**KWAZULU-NATAL PROVINCE**

**EDUCATION**
REPUBLIC OF SOUTH AFRICA

# NATIONAL SENIOR CERTIFICATE

## GRADE 12

## GEOGRAPHY P1

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## PREPARATORY EXAMINATION

## SEPTEMBER 2022

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**MARKS: 150**

**TIME: 3 hours**

**This question paper consists of 16 pages.**

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## 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 in the ANSWER BOOK provided.
3. ALL diagrams are included in the QUESTION PAPER.
4. Leave a line open between subsections of questions answered.
5. Start EACH question at the top of a NEW page.
6. Number your answers correctly according to the numbering system used in this question paper.
7. Do NOT write in the margins of your ANSWER BOOK.
8. Draw fully labelled diagrams when instructed to do so.
9. Answer in FULL SENTENCES, when you have to state, name, identify or list.
10. Units of measurement MUST be indicated in the final answer, e.g. 1 020 hPa, 10km, 4°C, and 50m.
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

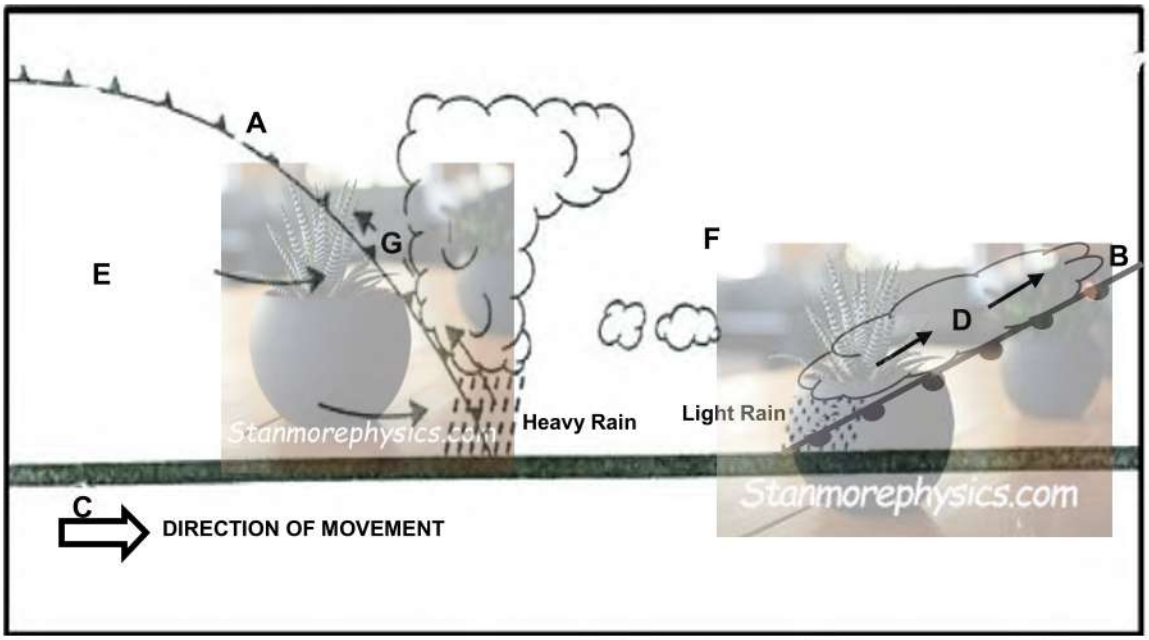
14. A 1 : 50 000 topographic map 2331CC PHALABORWA and a 1 : 10 000 orthophoto map 2331 CC 18 PHALABORWA (NORTH) are provided.
15. The area demarcated in RED/BLACK on the topographic map represents the area covered by the orthophoto map.
16. Show ALL calculations. Marks will be allocated for this.
17. You must hand in the topographic and the orthophoto map to the invigilator at the end of this examination session.

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## SECTION A

## QUESTION 1: CLIMATE AND WEATHER

1.1 Refer to the cross-section through the mature stage of a mid-latitude cyclone. Write only the answer next to the question numbers (1.1.1 to 1.1.5) in the ANSWER BOOK. e.g.1.1.6 polar easterlies.




[Adapted from South African Weather Pattern]

1.1.1 Identify the fronts labelled **A** and **B** respectively. (2 x 1) (2)

1.1.2 Give the general direction of movement of the mid-latitude cyclone indicated at **C**? (1 x 1) (1)

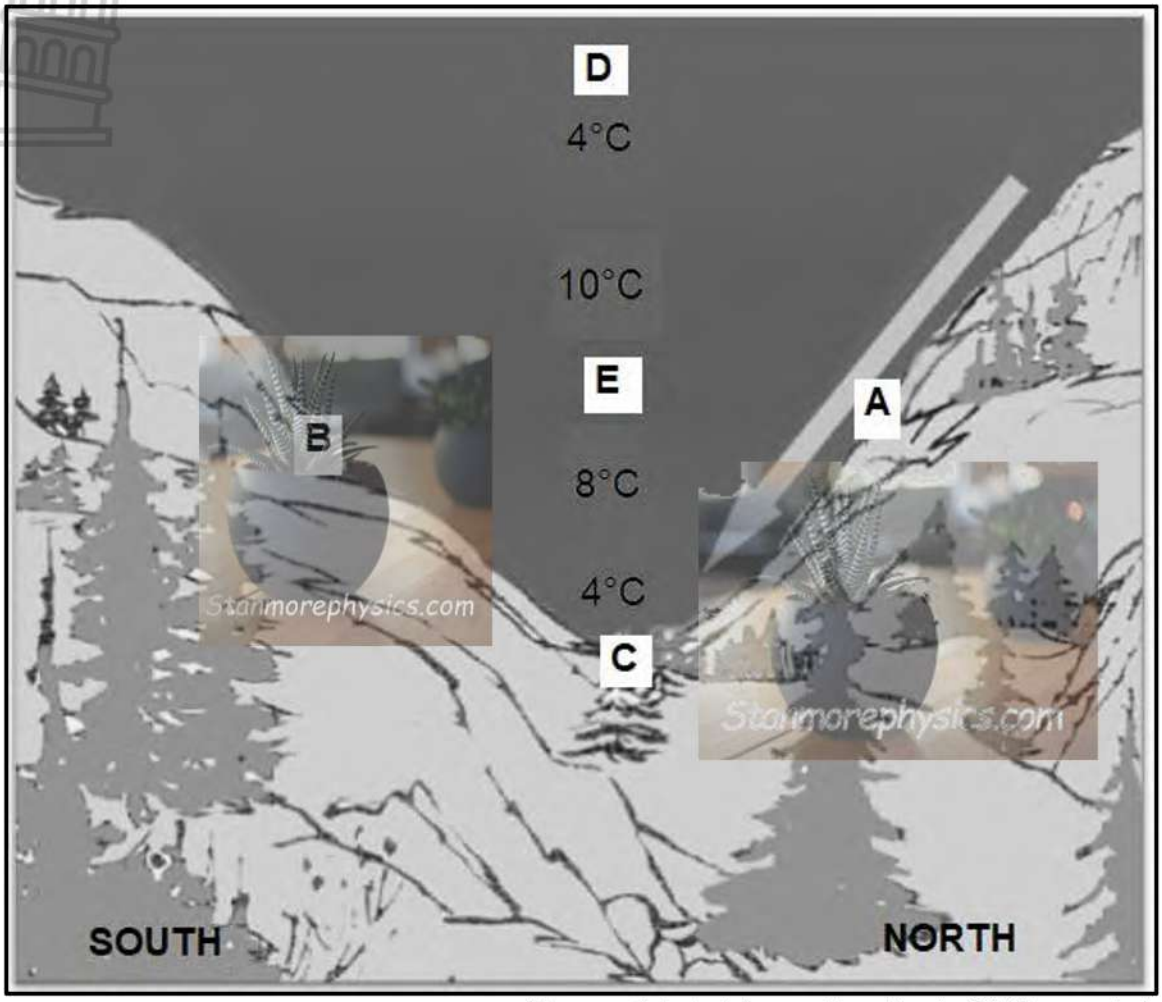
1.1.3 Name the cloud type labelled **D**. (1 x 1) (1)

1.1.4 Identify the sectors of the mid-latitude cyclone at **E** and **F** respectively. (2 x 1) (2)

1.1.5 State ONE characteristic of the air mass at **G** with regards to temperature. (1 x 1) (1)

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1.2 Refer to the sketch below illustrating valley climates in the Southern Hemisphere. Match each statement to one of the letters (A – E) in the sketch. Write only the letter next to the question numbers (1.2.1 to 1.2.8) in the ANSWER BOOK, e.g. 1.2.9 B. Each letter may be used more than once.




[Source: Adapted from valley climate-SA Geography]

1.2.1 Area that receives the most insolation during the day

1.2.2 Katabatic winds

1.2.3 The warmest place to build a house

1.2.4 The most suitable location for frost sensitive crops to be planted

1.2.5 Area where the frost pocket is found

1.2.6 Descending anti-cyclonic air

1.2.7 The north- facing slope

1.2.8 The thermal belt is located here (8 x 1) (8)

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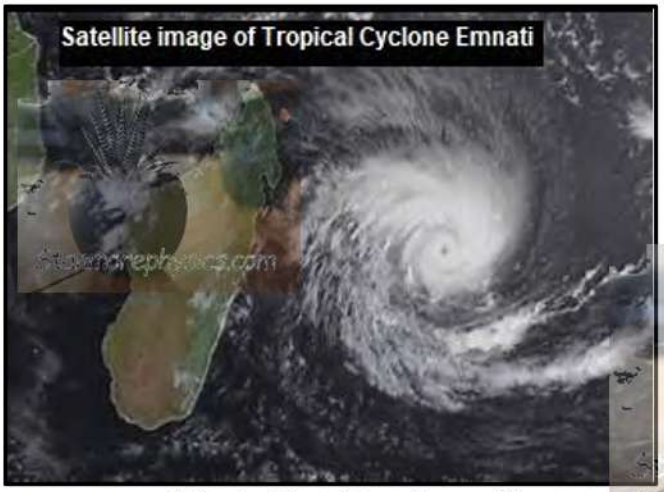
1.3 Refer to the infographic below on Tropical Cyclone Emnati.

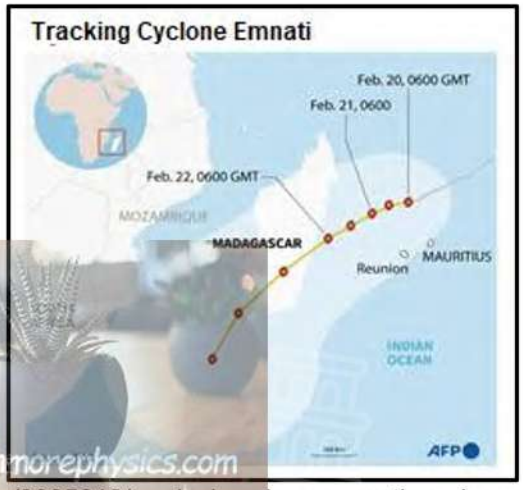
Tropical Cyclone Emnati, which passed just north of Indian Ocean islands of Mauritius and Reunion, reached the eastern coast of Madagascar on 22 February 2022 as a category 2 storm.

Emnati tore across the island with wind gusts as high as 200 km per hour and intense rainfall, eventually exiting the country the evening of 23 February 2022. Nearly 40,000 people from over 9,000 households were displaced ahead of the storm across seven regions. Telecommunication networks are down throughout the path of the cyclone, limiting contact with affected areas.

Already without immediate access to clean water, food, shelter and other essentials, affected communities will be dealing with the long-term impact of these consecutive storms well after houses are rebuilt. Not only have thousands of homes been destroyed but vital infrastructures have been severely damaged, including schools and hospitals. Entire communities are unable to access medical services at a time where COVID-19 is easily spread in crowded evacuation shelters, waterborne diseases are a greater risk after weeks of flooding, and people have limited access to basic hygiene facilities and supplies.

Farmers have lost their crops and animals, and artisans (skilled workers) have lost their materials. Without income, families will struggle even more to rebuild their lives and meet their basic needs.




[Adapted from https://www.citizen.co.za/news/3035618/tropical-cyclone-emnati-madagascar]

1.3.1 How many tropical cyclones have occurred in the current cyclone season in this area? (1 x 1) (1)

1.3.2 Give a reason for your answer to QUESTION 1.3.1. (1 x 2) (2)

1.3.3 Give evidence from the extract that Tropical Cyclone Emnati was associated with hurricane strength winds. (1 x 1) (1)

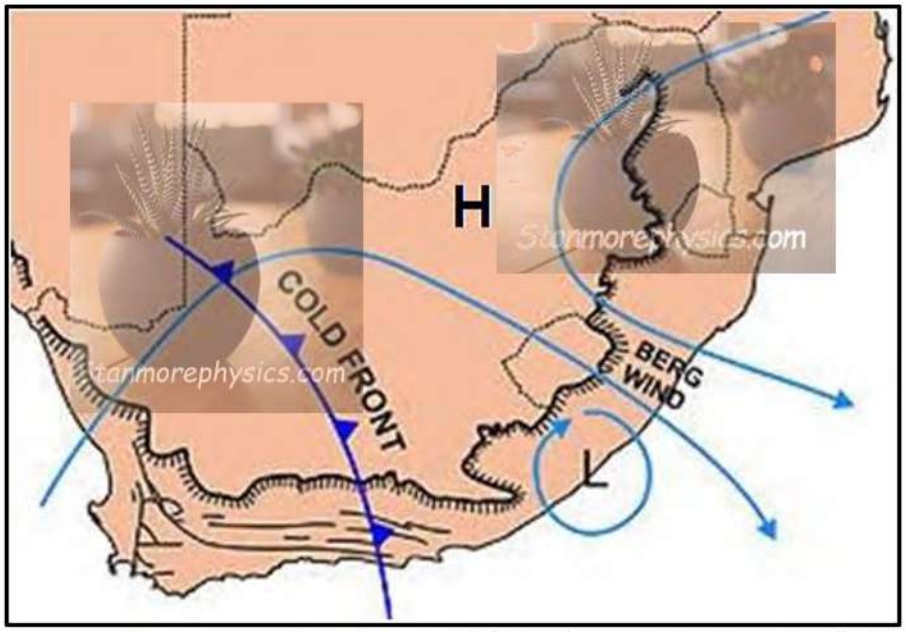
1.3.4 With reference to the diagram tracking Emnati, identify the general direction in which Tropical Cyclone Emnati moved. (1 x 1) (1)

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1.3.5 Give evidence from the satellite image to prove that Tropical Cyclone Emnati is in the mature stage. (1 x 2) (2)

1.3.6 In a paragraph of approximately EIGHT lines, describe the environmental impact of Tropical Cyclone Emnati on the island of Madagascar. (4 x 2) (8)

1.4 Refer to the sketch below illustrating the South African berg wind.




[Source: www.deepdyve.com/lp/wiley/berg-winds-of-south-africa]

1.4.1 Name TWO pressure systems evident in the sketch that are necessary for the development of berg winds. (2 x 1) (2)

1.4.2 In which season are berg winds most prevalent in South Africa? (1 x 1) (1)

1.4.3 State the cloud cover and temperature conditions that exist over the plateau during the formation of berg winds. (2 x 1) (2)

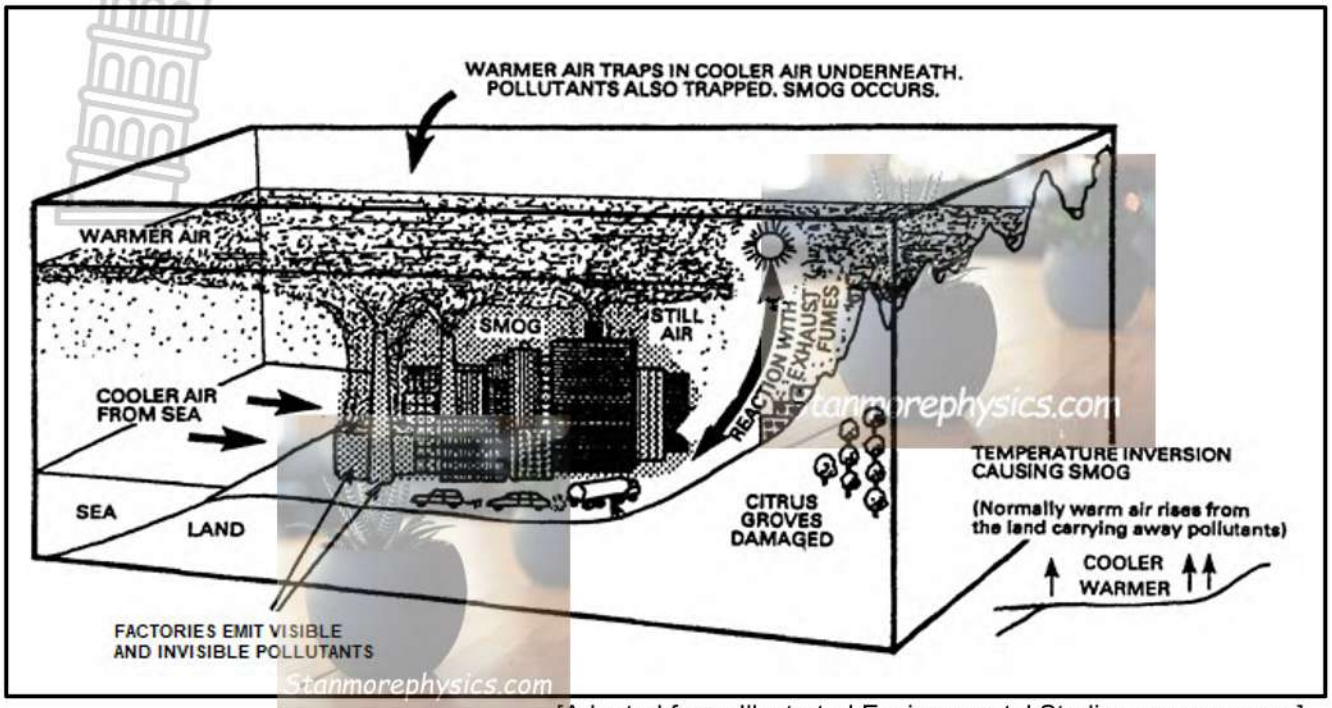
1.4.4 Explain how the temperature of the descending air mass changes as it moves towards the coast. (1 x 2) (2)

1.4.5 Explain TWO negative impacts that berg winds can have on the physical (natural) environment. (2 x 2) (4)

1.4.6 Berg winds are often associated with veldfires. Suggest TWO strategies that can be implemented to prevent the spreading of veld fires. (2 x 2) (4)

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1.5 Refer to the sketch below of a pollution dome over a city.




[Adapted from: Illustrated Environmental Studies. amazon.com]

1.5.1 Define the term *pollution dome*. (1 x 2) (2)

1.5.2 State TWO factors visible in the sketch that contributed to the formation of the pollution dome. (2 x 1) (2)

1.5.3 Give the term for the combination of smoke and fog that develops above a city. (1 x 1) (1)

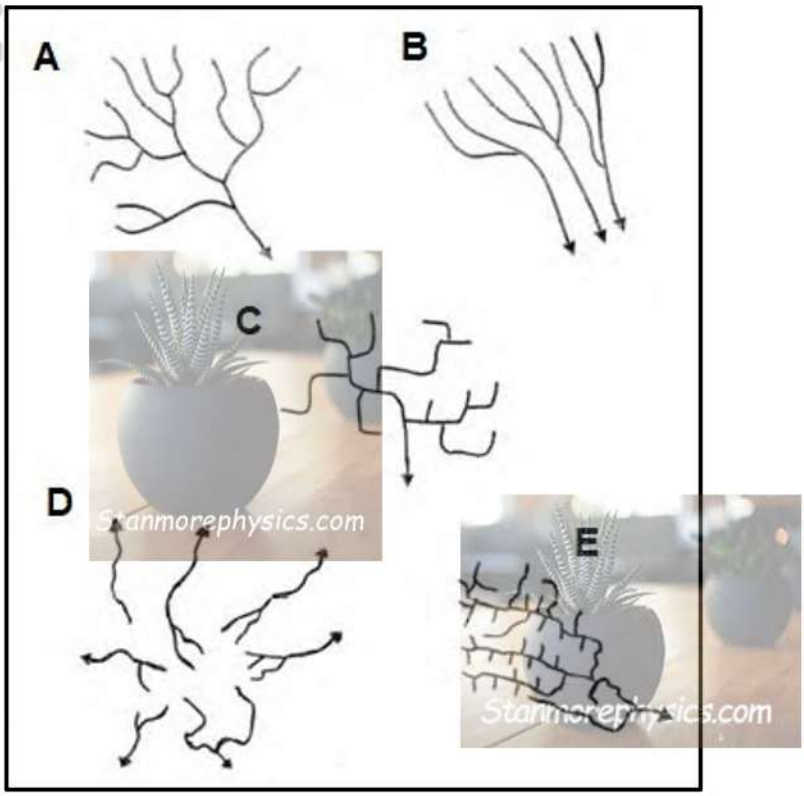
1.5.4 Explain why the pollution concentration over the city centre will be higher during winter than during summer. (2 x 2) (4)

1.5.5 Suggest THREE sustainable strategies that urban planners could put in place to reduce the impact of pollution and heat generation in the city. (3 x 2) (6)

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## QUESTION 2: GEOMORPHOLOGY

2.1 Refer to the sketches below showing various drainage patterns. Match the descriptions with the letter (A to E). Write only the letter (A-E) next to the question numbers (2.1.1 to 2.1.8) in the ANSWER BOOK, e.g. 2.1.9 F.




[Source: http://www.google.com/url?sa=i&url=https%3A%2F%]

2.1.1 Resembles the branches of a tree

2.1.2 Flows over rocks that have varying resistance to erosion

2.1.3 Develops on igneous rocks that have many joints

2.1.4 Streams flow away from a central high-lying point

2.1.5 Develops in areas where faulting has occurred

2.1.6 Tributaries join the main river at acute angles

2.1.7 Rivers flow parallel to each other with few tributaries

2.1.8 Flows over rocks that have uniform resistance to erosion (8 x 1) (8)

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2.2 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 (2.2.1 to 2.2.7) in the ANSWER BOOK, e.g. 2.2.8 **A**.

2.2.1 A river that only flows in the rainy season:

A. Periodic
B. Exotic
C. Permanent
D. Episodic

2.2.2 Discharge of a river refers to the …

A method of classifying streams.
B flow of water in the river.
C side view of a river.
D plan view of the river.

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2.2.3 Underground water that supplements (feeds into) a river is known as …

A. laminar flow.
B. sheet flow.
C. run-off.
D. base flow.

2.2.4 This feature forms due to water dropping down over a resistant layer of rock in a river:

A. Waterfall
B. Gorge
C. Flood plain
D. Meander

2.2.5 A /an … is a meander loop that is cut off from the main river.

A. undercut slope
B. slip-off slope
C. oxbow lake
D. river delta

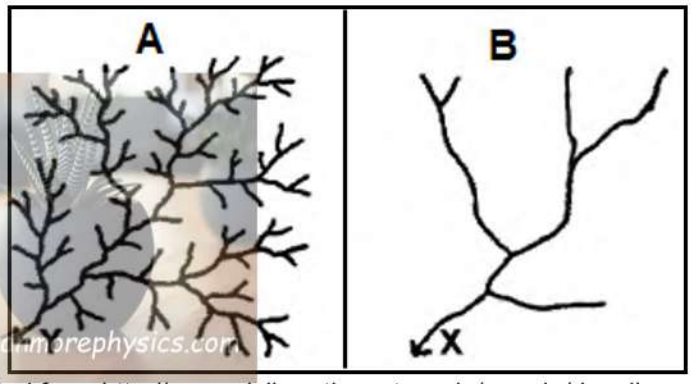
2.2.6 … are raised banks of a river caused by continuous flooding and deposition.

A. Deltas
B. Levees
C. Alluvial fans
D. Braided streams

2.2.7 A … forms when a river deposits its load in its channel and blocks its own path:

A. delta
B. braided stream
C. flood plain
D. levee (7 x 1) (7)

2.3 Refer to the diagrams below on drainage density.




[Adapted from http://www.civil.northwester.edu/people/dowding/airphoto/scan/a2]

2.3.1 Define the concept *drainage density*. (1 x 2) (2)

2.3.2 What evidence suggests that river system **A** has a higher drainage density than river system **B**? (1 x 2) (2)

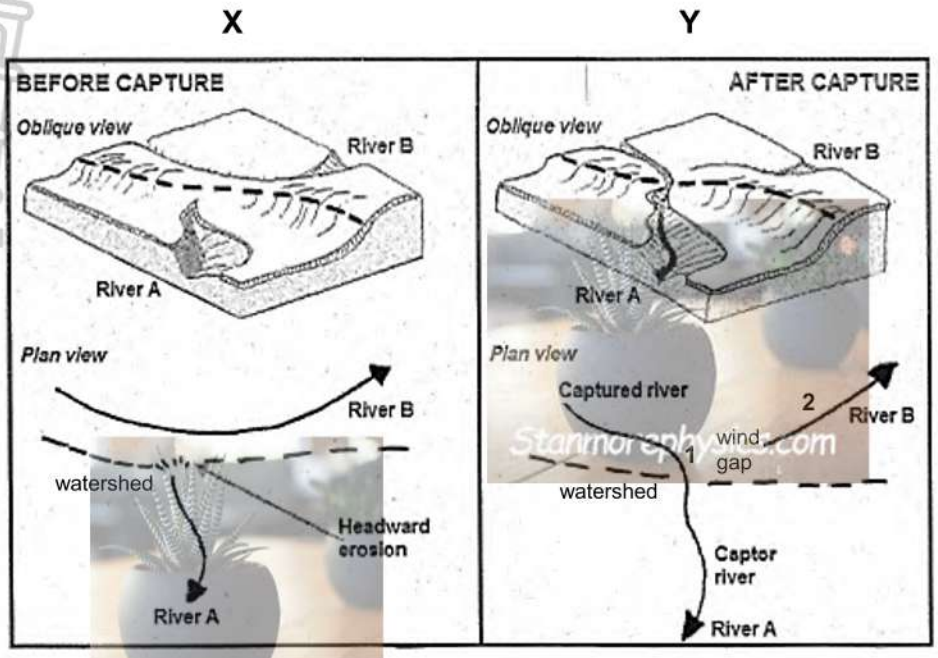
2.3.3 Determine the stream order at point **X**. (1 x 1) (1)

2.3.4 How will the stream order change if the fingertip streams are non-perennial? (1 x 2) (2)

2.3.5 Explain how gradient and rainfall can influence drainage density. (2 x 2) (4)

2.3.6 Explain the impact of urban development on the drainage density of the surrounding physical environment. (2 x 2) (4)

2.4 Refer to the sketches below showing river capture (stream piracy).




[Adapted from stream capture–https://en.m.wikipedia.org]

2.4.1 Define the concept *river capture.* (1 x 2) (2)

2.4.2 State ONE possible condition that lead to river **A** becoming the captor river. (1 x 1) (1)

Refer to the sketch labelled after capture.

2.4.3 Identify the features of river capture labelled **1** and **2**. (2 x 1) (2)

2.4.4 How did river **A** influence the shifting of the position of the watershed as seen in sketch **X** to **Y.** (1 x 2) (2)

2.4.5 In a paragraph of approximately EIGHT lines explain how river capture influences the volume of water and erosive ability of rivers **A** and **B** respectively. (4 x 2) (8)

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2.5 Refer to the extract below on catchment and river management.

**WETLANDS IN THE UMNGENI CATCHMENT**

Wetlands are areas where water completely covers the soil or is near the surface for varying periods of time. They have their own unique ecosystem. Wetlands in this catchment are most abundant upstream of Midmar Dam, and those in the headwaters (near the source) are known as "the uMngeni sponge". Some of these wetlands are formally conserved (protected by KZN Wildlife) as they are important breeding areas for the threatened wattled crane.

Many of the catchment's wetlands have been destroyed by human activities and the state of the remaining wetlands varies greatly. Some are in good condition while others are degraded and can no longer function as they should. Currently, the most significant threats to wetlands here are cultivation, artificial drainage, dams and urbanisation (especially in the Pietermaritzburg and Durban areas), alien plant invasion, overgrazing and too frequent burning. At the highest altitudes, approximately half of the original wetland area has been lost, while below this the loss has been greater than 60%.

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The continued loss and destruction of uMngeni wetlands is serious given their positive impact on river health by purifying water, controlling erosion and regulating water flow through the catchment.

Forestry companies in the area are contributing to wetland restoration by removing alien (not indigenous) forest trees planted within wetland areas in the catchment.

[Adapted from https://www.dws.gov.za/iwqs/rhp/state_of_rivers]

2.5.1 What is a *catchment area*? (1 x 2) (2)

2.5.2 Give ONE organisation mentioned in the extract that contributes to wetlands restoration. (1 x 1) (1)

2.5.3 State TWO human activities, mentioned in the extract, that pose the biggest threat to the wetlands in the Umgeni catchment area. (2 x 1) (2)

2.5.4 Explain TWO positive impacts that the Umgeni wetlands has on the catchment area. (2 x 2) (4)

2.5.5 Suggest THREE measures that could be implemented by the local government to manage areas like the Umngeni catchment that are at risk. (3 x 2) (6)

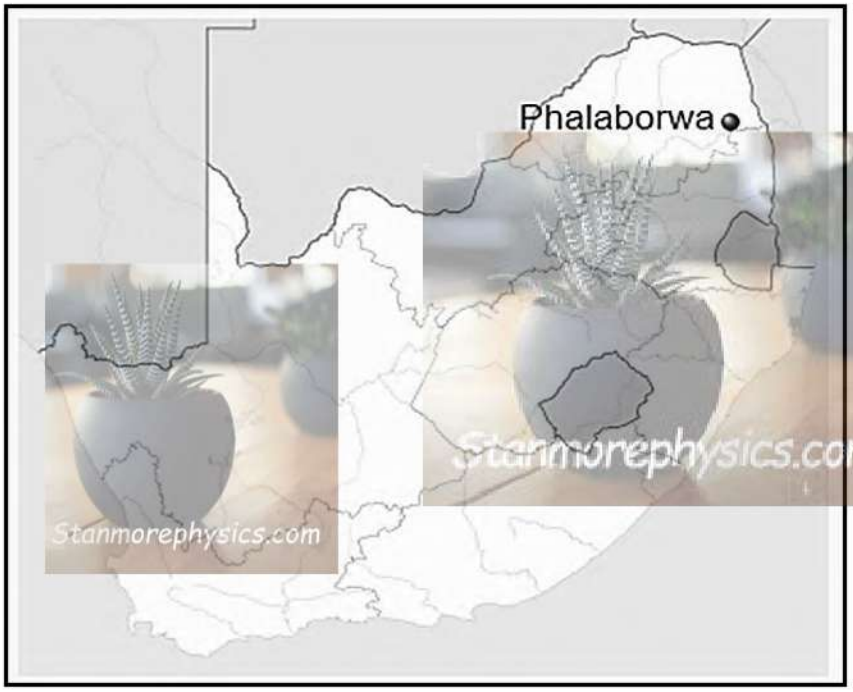
**TOTAL FOR SECTION A: [120]**

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## SECTION B

## QUESTION 3: GEOGRAPHICAL SKILLS AND TECHNIQUES

**GENERAL INFORMATION ON PHALABORWA**




Coordinates: 23°52'S; 31°04'E

Phalaborwa is a town in Limpopo province, South Africa. It is located near the confluence of the Ga-Selati River and the Olifants River, along the western border of the Kruger National Park in the Lowveld. Tourism and wildlife play dominant roles in the life of this town. Attractions, such as the Blyde River Canyon, the Three Rondavels, God's Window, Bourke's Luck Potholes and river cruises on the Olifants River, make Phalaborwa an important tourist destination in this province

[Adapted from https://en.wikipedia.org/wiki/Phalaborwa]

The following English terms and their Afrikaans translations are shown on the topographic map.

| ENGLISH | AFRIKAANS |
|---|---|
| Diggings | Uitgrawings |
| Golf course | Gholfbaan |
| River | Rivier |
| Sewerage works | Rioolwerke |
| Estate | Landgoed |
| Salt pan | Soutpan |
| Nature Reserve | Natuurreservaat |

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## 3.1 MAP SKILLS AND CALCULATIONS

3.1.1 23 in the map index 2331 CC refers to …

A. longitude
B. latitude
C. meridian
D. code (1 x 1) (1)

3.1.2 What is the difference in height between trigonometrical station 5 in block **E3** and spot height 499 in block **E4**. (1 x 1) (1)

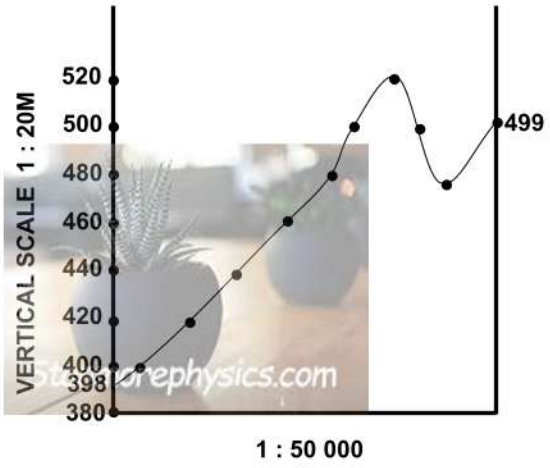
3.1.3 Calculate the straight-line distance in metres (m) between trigonometrical station 5 in block **E3** and the spot height 499 in block **E4**.

Formula: **Actual distance = Map distance x Map scale** (2 x 1) (2)

3.1.4 Use the answers to QUESTIONS 3.1.2 and 3.1.3 to calculate the average gradient between trigonometrical station 5 and spot height 499.

Formula: **Average Gradient = <u>Vertical interval</u> (VI)**
**Horizontal equivalent (HE)** (2 x 1) (2)

3.1.5 Refer to the cross-section below drawn from spot height 398 in block **E2** to spot height 499 in block **E4**.



(a) Is there intervisibility between spot 398 and spot height 499? (1 x 1) (1)

(b) Give a reason for your answer to QUESTION 3.1.7 (a). (1 x 1) (1)

(c) If the vertical scale is 1 : 2000 and the horizontal scale is 1 : 50 000, determine the vertical exaggeration of the cross section.

Formula: **Vertical exaggeration =** $\frac{\textbf{Vertical Scale}}{\textbf{Horizontal Scale}}$ (2 x 1) (2)

## 3.2 MAP INTERPRETATION

3.2.1 Feature **7** in block **B1** on the orthophoto map is a …

A. spur.
B. pass.
C. hill.
D. saddle. (1 x 1) (1)

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3.2.2 The fluvial feature at **F** in block **C5** on the topographic map is a/an …

A. catchment.
B. watershed.
C. confluence.
D. interfluve. (1 x 1) (1)

3.2.3 Refer to the river (on which feature **F** is found) in block **C5** on the topographic map.

(a) State the general direction in which this river is flowing. (1 x 1) (1)

(b) Give ONE reason for your answer to QUESTION 3.2.3 (a). (1 x 2) (2)

3.2.4 Phalaborwa receives seasonal rainfall.

(a) Identify TWO pieces of evidence from the topographic map to support the above statement. (2 x 1) (2)

(b) What impact does seasonal rainfall have on the natural vegetation around Phalaborwa? (1 x 2) (2)

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Refer to block **C1** on the orthophoto map.

3.2.5 Identify landform labelled **8.** (1 x 1) (1)

3.2.6 Give ONE reason for your answer to QUESTION 3.2.5 (1 x 2) (2)

## 3.3 GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

The orthophoto map has a high resolution.

3.3.1 Give evidence that the orthophoto map has a high resolution. (1 x 1) (1)

3.3.2 Suggest ONE way in which a high resolution orthophoto map will be of greater assistance to a map reader when examining features. (1 x 1) (1)

3.3.3 Define the term *buffering*. (1 x 2) (2)

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Refer to blocks **D2, D3** and **E2** on the topographic map.

3.3.4 Identify the feature that acts as a buffer for the river. (1 x 2) (2)

3.3.5 Explain how the feature (answer to QUESTION 3.3.4) could protect the river from the sewerage works in block **D2**. (1 x 2) (2)

**TOTAL FOR SECTION B: [30]**

**GRAND TOTAL: 150**

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