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Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2023

GEOGRAPHY P1

MARKS: 150

TIME: 3 hours

This question paper consists of 19 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.

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 1 020 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 (3224BC GRAAFF-REINET (SOUTH) and a 1 : 10 000 orthophoto map (3224 BC 1 GRAAFF-REINET) 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: CLIMATE AND WEATHER AND GEOMORPHOLOGY

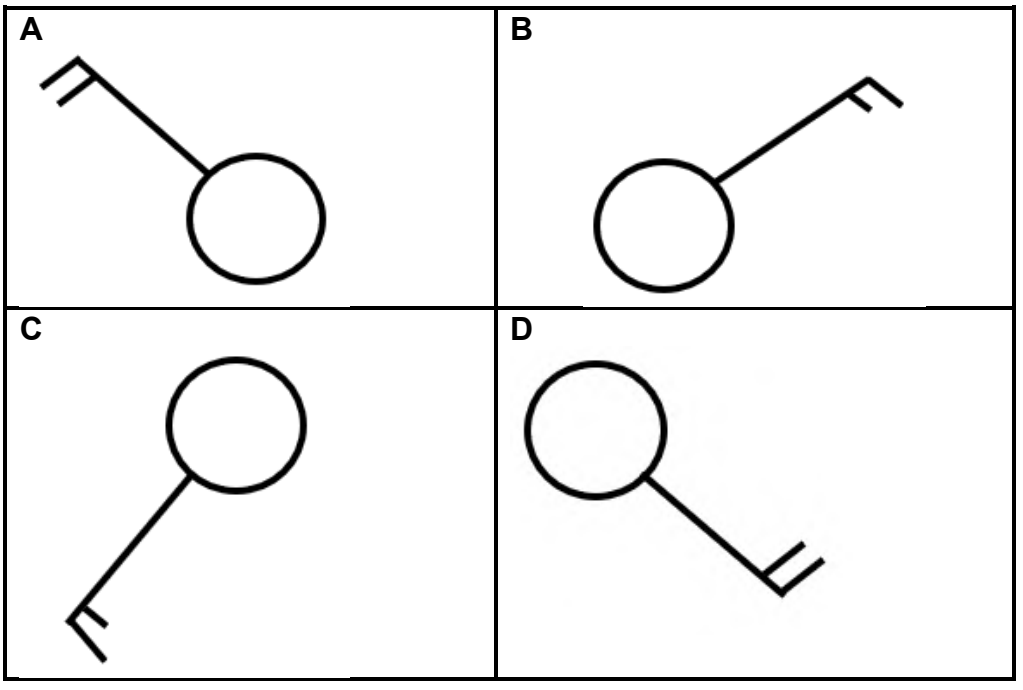
QUESTION 1: CLIMATE AND WEATHER

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 A zone of constant pressure between two cyclones or anticyclones is known as a …

A ridge.
B trough.
C front.
D saddle.

1.1.2 A north westerly wind of 20 knots is evident in …



1.1.3 Anticyclones are associated with … weather conditions and … of air.

(i) unstable
(ii) stable
(iii) divergence
(iv) convergence

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

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1.1.4 Berg winds occur when there is a … high pressure cell and a … low pressure cell present.

(i) Kalahari
(ii) Indian
(iii) heat
(iv) coastal

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

1.1.5 The high temperatures associated with berg winds are caused by … heating and the dry conditions is due to air moving from …

(i) adiabatic.
(ii) advection.
(iii) land to sea.
(iv) sea to land.

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

1.1.6 The high moisture content responsible for the formation of line thunderstorms is provided by … winds.

A south westerly
B north westerly
C north easterly
D south easterly

1.1.7 Line thunderstorms are associated with the following weather conditions:

A torrential rain; snow
B hurricane winds; hail
C torrential rain; gusty winds
D light rain; thunder

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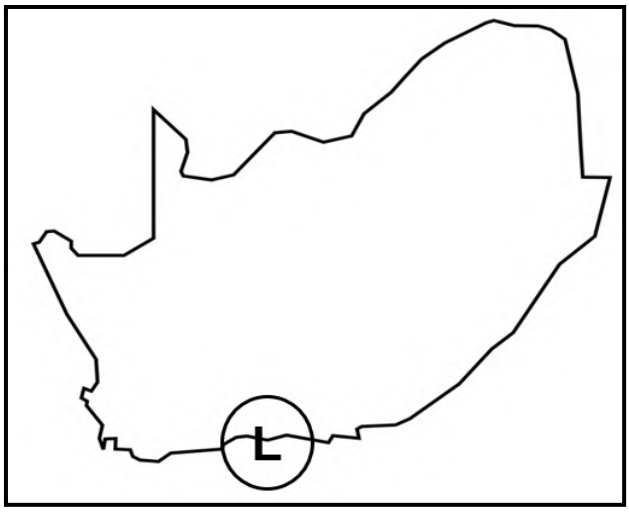
1.1.8 The coastal low on the map below will at first move in a … direction and then in a … direction.



[Source: Examiners own sketch]

(i) westerly
(ii) easterly
(iii) north westerly
(iv) north easterly

A (i) and (iii)
B (i) and (iv)
C (ii) and (iii)
D (ii) and (iv) (8 x 1) (8)

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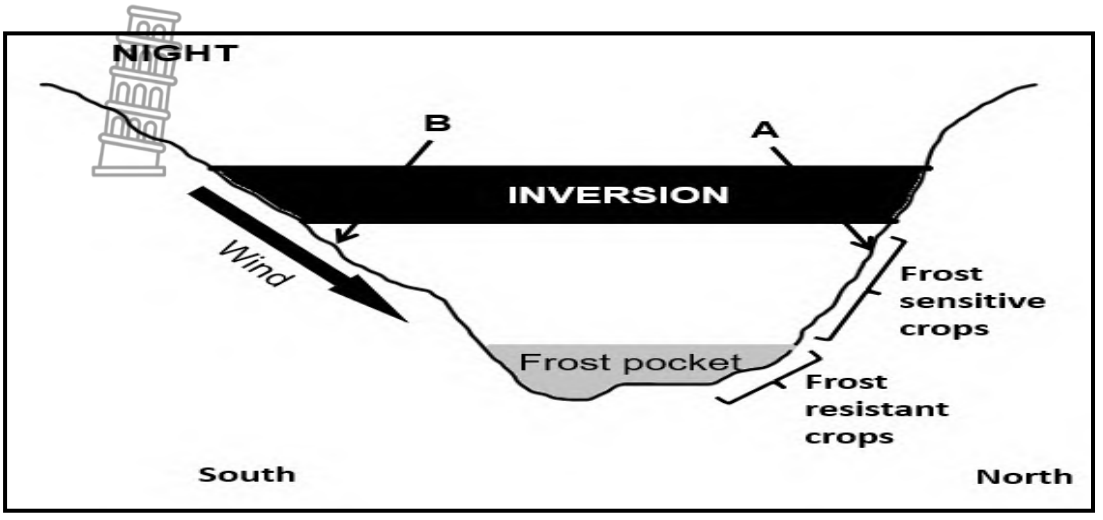
1.2 The following questions are based on local climates. Choose the correct word(s) from those given in brackets. Write only the word(s) next to the question numbers (1.2.1 to 1.2.7) in the ANSWER BOOK.

Refer to the sketch below to answer QUESTION 1.2.1 to 1.2.4.



[Adapted from online.htsenden.co.za]

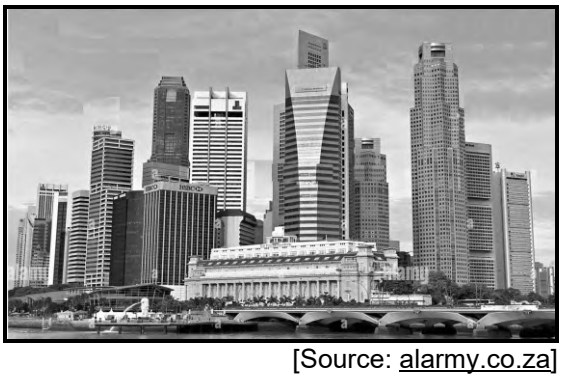
1.2.1 The wind in the sketch is a/an (anabatic/katabatic) wind.

1.2.2 Slope (**A**/**B**) will be the warmer slope.

1.2.3 (Peaches/Oranges) will be planted on the valley floor.

1.2.4 The inversion developed due to the displacement of (warm/cold) air.

Refer to the photo below, based on urban climate, to answer QUESTIONS 1.2.5 to 1.2.7.



[Source: alarmy.co.za]

1.2.5 The study of climate in a city is known as (macro/micro) climate.

1.2.6 A (pollution dome/heat island) occurs when there is an accumulation of soot, dust, and smoke over the city.

1.2.7 (Artificial surfaces/Urban activities) is the factor that contributes to higher temperatures over the city in the photograph below. (7 x 1) (7)

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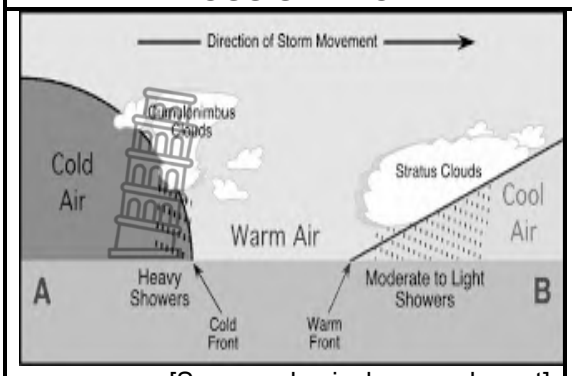
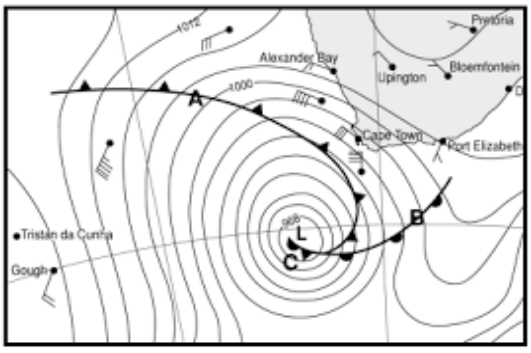
1.3 Refer to the infographic below on mid-latitude cyclones.

CROSS SECTION



[Source: physicalgeography.net]

WEATHER MAP



[Source: thundereducation.com]

THOUSANDS OF HOMES IN INFORMAL SETTLEMENTS DAMAGED IN CAPE TOWN STORMS

Cape Town – Torrential rains and flooding have damaged thousands of informal structures in and around Cape Town, Disaster Risk Management (DRM) said on Friday. The city's metropole was struck by heavy rains, gale-force winds, high seas, and plummeting (dropping) temperatures this week. On Wednesday, the city saw flooding in informal settlements and roads, with rain and thunder, and heavy snowfall recorded in the northern and Overberg regions of the Western Cape. DRM spokesperson Charlotte Powell said the rains caused substantial flooding in informal settlements across the city.

[Adapted from lol.co.za]

1.3.1 According to the infographic, in which direction does the mid-latitude cyclone move? (1 x 1) (1)

1.3.2 Why do cumulonimbus clouds develop ahead of the cold front? (1 x 2) (2)

1.3.3 Why does the type of rainfall at **B** differ from the rainfall at **A**? (1 x 2) (2)

Refer to the weather map.

1.3.4 Give evidence that a warm front occlusion developed. (1 x 1) (1)

1.3.5 How did the warm front occlusion develop? (2 x 2) (4)

Refer to the extract.

1.3.6 State ONE element of weather that is associated with a cold front according to the extract. (1 x 1) (1)

1.3.7 Explain how the weather conditions associated with a mid-latitude cyclone would negatively impact the residents in the informal settlements. (2 x 2) (4)

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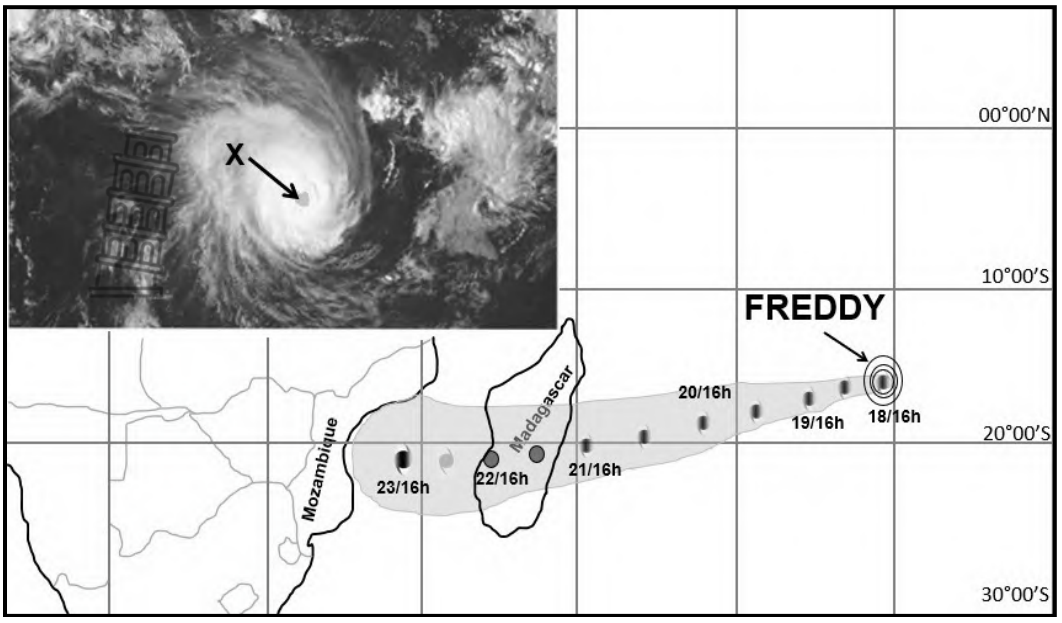
1.4 Refer to the sketch below showing the path of tropical cyclone Freddy.



[Source: Snow Report SA Facebook page]

1.4.1 How many tropical cyclones developed before FREDDY? (1 x 1) (1)

1.4.2 In which country did FREDDY first make landfall? (1 x 1) (1)

1.4.3 Give a reason for your answer to QUESTION 1.4.2. (1 x 1) (1)

1.4.4 Why did FREDDY intensify between the 22nd and the 23rd? (2 x 2) (4)

Refer to **X** on the satellite image.

1.4.5 Name **X** as indicated on the satellite image. (1 x 1) (1)

1.4.6 Mention ONE weather condition of **X**. (1 x 1) (1)

1.4.7 Describe the reason for the weather condition mentioned in QUESTION 1.4.6. (1 x 2) (2)

1.4.8 How will the weather surrounding **X** negatively impact the coastal biodiversity of Mozambique? (2 x 2) (4)

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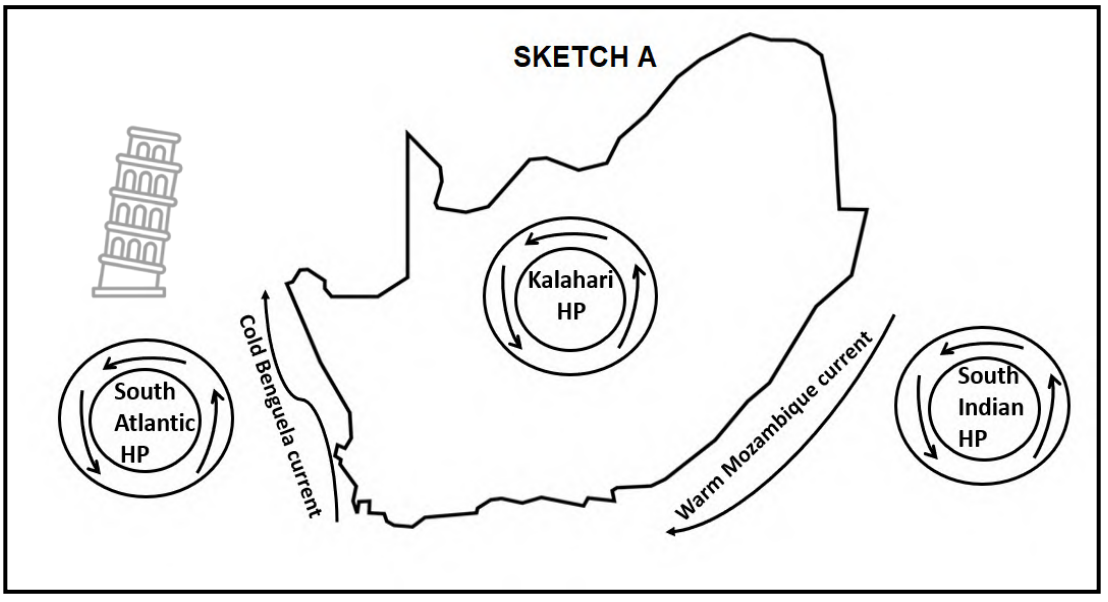
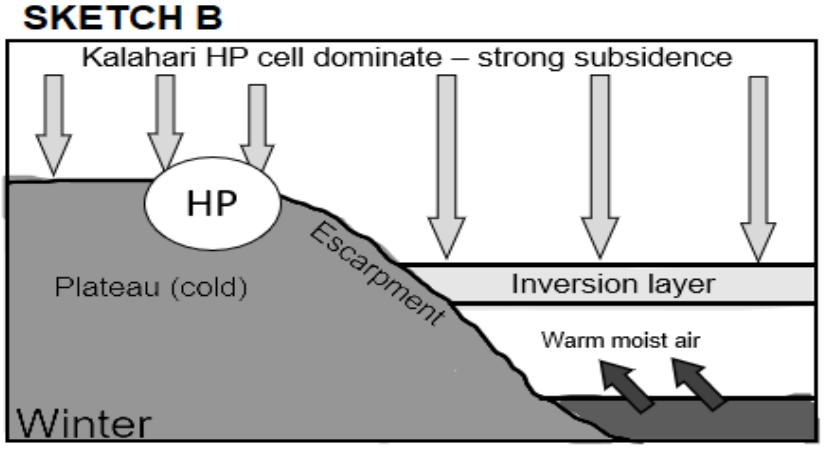
1.5 Refer to factors that influence the weather over South Africa in winter.





[Source: Examiner's own sketches]

1.5.1 Identify the TWO factors in sketch **A** that influences the weather of South Africa. (2 x 1) (2)

1.5.2 How would the position of the South Atlantic HP influence the weather of the west coast of South Africa in winter? (2 x 1) (2)

1.5.3 Why is the Kalahari HP dominant over the land in winter? (1 x 1) (1)

1.5.4 How does the dominant Kalahari high pressure cell influence the presence of the inversion layer in sketch **B**? (1 x 2) (2)

1.5.5 In a paragraph of approximately EIGHT lines, explain how the position of the inversion layer will bring clear and stable weather conditions over the interior of the country in winter. (4 x 2) (8)

[60]

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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 Y.

COLUMN A		COLUMN B	
2.1.1	Rivers that flow after heavy rainfall only in arid areas	**Y** **Z**	seasonal episodic
2.1.2	Tributaries joining at acute angles	**Y** **Z**	dendritic rectangular
2.1.3	Factors that influence higher drainage density	**Y** **Z**	gentle slope; dense vegetation steep slope; sparse vegetation
2.1.4	A fluvial landform which forms at a point where the river enters the sea	**Y** **Z**	delta braided stream
2.1.5	Side view of a river from source to mouth	**Y** **Z**	cross profile longitudinal profile
2.1.6	A feature associated with rejuvenation	**Y** **Z**	wind gap paired terraces
2.1.7	There are waterfalls and dams along the course of the river profile	**Y** **Z**	graded ungraded
2.1.8	Process of the watershed changing position	**Y** **Z**	abstraction rejuvenation

(8 x 1) (8)

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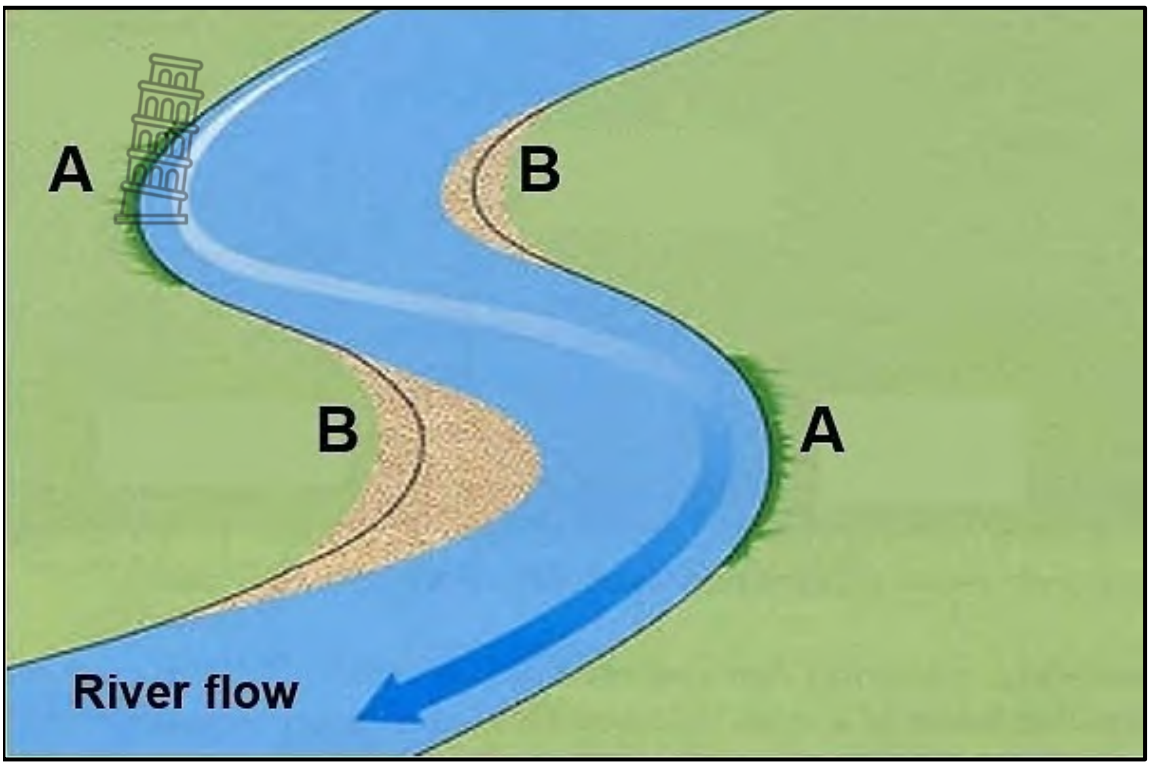
2.2 Refer to the sketch of a meander. Choose the correct word/letter from those given in brackets. Write only the word/letter next to the question numbers (2.2.1 to 2.2.7) in the ANSWER BOOK.



[Source: www.google.com]

2.2.1 Meanders generally form in the (upper/lower) course of the river.

2.2.2 Deposition occurs at (**A**/**B**).

2.2.3 River flow is rapid at (**A**/**B**).

2.2.4 The river cliff is likely to develop at (**A**/**B**).

2.2.5 **B** is called the (slip-off/undercut) slope.

2.2.6 The meander loop at **A** is likely to develop into a (floodplain/ox-bow lake).

2.2.7 A canoeist (person who paddles a boat) is likely to favour the bank at (**A**/**B**). (7 x 1) (7)

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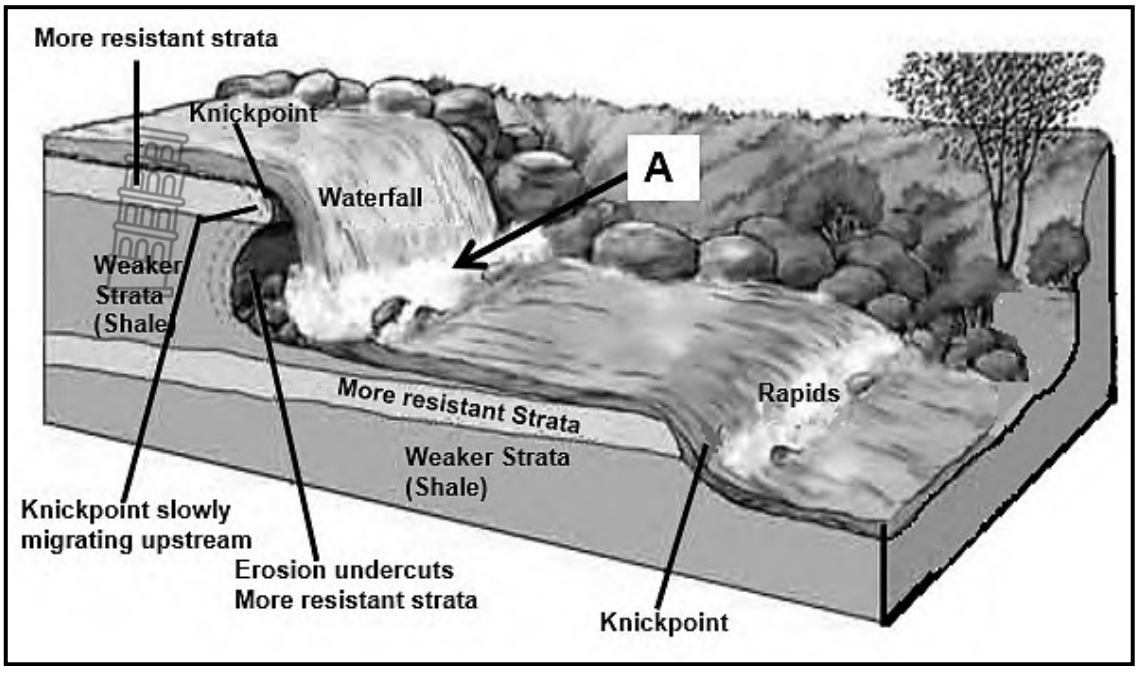
2.3 Refer to the sketch on waterfalls and rapids.



[Source: cfdsupport.com]

2.3.1 Name the stage of the river in which waterfalls and rapids form. (1 x 1) (1)

2.3.2 Identify the type of flow at **A** in the sketch. (1 x 1) (1)

2.3.3 How does gradient influence the type of flow (your answer to QUESTION 2.3.2)? (1 x 1) (1)

2.3.4 How will less resistant rock strata (soft rocks) and more resistant rock strata (hard rocks) lead to the formation of waterfalls. (2 x 2) (4)

2.3.5 Explain how the waterfall will eventually retreat upstream over time. (2 x 2) (4)

2.3.6 What impact will waterfalls and rapids have on infrastructural development along the river? (2 x 2) (4)

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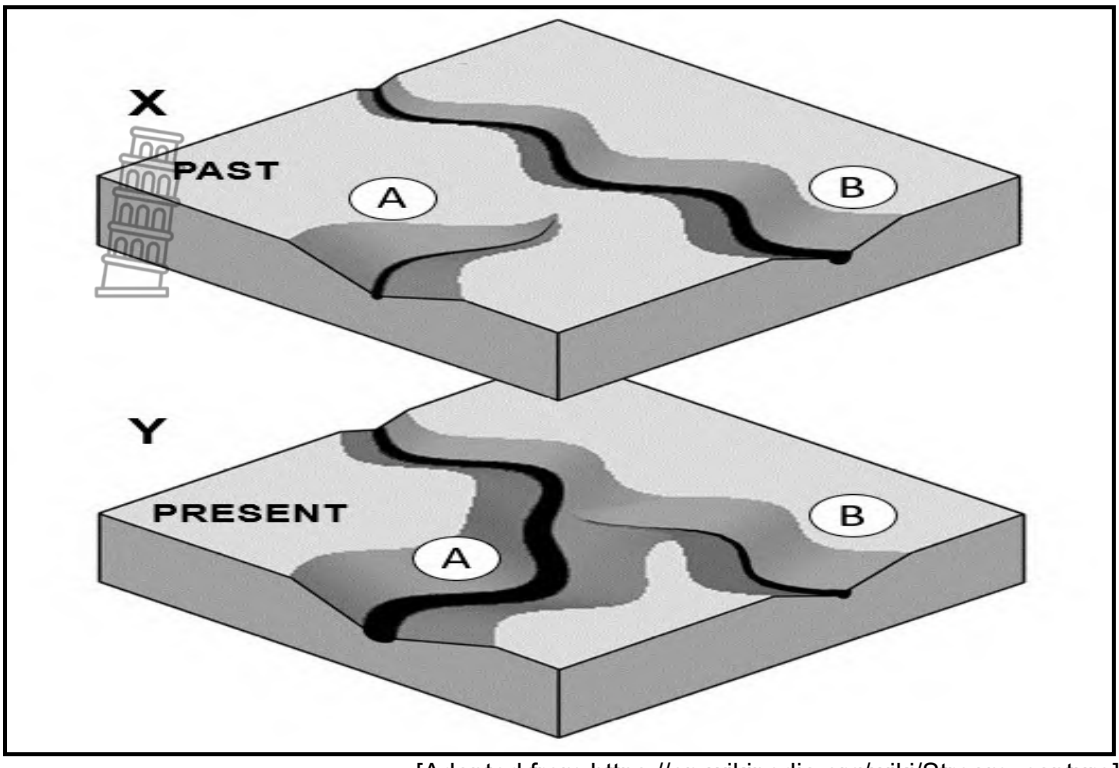
2.4 Refer to the sketch on river capture.



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

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

2.4.2 How does gradient in sketch **X** (past) cause river capture? (1 x 1) (1)

2.4.3 Identify the streams at **A** and **B** in sketch **Y** after river capture has taken place. (2 x 1) (2)

2.4.4 How would the physical (natural) environment negatively be influenced by the stream at **B**? (2 x 2) (4)

2.4.5 Explain the physical (natural) changes that stream **A** will undergo after river capture has taken place. (3 x 2) (6)

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2.5 Refer to the extract on catchment and river management.

SEWAGE POLLUTION IN THE NORTHERN CAPE IS KILLING THE PROVINCE'S LIFELINE – THE ORANGE RIVER

A Northern Cape Non-Governmental Organisation (NGO) has filed criminal complaints against the municipal managers of 11 towns in eight municipalities over "rampant" (widespread) sewage pollution that threatens agricultural exports, the quality of drinking water in the province and the health and livelihoods of the towns' residents.

"The only lifeline of the entire province is the Orange River and it's being contaminated (polluted) with sewage," said Fritz Bekker, one of the founders of Gariep Watch. Environmental monitoring by Gariep Watch has been underway since 2017. It manages the only chemical, bacteriological and biological water quality database on the lower Vaal and lower Orange River.

There is a R10 billion export industry downstream from these municipalities, which poses a risk to the export industry, the main crops being table grapes and raisins. "It is not only the problem with the export industry, it is jobs that will be lost as well," he added.

[Adapted from and article by Sheree Benga in the *Daily Maverick*]

2.5.1 According to the Northern Cape NGO, what type of pollution is affecting 11 towns? (1 x 1) (1)

2.5.2 Name the primary economic activity mentioned in the article that is directly threatened by this type of pollution (mentioned in QUESTION 2.5.1). (1 x 1) (1)

2.5.3 Why is the Orange River 'a lifeline' to the economic activity mentioned in QUESTION 2.5.2? (1 x 1) (1)

2.5.4 Why is river management so important in the lower Vaal and Orange rivers? (2 x 1) (2)

2.5.5 State the economic impact of poor river management in the lower course of the Vaal and Orange rivers? (1 x 2) (2)

2.5.6 In a paragraph of approximately EIGHT lines suggest sustainable strategies that can be implemented in order to maintain the quality of water in the lower Vaal and Orange River. (4 x 2) (8)

[60]

TOTAL SECTION A: 120

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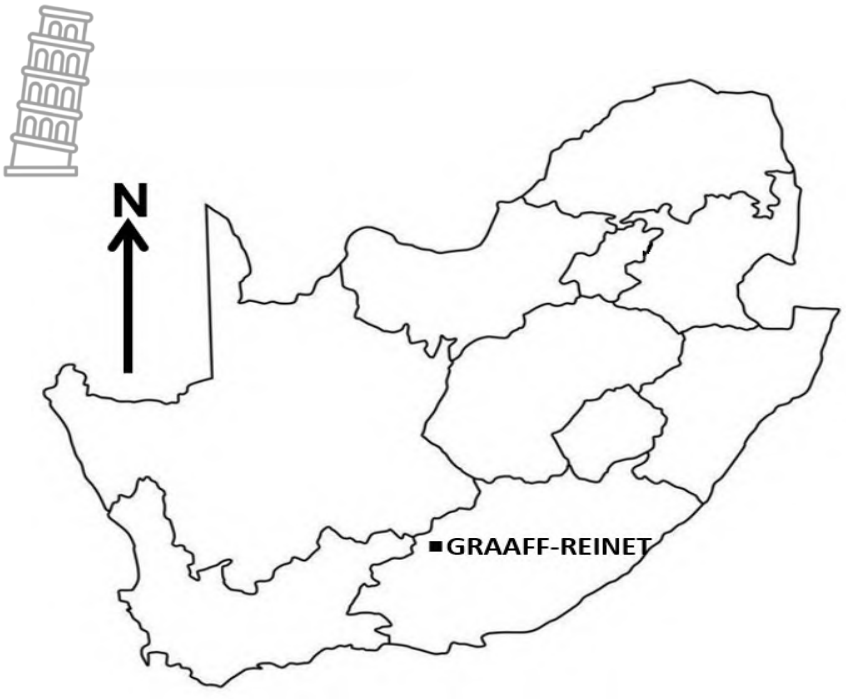
SECTION B

QUESTION 3: GEOGRAPHICAL SKILLS AND TECHNIQUES

GENERAL INFORMATION ON GRAAFF-REINET



Coordinates: 32°15′08″S 24°32′26″E

Graaff-Reinet, the heart of the "Great Karoo" is surrounded by the Camdeboo National Park in the Eastern Cape province of South Africa.
The Sneeuberg Mountain Range surrounds the town. The town lies in the horse-shoe bend of the Sundays River and boasts more proclaimed national monuments than any other South African town.
In Graaff-Reinet, the summers are hot; the winters are short, cold, dry, and windy; and it is mostly clear year-round. Over the course of the year, the temperature typically varies from 5 °C to 33 °C.
Rain falls in Graaff-Reinet is seasonal. The month with the most rain is February, with an average rainfall of 53 mm and the least rainfall is in July, with an average rainfall of 13 mm.

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

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

ENGLISH	AFRIKAANS
Canal	Kanaal
Furrow	Voor
Golf course	Gholfbaan
Weir	Studam

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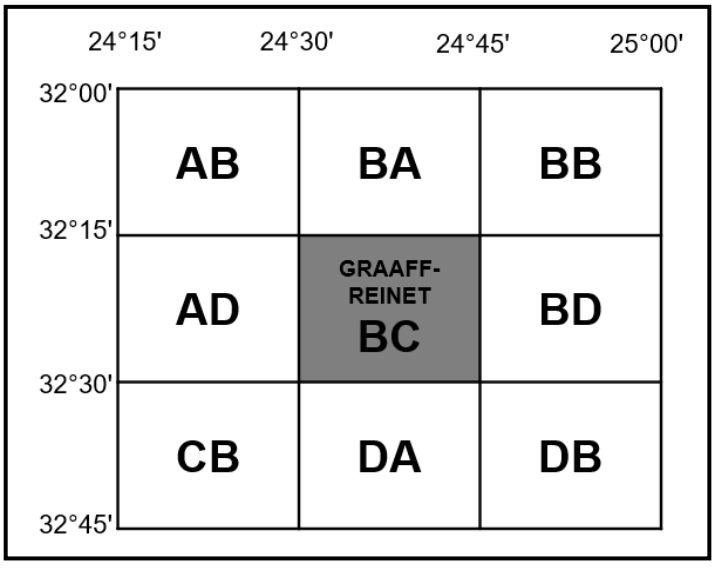
3.1 MAPWORK SKILLS AND CALCULATIONS

3.1.1 The total annual change of the magnetic declination in 2023 is … west of true north.

A 1°07'
B 25°07'
C 1°38'
D 26°45' (1 x 1) (1)

3.1.2 The index to sheets (map references) grid below indicates the location of the current map of 3224BC Graaff-Reinet (shaded), within the 32° to 33° south latitudes and 24° to 25° longitudes.



(a) Give the index to sheet (map reference) of the map south east of the current map. (1 x 1) (1)

(b) Provide the grid reference (degrees (°) and minutes (') of 3324BC GRAAFF-REINET. (2 x 1) (2)

3.1.3 Calculate the straight-line distance (in meters) of the arterial route (R63) from **F** (block **C4**) to **G** (block **D4**). Show ALL calculations. Marks will be awarded for calculations. (2 x 1) (2)

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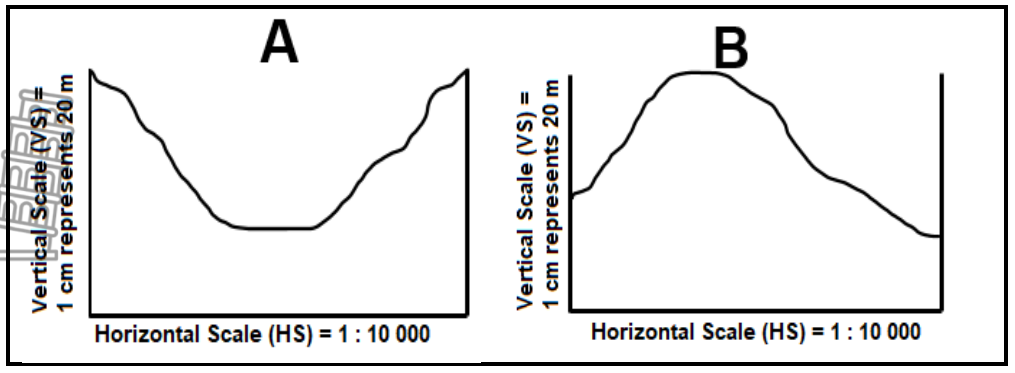
3.1.4 Refer to the cross-sections below which are found on the orthophoto map.



(a) Which cross-section represents **1** to **2** on the orthophoto map? (1 x 1) (1)

(b) Determine the vertical exaggeration (VE) of the cross section, if the vertical scale (VS) is 1 : 2 000. Show ALL calculations. Marks will be awarded for calculations.

$$\textit{Formule}: \frac{VS}{HS}$$

(3 x 1) (3)

3.2 MAP INTERPRETATION

3.2.1 The evidence on the topographical map that supports the statement that the rainfall in Graaf-Reinet is seasonal is … and …

(i) soil erosion
(ii) furrows
(iii) non-perennial rivers
(iv) perennial rivers

A (i) and (iii)
B (i) and (iv)
C (ii) and (iii)
D (ii) and (iv) (1 x 1) (1)

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3.2.2 The high-lying area **H** in block **B5**, on the topographical map, is a … because it separates … from one another.

(i) watershed
(ii) interfluve
(iii) tributaries
(iv) drainage basins

A (i) and (iii)
B (i) and (iv)
C (ii) and (iii)
D (iii) and (iv) (1 x 1) (1)

3.2.3 Refer to the valley at **J** in blocks **B4/B5**.

(a) Which slope (**X** or **Y**) is warmer? (1 x 1) (1)

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

(c) How do the slopes cause katabatic winds during the night in the valley? (1 x 2) (2)

3.2.4 Refer to slope **3** on the orthophoto map.

(a) Name slope **3** of the 'horse-shoe' bend (meander) of the Sundays River. (1 x 1) (1)

(b) Explain the fluvial process that dominates at slope **3**. (1 x 2) (2)

3.2.5 Refer to the topographical map.

(a) Identify the dominant drainage pattern in blocks **B1/2** and **C1/2**. (1 x 1) (1)

(b) Why did the pattern (answer to QUESTION 3.2.5(a)) develop in the area? (1 x 1) (1)

3.3 GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

Refer to area **4**, on the ortho photo map, which has been buffered.

3.3.1 What is a *buffer zone/area*? (1 x 2) (2)

3.3.2 Name the type of vector data that has been used to buffer the river, indicated by letter **4**. (1 x 1) (1)

3.3.3 What is the environmental importance of buffering the zone indicated by letter **4**? (1 x 2) (2)

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Refer to the encircled area **L** on the topographical map.

3.3.4 The encircled area **L** is experiencing a veldfire and the authorities are using remote sensing to help manage the veldfire.

(a) Name ONE component of GIS that is being used to gather information about the veldfire. (1 x 1) (1)

(b) How will remote sensing assist the authorities to manage the veldfire in the encircled area? (1 x 2) (2)

[30]

TOTAL SECTION B: 30
GRAND TOTAL: 150

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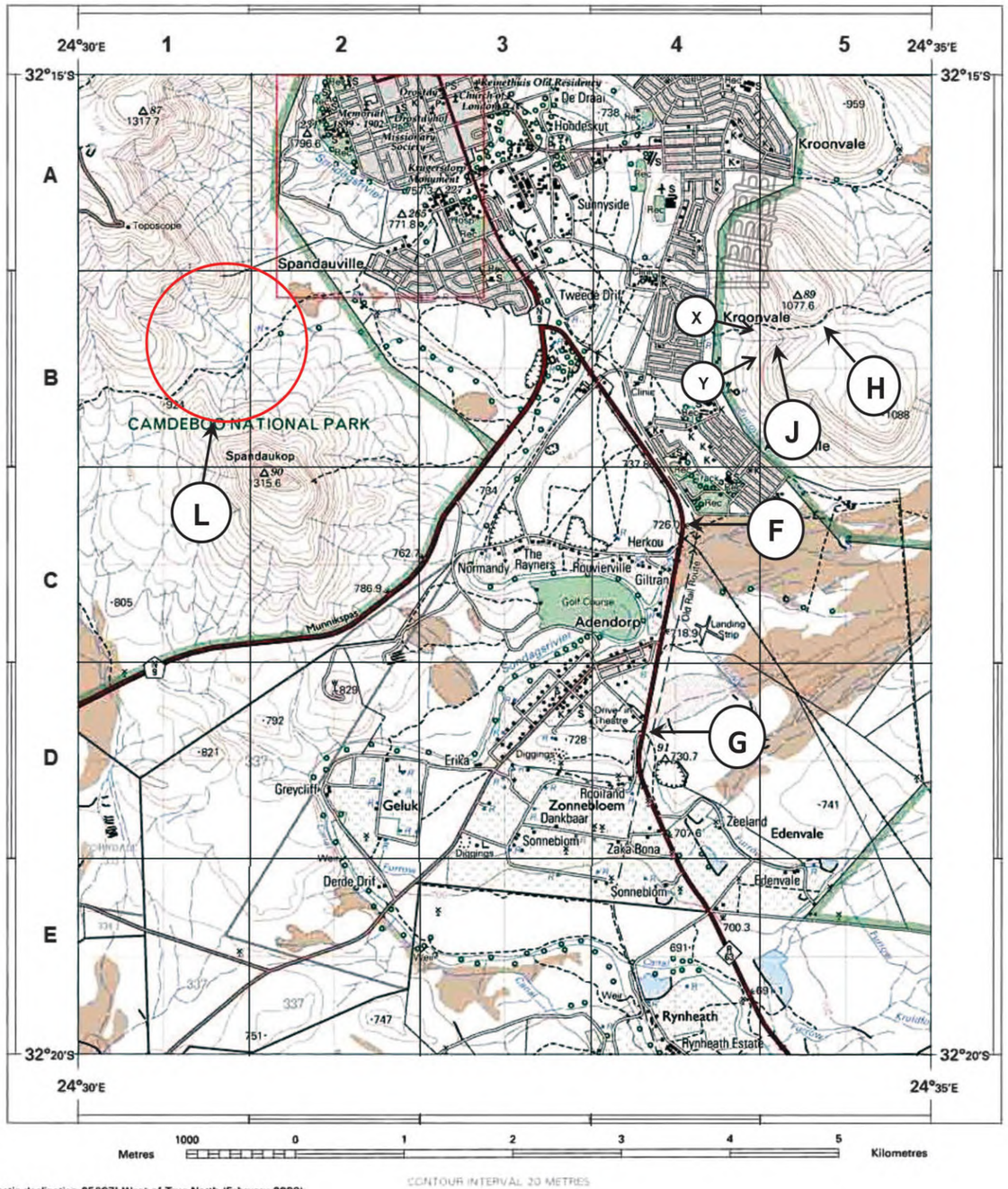
EXTRACT FROM 3224BC GRAAFF-REINET (SOUTH) 1:50 000



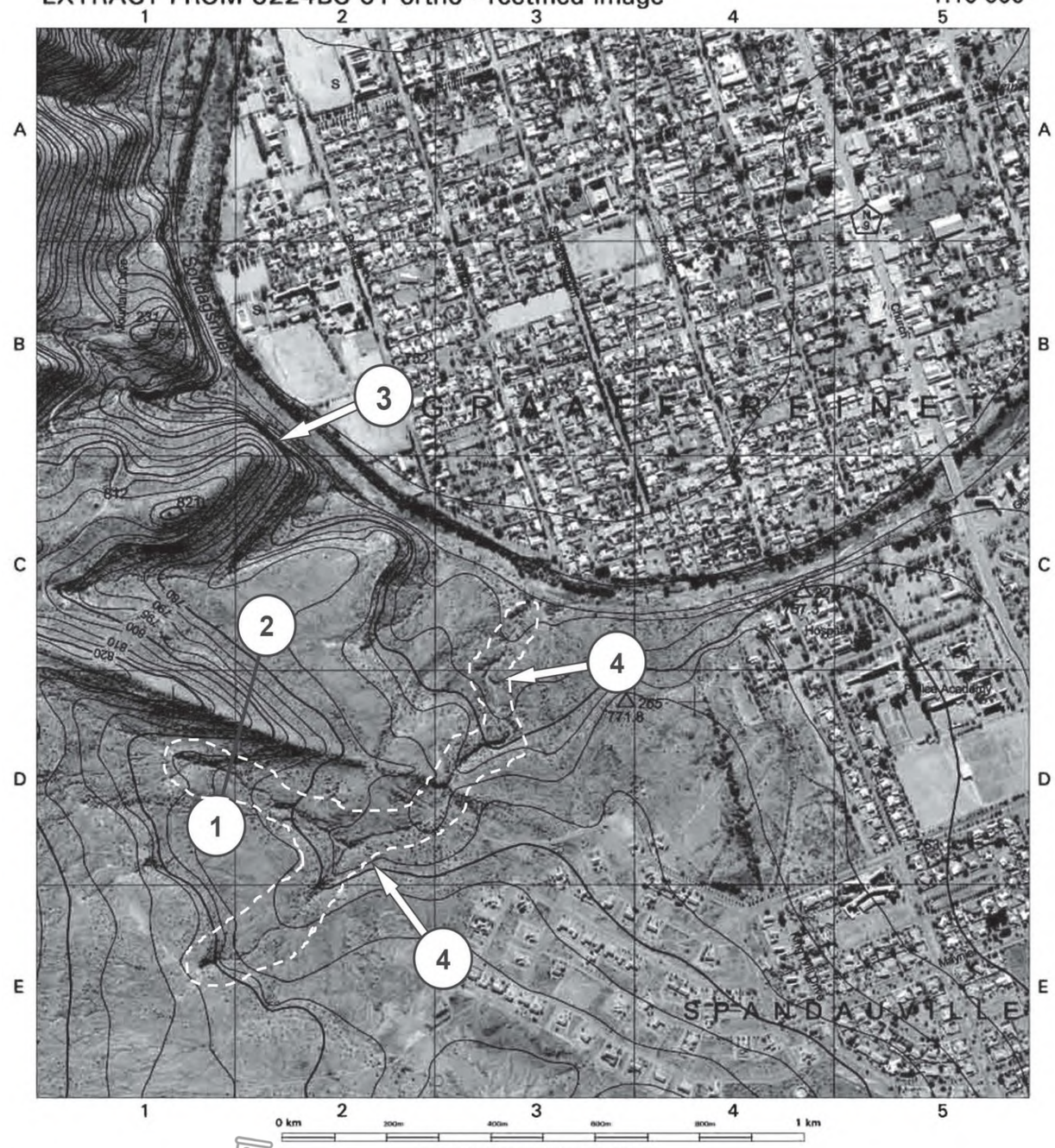
Mean magnetic declination 25°07' West of True North (February 2009).
Mean annual change 7' westwards (Feb. 2009 - Jan. 2010).

CONTOUR INTERVAL 20 METRES

REFERENCE

National Freeway; National Route
Arterial Route
Main Road
Secondary Road; Bench Mark
Other Road; Bridge
Track and Hiking Trail
Railway; Station or Siding
Other Railway; Tunnel
Embankment; Cutting
Power Line
Built-up Area (High, Low Density)
Buildings; Ruin
Post Office; Police Station; Store
Place of Worship; School; Hotel
International Boundary and Beacon
Provincial Boundary
Protected Area
Perennial River
Perennial Water
Non-perennial River
Non-Perennial Water
Dry Water Course
Dry Pan
Marsh and Vlei
Pipeline (above ground)
Water Tower; Reservoir; Water Point
Coastal Rocks
Prominent Rock Outcrop
Fence; Wall
Windpump; Monument
Communication Tower
Mine Dump; Excavation
Trigonometrical Station; Marine Beacon
Lighthouse and Marine Light
Cemetery; Grave
Erosion; Sand
Woodland
Cultivated Land
Orchard or Vineyard
Recreation Ground
Row of Trees
Original Farms

EXTRACT FROM 3224BC 01 ortho - rectified image 1:10 000



1:10000 KONTOERTUSSENRUIMTE 5 METER

VERKLARING

Nasionale Deurpad; Nasionale Roete
Hoofverkeersroete
Hoofpad
Sekondêre Pad; Hoogtemerk
Ander Pad; Brug
Dowwe Pad en Voetslaanpad
Spoorweg; Stasie of Sylyn
Ander Spoorweg; Tonnel
Opvulling; Deurgrawing
Kraglyn
Beboude Gebied (Hoë, Lae Digtheid)
Geboue; Murasie
Poskantoor; Polisiestasie; Winkel
Plek van Aanbidding; Skool; Hotel
Internasionale Grens en Baken
Provinsiale Grens
Bewarings Gebied
Standhoudende Rivier
Standhoudende Water
Nie-standhoudende Riviet
Nie-standhoudende Water
Droë Loop
Droë Pan
Moeras en Vlei
Pyplyn (bo die grond)
Watertoring; Reservoir; Waterpunt
Kuslynrotse
Prominente Klipbank
Draadheining; Muur
Windpomp; Monument
Kommunikasietoring
Mynhoop; Uitgrawing
Peilbaken; Seevaartbaken
Vuurtoring en Seevaartlig
Begraafplaas; Graf
Erosie; Sand
Beboste Gebied
Bewerkte Land
Boord of Wingerd
Ontspanningsterrein
Rye Bome
Oorspronklike Plase

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Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2023

GEOGRAPHY P1
MARKING GUIDELINE

MARKS: 150

This marking guideline consists of 9 pages.

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SECTION A: CLIMATE AND WEATHER AND GEOMORPHOLOGY

QUESTION 1: CLIMATE AND WEATHER

1.1	1.1.1	D (1)		
	1.1.2	A (1)		
	1.1.3	C (1)		
	1.1.4	B (1)		
	1.1.5	A (1)		
	1.1.6	C (1)		
	1.1.7	C (1)		
	1.1.8	D (1)	(8 x 1)	(8)
1.2	1.2.1	katabatic (1)		
	1.2.2	B (1)		
	1.2.3	Oranges (1)		
	1.2.4	warm (1)		
	1.2.5	micro (1)		
	1.2.6	pollution dome (1)		
	1.2.7	Artificial substances (1)	(7 x 1)	(7)
1.3	1.3.1	west to east/easterly (1)	(1 x 1)	(1)
	1.3.2	Warm air rises sharply along the steep cold front (2) Intense uplift of air along the cold front (2) **[ANY ONE]**	(1 x 2)	(2)
	1.3.3	There is a gentle gradient at **B** that results in the formation of stratus clouds and hence lighter rain (2) Cumulonimbus clouds causes heavy rainfall and stratus clouds causes soft, penetrating, or light rain (2) **[ANY ONE]**	(1 x 2)	(2)
	1.3.4	The warm front symbol at the apex (1)	(1 x 1)	(1)

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	1.3.5	The coldest air is found ahead of the warm front (2) Cold air is undercut along the warm front (2)	(2 x 2)	(4)
	1.3.6	Rain (1) Temperature (1) Winds (1) **[ANY ONE]**	(1 x 1)	(1)
	1.3.7	Heavy rain would result in flooding of homes (2) Heavy rain would wash away roads (2) Heavy rainfall will cause informal settlements to become inaccessible/cut off (2) Low temperatures would cause residents to fall ill (2) Gale force winds would destroy/damage informal structures (2) **[ANY TWO]**	(2 x 2)	(4)
1.4	1.4.1	5 (1)	(1 x 1)	(1)
	1.4.2	Madagascar (1)	(1 x 1)	(1)
	1.4.3	Freddy moves in an easterly direction (1) Freddy moves from west to east (1) First country in the east to west path of Freddy (1) **[ANY ONE]**	(1 x 1)	(1)
	1.4.4	It reached warmer water after landfall (2) Higher temperatures and evaporation energised the system (2) No more friction over warmer waters (2) Increase in latent heat (2) **[ANY TWO]**	(2 x 2)	(4)
	1.4.5	Eye (1)	(1 x 1)	(1)
	1.4.6	Clear skies (1) Higher temperatures (1) No/very little wind (1) No precipitation (1) **[ANY ONE]**	(1 x 1)	(1)
	1.4.7	Descending air causes clear skies (2) Heating up of descending air causes higher temperatures (2) Weak pressure gradient leads to no/very little wind (2) Loss of moisture due to descending air causes no rainfall (2) **[ANY ONE LINKED TO THE WEATHER CONDITION IN QUESTION 1.4.6]**	(1 x 2)	(2)
	1.4.8	Sand dunes will be blown away (2) Erosion of the coastline will increase (2) Fauna and flora will be destroyed (2) Habitats and food chains will be disturbed (2) The salinity of the marine ecosystem will be lowered (2) The destruction of the infrastructure will pollute the water (2) **[ANY TWO]**	(2 x 2)	(4)

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1.5 1.5.1 Anticyclones (Accept ONE example from the sketch) (1)
Ocean currents (Accept ONE example from the sketch) (1)
Plateau (Accept escarpment) (1)
[ANY TWO] (2 x 1) (2)

1.5.2 Anticyclonic movement will feed the country with cooler air (1)
It would allow mid-latitude cyclones to pass over Cape Town (1)
There would be heavy rain, low temperatures, strong winds and low humidity in Cape Town (1)
[ANY TWO] (2 x 1) (2)

1.5.3 It is part of the subtropical anticyclonic system that changes position with the revolution of the earth (1)
Weaker convection currents on the surface to force the descending from the Kalahari high upward (1)
[ANY ONE] (1 x 1) (1)

1.5.4 Stronger descending air heats up adiabatically down the escarpment, causing higher temperatures higher up in the atmosphere (2) (1 x 2) (2)

1.5.5 There is strong subsidence of air down the plateau (2)
The air heats up adiabatically (2)
An inversion layer forms below the plateau (2)
Moist air from warm Mozambique current ridges from the South Indian high up the plateau (2)
The moist air cannot reach the interior of the country because of the position of the inversion layer (2)
There is little cloud formation and hence little rainfall in winter (2)
[ANY FOUR] (4 x 2) (8)
[60]

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QUESTION 2: GEOMORPHOLOGY

2.1	2.1.1	Z (1)		
	2.1.2	Y (1)		
	2.1.3	Z (1)		
	2.1.4	Y (1)		
	2.1.5	Z (1)		
	2.1.6	Z (1)		
	2.1.7	Z (1)		
	2.1.8	Y (1)	(8 x 1)	(8)
2.2	2.2.1	lower (1)		
	2.2.2	B (1)		
	2.2.3	A (1)		
	2.2.4	A (1)		
	2.2.5	slip-off (1)		
	2.2.6	ox-bow lake (1)		
	2.2.7	A (1)	(7 x 1)	(7)
2.3	2.3.1	Upper (1)	(1 x 1)	(1)
	2.3.2	Turbulent (1)	(1 x 1)	(1)
	2.3.3	Steeper gradient in the upper course causes water to flow in tumbling and circular motions (1)	(1 x 1)	(1)
	2.3.4	Resistant rock lies either vertical, horizontal or tilted up stream (2) Softer rock underneath the harder rocks (2) Layers of more resistant strata (hard rock) takes longer to erode than layers of less resistant strata (soft rock) (2) Undercutting at the base of the harder resistant rock (2) There would be a sudden drop in elevation (waterfalls) (2) **[ANY TWO]**	(2 x 2)	(4)

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2.3.5 Erosion (undercutting) occurs at the foot of the waterfall creating a plunge pool (2)
Softer rock underneath is removed forming a notch (2)
The harder overhanging rock will collapse under gravity causing the waterfall to retreat upstream (2)
[ANY TWO] (2 x 2) (4)

2.3.6 They are navigational hazards (2)
Bridges would have to be constructed over these fluvial landforms (2)
These bridges would either have to include a road or railway line (2)
Turbines for the generation of hydroelectricity would have to be constructed at the base of these landforms (2)
Smaller dams could be built near the base of the falling water (2)
[ANY TWO] (2 x 2) (4)

2.4 2.4.1 Process by which one river captures/robs the headwaters of another river (2)
[CONCEPT] (1 x 2) (2)

2.4.2 The river flowing down the steeper side of the watershed erodes faster because it would be more energetic (1) (1 x 1) (1)

2.4.3 A – captor stream (1)
B – misfit stream (1) (2 x 1) (2)

2.4.4 Ecosystems would be destroyed (2)
Biodiversity would decrease (2)
Soil erosion would be prevalent (2)
Aesthetic beauty would be diminished (2)
Size of drainage basin would decrease (2)
Increased deposition on the banks of the river (2)
[ANY TWO] (2 x 2) (4)

2.4.5 Volume of water would increase (2)
Velocity of the river would increase (2)
Increased energy would result in more erosion (2)
River rejuvenation could occur (2)
Size of the drainage basin increases (2)
[ANY THREE] (3 x 2) (6)

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2.5	2.5.1	Sewage (1)	(1 x 1)	(1)
	2.5.2	Agricultural (1)	(1 x 1)	(1)
	2.5.3	It provides water for agricultural crops (1)	(1 x 1)	(1)
	2.5.4	This is the area where most settlements are located (1) Most human activity occurs here (1) This is where most raw sewage leaks into the river (1) Untreated sewage will create a health hazard (1) Dams are built in the lower course and untreated sewage runs into the dams (1) **[ANY TWO]**	(2 x 1)	(2)
	2.5.5	There would be a decrease in agricultural production (2) Less produce available for exports (2) More produce would have to be imported (2) Loss of jobs (2) Buying power decreases – multiplier effect (2) **[ANY ONE]**	(1 x 2)	(2)
	2.5.6	Upgrade sewerage works to ensure a functional sewerage network (2) Legislation is needed to control what is discharged in rivers (2) Public must be made aware/educated about importance of water conservation (2) Construction and settlements on the catchment area must be avoided (2) Constant testing to monitor the state of the river (2) Buffering of rivers (2) Fines to be instituted for those breaking the law (2) **[ANY FOUR]**	(4 x 2)	(8) **[60]**

TOTAL SECTION A: 120

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QUESTION 3: GEOGRAPHICAL SKILLS AND TECHNIQUES

3.1 3.1.1 C (1°38') (1) (1 x 1) (1)

3.1.2 (a) 3224 DB (1) (1 x 1) (1)

(b) 32°15'S (1); 24°30'E (1)

OR

32°15'-30'S (1); 24°30-45'E (1) (2 x 1) (2)

3.1.3 4 (1) cm x 500 = 2 000 m (1)
[Range 3,9 – 4,1 cm x 500 = 1 950 – 2050] (2 x 1) (2)

3.1.4 (a) B (1) (1 x 1) (1)

(b) $\dfrac{\frac{1}{2\,000}}{\frac{1}{10\,000}}$ (1) Substitution

$\dfrac{1}{2\,000} \times \dfrac{10\,000}{1}$ (1) conversion

5 times (1) (3 x 1) (3)

3.2 **MAP INTERPRETATION**

3.2.1 C (1) (1 x 1) (1)

3.2.2 B (1) (1 x 1) (1)

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

(b) It is the north-facing slope (2)
Receive direct sunrays (2)
Slope X is in the shadow zone (2)
[ANY ONE] (1 x 2) (2)

(c) Slopes cool off and causes air in contact with it to cool off and the colder air drains down the slopes (2)
Cool air from the slopes descend under the force of gravity (2)
[ANY ONE] (1 x 2) (2)

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3.2.4 (a) Undercut slope (1)
Outer bank (1)
[ANY ONE] (1 x 1) (1)

(b) The faster flowing water at the outer bank, erosion takes place (2) (1 x 2) (2)

3.2.5 (a) Radial (1) (1 x 1) (1)

(b) Streams/rivers flow in all directions from Spandau kop, which is a central point from which rivers radiate (1) (1 x 1) (1)

3.3 GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

3.3.1 Demarcated area of land designated for environmental protection (2)
[CONCEPT] (1 x 2) (2)

3.3.2 Polygon (1) (1 x 1) (1)

3.3.3 It will protect the water quality (2)
Prevent dumping/pollution of the river (2)
Preserve the bio-diversity/ecosystem/habitat of the river (2)
It will reduce erosion (2)
[ANY ONE] (1 x 2) (2)

3.3.4 (a) Hardware (1)
Software (1)
People (1)
[ANY ONE] (1 x 1) (1)

(b) Can gather information without being physically present (2)
Information is immediately available for emergency services (2)
[ANY ONE] (1 x 2) (2)
[30]

TOTAL SECTION B: 30
GRAND TOTAL: 150

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