Province of the
EASTERN CAPE
EDUCATION

Iphondo leMpuma Kapa: Isebe leMfundo
Provinsie van die Oos Kaap: Department van Onderwys
Porafensie Ya Kapa Botjahabela: Lefapha la Thuto

NATIONAL SENIOR CERTIFICATE

GRADE 12



MARKS: **150**

TIME: **3 hours**

This question paper consists of 16 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, for example 1 010 hPa, 9 °C and 25 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 (3419AB CALEDON) and a 1 : 10 000 (3419 AB 24 CALEDON) orthophoto map 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.

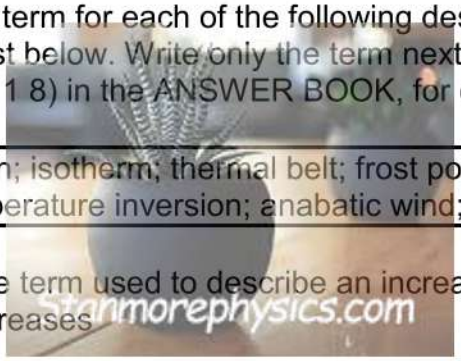
Copyright reserved

SECTION A: CLIMATE AND WEATHER AND GEOMORPHOLOGY

QUESTION 1: CLIMATE AND WEATHER

1.1 Give ONE term for each of the following descriptions by choosing the term from the list below. Write only the term next to the question numbers (1.1.1 to 1.1 8) in the ANSWER BOOK, for example 1.1.9 Plume.

sublimation; isotherm; thermal belt; frost pocket; radiation fog; advection fog; temperature inversion; anabatic wind; hygroscopic nuclei; albedo



1.1.1 The term used to describe an increase in temperature as height increases

1.1.2 Occurs when the temperature of cold air on the valley floor drops to below freezing point

1.1.3 A type of wind that result from air moving up the valley slope during the day

1.1.4 Particles of dust, smoke or salt that water vapour sticks to and condenses

1.1.5 Lines on a map connecting points having the same temperature

1.1.6 The amount of incoming solar radiation that is reflected by the earth surfaces

1.1.7 Forms at night under clear, calm conditions

1.1.8 An area where a warm air mass is trapped between the colder air mass (8 x 1) (8)

1.2 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 (1.2.1 to 1.2.7) in the ANSWER BOOK, for example 1.2.8 A.

1.2.1 The system deflects mid-latitude cyclones away from the coast in summer.

A Coastal low
B South Indian High-Pressure Cell
C South Atlantic High-Pressure Cell
D Kalahari High-Pressure Cell

1.2.2. Results in stable, fine weather with clear …

A anticyclones.
B cyclones.
C depressions.
D heat low.

1.2.3 In winter … air compress and … adiabatically which causes the inversion layer to be below the escarpment.

(i) sinking
(ii) rising
(iii) heat
(iv) cool

A (i) and (iii)
B (i) and (iv)
C (ii) and (iii)
D (ii) and (iv)

1.2.4 In a thermal low, the air in contact with the earth surface … and … towards a low-pressure centre.

(i) cools
(ii) heats
(iii) diverges
(iv) converges

A (i) and (iii)
B (i) and (iv)
C (ii) and (iii)
D (ii) and (iv)

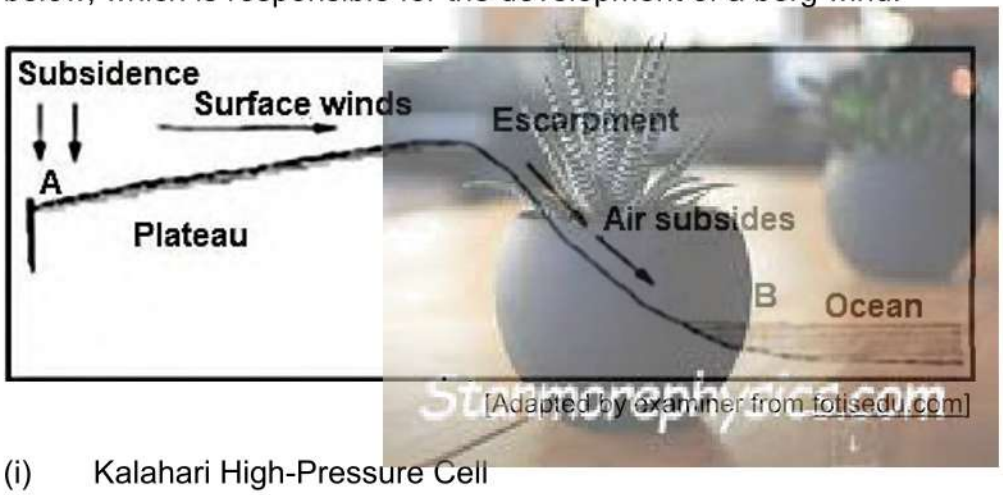
Copyright reserved

1.2.5 Onshore winds on the west coast are … with …

(i) warm and dry.
(ii) cold and dry.
(iii) no moisture.
(iv) limited moisture.

A (i) and (iii)
B (i) and (iv)
C (ii) and (iii)
D (ii) and (iv)

1.2.6 Name the pressure cells at **A** and **B** as indicated on the diagram below, which is responsible for the development of a berg wind.



(i) Kalahari High-Pressure Cell
(ii) South Indian High-Pressure Cell
(iii) Thermal low
(iv) Coastal low

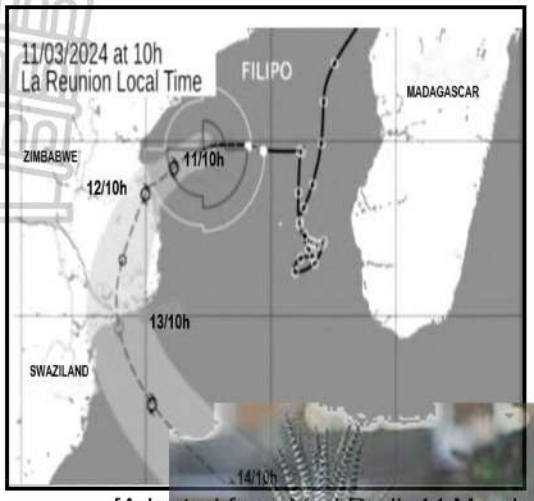
A (i) and (iii)
B (i) and (iv)
C (ii) and (iii)
D (ii) and (iv)

1.2.7 South African berg winds are warm offshore winds due to the …

A temperatures there are warmer above the plateau.
B low-pressure cell that feeds warm moist air from the interior.
C temperature of air that decreases by 1˚C per 100 m as it ascends.
D temperature of air that increases by 1˚C per 100 m as it descends. (7 x 1) (7)

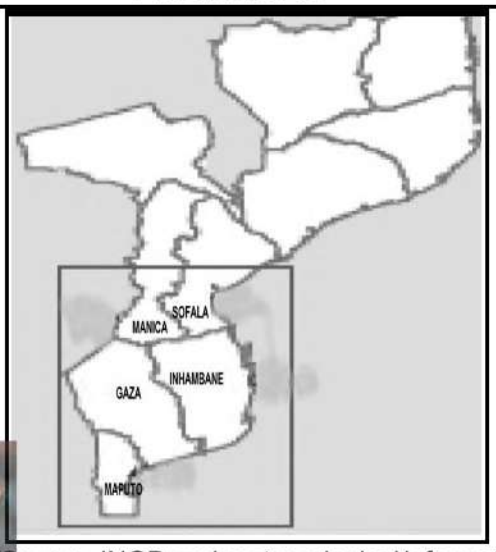
1.3 Refer to the infographic below on a Tropical Cyclone Filipo.

SATELITE IMAGE



[Adapted from Med Redl, 11 March 2024]

PROVINCES



[Source: INGD and meteorological information. Accessed on 15 March 2024.]

SITUATION OVERVIEW

The National Institute for Disaster Management (INGD) reported that 48 116 people (8 583 households) were affected in the provinces of Gaza, Inhambane, Maputo and Sofala. Two deaths and 25 people injured have been reported. According to the information available, the most affected area is Maputo city with 25 455 people affected (2 percent of total population). Damage to infrastructure includes 8 000 houses partially/ completely damaged, 146 schools (22 442 students) affected along with 51 health centres, 56 electric poles, and 19 roads. The highest humanitarian needs are in education, shelter / NFIs, water purification and hygiene kits. Infrastructure reconstruction/ rehabilitation needs have also been identified.

[Source: INGD and meteorological information. Accessed on 15 March 2024]

1.3.1 When did the Tropical Cyclone Filipo make landfall? (1 x 2) (2)

1.3.2 Describe the path of Tropical Cyclone Filipo from the 11th to the 14th. (2 x 1) (2)

Refer to the map.

1.3.3 People and households were affected by the Tropical Cyclone Filipo Filipo. Mention at least TWO provinces that were affected. (2 x 1) (2)

1.3.4 How many people were mostly affected in this region, according to the extract? (1 x 1) (1)

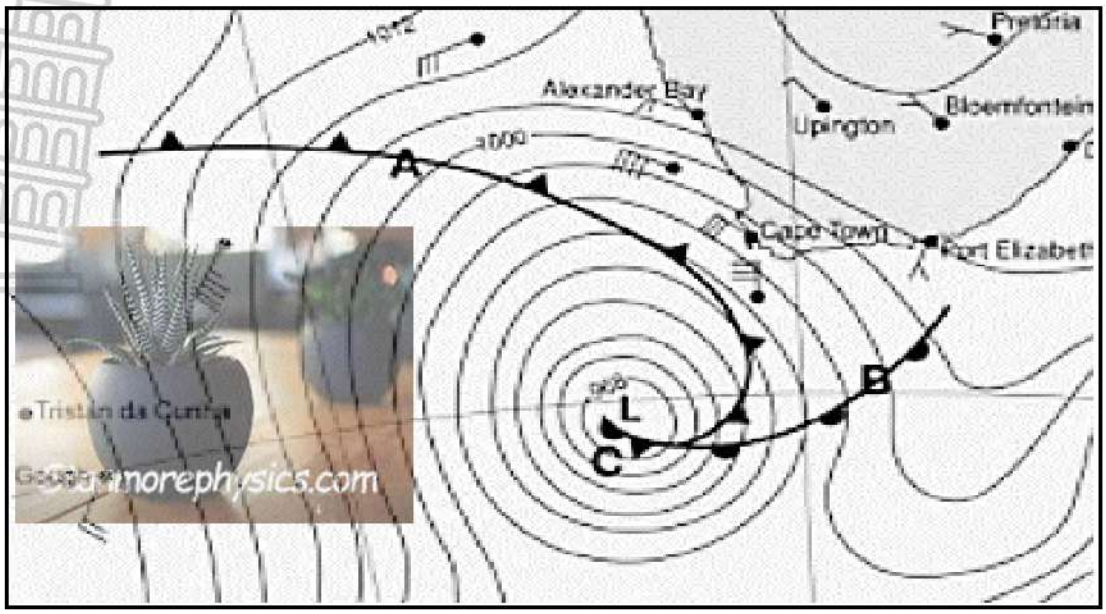
1.3.5 Identify TWO services that were most needed. (2 x 1) (2)

1.3.6 Extract TWO examples of infrastructure mentioned in the extract that have been affected by Tropical Cyclone Filipo. (2 x 1) (2)

1.3.7 Suggest measures that could be implemented by the government of Mozambique to reduce the impact of tropical cyclones. (2 x 2) (4)

Copyright reserved

1.4 Refer to the synoptic weather map portraying a mid-latitude cyclone.



[Source: http://www.wozamatric.co.za]

1.4.1 Define the term *cyclogenesis*. (1 x 2) (2)

1.4.2 Provide a suitable name for the fronts at **A** and **B**. (2 x 1) (2)

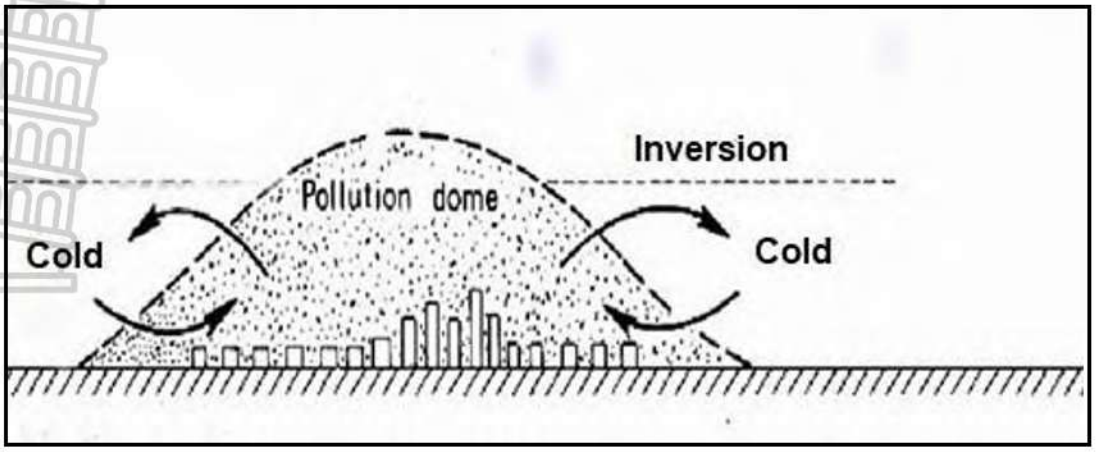
1.4.3 Give the term used to describe the change of wind direction in the Southern Hemisphere. (1 x 1) (1)

1.4.4 Explain why the wind changed from a north westerly wind to a south westerly wind in the Southern Hemisphere. (1 x 2) (2)

1.4.5 Letter **C** refers to an occluded stage.
In a paragraph of approximately EIGHT lines, describe the process that resulted in the formation of a cold and warm front occlusion.
(4 x 2) (8)

Copyright reserved

1.5 Refer to the sketch showing a pollution dome.



[Source: www.science direct.com]

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

1.5.2 Give THREE reasons why a pollution dome is common in most cities. (3 x 1) (3)

1.5.3 A pollution dome is at a lower altitude at night than during the day. Explain why this occurs. (2 x 2) (4)

1.5.4 Explain the climatological effect of a pollution dome over a city. (3 x 2) (6)

[60]

QUESTION 2: GEOMORPHOLOGY

2.1 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 Z.

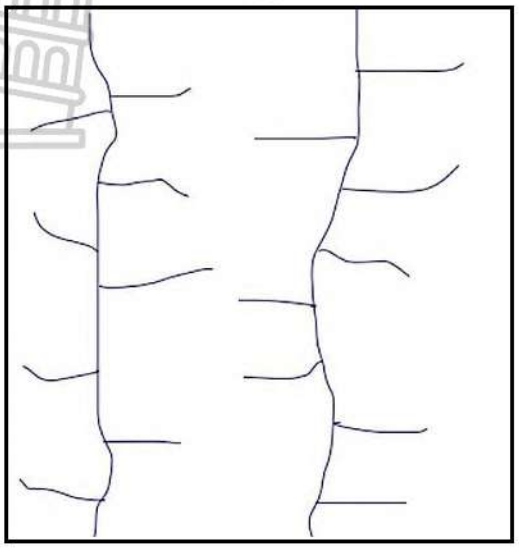
	COLUMN A		COLUMN B
2.1.1	The river is younger than the underlying rock structure through which it flows	**Y** **Z**	antecedent stream superimposed stream
2.1.2	The area through which a river system flow	**Y** **Z**	drainage basin catchment area
2.1.3	The upper limit of water that is found underground	**Y** **Z**	water table watershed
2.1.4	Rivers flow towards a central point or depression	**Y** **Z**	radial centripetal radial centrifugal
2.1.5	Lowest level to which the river can erode	**Y** **Z**	base flow base level
2.1.6	More energy is required to overcome obstacles	**Y** **Z**	turbulent flow laminar flow
2.1.7	Forms at the base of a waterfall due to the force of falling water	**Y** **Z**	knick-point plunge pool
2.1.8	Flows only after a heavy rainfall or thunderstorm	**Y** **Z**	periodic river episodic river

(8 x 1) (8)

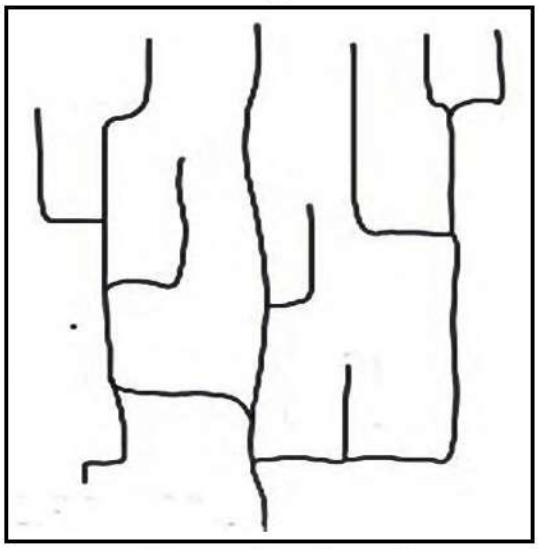
Copyright reserved

2.2 Refer to the drainage patterns below.
Match the descriptions in QUESTIONS 2.2.1 to 2.2.7 with the images **A** or **B**. Write only the letter, (**A** or **B**) next to the question numbers (2.2.1 to 2.2.7) in the ANSWER BOOK, for example 2.2.8 B.

A



B



[Source: https://www.Quora.com]

2.2.1 Tributaries join the main river at right angle.

2.2.2 There are right angle bends along the course of the main river and its tributaries.

2.2.3 This pattern occurs in folded sedimentary rocks.

2.2.4 Develops in areas where faults occur parallel to each other.

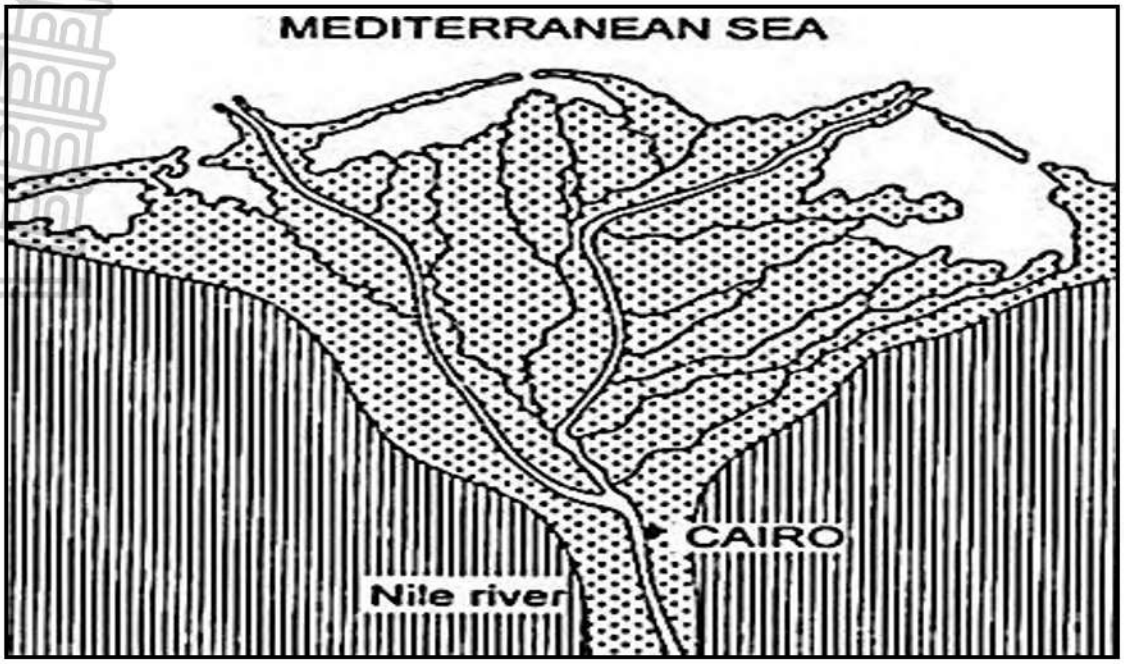
2.2.5 Forms on rocks that have many joints.

2.2.6 Tributaries are short.

2.2.7 Tributaries often flow from gaps or poorts. (7 x 1) (7)

Copyright reserved

2.3 Refer to the sketch on deltas.



[Source: Insightsonindia.com]

2.3.1 What is a *delta*? (1 x 2) (2)

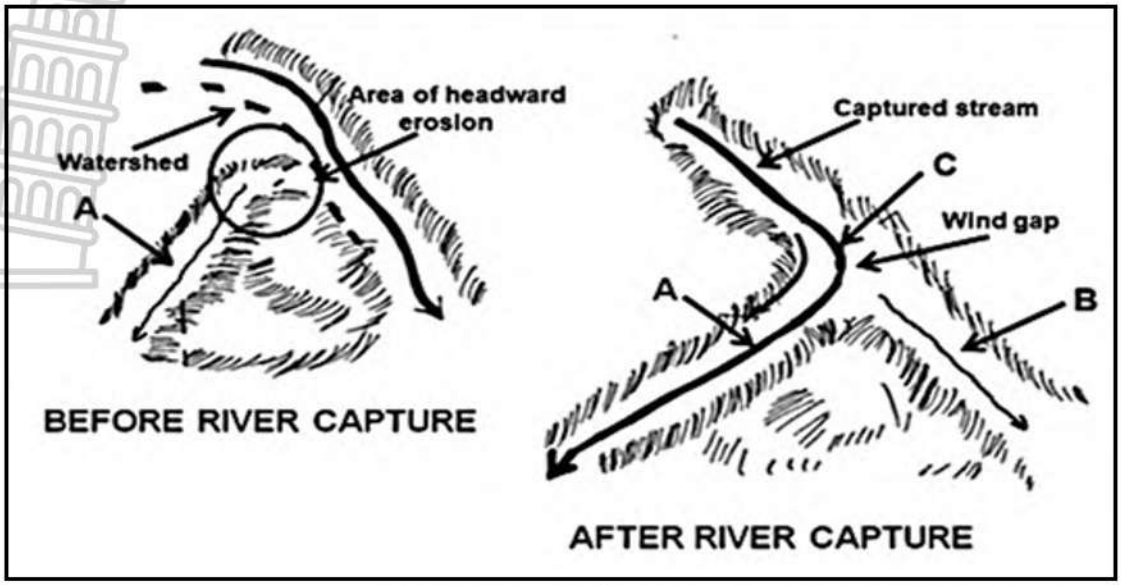
2.3.2 Name the type of delta represented in the diagram above. (1 x 1) (1)

2.3.3 How does the gradient of the slope and ocean currents influence the formation of deltas? (2 x 2) (4)

2.3.4 In a paragraph of approximately EIGHT lines, outline the importance of delta's to people on the environment. (4 x 2) (8)

Copyright reserved

2.4 Refer to the sketch on river capture.



[Adapted from https://www.google.com/search?g=river+capture]

2.4.1 Define the concept at point **C**. (1 x 2) (2)

2.4.2 (a) Identify feature **B** on the sketch. (1 x 1) (1)

(b) Briefly explain the process involved in the formation of the feature at **B**. (2 x 2) (4)

2.4.3 Provide a suitable name for the river at **A** after river capture. (1 x 1) (1)

2.4.4 Which river (**A** or **B**) is rejuvenated after river capture? (1 x 1) (1)

2.4.5 Provide a reason for your answer to QUESTION 2.4.4. (1 x 2) (2)

2.4.6 How will river capture impact the ecosystem found at **B** on the sketch? (2 x 2) (4)

Copyright reserved

2.5 Refer to the extract on the crisis looms with inadequate treated sewage.

> The latest yearly green drop report, based on the testing of 140 sewage wastewater treatment works shows that, 81% of South Africa's sewage discharge was not adequately retreated before being released into the rivers, with 19% of the treatment works meeting minimum standards, said AfriForum environment affairs adviser Manais de Vaal.
>
> The report, which was launched at the site of a broken sewage pump station in Vereeniging showed that, at a national level, at only 26 out of 140 sewage wastewater treatment works did effluent meet in the minimum standards for discharge into a water source, leaving the effluent output of 144 plants not up to standard.
>
> [Source: 15th November 2023 by Natasha Odendaal]

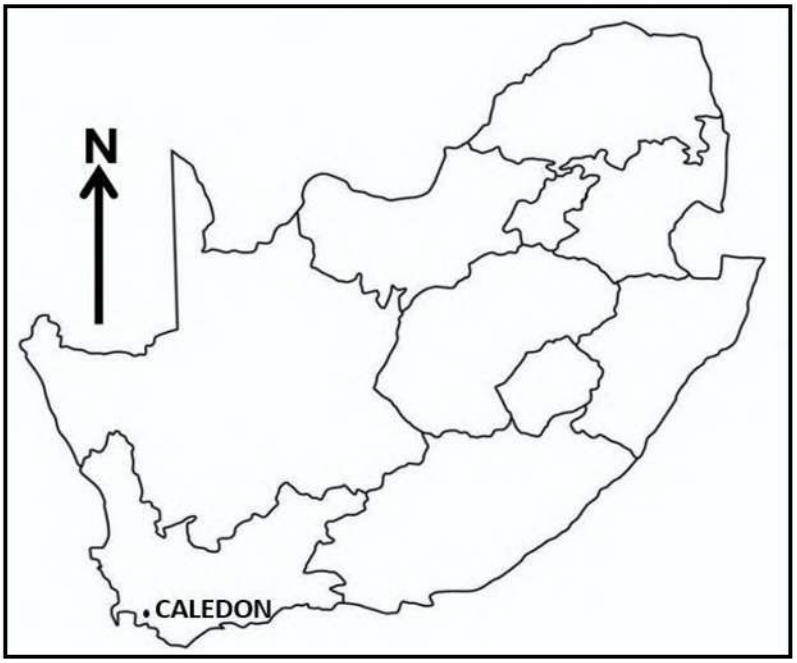
2.5.1	What percentage, evident in the extract, shows that the sewage was not adequately treated?	(1 x 1)	(1)
2.5.2	What initiated this crisis, according to the extract?	(1 x 2)	(2)
2.5.3	Quote, from the extract, the total number of treated plants that were up to a required standard.	(1 x 2)	(2)
2.5.4	Besides broken sewage pump stations, supply other factors that may have led to river pollution.	(2 x 2)	(4)
2.5.5	Suggest THREE sustainable measures that can be put in place to minimise the impact of water pollution.	(3 x 2)	(6)
			[60]

TOTAL SECTION A: 120

SECTION B

QUESTION 3: GEOGRAPHICAL SKILLS AND TECHNIQUES

GENERAL INFORMATION ON CALEDON



Co-ordinates: 34˚13' S; 19˚ 25' E

Caledon has a Mediterranean climate of warm, dry summers and cool, wet winters. Temperatures are modified by its close proximity to the South Atlantic Ocean, just over the Klein River Mountains to the south.

[Source: https://en.wikipedia.org/wiki/Caledon, Western Cape]

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

ENGLISH	AFRIKAANS
Aerodrome	Vliegveld
Canal	Kanaal
Diggings	Uitgrawings
Furrow	Voor
Golf course	Gholfbaan
Sewerage works	Rioolwerke
Show grounds	Skougronde
Waterfall	Waterval
Weir	Studam

Copyright reserved

3.1 MAPWORK SKILLS AND CALCULATIONS

3.1.1 In which province is Caledon situated? (1 x 1) (1)

3.1.2 Determine the direction of spot height 236 (south of Caledon) from Vleiview at number **8** on the orthophoto. (1 x 1) (1)

3.1.3 Give a reason why the hospital (area **2**) on the orthophoto map appears bigger than the hospital in block **E3** on the topographical map. (1 x 2) (2)

3.1.4 Study the orthophoto index map sheet north west of 3419 AB 24.

Four options are given as answers to the question below. Choose the answer and write only the letter (A–D) next to the question number (3.1.4) in the ANSWER BOOK, for example 3.1.5 A.

The orthophoto index sheet north west of 3419 AB 24 is ...

A 3419 AB 18.
B 3419 AB 19.
C 3419 AB 20.
D 3419 AB 21. (1 x 1) (1)

3.1.5 Calculate the average gradient from the benchmark in block **D6** to the trigonometrical station in block **E6**.

$$\textbf{Formula: Gradient} = \frac{\textbf{VI}}{\textbf{HE}}$$

(5 x 1) (5)

3.2 MAP INTERPRETATION

Aspect is the angle at which the sun's rays strike a slope.

3.2.1 Refer to block **D4** and **D5** on the topographic map.

How did this aspect influence the growth of vegetation in block **D4** and **D5**? (1 x 2) (2)

3.2.2 Refer to feature numbered **3** on the orthophoto map.

(a) At which time of the day (morning / noon / afternoon) was the photograph taken? (1 x 1) (1)

(b) Give a reason for your answer to QUESTION 3.2.2(a). (1 x 2) (2)

3.2.3 Give a suitable name for the drainage pattern in block **C5**. (1 x 1) (1)

3.2.4 Describe the characteristics associated with the drainage pattern in QUESTION 3.2.3. (1 x 2) (2)

3.2.5 Determine the stream order of the dendritic drainage pattern in block **A5**. (1 x 2) (2)

3.2.6 Classify the drainage density of the streams in block **A5** and block **A6**. (1 + 1) (2)

Copyright reserved

3.3 GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

Refer to the topographic map.

3.3.1 A spatial object is defined as any feature that can be recorded as a point, line or polygon.

Refer to block **D2** on the topographical map and identify the following:

(a) Natural polygon feature (1 x 1) (1)

(b) Natural line feature (1 x 1) (1)

3.3.2 Define a *data layer*. (1 x 2) (2)

3.3.3 Which data layers were considered for the dam in block **B5**? (2 x 1) (2)

3.3.4 Suggest ONE advantage of creating the buffer zone along the river in block **C1** on the topographical map. (1 x 2) (2)

[30]

TOTAL SECTION B: 30
GRAND TOTAL: 150