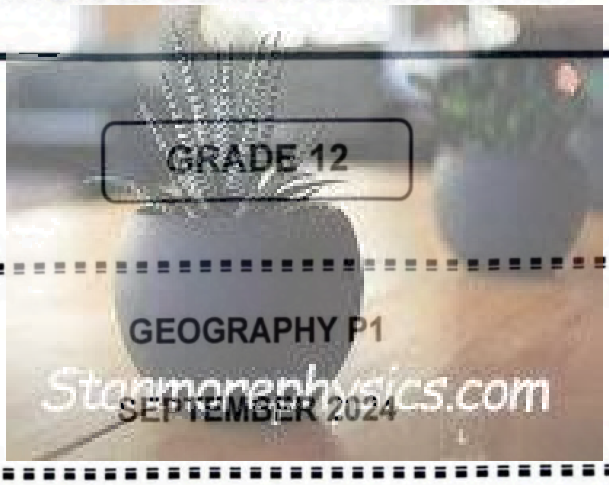
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REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE



GRADE 12

GEOGRAPHY P1

Stanmorephysics.com

SEPTEMBER 2024

MARKS: 150

TIME: 3 hours

N2781E

X05

This question paper consists of 21 pages.

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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 topographic map 3224BC GRAAFF REINET and a 1 : 10 000 orthophoto map 3224BC 01 GRAAFF REINET are provided.

15. The area demarcated in RED/BLACK on the topographical map represents the area covered by the orthophoto map.

16. Marks will be allocated for steps in calculations.

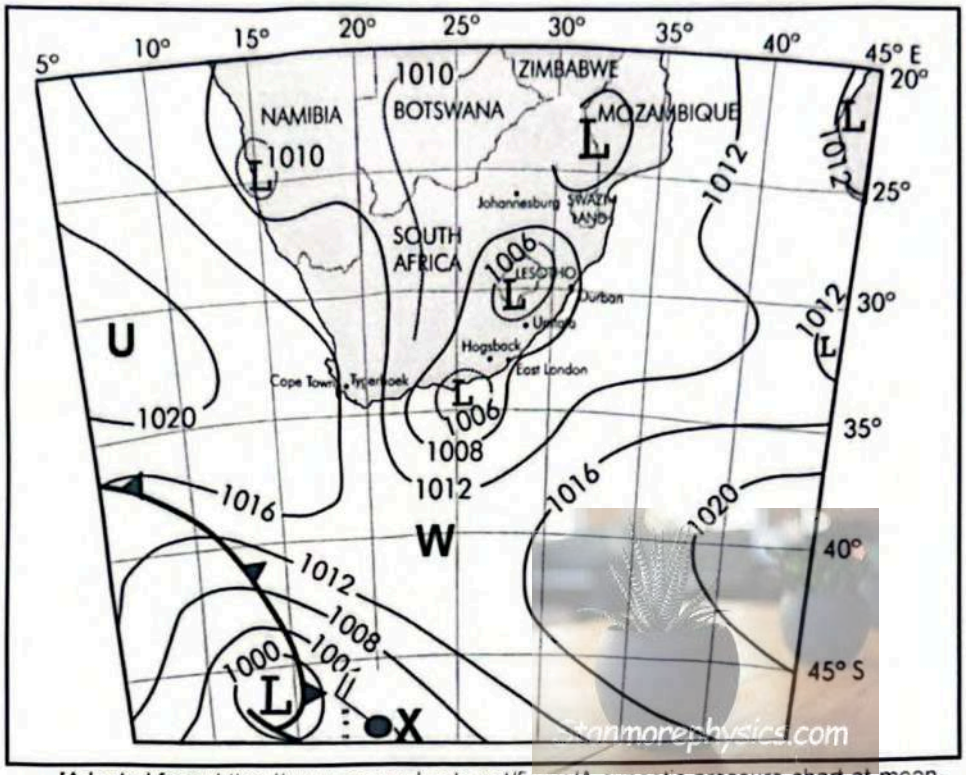
17. You must hand in the topographical and the orthophoto map to the invigilator at the end of this examination session.

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SECTION A: CLIMATE AND WEATHER AND GEOMORPHOLOGY

QUESTION 1: CLIMATE AND WEATHER

1.1 Refer to the weather map below. Complete the statements in COLUMN A with the options in COLUMN B. Write only **Y** or **Z** next to the question numbers (1.1.1 to 1.1.7) in the ANSWER BOOK, e.g. 1.1.8 Z.



[Adapted from: https://www.researchgate.net/figure/A-synoptic-pressure-chart-at-mean-sea- level-basedonSouth African-Weather-Bureau-records_fig2_255654239]

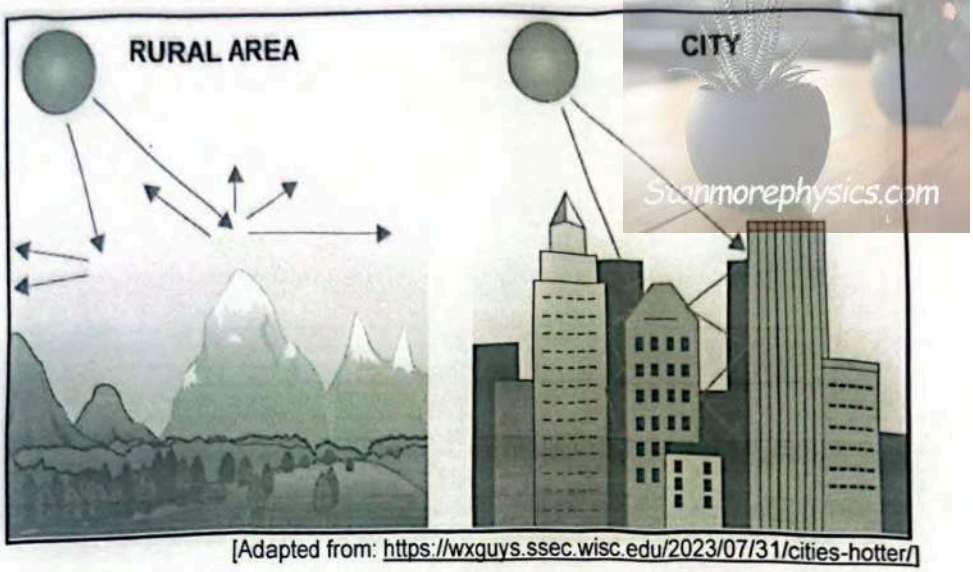
COLUMN A	COLUMN B
1.1.1 The synoptic map above represents the ... season.	**Y** winter **Z** summer
1.1.2 The weather station model at **X** is in the ...	**Y** cold sector **Z** warm sector
1.1.3 The temperature in Lesotho will most probably be ...	**Y** high **Z** low
1.1.4 The area of constant pressure between two highs and two lows at **W** is called ...	**Y** saddle **Z** ridge
1.1.5 The pressure cell found at **U** is the south ... high pressure cell.	**Y** Indian **Z** Atlantic
1.1.6 The pressure reading at the Cut-off low in Mozambique is ... hPa.	**Y** 1010 **Z** 1008
1.1.7 The wind direction from **U** to **X** will most likely be in a ... direction.	**Y** south easterly **Z** north westerly

(7 x 1) (7)

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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 1.2.8) in the ANSWER BOOK, e.g. 1.2.9 A

Refer to the photo below illustrating the rural area and the city to answer QUESTIONS 1.2.1 to 1.2.4.



[Adapted from: https://wxguys.ssec.wisc.edu/2023/07/31/cities-hotter/]

1.2.1 Evapotranspiration is ... in the rural areas because open spaces reflect ... energy out to space.

(i) higher
(ii) lower
(iii) solar
(iv) terrestrial

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

1.2.2 Cities experience less wind circulation because ...

A buildings are tall.
B buildings have more glass.
C buildings are of darker materials.
D buildings are built of concrete.

1.2.3 This is NOT a reason for the development of the heat island.

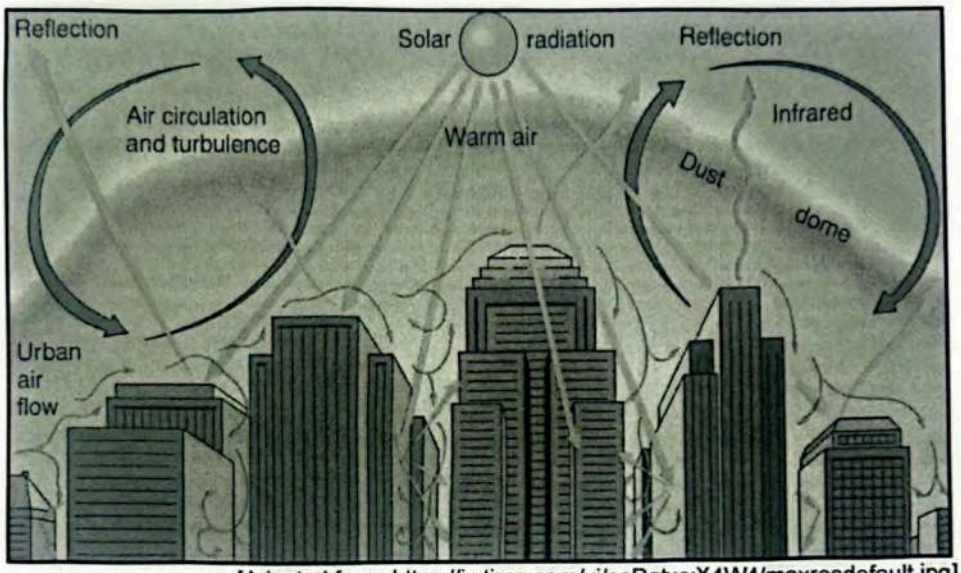
A artificial surface materials
B artificial sources of heat
C density of bulidings
D aspect

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1.2.4 The pressure gradient that exists between the rural area and the city is mainly because of ...

A high pressure in the city.
B low pressure in the rural area.
C high pressure in the rural area.
D high temperature in the rural area.

Refer to the diagram below showing the pollution dome to answer QUESTIONS 1.2.5 to 1.2.8.



[Adapted from: https://i.ytimg.com/vi/saRgtwxX4W4/maxresdefault.jpg]

1.2.5 The ... is/are responsible for the reduced insolation in the city.

A pollution dome/s
B tall buildings
C sun
D reflection

1.2.6 The pollution dome expands during the day mainly because of ...

A more human activities.
B cloud cover.
C heat island.
D evaporation.

1.2.7 The main cause of the dome in the diagram above is ...

A warm air.
B dust.
C urban air flow.
D infrared.

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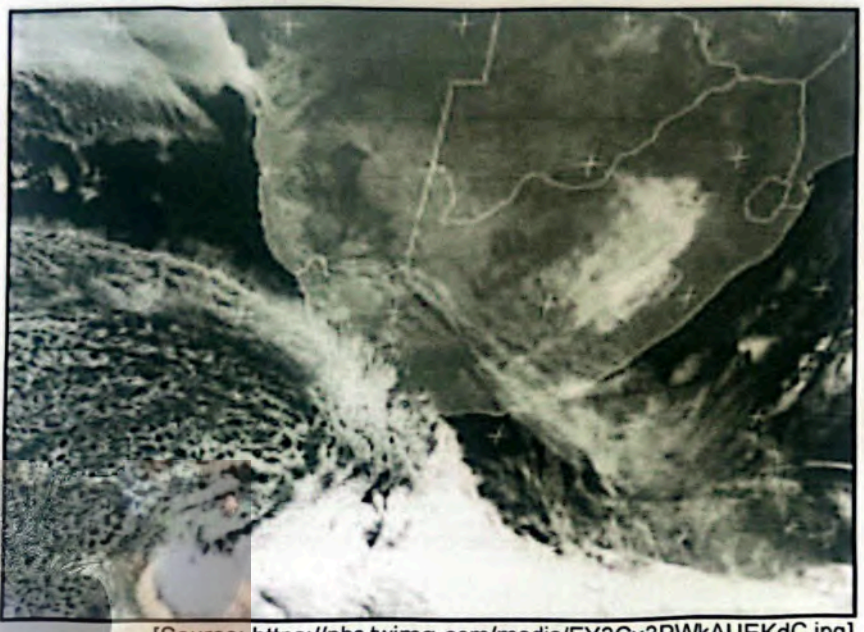
1.2.8 The pollution dome is strongly developed at/during the ... due to ...

(i) day
(ii) night
(iii) cooler tempratures and subsiding air
(iv) increased tempratures and rising air

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

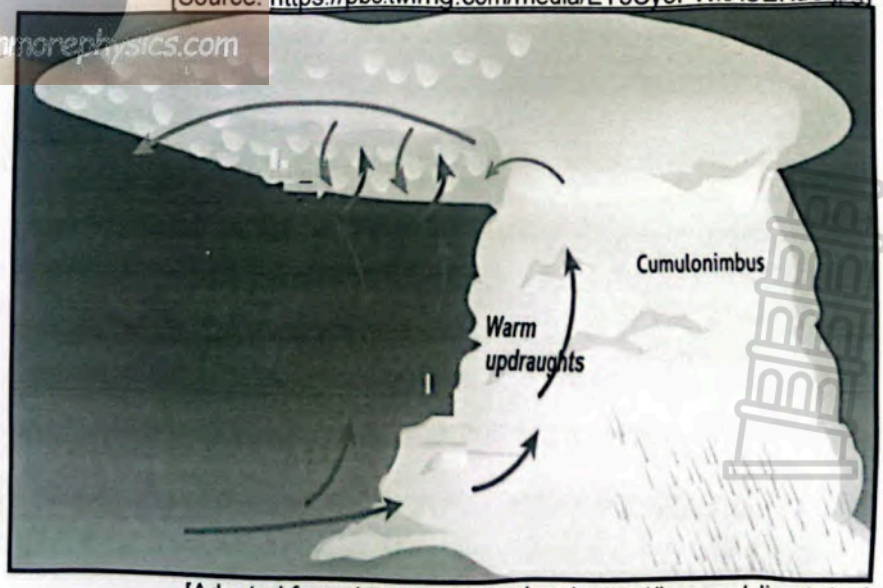
(8 x 1) (8)

1.3 Refer to the satellite image and the photo below on mid-latitude cyclones.



[Source: https://pbs.twimg.com/media/EY3Cy3PWkAUEKdC.jpg]

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[Adapted from: https://webstockreview.net/images/clipart-cloud cumulonimbus-cloud-17.png]

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1.3.1 Identify the front in the Mid-latitude cyclone that will lead to the development of cumulonimbus clouds. (1 x 1) (1)

1.3.2 Briefly explain how cumulonimbus clouds are formed. (1 x 2) (2)

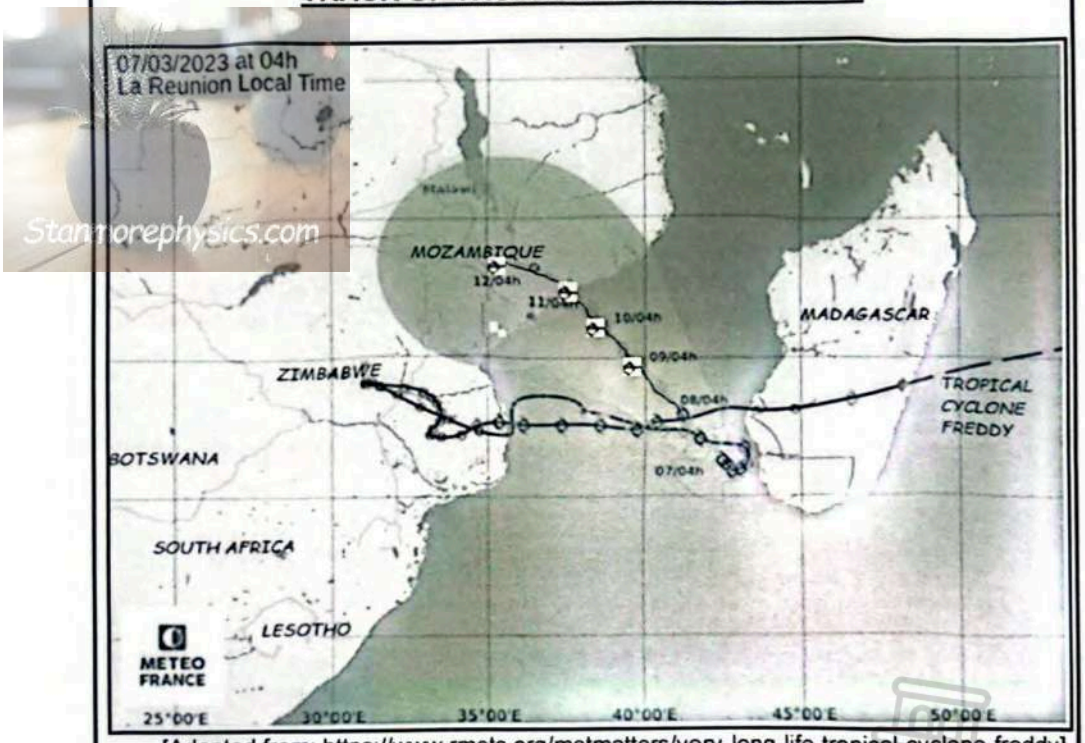
1.3.3 Draw a sketch map to illustrate the satellite image. (2 x 1) (2)

1.3.4 How will the Cumulonimbus clouds change the weather of Cape Town? (2 x 2) (4)

1.3.5 Explain how the cumulonimbus clouds can be expected to increase the water levels in the Western Cape. (3 x 2) (6)

1.4 Refer to the infographic below on Tropical cyclone Freddy.

TRACK OF TROPICAL CYCLONE FREDDY



[Adapted from: https://www.rmets.org/metmatters/very-long-life-tropical-cyclone-freddy]

Record-breaking Tropical Cyclone Freddy

According to the National Oceanic and Atmospheric Administration, no tropical cyclones had taken such a path across the Indian Ocean in the past two decades. On March 7, Freddy became the longest-lived tropical cyclone ever recorded and was at that time officially Earth's most energetic storm ever observed.

Cyclone Freddy made landfall on Madagascar's eastern coast, near Mananjary, on February 21. Freddy then moved across the Mozambique Channel and made landfall in Mozambique's Inhambane province on February 24. Cyclone Freddy made its third landfall in total and its second

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landfall in Mozambique on March 11 in Zambézia province, with maximum winds of almost 92 miles per hour (148 kilometers per hour). Freddy moved over land as a tropical depression, with a localized center close to the border between Mozambique and the southern tip of Malawi, a landlocked country. Although the system dissipated, it still generated intense rainfall in the interior of Mozambique and southern Malawi.

[Adapted from: https://disasterphilanthropy.org/disasters/tropical-cyclonefreddy/]

1.4.1 State the direction of tropical cyclone Freddy across the Mozambique channel towards Mozambique as shown on the map. (1 x 1) (1)

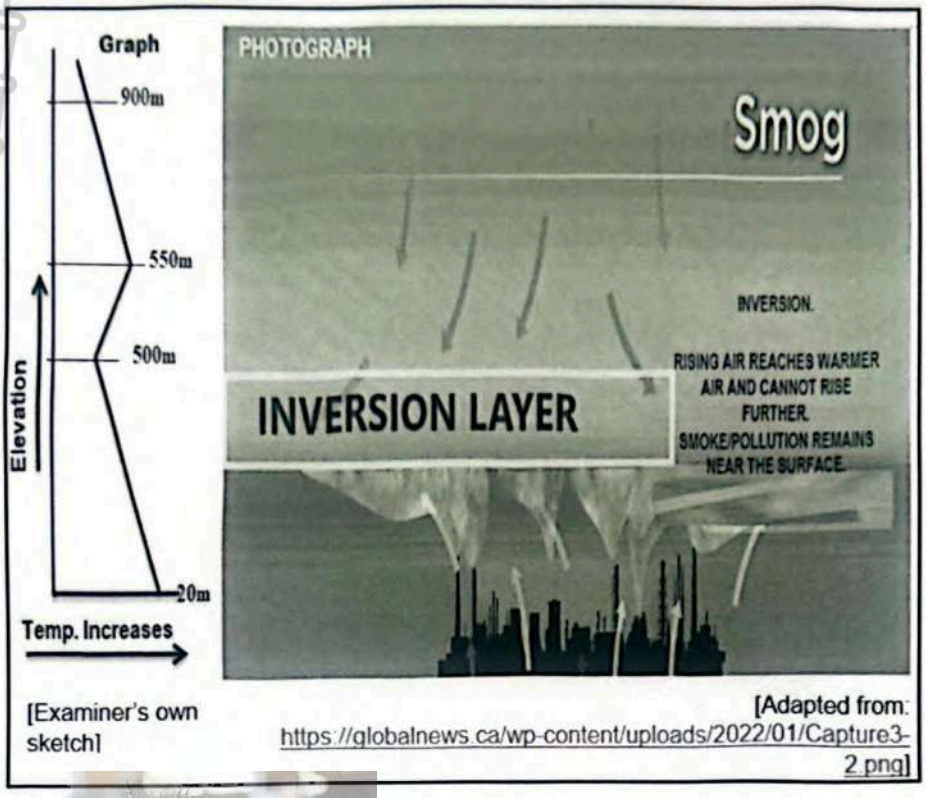
1.4.2 In the text, (third paragraph), tropical cyclone Freddy is regarded as a tropical depression.

a) On what basis has it been classified as a tropical depression? (1 x 2) (2)

b) What impact will wind traveling at 148km/h velocity (speed) have on the natural vegetation in Mozambique? (2 x 2) (4)

1.4.3 The map depicts an erratic (unpredictable) path of a tropical cyclone, Freddy. In a paragraph of approximately EIGHT lines, give possible reasons for the erratic path it followed and why this creates problems for disaster management teams to effectively manage the impact of tropical cyclones. (4 x 2) (8)

1.5 Refer to the diagram below showing the Inversion layer.



[Examiner's own sketch]

[Adapted from: https://globalnews.ca/wp-content/uploads/2022/01/Capture3-2.png]

1.5.1 Define the concept *inversion layer*. (1 x 2) (2)

1.5.2 State THREE conditions favourable for the formation of the inversion layer. (3 x 1) (3)

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1.5.3 Give a reason for the trapped smoke/pollution near the surface. (1 x 2) (2)

1.5.4 Study the graph above and describe the sequence of changes of temperature with altitude. (2 x 2) (4)

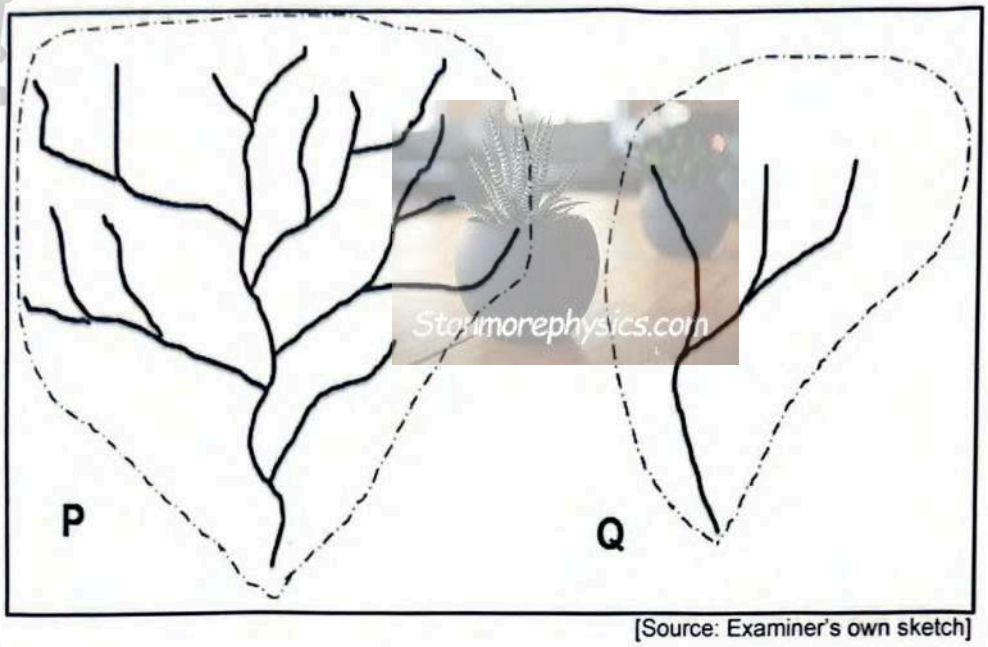
1.5.5 Explain how the trapped smoke/pollution will negatively impact on the health of the people. (2 x 2) (4)

[60]

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QUESTION 2: GEOMORPHOLOGY

2.1 Refer to drainage basins **P** and **Q** below which have different drainage densities. Match the descriptions in QUESTIONS 2.1.1 to 2.1.5 with **P** and **Q**. Write only **P** or **Q** next to the question number (2.1.1 to 2.1.8) in the ANSWER BOOK, e.g. 2.1.9 **Q**



[Source: Examiner's own sketch]

2.1.1 Dense vegetation cover that prevents surface run-off

2.1.2 A drainage basin that experiences high rainfall

2.1.3 A drainage basin that has mainly clay soils

2.1.4 A drainage basin that has mainly permeable rock

2.1.5 Rivers in this drainage basin flow through hilly areas

2.1.6 A drainage basin that has porous rock with sandy soils

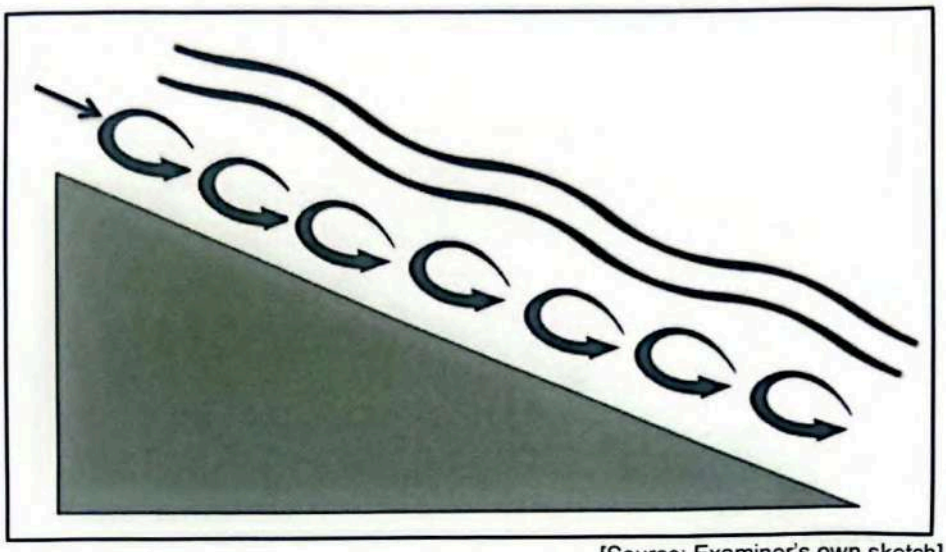
2.1.7 A drainage basin found in gently sloping land

2.1.8 A drainage basin with the highest stream order (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 D.

Refer to the sketch below showing the flow pattern of a river to answer QUESTIONS 2.2.1 to 2.2.3.



[Source: Examiner's own sketch]

2.2.1 This flow pattern takes place in the … of the river.

A lower course
B upper course
C floodplain
D meander

2.2.2 The velocity of the river experienced in this flow pattern is … as a result of … gradient.

(i) low
(ii) high
(iii) gentler
(iv) steeper

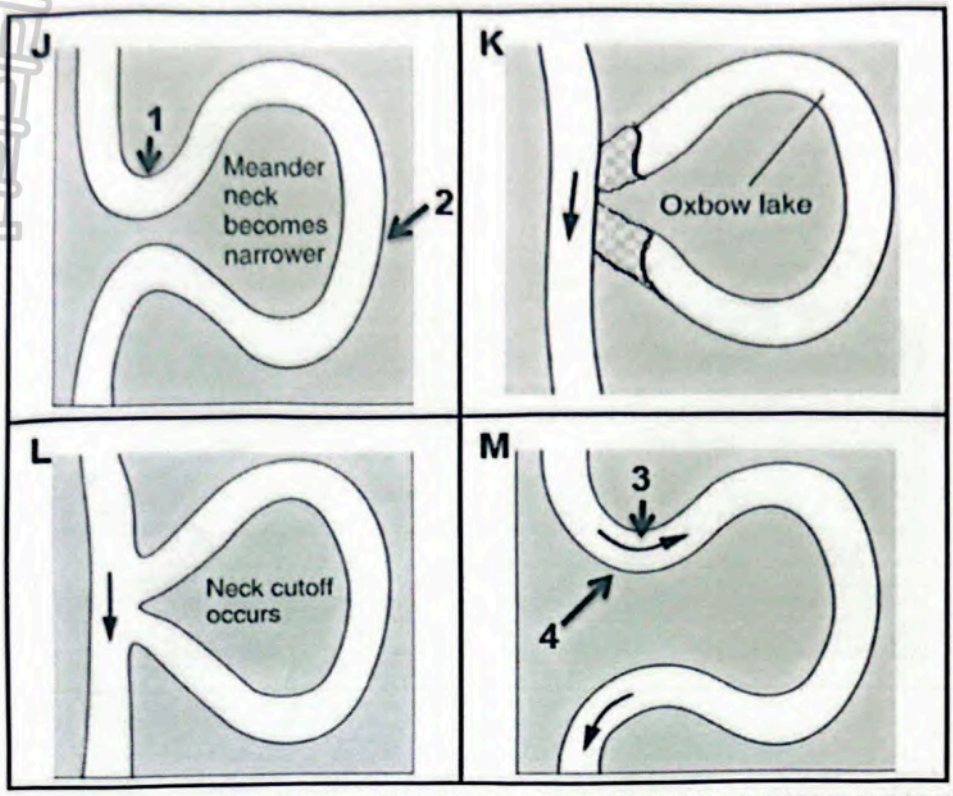
A (iii) and (ii)
B (ii) and (iv)
C (i) and (iii)
D (i) and (iv)

2.2.3 The flow pattern illustrated in the figure is a … pattern.

A dendritic
B turbulent
C laminar
D trellis

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Refer to the diagram below showing the process in the formation of an ox-bow lake to answer QUESTIONS 2.2.4 to 2.2.7.



[Adapted from: https://riversandwaterfalls.weebly.com/meanders.html]

2.2.4 The process in the formation of an ox-bow lake is represented as …

A M, J, L, K.
B M, L, K, J.
C J, K, L, M.
D L, M, J, K.

2.2.5 The meander feature found at **2** is a …

A meander neck.
B meander loop.
C meandering.
D meamnder scar.

2.2.6 **4** represents the outer bank of the meander/bend which is called …

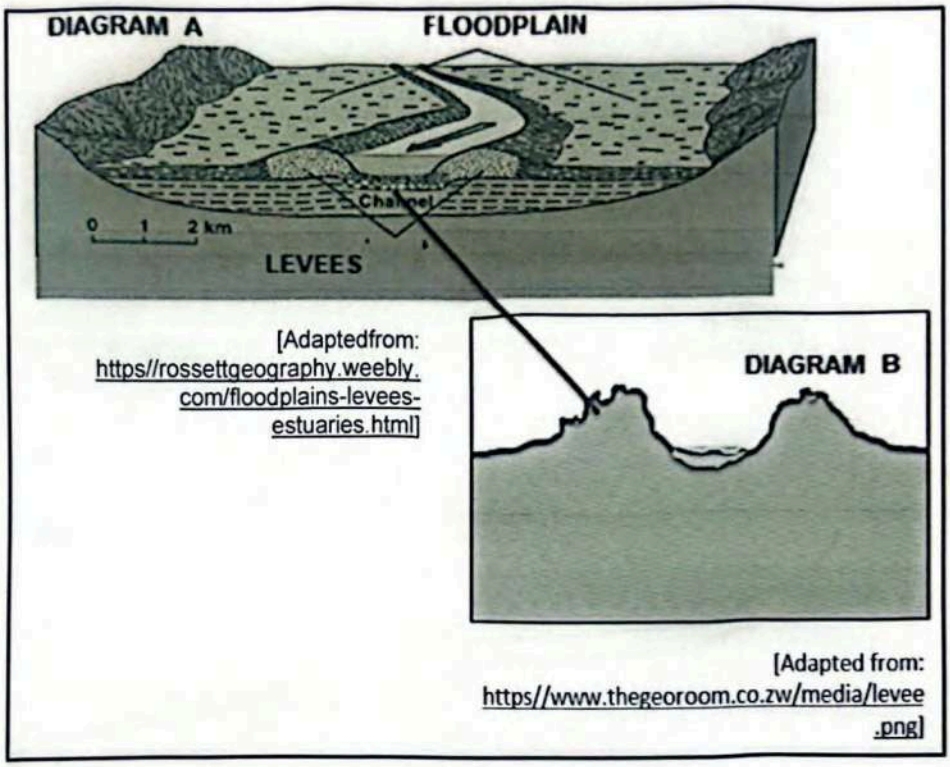
A convex bank.
B slip-off bank.
C undercut bank.
D inner bank.

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2.2.7 The river flow at **3** ... and ... takes place.

A slows down; erosion
B slows down; deposition
C increases; erosion
D increases; deposition (7 x 1) (7)

2.3 Refer to DIAGRAM A and DIAGRAM B on fluvial landforms below.



[Adaptedfrom: https//rossettgeography.weebly.com/floodplains-levees-estuaries.html]

[Adapted from: https//www.thegeoroom.co.zw/media/levee.png]

2.3.1 Define the geographical term *floodplain*. (1 x 2) (2)

2.3.2 DIAGRAM **B** indicates the enlarged part of the levee in DIAGRAM **A**.

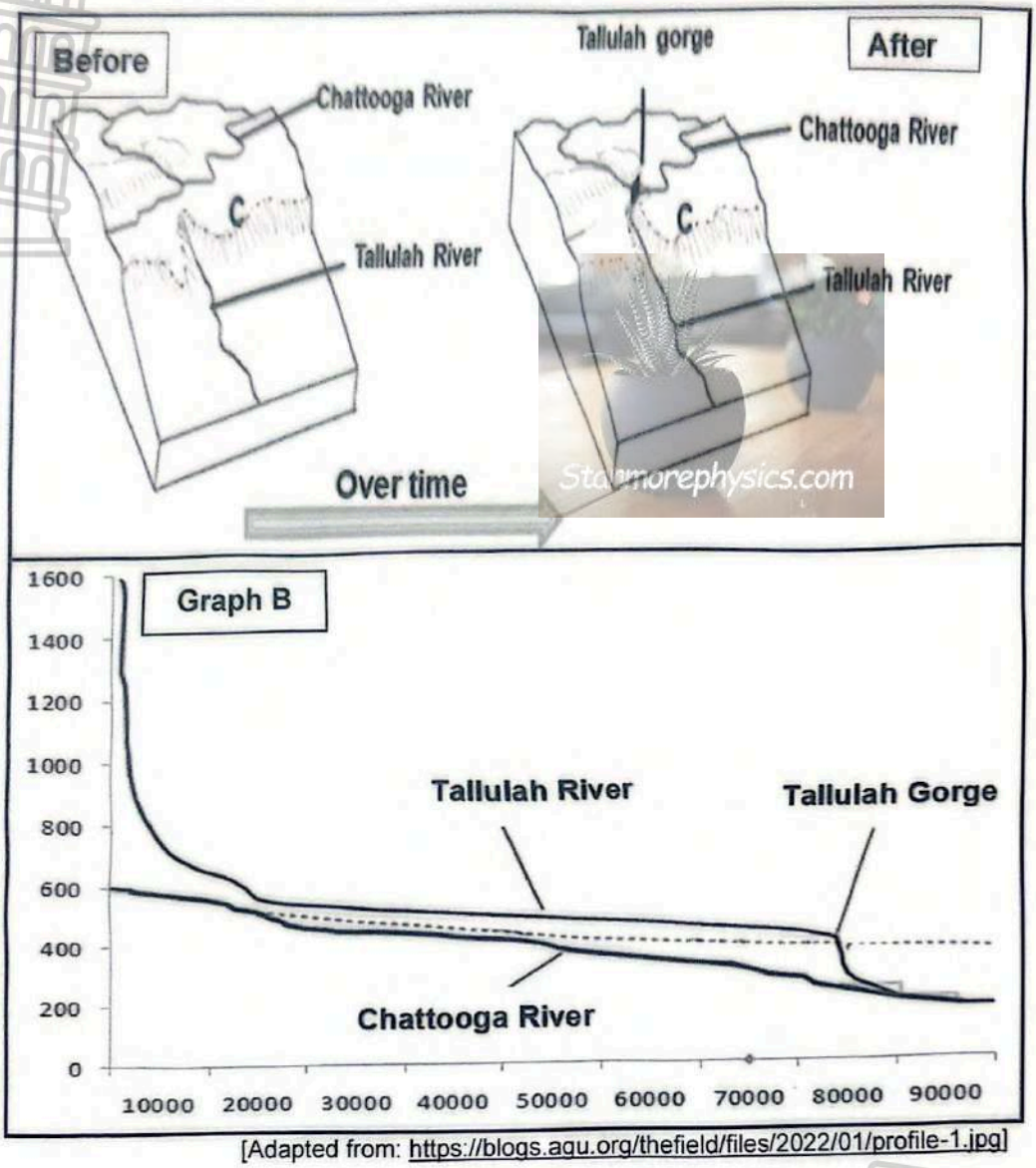
a) What type of profile is shown here? (1 x 1) (1)

b) Explain how and why the dimensions (shapes) of the river valley, illustrated in DIAGRAM **B** (width and depth), will change once rejuvenation occurs. (2 x 2) (4)

c) Briefly describe the process in the formation of the natural levee in DIAGRAM **B**. (4 x 2) (8)

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2.4 Refer to the infographic below on the processs of river capture.



[Adapted from: https://blogs.agu.org/thefield/files/2022/01/profile-1.jpg]

2.4.1 Which river between Tallulah River and Chattooga River is a captured stream? (1 x 1) (1)

2.4.2 Refer to Graph **B** above and determine the height of the Tallulah gorge. (1 x 2) (2)

2.4.3 Draw a sketch to illustrate the area after river capture has taken place. Clearly indicate the following land forms: watershed; wind gap and the misfit stream. (4 x 1) (4)

2.4.4 Name and explain the fluvial landform that will develop at Tallulah gorge. (2 x 2) (4)

2.4.5 The divide at **C** is migrating upstream. Explain how this occurs. (2 x 2) (4)

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2.5 Refer to the extract below on strategies to manage catchment areas.

Water Availability and Uses at the National and Regional Level

Water use in South Africa is determined by conditions of climate, geography and history. Water is generally scarce with a mean annual rainfall that ranges from 301 mm/annum in the Karoo Region to 815 mm/annum in the Eastern Coastal Region. Rainfall in South Africa is highly seasonal and variable, especially in the more arid areas where unpredictable droughts occur.

The total surface runoff is only 50,150 m^3/annum with 60% of this arising from only 20% of the land area. Most of the larger rivers draining the country are shared by one or more neighboring states. And due to streamflow variability the estimated maximum yield is 33,290 Mm^3/annum.

Groundwater in South Africa is scarce, although it has played a key role in the settlement and initial development of the country. In rural areas today, groundwater is still of great importance.

The total water use for 2022 was estimated as 20,045 Mm^3/a with the following distribution categories of uses:

· Irrigation	54%
· Environment	19%
· Domestic and Urban	11%
· Mining and large industries	8%
· Afforestation	8%

In South Africa the term "afforestation" refers to forestation, or the growing of trees on a piece of land.

The natural scarcity of water is also aggravated for the following reasons: most of the main metropolitan areas and industrial growth centers have developed around mineral deposit and harbor sites, and are situated far from river courses.

Some of the irrigation developments were originally established in regions where water was still relatively abundant, but now water has become scarce in those regions; and in several catchment areas the water requirements far exceed availability.

[Adapted from: https://www.fao.org/3/x9419e/x9419e08.htm]

2.5.1 What is the minimum mean annual rainfall in the Karoo Region of South Africa? (1 x 1) (1)

2.5.2 Define the concept *ground water*. (1 x 2) (2)

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2.5.3 Elaborate on how afforestation(growing of trees) and rainfall will influence ground water levels. (2 x 2) (4)

2.5.4 Describe the relationship between afforestation and the amount of ground water. (2 x 2) (4)

2.5.5 Explain how human activities impact negatively on the quality of ground water. (2 x 2) (4)

[60]

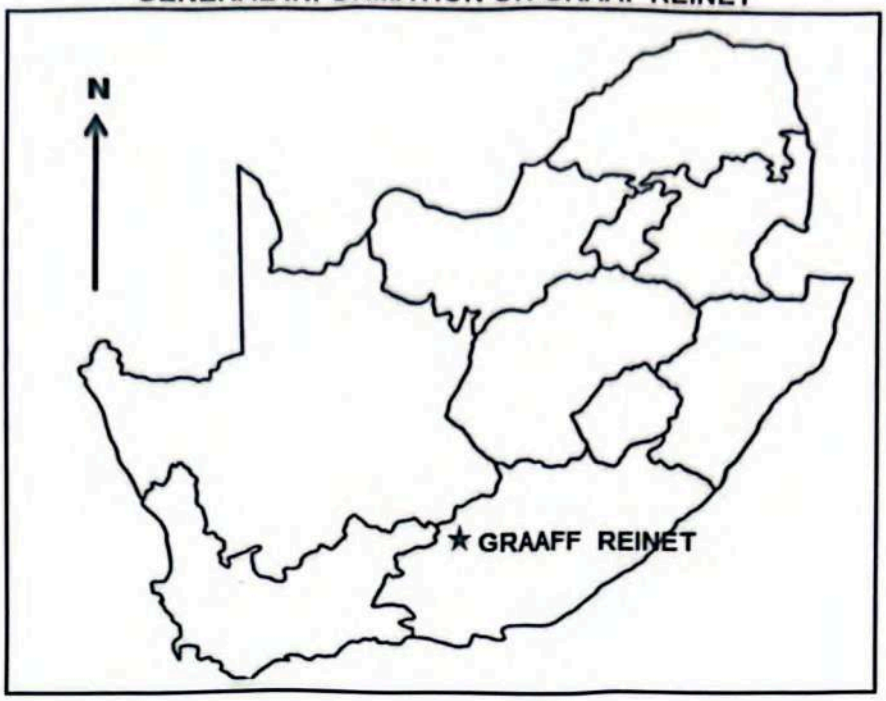
TOTAL SECTION A: 120

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SECTION B

QUESTION 3: GEOGRAPHICAL SKILLS AND TECHNIQUES

GENERAL INFORMATION ON GRAAF REINET



Coordinates: 32° 15′ S, 24° 32′ E

Graaff-Reinet is a town in the Eastern Cape Province of South Africa. It is the oldest town in the province. It is also the sixth-oldest town in South Africa,after CapeTown, Stellenbosch, Simon'sTown, Paarl and Swellendam.

The town lies 750 metres (2,460 ft) above sea level and is built on the banks of the Sundays River, which rises a little further north on the southern slopes of the Sneeuberge, and splits into several channels here.

The town is home to a number of tourist attractions, including the Dutch Reformed Church in the town, which is a prominent stone building with seating to accommodate 1 500 people. The town is also home to tourist sites such as The Valley of Desolation, Camdeboo National Park and the Reinet House Museum, a Cape Dutch building, formerly the Dutch Reformed Church parsonage.

[Adapted from: https://en.wikipedia.org/wiki/Graaff-Reinet

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

ENGLISH	AFRIKAANS
Diggings	Delwerye
Furrow	Voor
Golf course	Gholfbaan

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River | Rivier
Sundays River | Sondagrivier

3.1 MAP SKILLS AND CALCULATIONS

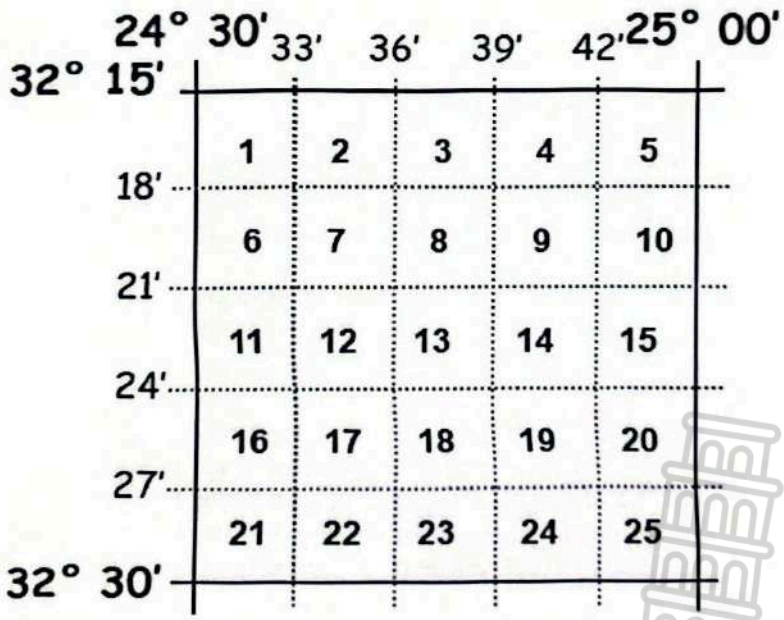
3.1.1 The national road passing through Graaff Reinet is …

A N1.
B N3.
C N9.
D N2. (1 x 1) (1)

3.1.2 The geographical feature/landform represented by line **L** on the topographic map is a …

A valley.
B saddle.
C mesa.
D poort. (1 x 1) (1)

3.1.3 The map index to the orthophoto mapsheet south of the photographed area is …



A 21.
B 6.
C 1.
D 11. (1 x 1) (1)

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3.1.4 Given the difference in years for the magnetic declination on the map as 15 years, determine the total annual change. (2 x 1) (2)

3.1.5 Use the answer to QUESTION 3.1.4 to calculate current magnetic declination. (2 x 1) (2)

3.1.6 Use the answers to QUESTION 3.1.5 to calculate the magnetic bearing of the communication tower in blocks **G3; G4** from spot height 821 in block **G2**.

Formula: **MB = TB + MD** (3 x 1) (3)

3.2 MAP INTERPRETATION

3.2.1 Graaff Reinet is situated in a depression made by the surrounding mountains.

a) These winds are most likely to blow during the night.

A Monsoon
B Katabatic
C Anabatic
D Westerlies (1 x 1) (1)

Refer to the topographical map.

b) The Sundays River is a (perennial/non-perennial) river. (1 x 1) (1)

c) Mention the type of soil at **M** on the topographic map. (1 x 1) (1)

Refer to the orthophoto map.

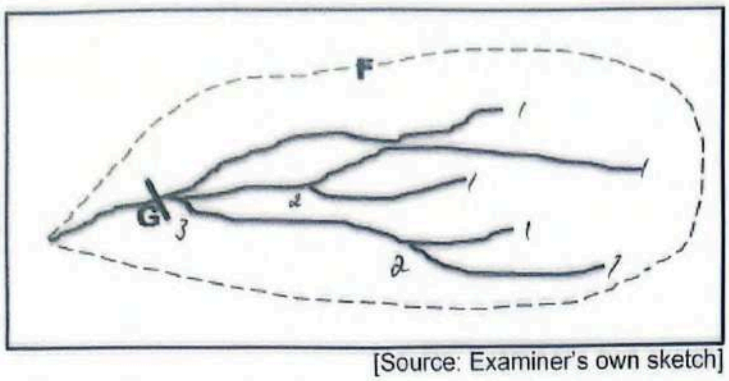
3.2.2 Explain why Graaff Reinet is vulnerable to flooding. (1 x 2) (2)

3.2.3 Give the drainage pattern that develops as water flows from Spandaukop in block **D2/3**. (1 x 1) (1)

3.2.4 Account for your answer in QUESTION 3.2.3. (1 x 2) (2)

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3.2.5 The sketch below represents the area of blocks **E8** to **E10** and **F8** to **F10**.



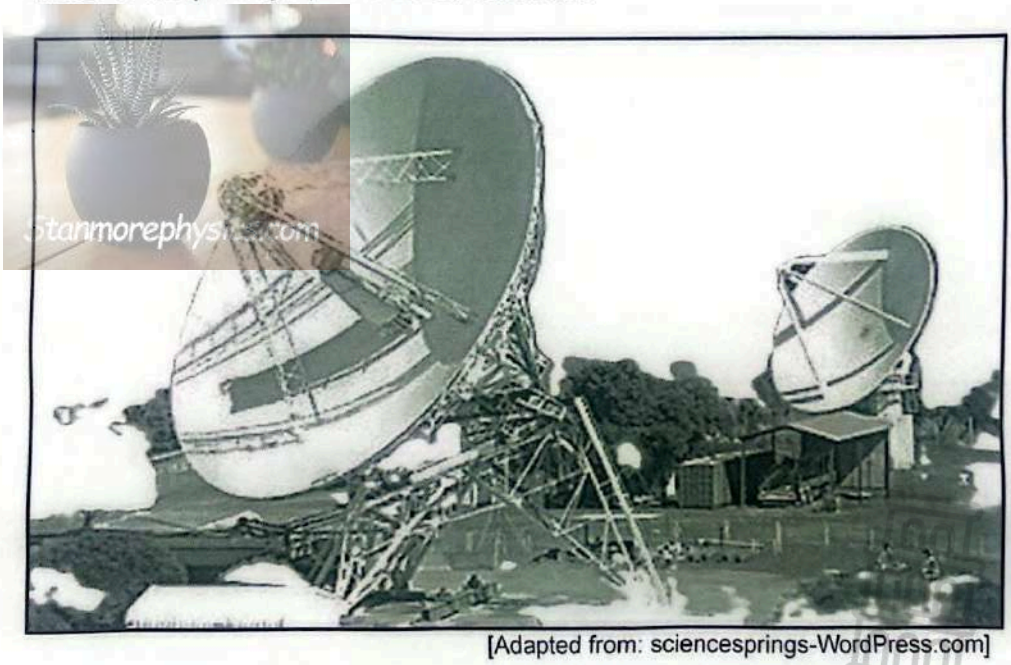
[Source: Examiner's own sketch]

a) The feature **F** is a watershed. What is a *watershed*? (1 x 2) (2)

b) Determine the stream order at **G**. (1 x 2) (2)

3.3 GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

Refer to the photograph below on satellites.



[Adapted from: sciencesprings-WordPress.com]

3.3.1 Satellite images are stored in (digital /analogue) form, making them very useful for GIS. (1 x 1) (1)

3.3.2 A satellite image that shows weather patterns is called ...

A landsat.
B meteosat.
C geostationary.
D remote sensing (1 x 1) (1)

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3.3.3 A group of learners have to conduct research on the Spandaukop conical hill. They are required to use both primary and secondary sources of information.

a) Is Spandaukop on the topographic map in block **D2**, a primary or secondary data? (1 x 1) (1)

b) Suggest a method that they can use to gather primary information. (1 x 1) (1)

c) Discuss TWO disadvantages of using secondary sources of data. (2 x 2) (4)

TOTAL SECTION B: 30
GRAND TOTAL: 150

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