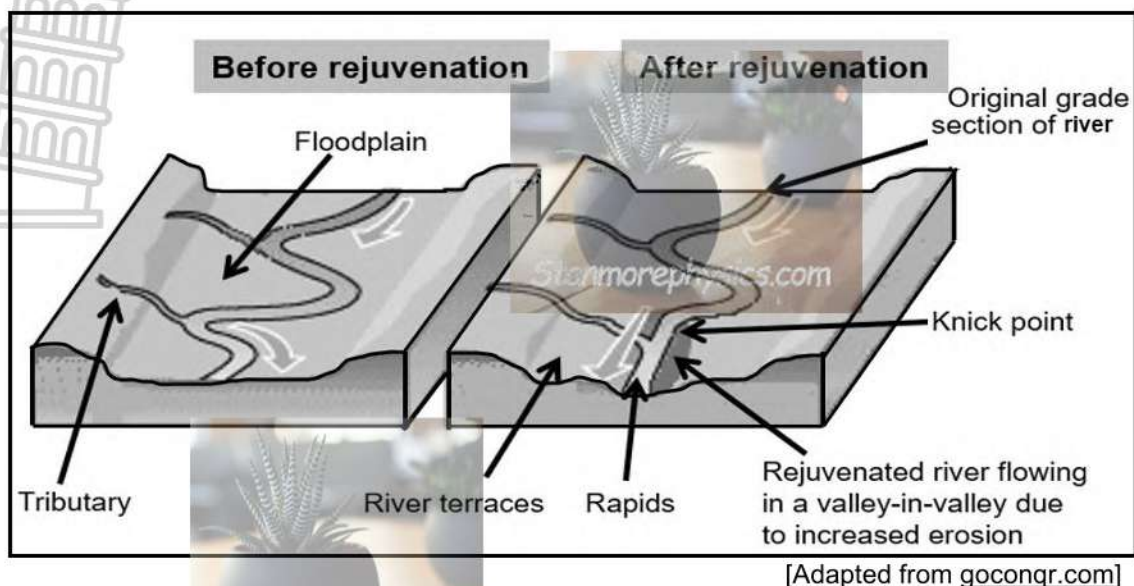


[Source: shutterstock.com]

COLUMN A		COLUMN B	
2.1.1	Cross profiles show ...	Y:	a side view of the river
		Z:	a view from bank to bank
2.1.2	The dominant fluvial process in the middle course is ...	Y:	lateral erosion
		Z:	vertical erosion
2.1.3	Fluvial landform that encourages farming.	Y:	floodplain
		Z:	waterfall
2.1.4	Fluvial deposition encourages the formation of ...	Y:	deltas
		Z:	rapids
2.1.5	The volume of water in the upper course is ...	Y:	high
		Z:	low
2.1.6	The source of a river can be found in the ...	Y:	upper course
		Z:	lower course
2.1.7	The area drained by a river and its tributaries, are known as the ...	Y:	river system
		Z:	drainage basin
2.1.8	V-shaped valleys in the upper course is caused by ...	Y:	vertical erosion
		Z:	lateral erosion

(8 x 1) (8)

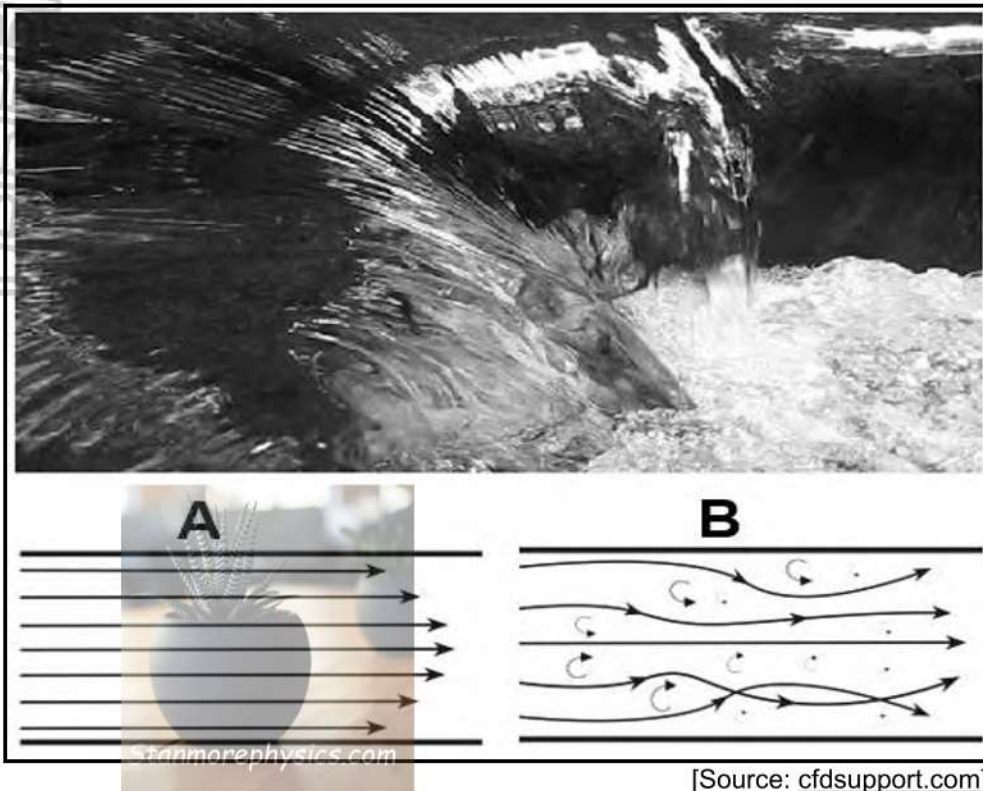
- 2.2 Refer to the sketch of river rejuvenation. Choose the correct word(s) from those given in brackets. Write only the word(s) next to the question numbers (2.2.1 to 2.2.7) in the ANSWER BOOK.



- 2.2.1 River rejuvenation is the process where a river erodes (laterally/vertically) again.
- 2.2.2 The point where the old erosion meets with the new is called a (valley/knickpoint).
- 2.2.3 River rejuvenation is caused by a (drop in sea level/watershed changing its position).
- 2.2.4 River terraces form (before/after) rejuvenation.
- 2.2.5 (Valley-in-valleys/Rapids) form on the floodplain.
- 2.2.6 The tributaries after rejuvenation lengthen due to (lateral/headward) erosion.
- 2.2.7 River rejuvenation will cause the river profile to be (graded/ungraded).

(7 x 1) (7)

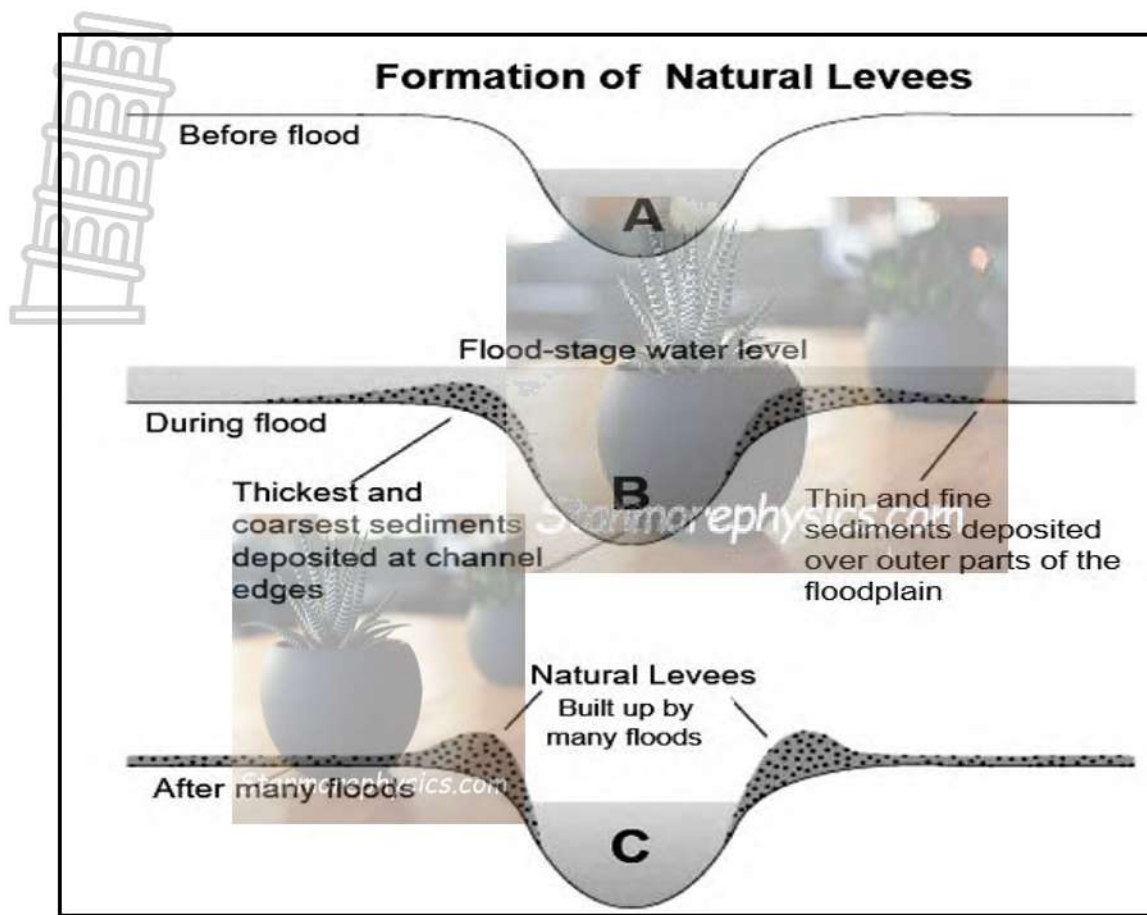
2.3 Refer to the image and sketches of the flow of water in a river.



[Source: cfdsupport.com]

- 2.3.1 Classify the water flow as (*laminar* or *turbulent*) in sketch **A**. (1 x 1) (1)
- 2.3.2 How did the river bed determine the type of water flow in sketch **A** (your answer to QUESTION 2.3.1). (1 x 2) (2)
- 2.3.3 Why would the water flow in sketch **A** encourage deposition? (2 x 2) (4)
- 2.3.4 In a paragraph of approximately EIGHT lines explain how the fluvial features and steep gradient (slopes) of the upper course impacts on the flow of water in sketch **B**. (4 x 2) (8)

2.4 Refer to the sketch of the formation of a levee.



[Source: quizlet.com]

- 2.4.1 What is a *natural levee*? (1 x 2) (2)
- 2.4.2 Does sketch **A**, **B**, or **C** reflect the flood stage? (1 x 1) (1)
- 2.4.3 How does flooding of the river contribute to the formation of the levee? (1 x 2) (2)
- 2.4.4 What is the significance (importance) of the thickest and coarsest sediments, being deposited, for the formation of natural levees? (1 x 2) (2)
- 2.4.5 How is the formation of a levee of benefit to the floodplain? (2 x 2) (4)
- 2.4.6 Explain the negative impact of levees to the surrounding farming community. (2 x 2) (4)

2.5 Below is an extract on river management.

Port Elizabeth is the largest city in the Eastern Cape, with 1 million inhabitants. 70% of the water supply to Port Elizabeth comes from the Kouga, Baviaans- and Kromme catchment areas, and the Baviaans and Kouga that feeds into the Kouga dam. The Kouga dam services Port Elizabeth and the Gamtoos Valley, which is one of South Africa's prime citrus production regions.

The Port Elizabeth catchment area, however, suffers from the impacts of climate change, leading to increased flood and drought events, effects of which are increased by overgrazing, alien invasive trees, wetland degradation, erosion, and bad spatial planning. These effects have led to decreased retention capacity of the soil and increased runoff. The catchment area can be restored by planting indigenous vegetation to repair the landscape and reduce soil erosion. Planting procedures can be refined to maximise survivorship and minimize costs in different soil types and by training local communities, restoration practitioners and land users on restoration and planting, as well as other land uses. Restoration of degraded hillslopes in the Baviaanskloof will increase baseflow, improve water retention and reduce sediment build-up, benefiting the Port Elizabeth catchment area.

[Source: replenishafrica.com]

- 2.5.1 According to the extract, why are the Kouga, Baviaans and Kromme catchment areas important to Port Elizabeth? (1 x 1) (1)
- 2.5.2 What is a *catchment area*? (1 x 2) (2)
- 2.5.3 Quote TWO physical factors, from the extract, that impact negatively on the Port Elizabeth catchment area. (2 x 1) (2)
- 2.5.4 What is the negative impact of poor planning on the catchment area? (1 x 2) (2)
- 2.5.5 Why would inter-basin water transfer schemes not be a viable (appropriate) solution to increase water supply to the Kouga, Baviaans and Kromme catchment area? (2 x 2) (4)
- 2.5.6 Explain how the sustainable management of the Kouga, Baviaans and Kromme catchment would have a positive economic impact on the city of Port Elizabeth. (2 x 2) (4)

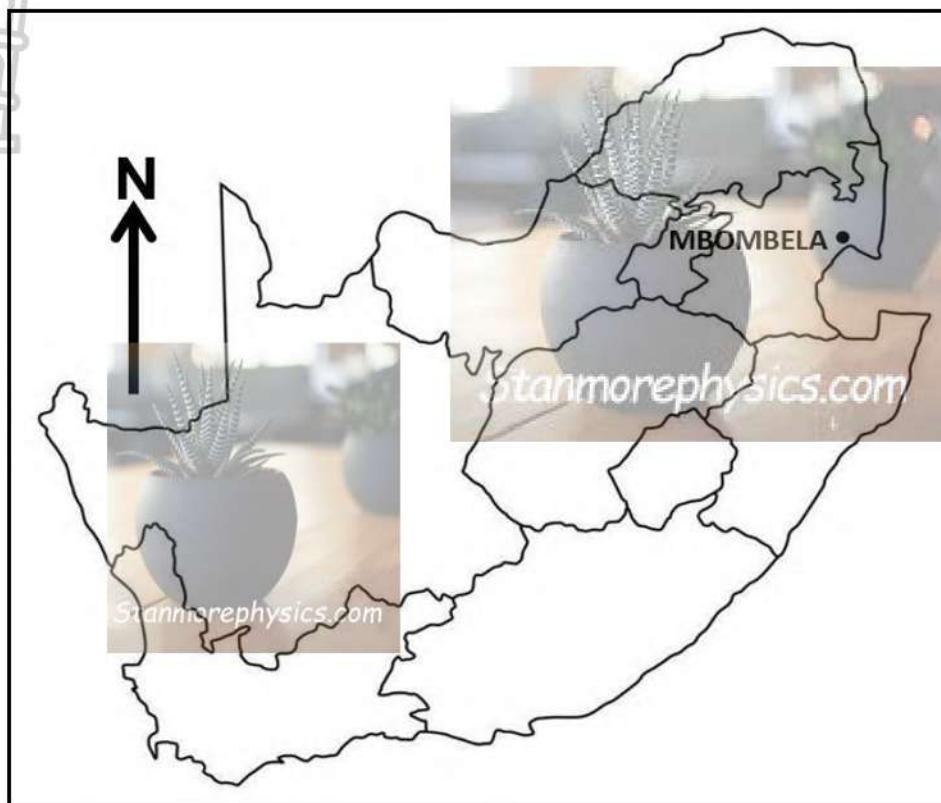
[60]

TOTAL SECTION A: 120

SECTION B

QUESTION 3: GEOGRAPHICAL SKILLS AND TECHNIQUES

GENERAL INFORMATION ON MBOMBELA



Coordinates: $25^{\circ}27'57''\text{S}$ $30^{\circ}59'07''\text{E}$

City of Mbombela is situated in the eastern part of South Africa and is the capital of Mpumalanga Province. The city is built on the fertile, flat valley floor of the Umgwenya (Crocodile) River where there is ample water supply from the river. The city serves as a gateway to some of the best eco- and adventure activities in Southern Africa with its moderate climate.

[Adapted from <https://en.wikipedia.org/wiki/Mbombela>]

The following English term and their translations are shown on the topographic map:

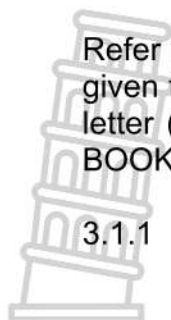
ENGLISH

Aerodrome
Canal
Diggings
Furrow
Golf course
Sewerage works
Show grounds
Waterfall
Weir

AFRIKAANS

Vliegveld
Kanaal
Uitgrawings
Voor
Gholfbaan
Rioolwerke
Skougronde
Waterval
Studam

3.1 MAPWORK SKILLS AND CALCULATIONS



Refer to the topographical map and the orthophoto map. Four options are given for the questions below. Choose the correct answer and write only the letter (A–D) next to the question numbers (3.1.1 to 3.1.3) in the ANSWER BOOK e.g. 3.1.4 A.

3.1.1 Mbombela is situated in the ... Province.

- A North West
- B Mpumalanga
- C Gauteng
- D Free State

(1 x 1) (1)

3.1.2 The true bearing from spot height 873 in block **E4** to the trigonometrical station in block **E5** is ...

- A 24°
- B 50°
- C 204°
- D 180°

(1 x 1) (1)

3.1.3 The co-ordinates for the communication tower at **F** in block **D3** is ...

- A 25°28'25" E 30°57'55" S.
- B 25°28'25" S 30°57'55" S.
- C 25°28'24" S 30°57'54" E.
- D 25°31'36" S 30°58'55" E.

(1 x 1) (1)

3.1.4 Calculate the magnetic declination of the topographical map for 2022. Use the steps below to answer the question. Show ALL calculations. Clearly indicate the direction in relation to true north in your final answer.

Difference in years

Mean annual change

Total change

Magnetic declination 2022

(5 x 1) (5)

3.1.5 Determine the magnetic bearing for 2022 from spot height 873 in block **E4** to the trigonometrical beacon in block **E5**.

Formula:

Magnetic bearing = True bearing (TB) + Magnetic declination (MB)

(2 x 1) (2)

3.2 MAP INTERPRETATION



Refer to the topographic map and the orthophoto map.

3.2.1 The settlement at **G** in block **E1**, experiences low temperatures during the night due to ...

- A anabatic winds.
- B katabatic winds.
- C fog.
- D aspect.

(1 x 1) (1)

3.2.2 The Umgwenya River in block **C5**, is an example of a ... river.

- A permanent
- B exotic
- C periodic
- D episodic

(1 x 1) (1)

3.2.3 Refer to the orthophoto map.

(a) Is the average temperature higher at **1** or **2**?

(1 x 1) (1)

(b) Give TWO reasons for your answer to QUESTION 3.2.3(a).

(2 x 2) (4)

- 3.2.4 Refer to the fluvial landform at **H** on the topographic map and the photograph below.



- (a) If one stood at the viewing point **X** (in the photograph) looking at the waterfall, would one be looking towards **J** or **K** on the topographic map? (1 x 1) (1)
- (b) How does this waterfall in the photograph hinder the construction of a bridge at **J** on the topographic map? (1 x 2) (2)
- (c) The waterfall will migrate (move) in a southerly direction. Substantiate this statement with evidence from the topographic map. (1 x 2) (2)

3.3 GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

Refer to the topographic map.

- 3.3.1 Is the demarcated area in blocks **B5** and **C5** an example of *raster* or *vector* data? (1 x 1) (1)
- 3.3.2 Give a reason for your answer to QUESTION 3.3.1. (1 x 1) (1)
- 3.3.3 Give evidence from the demarcated area that proves that the farmer considered the infrastructure data layer for the location of this farm. (1 x 2) (2)
- 3.3.4 Why is the location of this farm considered to be poor river management? (2 x 2) (4)

[30]

TOTAL SECTION B: 30
GRAND TOTAL: 150



Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2022

GEOGRAPHY P1 MARKING GUIDELINE

MARKS: 150

This marking guideline consists of 9 pages.

SECTION A: CLIMATOLOGY AND GEOMORPHOLOGY**QUESTION 1**

1.1 1.1.1 B (1)

1.1.2 C (1)

1.1.3 D (1)

1.1.4 C (1)

1.1.5 B (1)

1.1.6 A (1)

1.1.7 D (1)

1.1.8 C (1)

(8 x 1) (8)

1.2 1.2.1 ITCZ (1)

1.2.2 heat (1) stanmorephysics.com

1.2.3 north (1)

1.2.4 January (1)

1.2.5 July (1)

1.2.6 South Atlantic (1)

1.2.7 January (1)

(7 x 1) (7)

1.3 1.3.1 The name starts with letter A/First letter of the alphabet (1) (1 x 1) (1)

1.3.2 Madagascar (1)

Reunion (1)

Mauritius (1)

[ANY ONE]

(1 x 1) (1)

1.3.3 These islands are in the direct path of the tropical cyclone that moves
in an easterly direction (1)

(1 x 1) (1)

1.3.4 Latent heat is distributed vertically around the centre of the storm (2)

This leads to a pressure drop at the surface (2)

Pressure gradient between the storm and the surface strengthened

(2)

[ANY TWO]

(2 x 2) (4)



- 1.3.5 The cyclone moves towards higher sea temperatures (2)
It encounters a different wind belt (westerly wind belt) (2) (2 x 2) (4)
- 1.3.6 Strong winds cause storm surges that would damage harbours (2)
Damage to harbours will limit imports and exports (2)
Commercial fishing vessels would not be able to go out to sea (2)
It would discourage tourism and its related coastal activities (accept examples) (2)
There would be a loss of jobs in the tourism sector (2)
Repairs to infrastructure along the coast would be costly for insurance companies or government (2)
[ANY TWO] (2 x 2) (4)
- 1.4 1.4.1 Thunderstorms arranged in a line from the NW to the SE over the interior of the country during summer (2)
[CONCEPT] (1 x 2) (2)
- 1.4.2 Covers a greater vertical/widespread area (1)
They have a longer duration (1)
Are more destructive (1)
[ANY ONE] (1 x 1) (1)
- 1.4.3 Low pressure over the land (1)
Band of thunderstorms stretching from NW to the SE of the country (1)
Thunderstorms are experienced on the eastern part of the heat low/moisture front (1)
[ANY TWO] (2 x 1) (2)
- 1.4.4 Diverges cold, dry south westerly winds to meet warm moist air in the central part of the country (2) (1 x 2) (2)
- 1.4.5 It carries warm moist air towards the heat low (2)
The north easterly winds are undercut by the cold, dry air and rises along the moisture front (2) (2 x 2) (4)
- 1.4.6 Valuable nutrients in the soil are washed away (2)
Soil nutrients leach lower down the soil profile making soil less fertile (2)
Ecosystems/foodchains are destroyed (2)
Decrease in biodiversity (2)
Aesthetic beauty diminished (2)
Vegetation flooded (2)
Wildlife drown (2)
[ANY TWO] (2 x 2) (4)

- 1.5 1.5.1 Temperature (1) (1 x 1) (1)
- 1.5.2 Increases humidity (2) (1 x 2) (2)
- 1.5.3 Tall buildings cause the sun's rays to be reflected and deflected between the buildings (2)
Large surface areas of buildings absorb more of the sun's rays (2)
Density of buildings ensures that the heat remains closer to the earth's surface (2)
[ANY TWO – answer must include shape and density] (2 x 2) (4)
- 1.5.4 Paint buildings in lighter colours e.g. white to increase reflection of heat (2)
Planting gardens on roof tops will cool temperatures (2)
Buildings should be eco-friendly (green) (2)
Future land use planning (buildings) should coincide with prevailing wind directions to cool cities (2)
Decentralise commercial activities to reduce building density (2)
Decrease building height to reduce heat trapped by buildings (2)
Decrease building density to reduce heat near surface (2)
Filters in chimneys of buildings to reduce air pollution
[ANY FOUR – answer must include shape and density] (4 x 2) (8)
- Stanmorephysics.com* [60]

QUESTION 2: GEOMORPHOLOGY

2.1 2.1.1 Z (1)

2.1.2 Y (1)

2.1.3 Y (1)

2.1.4 Y (1)

2.1.5 Z (1)

2.1.6 Y (1)

2.1.7 Z (1)

2.1.8 Y (1)

(8 x 1) (8)

2.2 2.2.1 vertically (1)

2.2.2 knickpoint (1)

2.2.3 a drop in sea level (1)

2.2.4 after (1)

2.2.5 Valley-in-valleys (1)

2.2.6 headward (1)

2.2.7 ungraded (1)

(7 x 1) (7)

2.3 2.3.1 laminar (1)

(1 x 1) (1)

2.3.2 The river bed is smooth which allows for a smooth flow (2)
There are no rocks or obstacles to cause friction (2)**[ANY ONE]**

(1 x 2) (2)

2.3.3 The water flow has a low velocity (2)

The river cannot transport all of its load, resulting in deposition (2)

(2 x 2) (4)

2.3.4 **Fluvial features**

The narrow V-shaped valley causes friction which slows the flow of water (2)

Traction load cause swirling movement of water (2)

Waterfalls increases the velocity of water and swirling movement at the plunge pool (2)

Rapids increases the velocity of water over the outcrop/layer dipping stream up (2)

Steep gradient (Slopes)

Increases velocity of water (2)

Uneven slopes cause swirling movement of water (2)

[ANY FOUR – both fluvial features and steep gradient must be mentioned]

(4 x 2) (8)

- 2.4 2.4.1 Embankments formed after a river floods/naturally raised banks of a river (1)

[CONCEPT]

(1 x 2) (2)

- 2.4.2 B (1)

(1 x 1) (1)

- 2.4.3 After flood waters recede, it leaves behind gravel, sand and silt which builds up to form a raised bank (2)

Flooding causes deposition of the coarse material at the edges (2)

Continuous flooding causes built-up of sediments on the banks (2)

[ANY ONE]

(1 x 2) (2)

- 2.4.4 They are not easily transported or washed away (2)

These sediments bring stability to the raised bank (2)

[ANY ONE]

(1 x 2) (2)

- 2.4.5 Reduces erosion of the flood plain (2)

It is effective in flood control as it acts as a buffer that can protect the surrounding floodplain (2)

Decreases flooding so that the floodplain does not become waterlogged (2)

Preserves habitats, ecosystems and biodiversity on the floodplain due to less flooding (2)

[ANY TWO]

(2 x 2) (4)

- 2.4.6 Makes it difficult for farmer to access water for irrigation (2)

Increases costs for farmers as they have to source water further downstream/upstream (2)

River becomes inaccessible to livestock (2)

Alluvium/silt not deposited regularly on floodplain causing soil fertility problems (2)

Production will decrease due to a shortage of fertile land (2)

Farmland will be flooded if levee breaks (2)

[ANY TWO]

(2 x 2) (4)

- 2.5 2.5.1 Provides Port Elizabeth with 70% of its water (1) (1 x 1) (1)
- 2.5.2 The upper reaches of a drainage basin that supplies a river with most of its water / The area that captures rain water, which will drain into a river system (2)
[CONCEPT] (1 x 2) (2)
- 2.5.3 Climate change (1)
Droughts (1)
Erosion (1)
[ANY TWO] (2 x 1) (2)
- 2.5.4 River will become polluted (2)
Dumping of industrial waste (2)
Inhabitants will contaminate the water (2)
Eutrophication will increase (2)
Water quality will decrease (2)
River will silt up (2)
Aquatic (rivers) ecosystems are destroyed (2)
Settlement development will destroy natural catchment areas (2)
[ANY ONE] (1 x 2) (2)
- 2.5.5 It is too expensive to construct (2)
It would affect flow patterns of rivers (2)
Disruption of Aquatic (river) ecosystems (2)
[ANY TWO] (2 x 2) (4)
- 2.5.6 Sustainable job opportunities in maintaining the drainage basins (2)
Quality water supply to surrounding farmers who can increase output for manufacturing (2)
Water supply to industries is consistent and productivity will be maintained or increased (2)
It will attract further industrial investment (2)
This will have a multiplier effect on the economy of the region (2)
[ANY TWO] (2 x 2) (4)
- [60]

TOTAL SECTION A: 120

SECTION B

QUESTION 3: GEOGRAPHICAL SKILLS AND TECHNIQUES

- 3.1 3.1.1 B (1) (1 x 1) (1)
- 3.1.2 A (1) (1 x 1) (1)
- 3.1.3 C (1) (1 x 1) (1)

3.1.4 Difference in years: $2022 - 2014 = 8$ years (1)

Mean annual change: $5'(1)$ West

Total change: $8 \times 5 = 40'$ (1) West

Magnetic declination
in 2022:

$18^{\circ}12'$
 $+(1) 40'$

$18^{\circ}52'$ West of True North (1) (5 x 1) (5)

3.1.5 $24^{\circ} + 18^{\circ}52' (1)$
 $= 42^{\circ}52' (1)$ (2 x 1) (2)

3.2 MAP INTERPRETATION

3.2.1 B (1) (1 x 1) (1)

3.2.2 A (1) (1 x 1) (1)

3.2.3 (a) 1 (1) (1 x 1) (1)

- (b) Artificial surfaces at **1** absorb more heat (2)
Natural surfaces at **2** does not absorb a lot of heat (2)
Artificial production of heat at the industrial area (2)
Pollution dome created will increase temperatures at **1** (2)
Higher buildings at **1** trap the heat (2)
[ANY TWO] (2 x 2) (4)

3.2.4 (a) J (1) (1 x 1) (1)

(b) It would be expensive to build (higher) bridges (2) (1 x 2) (2)

- (c) The river in the area flows in a northerly direction (2)
Headward erosion will occur in a southerly direction (2)
[ANY ONE] (1 x 2) (2)

3.3 GEOGRAPHICAL INFORMATION SYSTEMS (GIS)



3.3.1 Vector (1) (1 x 1) (1)

3.3.2 Lines, points, and polygons are used to represent the features. (1)
(1 x 1) (1)

3.3.3 The vineyard and orchards are surrounded by other roads for the distribution of products (2)

Linked to the national freeway for distribution of goods (2)

Linked to the railway for transportation/export of bulk products (2)

[ANY ONE] (1 x 2) (2)

3.3.4 The run-off will end up in the river through the tributary streams (2)

The slope of the banks is steep, which will cause faster deposition of loose silt in the river (2)

The pesticides and insecticides used by farmers will flow easily into the river causing eutrophication (2)

The area is not buffered, and expansion of the vineyard and orchards closer to the river is not restricted (2)

[ANY TWO] (2 x 2) (4)
[30]

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TOTAL SECTION B: 30

GRAND TOTAL: 150