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GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION

2025

10781

GEOGRAPHY

(PAPER 1)

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GEOGRAPHY: Paper 1

TIME: 3 hours

MARKS: 150

10781E

MAP AT THE END

18 pages

X05

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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 the subsections of questions answered.
5. Start EACH question at the top of a NEW page.
6. Number the answers correctly according to the numbering system used in this question paper.
7. Do NOT write in the margins of the ANSWER BOOK.
8. Draw fully-labelled diagrams when instructed to do so.
9. Answer in FULL SENTENCES, except when you have to state, name, identify or list.
10. Units of measurement MUST be indicated in your final answer, e.g. 1 020 hPa, 14 °C and 45 m.
11. You may use a non-programmable calculator.
12. You may use a magnifying glass.
13. Write neatly and legibly.

SPECIFIC INSTRUCTIONS AND INFORMATION FOR SECTION B

14. A 1 : 50 000 topographical map of 2531BC MALELANE and a 1 : 10 000 orthophoto map 2531 BC 8 MALELANE are provided.
15. The area demarcated in RED 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 maps to the invigilator at the end of this examination session.

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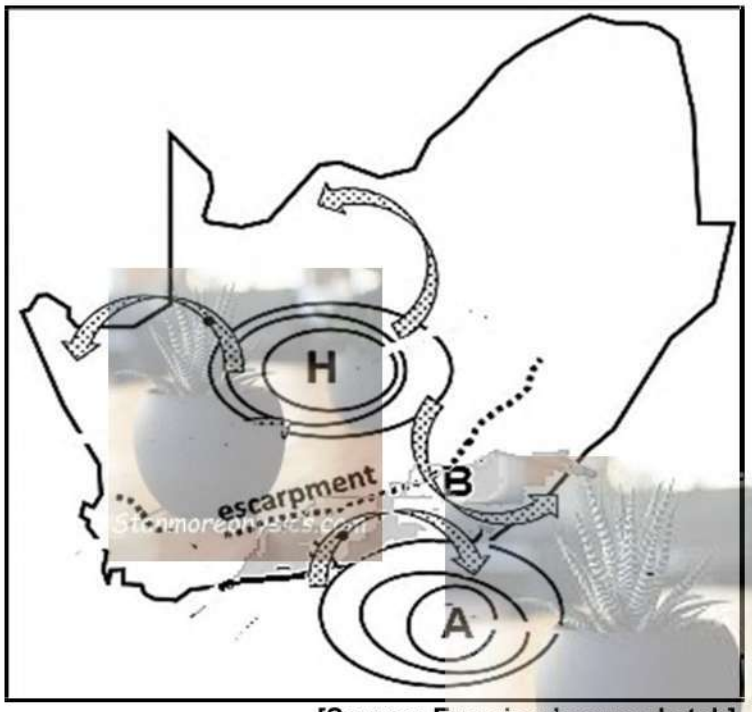
SECTION A: CLIMATE AND WEATHER AND GEOMORPHOLOGY

QUESTION 1: CLIMATE AND WEATHER

1.1 Complete the statements in COLUMN A with the options in COLUMN B. Write down only **Y** or **Z** next to the question numbers (1.1.1 to 1.1.8) in the ANSWER BOOK, e.g. 1.1.9 Y.

Refer to the extract of a synoptic weather map of South Africa below and answer the following questions.



[Source: Examiner's own sketch]

	COLUMN A		COLUMN B
1.1.1	The sketch shows … conditions.	**Y** **Z**	summer winter
1.1.2	The pressure cell at **A** is a … low pressure.	**Y** **Z**	coastal thermal
1.1.3	The arrow at **B** on the sketch represents … winds.	**Y** **Z**	berg south-easterly
1.1.4	The winds in QUESTION 1.1.3 result in the shaded area at **B** being … than normal.	**Y** **Z**	colder warmer
1.1.5	Berg wind conditions are usually associated with a … pressure gradient.	**Y** **Z**	gentle steep
1.1.6	The weather conditions at QUESTION 1.1.5 may result in the rapid … of veld fires.	**Y** **Z**	spread development

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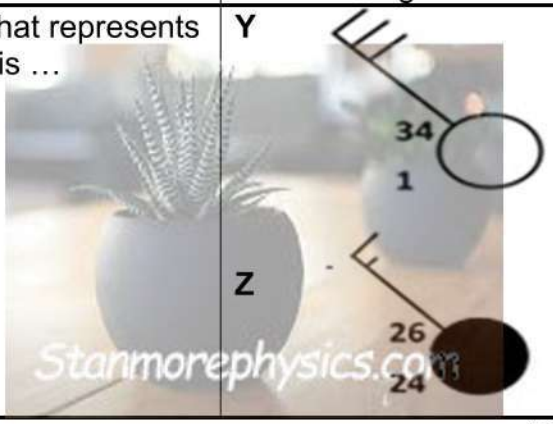
1.1.7	Berg wind conditions are enhanced by adiabatic … of air.	**Y** **Z**	cooling heating
1.1.8	The weather station model that represents the weather conditions at **B** is …	**Y**	

(8 x 1) (8)

1.2 Choose the correct word from those given in brackets. Write only the correct word next to the question numbers (1.2.1 to 1.2.7) in the ANSWER BOOK, e.g. 1.2.8 cold.

1.2.1 The central part of a city is (colder/warmer) than the surrounding rural areas.

1.2.2 The (transpiration/condensation) process in vegetation lowers the temperature in rural areas.

1.2.3 The wind speed is (lower/higher) in urban areas than in rural areas.

1.2.4 Precipitation occurs (more/less) frequently in rural areas than in urban areas.

1.2.5 The temperature in a city can be lowered by painting concrete surfaces in (dark/light) colours.

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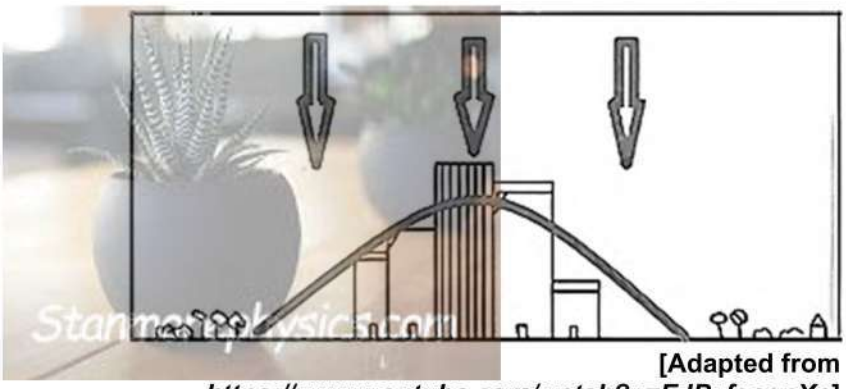
Refer to the sketch below to answer QUESTIONS 1.2.6 and 1.2.7.



[Adapted from *https://www.youtube.com/watch?v=EJPxfqaopXo*]

1.2.6 The sketch represents a pollution dome during the (day/night).

1.2.7 The height of the pollution dome indicates the presence of (more/less) convectional currents over the urban area.

(7 x 1) (7)

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1.3 Refer to the infographic on mid-latitude cyclones below and answer the following questions.

CAPE TOWN IS HIT BY MORE MID-LATITUDE CYCLONES

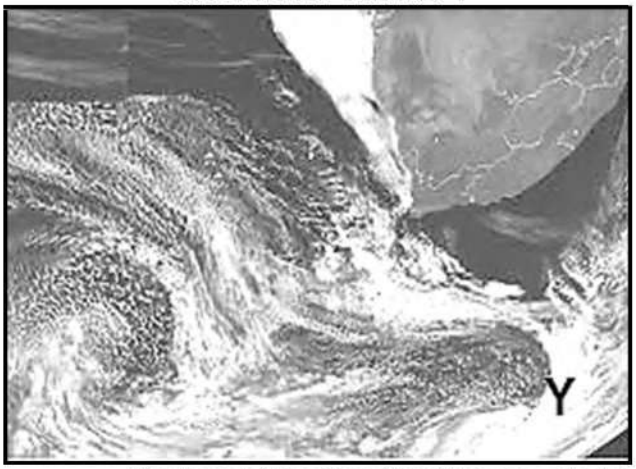
By GERALD IMRAY

Updated: 5:48 PM GMT+2, July 11, 2024

CAPE TOWN, South Africa (AP) — The South African city of Cape Town and surrounding areas were hit by more storms on Thursday that ripped roofs off houses and caused widespread flooding, forcing at least 4 500 people out of their homes and damaging at least 15 000 structures, authorities said. The devastating weather began a week ago. Multiple cold fronts have battered the region on the south-western tip of Africa since late last week, bringing record rainfall and gale-force winds in some parts. City authorities said the bad weather was expected to continue until the weekend and possibly into next week.

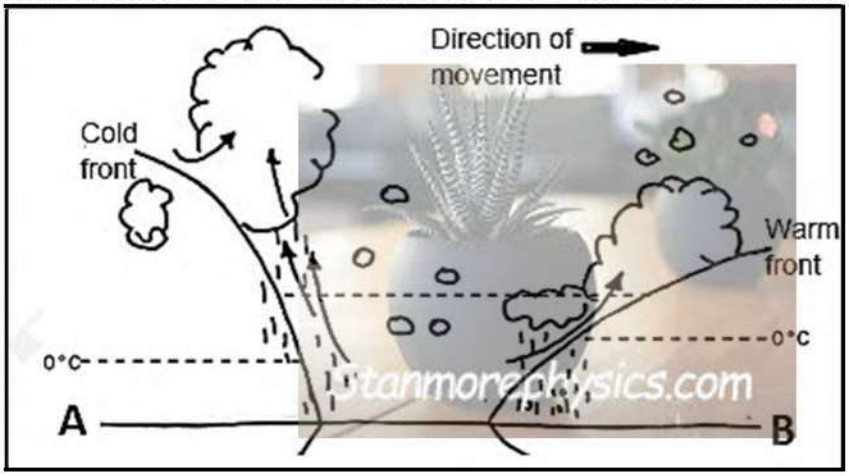
[Source: *https://apnews.com/article/south-africa-storms-floods-cape-town-3be223aee333da1fe441730f76cedfb9*]

SATELLITE IMAGE



[Source: *https://weatherblog.co.za/cold-front/majestic-cold-front-about-to-make-landfall/*]

CROSS-SECTION THROUGH THE MATURE STAGE OF A MID-LATITUDE CYCLONE



[Source: *http://www.physicalgeography.net/fundamentals/7s.html*]

1.3.1 Provide the reason, from the article, for the record rainfall experienced around Cape Town. (1 x 1) (1)

1.3.2 Identify the cloud type indicated at **Y** on the satellite image. (1 x 1) (1)

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1.3.3 Account for the development of the cloud type at **Y** (answer to QUESTION 1.3.2). (1 x 2) (2)

1.3.4 State the general direction of movement of a mid-latitude cyclone. (1 x 1) (1)

1.3.5 Give a reason for the answer to QUESTION 1.3.4. (1 x 2) (2)

1.3.6 Explain how the general direction of movement of the mid-latitude cyclone (answer to QUESTION 1.3.4) resulted in the flooding referred to in the article. (2 x 2) (4)

1.3.7 Draw a labelled plan view of the cross-section from **A** to **B**. The following must be shown in the drawing:

- The position of the cold front
- The position of warm air
- The position of cold air (4 x 1) (4)

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1.4 Refer to the information on Tropical Cyclone Dikeledi below and answer the following questions.

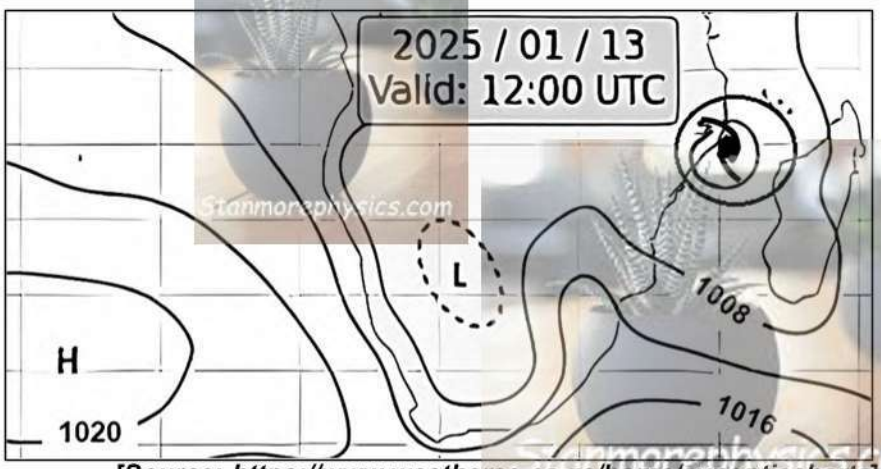
MOZAMBIQUE – TROPICAL CYCLONE DIKELEDI

13 JANUARY 2025

Mozambique is facing a new devastating weather system as Tropical Storm Dikeledi has reintensified into a tropical cyclone. It is currently moving across Nampula in Madagascar and will weaken over land. It is expected to re-enter the Mozambique Channel near Angoche by 14 January, potentially regaining strength to a cyclone or intense cyclone. The National Meteorology Institute (INAM) indicates that strong winds and heavy rainfall (up to 200 mm/24h) are expected to impact coastal districts, including Mossuril, Mogincual, Liupo and Angoche in the Nampula province

[Adapted from *https://reliefweb.int/report/mozambique/mozambique-cyclone-tropical-dikeledi-flash-update-1-13-january-2025-enpt*]

EXTRACT FROM A SYNOPTIC WEATHER MAP



[Source: *https://www.weathersa.co.za/home/synopticcharts*]

1.4.1 How many tropical cyclones have occurred before cyclone Dikeledi? (1 x 1) (1)

1.4.2 Provide a reason for the answer to QUESTION 1.4.1. (1 x 2) (2)

1.4.3 Refer to the map extract and determine the air pressure at the centre of the tropical cyclone. (1 x 2) (2)

1.4.4 Explain why Tropical Cyclone Dikeledi will weaken when moving over land. (1 x 2) (2)

1.4.5 In a paragraph of approximately EIGHT lines, discuss how strong winds and heavy rain will impact negatively on the natural environment, when Tropical Cyclone Dikeledi makes landfall. (4 x 2) (8)

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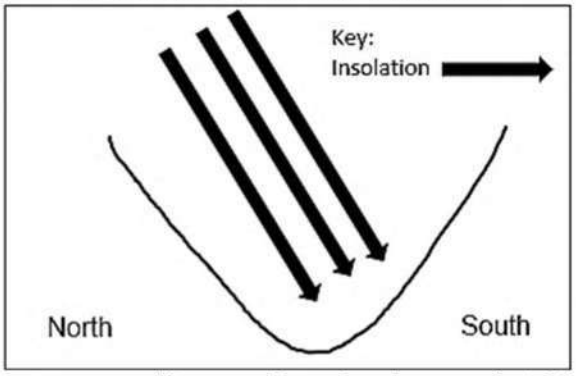
1.5 Refer to the infographic on valley climate in the Southern Hemisphere below when answering the following questions.

KATABATIC WIND

As air cools it becomes denser and therefore heavier. The cold air then flows down the side of the valley, resulting in a katabatic flow (or wind).

[Adapted from *https://skybrary.aero/articles/katabatic-wind*]

INSOLATION IN THE VALLEY



[Source: Examiner's own sketch]

PHOTOGRAPH OF A VALLEY

[Source: *https://www.flickr.com/photos/zakopaneinthesierras/31006055087*]

1.5.1 Define the term *slope aspect*. (1 x 2) (2)

1.5.2 Provide evidence from the "insolation in the valley" sketch that the valley is located in the Southern Hemisphere. (1 x 2) (2)

1.5.3 At which slope, **C** or **D**, will the shadow zone on the photograph develop? (1 x 1) (1)

1.5.4 Account for the difference in vegetation between slopes **C** and **D**, which is evident in the photograph. (2 x 2) (4)

1.5.5 Refer to the extract on katabatic winds in a valley. Explain how katabatic winds can lead to the development of a valley inversion. (3 x 2) (6)

[60]

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QUESTION 2: GEOMORPHOLOGY

2.1 Refer to diagrams **A** and **B** below which show the flow patterns of rivers. Match the descriptions in QUESTIONS 2.1.1 to 2.1.7 with **A** or **B**. Write down only **A** or **B** next to the question numbers (2.1.1 to 2.1.7) in the ANSWER BOOK, e.g. 2.1.8 A.

DIAGRAM A - LAMINAR FLOW	DIAGRAM B - TURBULENT FLOW
[Source: *www.vecteezy.com/free-photos/winding-river*]	[Source: *www.vecteezy.com/free-photos/river-rapids*]

2.1.1 The flow pattern in which water flows in parallel layers occurs in diagram (**A**/**B**).

2.1.2 Diagram (**A**/**B**) represents a flow pattern that occurs in the upper course of a river.

2.1.3 Obstacles in the river channel have resulted in the flow pattern in diagram (**A**/**B**).

2.1.4 Diagram (**A**/**B**) shows the flow pattern that occurs over an even and gently sloping river channel.

2.1.5 In diagram (**A**/**B**), the flow pattern results in a higher rate of erosion.

2.1.6 The flow pattern that mostly occurs on an ungraded river profile is shown in diagram (**A**/**B**).

2.1.7 The formation of ox-bow lakes is most likely to occur in diagram (**A**/**B**).

(7 x 1) (7)

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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 2.2.8) in the ANSWER BOOK, e.g. 2.2.9 A.

2.2.1 River rejuvenation can be defined as the …

A widening of a river valley due to deposition.
B river having renewed energy and downward erosion.
C formation of a delta at the river mouth.
D complete drying up of a river.

2.2.2 River rejuvenation is likely caused by the …

A deposition of sediments.
B rising of sea levels.
C rising of land along the course of a river.
D creation of meanders.

2.2.3 A/An … is a feature commonly associated with river rejuvenation.

A floodplain
B incised meander
C delta
D levee

2.2.4 Rejuvenated rivers will have a … energy level resulting in increased …

(i) lower
(ii) higher
(iii) deposition.
(iv) erosion.

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

2.2.5 River capture is when a river on a … altitude intercepts the waters of another river through constant … erosion.

(i) higher
(ii) lower
(iii) headward
(iv) lateral

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

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2.2.6 The feature formed at the location where the captured stream is diverted into the captor stream is known as the …

A wind gap.
B confluence of two tributaries.
C source of the river.
D elbow of capture.

2.2.7 River capture is caused by …

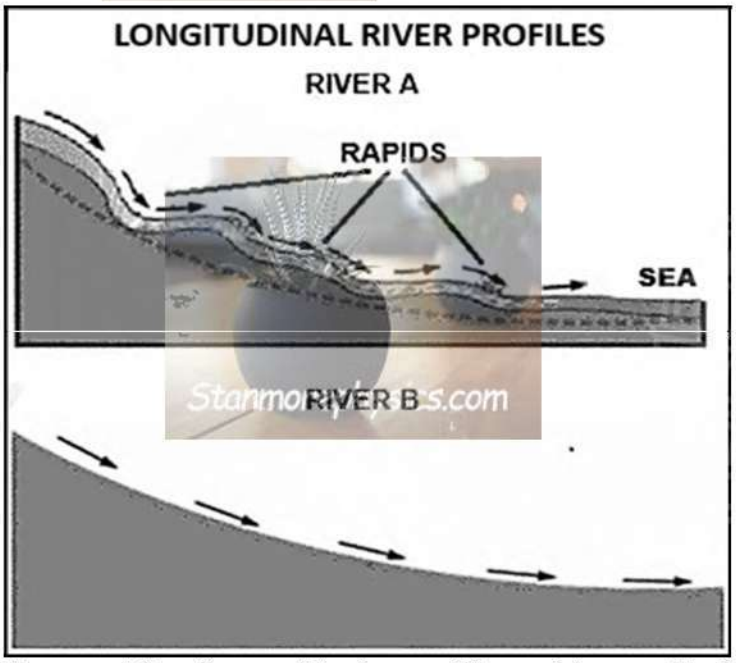
A tectonic uplift in the river valley.
B lateral erosion near the river source.
C headward erosion by a more powerful stream.
D sediment deposition in the lower course of a river.

2.2.8 A misfit stream can be described as a river …

A too small for the valley in which it flows.
B that occurs on a gentle landscape.
C intercepted by a more energetic river.
D where vertical erosion is dominant.

(8 x 1) (8)

2.3 Refer to the diagrams below, indicating the longitudinal profiles of rivers **A** and **B** and answer the questions that follow.



[Source: *https://www.slideshare.net/jlanser/river-profiles*]

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2.3.1 Define the concept *ungraded profile*. (1 x 2) (2)

2.3.2 Does river **A** have a graded or an ungraded profile? (1 x 1) (1)

2.3.3 Provide evidence from the diagram to support the answer to QUESTION 2.3.2. (1 x 2) (2)

2.3.4 In the longitudinal profile of river **A**, identify the:

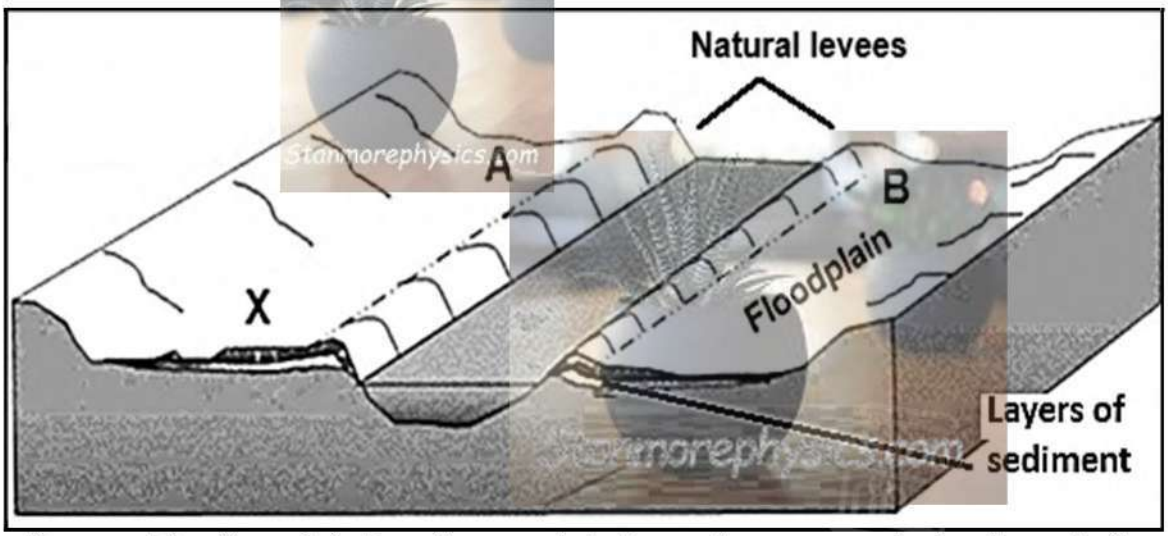
(a) Permanent base level of erosion (1 x 1) (1)

(b) Temporary base level of erosion (1 x 1) (1)

2.3.5 Describe the shape of the longitudinal profile of river **B**. (1 x 2) (2)

2.3.6 Explain how erosion and deposition contribute to the shape of the longitudinal profile of river **B**, as described in QUESTION 2.3.5. (3 x 2) (6)

2.4 Refer to the diagram on natural levees below to answer the questions that follow.



[Source: *https://www.tutor2u.net/geography/reference/gcse-geography-landforms-in-the-lower-course-river-landscapes-6*]

2.4.1 What is a *natural levee*? (1 x 2) (2)

2.4.2 In which course of the river is the floodplain in the diagram most likely to occur? (1 x 1) (1)

2.4.3 What type of erosion is dominant in the river shown in the diagram? (1 x 2) (2)

2.4.4 Use evidence from the diagram to explain how flooding leads to the formation of a natural levee. (2 x 2) (4)

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2.4.5 Draw a labelled cross-section of the river from **A** to **B**. The cross-section must show:

(a) The shape of the river valley (1 x 1) (1)

(b) The position of the natural levee (1 x 1) (1)

2.4.6 Evaluate why site **X** would be a suitable (good) location for the development of a rural settlement. (2 x 2) (4)

2.5 Refer to the extract below on river management.

THE UMBILO RIVER SYSTEM, SOUTH AFRICA

The water in the UmBilo River system in Durban's eThekwini Municipality in KwaZulu-Natal is severely polluted. This is due to years of industrial pollution and inefficient sewage infrastructure which results in raw sewage contaminating the water system.

The water pollution is so severe that the water has changed colour. Not only is the health of the surrounding communities being affected by this water pollution, but sensitive ecosystems along the path of the UmBilo river system are also being destroyed.

Greenpeace Africa is partnering with the UmBilo River Watch community group to raise awareness about the causes and effects of this water pollution on vulnerable communities and ecosystems.

[Adapted from *https://www.greenpeace.org/africa/en/blogs/49015*]

2.5.1 Define the concept *river management.* (1 x 2) (2)

2.5.2 In which province is the eThekwini Municipality located? (1 x 1) (1)

2.5.3 According to the extract, what are the main causes of pollution of the UmBilo River? (2 x 1) (2)

2.5.4 Name ONE environmental impact of pollution, highlighted in the extract. (1 x 2) (2)

2.5.5 In a paragraph of approximately EIGHT lines, suggest strategies that the eThekwini Municipality can implement to protect the UmBilo River from untreated sewage. (4 x 2) (8)

[60]

TOTAL SECTION A: 120

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SECTION B

QUESTION 3: GEOGRAPHICAL SKILLS AND TECHNIQUES

BACKGROUND INFORMATION ON MALELANE

Coordinates: 25°29′S ; 31°31′E

Malelane is a gateway to the Kruger National Park, Mozambique and Eswatini (formerly Swaziland). This charming farming town in Mpumalanga is situated on the N4 national highway about halfway between the capital city of Mpumalanga, Nelspruit, and the capital city of Mozambique, Maputo. Malelane sits on the intersection of three roads that lead to many of southern Africa's favourite tourist destinations. Driving into Malelane from Nelspruit, you can see the hilly outcrop directly ahead, with the Mozambique border post nestled at its base. Turn left and the promise of a few glorious days in the Kruger National Park beckons you. Turn right and the lush, tropical landscape of Eswatini lies on the horizon.

[Source: *https://hamiltonslodge.co.za/history-of-malelane/*]

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

ENGLISH	**AFRIKAANS**
Diggings	Uitgrawings
Caravan park	Karavaanpark
Sewage works	Rioolwerke
Golf course	Gholfbaan
Wetland	Vleiland

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3.1 MAP SKILLS AND CALCULATIONS

Refer to the topographical map and the orthophoto map.

3.1.1 In which province is Malelane located?

A Gauteng
B Limpopo
C Mpumalanga
D KwaZulu-Natal (1 x 1) (1)

3.1.2 The grid reference number located to the east of the Malelane map 2531BC is:

A 2531BD
B 3125BD
C 2531BB
D 3125BD (1 x 1) (1)

Refer to the orthophoto map.

3.1.3 What is the difference in height between the contour line at **7** and spot height **8** on the orthophoto map? (1 x 1) (1)

3.1.4 Use the answer to QUESTION 3.1.3 to calculate the gradient from the contour line at **7** to spot height **8.**

Use the map distance of 4,5 cm. (3 x 1) (3)

Formula: **Average gradient =** $\frac{\textbf{vertical interval (VI)}}{\textbf{horizontal equivalent (HE)}}$

3.1.5 Refer to the answer to QUESTION 3.1.4.

At this gradient, will there be more infiltration or more run-off? (1 x 2) (2)

3.1.6 Motivate your answer to QUESTION 3.1.5. (1 x 2) (2)

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3.2 MAP INTERPRETATION

Refer to the topographical map.

3.2.1 (a) A wind that blows at night from spot height **405** in block **B3** in a westerly direction to the Umgwenya River, is known as a/an … wind.

A berg
B anabatic
C katabatic
D fohn (1 x 1) (1)

(b) Identify the negative environmental impact that the wind identified in QUESTION 3.2.1 (a), can have on the Leopard Creek Golf Estate in block **B2**. (1 x 2) (2)

Refer to line **F** – **G** in blocks **B1** and **B2** in the topographical map.

3.2.2 (a) Draw a cross-section along the line **F** – **G** across the Umgwenya River. Provide the following labels on the cross-section:

(i) Undercut slope
(ii) Slip-off slope (2 x 1) (2)

(b) Give ONE physical reason why the Leopard Creek Golf Course is located at point **G** rather than at point **F**. (1 x 2) (2)

Refer to block **C2** on the topographical map.

3.2.3 Identify the fluvial feature at **H** in block **C2** on the topographical map. (1 x 1) (1)

3.2.4 The feature identified in QUESTION 3.2.3 is commonly found in the … of a river where the river valley has a/an ... (1 x 1) (1)

(i) upper course
(ii) middle course
(iii) U-shape.
(iv) V-shape.

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

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3.2.5 (a) What is the general direction of flow of the Umgwenya River on the topographical map? (1 x 1) (1)

(b) Give evidence from the topographical map to support the answer to QUESTION 3.2.5 (a). (1 x 2) (2)

3.3 GEOGRAPHIC INFORMATION SYSTEMS (GIS)

Refer to the dam in block **A5** on the topographical map.

3.3.1 (a) Is the dam an example of (vector/raster) data? (1 x 1) (1)

(b) Give a reason for the answer to QUESTION 3.3.1(a). (1 x 2) (2)

Refer to block **A4** and the map reference on the topographical map.

3.3.2 (a) Define the term *buffering*. (1 x 2) (2)

(b) Identify the land-use feature at **J** in block **A4**. (1 x 1) (1)

(c) Explain how the land-use feature identified in QUESTION 3.3.2(b) is an example of buffering. (1 x 2) (2)

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TOTAL SECTION B: 30

TOTAL: 150

END

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GAUTENG PROVINCE
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PREPARATORY EXAMINATION

2025

MARKING GUIDELINES

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GEOGRAPHY (PAPER 1) (10781)

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21 pages

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MARKING PRINCIPLES FOR GEOGRAPHY – SEPT 2025

The following marking principles have been developed to standardise marking processes.

MARKING

- ALL questions MUST be marked, irrespective of whether they are correct or incorrect.
- Where the maximum marks have been allocated for a particular question, place an **M** over the remainder of the text to indicate that the maximum marks have been achieved.
- A clear, neat tick must be used: ✓
  - If ONE mark is allocated, ONE tick must be used. ✓
  - If TWO marks are allocated, TWO ticks must be used. ✓✓
  - The tick must be placed at the FACT that a mark is being allocated for.
  - Ticks must be kept SMALL, as various layers of moderation may take place.
- Incorrect answers must be marked with a clear, neat cross: **X**
  - Use MORE than one cross across a paragraph/discussion style questions to indicate that all facts have been considered.
  - Do NOT draw a line through an incorrect answer.
  - Do NOT underline the incorrect facts.

NOTE THE FOLLOWING

- If the numbering is incorrect or left out, as long as the sequence of answers to questions is followed candidates can be credited.
- Spelling errors – if the word/term, is recognisable, award the marks provided the meaning is correct.
- Be sensitive to the sense of an answer, which may be stated in a different way.
- In questions where a letter is the accepted response, but the learner writes the actual answer – award marks.

TOTALLING AND TRANSFERRING OF MARKS

- Each subquestion must be totalled.
  - Questions in Section A has five subsections, therefore five sub-totals per question is required. Section B has three subsections and three subtotals.
  - Subsection totals to be written in the right-hand margin at the end of the subsection and underlined.
  - Sub-totals must be written legibly.
  - Leave space to write in the moderated marks on different levels.
- Total subtotals and transfer totals to the top left-hand margin next to question number.
- Transfer the final total to the cover of the answer book.

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MODERATION

Moderation is done in the same way as the initial marking. All guidelines for marking must be adhered to.

If a mark for a subquestion is changed after moderation, the moderator must strike through the marker's mark and write down the new mark.

The total for the question must be recalculated, and similarly struck off and the new total to be written down.

EXAMPLE FOR MARKING

QUESTION 1 22

1.1 1.1.1 A (South Atlantic High) ✓

1.1.2 B (Kalahari High) ✓

1.1.3 B (South Indian) X 2

1.2 1.2.1 Melting snow ✓

1.2.2 Mouth X

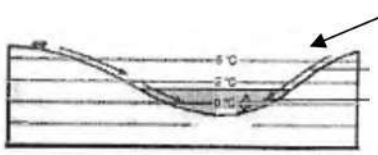
1.2.3 Third order ✓ 2

1.3 1.3.1 Katabatic X

1.3.2 **1** occurs during the day while **2** occurs at night ✓✓

1.3.3 Cold air rolls down ✓✓ into the valley and forms an inversion.

Air flows downslope ✓✓



6

1.4 1.4.1 Shape of front concave X
Steep gradient of front ✓

1.4.2 Warm air undercuts the cold air X

1.4.3 Air behind the cold front is colder ✓✓ than the air in front. Cold air moves faster than warm ✓✓ air ahead of it. Cold front catches up with the warm front. 5

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1.5 1.5.1 (a) A river that only flows all year-round X

(b) The river channel is wide X

(c) Regularity ✓✓ of rainfall and the soil ✓✓ type over which the streams flow.

1.5.2 Gauteng ✓ and the Eastern Cape x

1.5.3 The cost of food production will increase as it is costly to buy purified water. Farmers will have to buy more chemicals ✓✓ to purify water. Chemicals cost a lot, and this will increase production costs. It will be costly to purify water for use in electricity generation. These costs will be included in electricity prices. Costs will increase the price of electricity during production. There will be less clean water to generate hydroelectricity. M

7

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SECTION A: CLIMATE AND WEATHER AND GEOMORPHOLOGY

QUESTION 1: CLIMATE AND WEATHER

1.1 Complete the statements in COLUMN A with the options in COLUMN B. Write down only **Y** or **Z** next to the question numbers (1.1.1 to 1.1.8) in the ANSWER BOOK, e.g. 1.1.9 Y.

1.1.1 Z (1)/winter

1.1.2 Y (1)/coastal

1.1.3 Y (1)/berg

1.1.4 Z (1)/warmer

1.1.5 Z (1)/steep

1.1.6 Y (1)/spread

1.1.7 Z (1)/heating

1.1.8 Y (1) (8 x 1) (8)

1.2 Choose the correct word from those given in brackets. Write only the correct word next to the question numbers (1.2.1 to 1.2.7) in the ANSWER BOOK, e.g. 1.2.8 cold.

1.2.1 warmer (1)

1.2.2 transpiration (1)

1.2.3 lower (1)

1.2.4 less (1)

1.2.5 light (1)

1.2.6 night (1)

1.2.7 less (1) (7 x 1) (7)

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1.3 Refer to the infographic on mid-latitude cyclones below and answer the following questions.

SOUTH AFRICA'S CAPE TOWN IS HIT BY MORE MID-LATITUDE CYCLONES

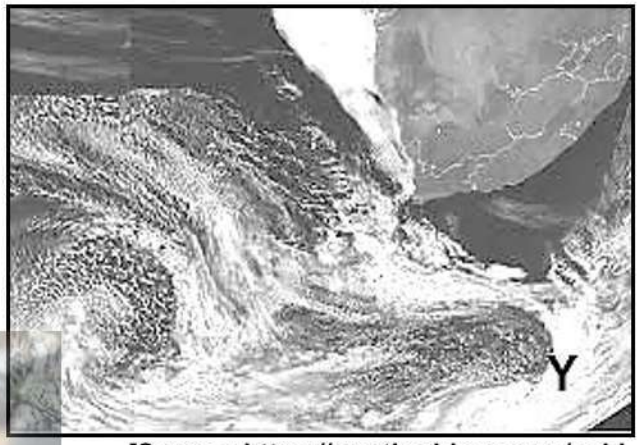
By GERALD IMRAY

Updated 5:48 PM GMT+2, July 11, 2024

CAPE TOWN, South Africa (AP) — The South African city of Cape Town and surrounding areas were hit by more storms Thursday that ripped roofs off houses and caused widespread flooding, forcing at least 4,500 people out of their homes and damaging at least 15,000 structures, authorities said. The devastating weather began a week ago. Multiple cold fronts have battered the region on the south-western tip of Africa since late last week, bringing record rainfall and gale-force winds in some parts. City authorities said the bad weather was expected to continue until the weekend and possibly into next week.

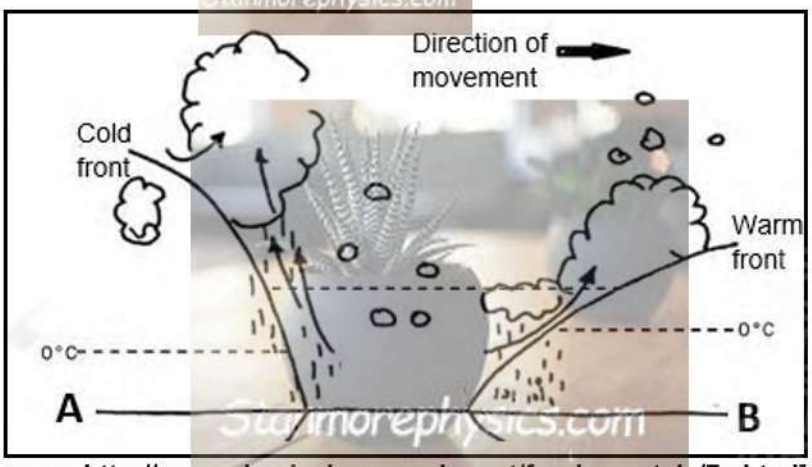
[Source: https://apnews.com/article/south-africa-storms-floods-cape-town-3be223aee333da1fe441730f76cedfb9]

SATELLITE IMAGE



[Source: https://weatherblog.co.za/cold-front/majestic-cold-front-about-to-make-landfall/]

CROSS SECTION THROUGH THE MATURE STAGE OF A MID-LATITUDE CYCLONE



[Source: http://www.physicalgeography.net/fundamentals/7s.html]

1.3.1 Provide the reason from the article, for the record rainfall experienced around Cape Town.

Multiple cold fronts have battered the region on the south-western tip of Africa since late last week. (1) (1 x 1) (1)

1.3.2 Identify the cloud type indicated at **Y** on the satellite image.

Cumulonimbus (1) (1 x 1) (1)

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1.3.3 Account for the development of the cloud type at **Y** (answer to QUESTION 1.3.2).

Rapid upliftment of warm air due to the steep gradient of the cold front (2) (1 x 2) (2)

1.3.4 State the general direction of movement of a mid-latitude cyclone.

West to east /Eastwards (1) (1 x 1) (1)

1.3.5 Give a reason for the answer to QUESTION 1.3.4.

Driven by the westerlies (2)
The system moves in the direction of the prevailing winds (2)
[ANY ONE] (1 x 2) (2)

1.3.6 Explain how the general direction of movement of the mid latitude (answer to QUESTION 1.3.4) resulted in the flooding referred to in the article.

West to east movement over the Atlantic ocean – carrying large amounts of water results in heavy rainfall (2)
Continuous formation of cumulonimbus clouds due to multiple cold fronts causing excessive rainfall (2)
Continuous heavy rainfall from multiple mid-latitude cyclones saturates the soil leading to (more) flooding (2)
[ANY TWO] (2 x 2) (4)

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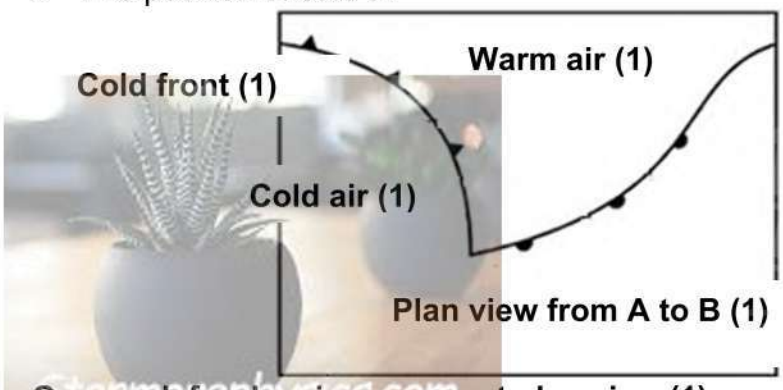
1.3.7 Draw a labelled plan view of the cross-section from **A** to **B**. The following must be shown in the drawing:

- The position of the cold front
- The position of warm air
- The position of cold air



One mark for drawing a correct plan view (1)
One mark for the correct position of the cold front (1)
One mark for the correct position of warm air (1)
One mark for the correct position of cold air (1) (4 x 1) (4)

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1.4 Refer to the information on Tropical Cyclone Dikeledi below and answer the following questions.

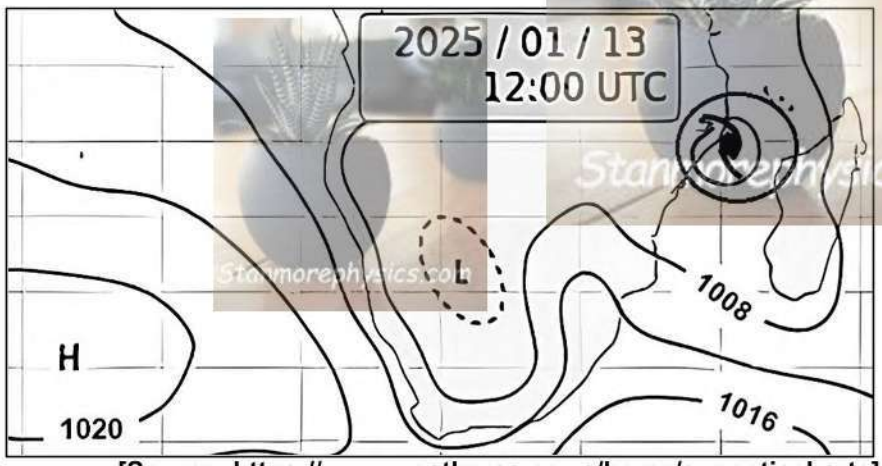
MOZAMBIQUE – TROPICAL CYCLONE DIKELEDI

13 JANUARY 2025

Mozambique is facing a new devastating weather system as Tropical Storm Dikeledi has reintensified into a tropical cyclone. It is currently moving across Nampula in Madagascar and will weaken over land. It is expected to re-enter the Mozambique Channel near Angoche by 14 January, potentially regaining strength to a cyclone or intense cyclone. The National Meteorology Institute (INAM) indicates that strong winds and heavy rainfall (up to 200 mm/24h) are expected to impact coastal districts, including Mossuril, Mogincual, Liupo and Angoche in the Nampula province

[Adapted from https://reliefweb.int/report/mozambique/mozambique-cyclone-tropical-dikeledi-flash-update-1-13-january-2025-enpt]

EXTRACT FROM A SYNOPTIC WEATHER MAP



[Source: https://www.weathersa.co.za/home/synopticcharts]

1.4.1 How many tropical cyclones have occurred before cyclone Dikeledi?

3 (1) (1 x 1) (1)

1.4.2 Provide a reason for the answer to QUESTION 1.4.1.

Tropical cyclones are named alphabetically (2)
D is the 4th letter of the alphabet so there were 3 before it (2)
[ANY ONE] (1 x 2) (2)

1.4.3 Refer to the map extract and determine the air pressure at the centre of the tropical cyclone.

Lower than 1 000 mb/hPa (2) (1 x 2) (2)

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1.4.4 Explain why Tropical Cyclone Dikeledi will weaken when moving over land.

The winds are slowed down by friction with the land surface (2)
Less moist air enters the system which reduces the amount of condensation (2)
Less latent heat is released through condensation to sustain the system (2)
Pressure gradient weakens causing winds to slow down (2)
Less convection results in less evaporation (2)
[ANY ONE] (1 x 2) (2)

1.4.5 In a paragraph of approximately EIGHT lines, discuss how strong winds and heavy rain impact negatively on the natural environment, when Tropical Cyclone Dikeledi makes landfall.

<u>Strong Winds</u>
Strong winds will uproot trees (2)
Strong winds will displace the sand/soil on the coast (2)
Soil erosion takes place due to strong winds (2)
Coastal landforms (example dunes) are destroyed/displaced by strong winds (2)

<u>Heavy Rainfall</u>
Heavy rainfall/floods wash away natural vegetation (2)
Flooding caused by heavy rain will displace the sand/soil on the coast (2)
Coastal landforms (example dunes) are destroyed/displaced by heavy rainfall/flooding (2)
Coastal ecosystems are disrupted/destroyed by flooding (2)
Habitats of animals are destroyed by flooding (2)
Animals drown/die due to flooding (2)
Soil erosion takes place due to heavy rainfall/flooding (2)

(ANY FOUR: Must have from both STRONG WINDS and HEAVY RAINFALL)

(Must refer to the factors strong wind and heavy rainfall and the impact theeof in responses.) (4 x 2) (8)

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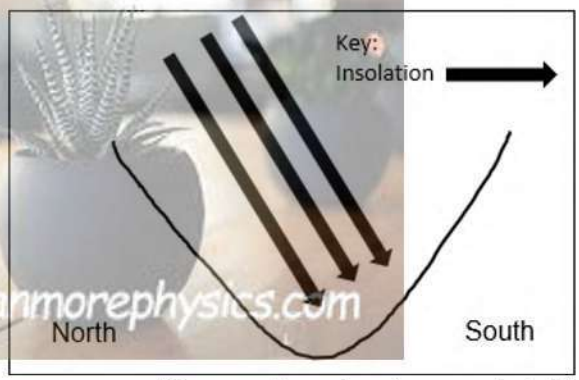
1.5 Refer to the infographic on valley climate in the Southern Hemisphere below when answering the following questions.

KATABATIC WIND

As air cools it becomes denser and therefore heavier. The cold air then flows down the side of the valley, resulting in a katabatic flow (or wind).

[Adapted from https://skybrary.aero/articles/katabatic-wind]

INSOLATION IN THE VALLEY



[Source: Examiner's own sketch]

PHOTOGRAPH OF A VALLEY

[Source: *https://www.flickr.com/photos/zakopaneinthesierras/31006055087*]

1.5.1 Define the concept *slope aspect*.

The direction that a slope faces (2) (1 x 2) (2)

1.5.2 Provide evidence from the "insolation in the valley" sketch that the valley is located in the Southern Hemisphere.

Direct insolation on the North facing slope/Southern slope (2)
(1 x 2) (2)

1.5.3 The shadow zone will develop at slope (**C**/**D**) on the photograph.

D (1) (1 x 1) (1)

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1.5.4 Account for the difference in vegetation between slopes **C** and **D** which is evident in the photograph.

At D
More moisture available at D for plants to grow than at C (2)
Less (direct) sunlight/insolation at D causes less evaporation than at C (2)

OR

At C
Less moisture available at C for plants to grow than at D (2)
More (direct) sunlight/insolation at C causes more evaporation than at D (2)

[ANY TWO - Must refer to the same characteristic at C and D]
(2 x 2) (4)

1.5.5 Refer to the extract on katabatic winds in a valley. Explain how katabatic winds can lead to the development of a valley inversion.

Cold air flows down the valley slopes and collects at the bottom of the valley (2)
Warm air is displaced upwards (2)
Subsiding cooler/cold air from above traps the warm displaced air (2)
Warm air is trapped between the cold air (2)
[ANY THREE] (3 x 2) (6)
[60]

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QUESTION 2: GEOMORPHOLOGY

2.1 Refer to diagrams **A** and **B** below which shows the flow patterns of rivers. Match the descriptions in QUESTIONS 2.1.1 to 2.1.7 with **A** or **B**. Write down only **A** or **B** next to the question numbers (2.1.1 to 2.1.7) in the ANSWER BOOK, e.g. 2.1.8 A.

2.1.1 A / LAMINAR (1)

2.1.2 B / TURBULENT (1)

2.1.3 B /TURBULENT (1)

2.1.4 A / LAMINAR (1)

2.1.5 B / TURBULENT (1)

2.1.6 B / TURBULENT (1)

2.1.7 A / LAMINAR (1) (7 x 1) (7)

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 (2.1.1 to 2.1.8) in your ANSWER BOOK, e.g. 2.1.9 A.

2.2.1 B (1) / river having renewed energy and downward erosion

2.2.2 C (1) / rising of land along the course of a river

2.2.3 B (1) / Incised meander

2.2.4 D (1) / (ii) and (iv)

2.2.5 B (1) / (ii) and (iii)

2.2.6 D (1) / elbow of capture

2.2.7 C (1) / headward erosion by a more powerful stream

2.2.8 A (1) / too small for the valley in which it flows (8 x 1) (8)

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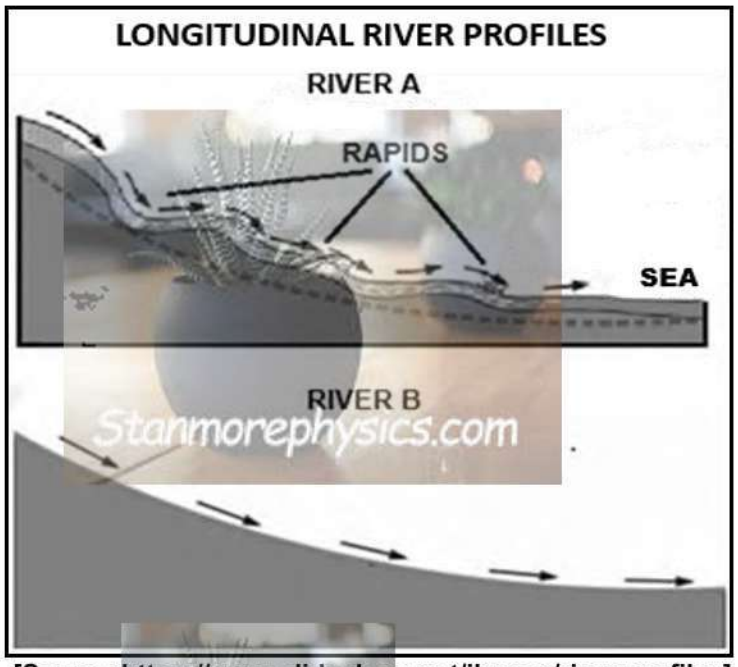
2.3 Refer to the diagrams below, indicating a longitudinal profile of rivers **A** and **B** and answer the questions that follow.



[Source:https://www.slideshare.net/jlanser/river-profiles]

2.3.1 Define the concept *ungraded profile*.

A river that has not yet reached a state of equilibrium between erosion, transportation, and deposition (2) [CONCEPT] (1 x 2) (2)

2.3.2 Does river **A** have a graded or ungraded profile?

Ungraded (1) (1 x 1) (1)

2.3.3 Provide evidence from the diagram to support your answer in QUESTION 2.3.2.

River profile is not smooth (2)
River profile is interrupted by several temporary erosion base levels (e.g. rapids, knickpoints) (2)
Multi-concave profile (2)
[ANY ONE] (1 x 2) (2)

2.3.4 In the longitudinal profile of river **A**, identify the:

(a) Permanent base level of erosion

Sea (1) (1 x 1) (1)

(b) Temporary base level of erosion.

Rapids (1) (1 x 1) (1)

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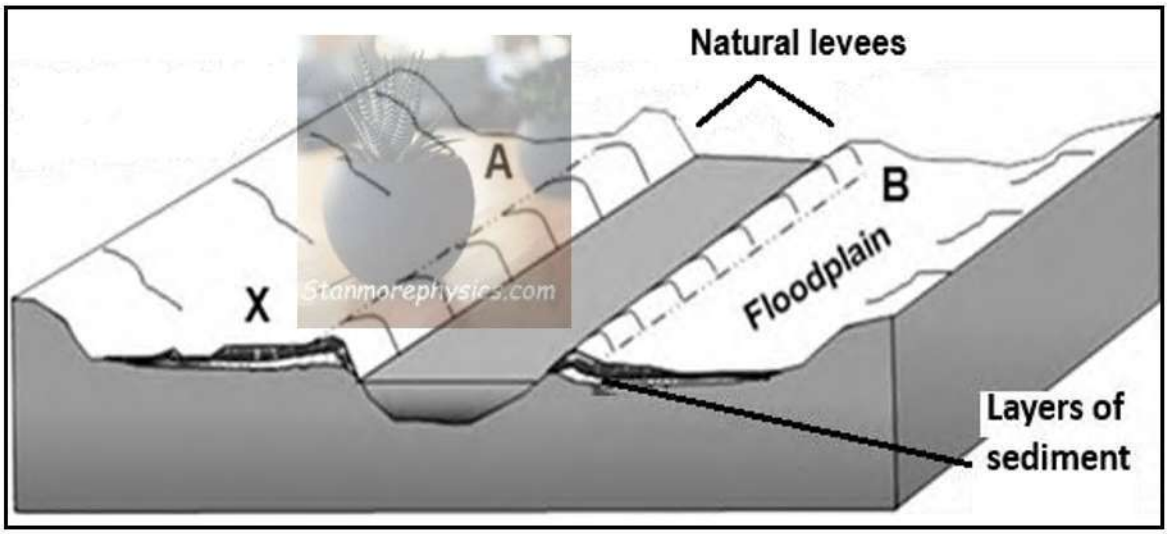
2.3.5 Describe the shape of the longitudinal profile of river **B**.

Concave (2) (1 x 2) (2)

2.3.6 Explain how erosion and deposition contribute to the shape of the longitudinal profile of river **B**, described in QUESTION 2.3.5.

In the upper course vertical erosion is dominant resulting in a steep gradient (2).
In the middle course lateral erosion is dominant resulting in a gradual gradient (2).
In the lower course deposition is dominant resulting in a flat gradient (2).
Results in a concave profile (2)
[ANY THREE] (3 x 2) (6)

2.4 Refer to the diagram on natural levees below to answer the questions that follows.



[Source: https://www.tutor2u.net/geography/reference/gcse-geography-landforms-in-the-lower-course-river-landscapes-6]

2.4.1 What is a *natural levee*?

An embankment formed after a river floods/Naturally raised banks of a river/Sand deposits along either side of the floodplain of a river [CONCEPT] (2) (1 x 2) (2)

2.4.2 In which course of the river is the floodplain in the diagram most likely to occur?

Middle (1) OR Lower (1) (1 x 1) (1)

2.4.3 What type of erosion would be dominant in the river shown in the diagram?

Lateral (sideways) (2) (1 x 2) (2)

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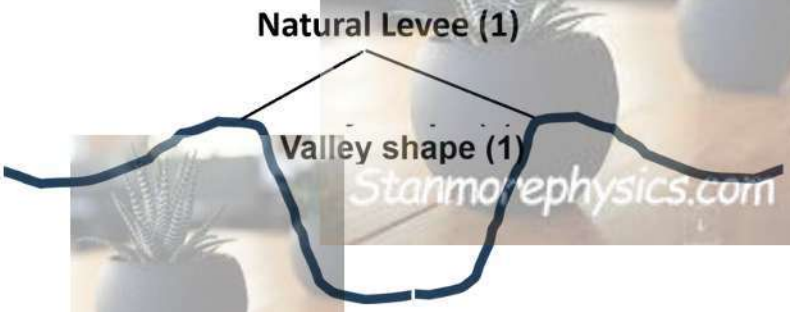
2.4.4 Use evidence from the diagram to explain how flooding leads to the formation of a natural levee.

Material/Sediment (gravel, sand, and silt) is deposited after flooding on the banks of the river (2)
Repeated depositing of layers of material/sediments builds up on the riverbank (2)
The build-up of material/sediment forms a natural levee (2)
[ANY TWO] (2 x 2) (4)

2.4.5 Draw a labelled cross-section of the river from **A** to **B**. The cross-section must show:

(a) The shape of the river valley (1 x 1) (1)

(b) The position of the natural levee (1 x 1) (1)



1 mark shape of the valley (1)
1 mark position of the levees (1)

2.4.6 Evaluate why site **X** would be a suitable (good) location for the development of a rural settlement.

Close to river – easier access to water (2)
Deposited material on floodplain provides fertile soil for agriculture (2)
Easier to settle and farm - gentle gradient (2)
Safe – protected from flooding (by natural levee) (2)
[ANY TWO] (2 x 2) (4)

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2.5 Refer to the extract below on river management.

THE UMBILO RIVER SYSTEM, SOUTH AFRICA

The water in the UmBilo River system in Durban's eThekwini Municipality in KwaZulu-Natal is severely polluted. This is due to years of industrial pollution and inefficient sewage infrastructure which results in raw sewage contaminating the water system.

The water pollution is so severe that the water has changed colour. Not only is the health of the surrounding communities being affected by this water pollution, but sensitive ecosystems along the path of the UmBilo river system are also being destroyed.

Greenpeace Africa is partnering with the UmBilo River Watch community group to raise awareness about the causes and effects of this water pollution on vulnerable communities and ecosystems.

[Adapted from https://www.greenpeace.org/africa/en/blogs/49015]

2.5.1 Define the concept *river management.*

The practice of managing water resources in a river basin in relation to the socio-economic setting (2) [CONCEPT] (1 x 2) (2)

2.5.2 In which province is the eThekwini Municipality located?

Kwazulu-Natal/KZN (1) (1 x 1) (1)

2.5.3 According to the extract, what are the main causes of pollution of the Umbilo River?

Pollution from industry (1)
Inefficient treatment of raw sewage (1) (2 x 1) (2)

2.5.4 Name ONE environmental impact of pollution highlighted in the extract.

The destruction of ecosystems (2) (1 x 2) (2)

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2.5.5 In a paragraph of approximately EIGHT lines, suggest strategies that the eThekwini Municipality can implement to protect the UmBilo River from untreated sewage.

Legislation preventing raw sewage from being dumped in rivers (2)
Fines imposed for dumping raw sewage in rivers (2)
Awareness campaigns (2)
Allocation of funds to fix sewage treatment plants (2)
Provision of qualified technicians to maintain sewage treatment plants (2)
Encourage treatment/recycling of sewage (2)
Frequent testing of water quality to monitor impurities (2)
Regular maintenance of sewerage systems (2)
Upgrading sewerage systems (2)
[ANY FOUR] **(4 x 2) (8)**

[60]

TOTAL SECTION A: 120

(4 x 2) (8)
[60]

TOTAL SECTION A: 120

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SECTION B

QUESTION 3: GEOGRAPHICAL SKILLS AND TECHNIQUES

3.1 MAP SKILLS AND CALCULATIONS

Refer to the topographical map and orthophoto map.

3.1.1 C (1)/Mpumalanga (1 x 1) (1)

3.1.2 A(1)/2531BD (1 x 1) (1)

Refer to the orthophoto map.

3.1.3 What is the difference in height between the contour line **7** and spot height **8** on the orthophoto map?

382 – 300 = 82m (Range: 82m – 90m)(1)

(1 x 1) (1)

3.1.4 Use the answer to QUESTION 3.1.3 to calculate the gradient from the contour line **7** to spot height **8.**

Use the map distance of 4,5 cm. (3 x 1) (3)

Formula: **Average gradient = Vertical Interval (VI) / Horizontal Equivalent (HE)**

Gradient = VI / HE
VI = 382 - 300 = 82 (Range: 82m – 90m) m
HE= 4,5 cm x 100 ~~m~~ = 450 m (1)
Gradient = 82 / 450 **(1) Correct substitution**
= 1 : 5,48 (1) / 1 : 5, 49 (1)

3.1.5 Refer to the answer to QUESTION 3.1.4.

At this gradient there will be more (infiltration/run-off).

Run-off (2) (1 x 2) (2)

3.1.6 Motivate your answer to QUESTION 3.1.5.

(Steep) gradient results in less infiltration (2)
(Steep) gradient results in more run-off (2) (1 x 2) (2)

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3.2 MAP INTERPRETATION

Refer to the topographical map.

3.2.1 (a) A wind that blows at night from spot height **405** in block **B3** in a westerly direction to the Umgwenya River, is known as a/an … wind.

C (1)/Katabatic (1 x 1) (1)

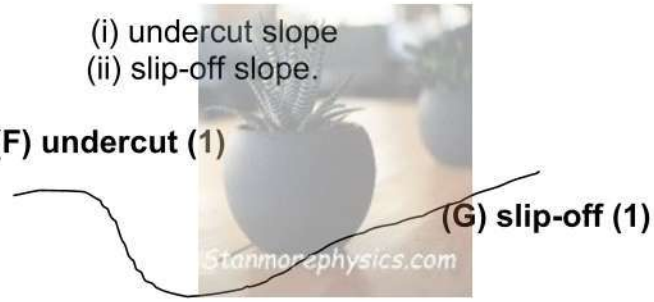
(b) Identify the negative environmental impact that the wind, identified in QUESTION 3.2.1 (a), can have on the Leopard Creek Golf Estate in blocks **B1** and **B2**

Frost can kill plants/vegetation (2) (1 x 2) (2)

Refer to line **F – G** in blocks **B1** and **B2** in the topographical map**.**

3.2.2 (a) Draw a cross-section along the line **F – G** across the Umgwenya River. Provide the following labels on your cross-section.

(i) undercut slope
(ii) slip-off slope. (2 x 1) (2)



1 mark for the undercut slope (1)
1 mark for the slip-off slope (1)

(b) Give ONE physical reason why the Leopard Creek Golf Course is located at **G** rather than at **F .**

More erosion at F (2)
Less erosion at G (2)
More deposition at G (2)
Less deposition at F (2)
Less risk of flooding at G (2)
More risk of flooding at F (2)
[ANY ONE] (1 x 2) (2)

Refer to block **C2** on the topographical map.

3.2.3 I Identify the fluvial feature at **H** in block **C2** on the topographical map.

Braided stream (1) (1 x 1) (1)

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3.2.4 The feature identified in QUESTION 3.2.3 is commonly found in the … of a river where the river valley has a ...

C (1) / (ii) and (iii) (1 x 1) (1)

3.2.5 (a) What is the general direction of the flow of the Umgwenya River on the topographical map?

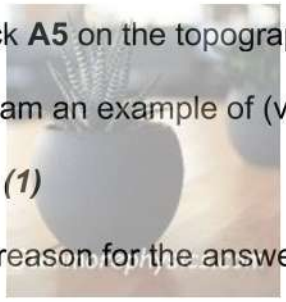
North East (1) (1 x 1) (1)

(b) Give evidence from the topographical map to support the answer in QUESTION 3.2.5 (a).

Angle at which tributaries join the main river (2)
Spot heights / contour lines decrease towards the north east (2)
[ANY ONE] (1 x 2) (2)

3.3 GEOGRAPHIC INFORMATION SYSTEMS (GIS)

Refer to the dam in block **A5** on the topographical map.



3.3.1 (a) Is the dam an example of (vector/raster) data?

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

(b) Give a reason for the answer in QUESTION 3.3.1(a).

Vector data is given in lines, points/dots and polygons (2)
(1 x 2) (2)

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Refer to block **A4** and the map reference on the topographical map.

3.3.2 (a) Define the term *buffering*.

The process of demarcating an area around a spatial feature (2)
[CONCEPT] (1 x 2) (2)

(b) Identify the land-use feature labelled **J** in block **A4**.

Protected area (1) (1 x 1) (1)

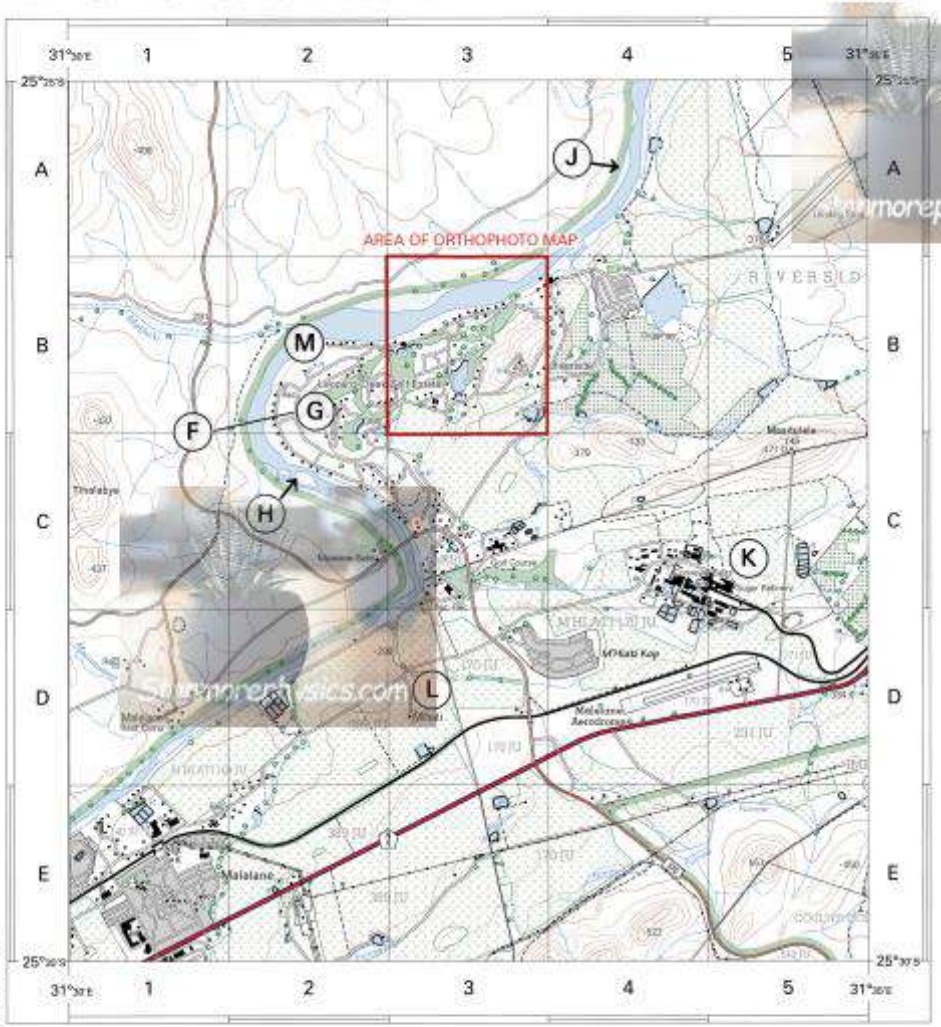
(c) Explain how the land-use feature identified in QUESTION 3.3.2(b) is an example of buffering.

Demarcation of the area around the river where there is a risk of flooding. (2)
No developments are allowed in this protected area. (2)
[ANY ONE] (1 x 2) (2)

TOTAL SECTION B: 30

TOTAL: 150

EXTRACT FROM 2531BC MALELANE 1:50 000



Metres 1000 0 1 2 3 4 5 Kilometres

Mean magnetic declination 18°28' West of True North (January 2014)
Mean annual change 9' Westwards (Jan. 2014 - Dec. 2014)

CONTOUR INTERVAL 20 METRES - KONTOERTUSSENRUIMTE 20 METER

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 2531 BC 16 RIVERSIDE ortho - rectified image 1:10 000

0 km 1 km

CONTOUR INTERVAL 5 METRES - KONTOERTUSSENRUIMTE 5 METER

VERKLARING

Nasionale Deurpad; Nasionale Roete
Hoofpaaie
Sekondêre Pad; Hoogtemerk
Ander Pad; Brug
Dowwe Pad en Voetslanpad
Spoorweg; Stasie of Syding
Ander Spoorweg; Tonnel
Opvulling; Deurgrawing
Kragdyn
Bebouing (Hoë Digtheid, Lae Digtheid)
Geboue; Monument
Poskantoor; Polisiestasie; Winkel
Plek van Aanbidding; Skool; Hotel

Internasionale Grens en Baken
Provinsiale Grens
Bewaarde Gebied
Standhoudende Rivier
Standhoudende Water
Nie-standhoudende Rivier
Nie-standhoudende Water
Drie Loop
Drie Pan
Vleivlei en Vlei
Pyplyn (bo die grond)
Watertoring; Reservoir; Waterpunt
Kontyrmotor
Prominente Klipbank

Draadheining; Muur
Windpomp; Monument
Kommunikasietoring
Myntkeur; Uitgrawing
Feilbaken; Seinstasiebaken
Vuurtoring en Seinkerktig
Begraafplaas; Graf
Erosie; Sand
Bebosde Gebied
Bewerkte Land
Boord of Wingerd
Omsaaiingsbamoen
Ry Bome
Doringbos/Ike Plaas