



GEOGRAPHY: PAPER II

EXAMINATION NUMBER

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Time: 1½ hours

100 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. Write your examination number in the blocks provided above.
2. This question paper consists of 15 pages, a topographic map and an aerial photograph. Please check that your paper is complete.
3. Read the questions carefully.
4. Answer ALL the questions in the spaces provided on the question paper.
5. Carefully study the composite* 1:50 000 topographic map extract 3025 BD and DB; 3026 AC and CA BETHULIE and the accompanying 1:10 000 Bethulie aerial photograph before answering the questions.
6. The topographic map has grid lines with markings A to I and 1 to 11 that may be used to identify locations according to blocks.
7. The topographic map extract, aerial photograph and your completed answer book must be handed to the invigilator at the end of the examination. The maps and aerial photographs may be retained by the school for future use.
8. On page 2 there is a glossary of words. This will help you understand what the words in **bold** in the questions are asking you to do. There is also an English-Afrikaans translation of some words appearing on the map.
9. A magnifying glass and calculator may be used.
10. It is in your own interest to write legibly and to present your work neatly.
11. You may use the back page for rough work. No marks will be allocated to rough work.

*composite – the map is made up of sections of four map sheets that have been merged together.

FOR MARKER'S USE ONLY

Question	1	2	3	4	Total
Marks	41	24	21	14	100
Obtained					

Glossary of terms

WORD	MEANING
Account for	To justify, and provide reasons for something using a short explanation.
Calculate	To work out the value of something using a mathematical method.
Classify	To arrange in categories or groups according to shared qualities.
Create	To produce or form something out of nothing, to design, to make.
Design	To explain step-by-step a process or plan of action.
Determine	To discover as a result of investigation; to come to a decision or resolution.
Draw	To show by means of a sketch/ illustration.
Explain	To describe something so that it can be understood.
Identify	To give the details or characteristics of something.
Label	To mark a diagram or sketch with information.
Order	To arrange according to a specific method or sequence.
Provide	To give.
Shade	To colour in; to fill in using colour or patterns.
Substantiate	To support an answer with proof or evidence.
Suggest	To put forward ideas or reasons.
Verify	To prove that something is true.

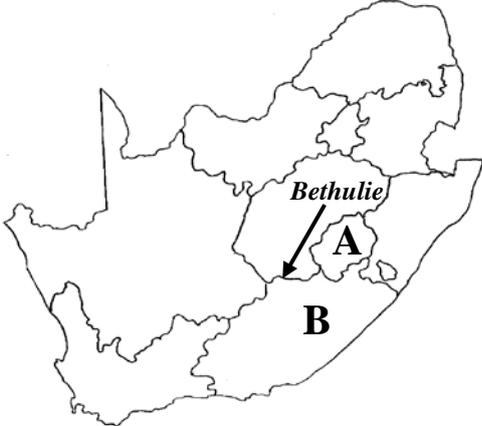
Translation of words

English to Afrikaans

Brickworks	Baksteenfabriek
Bridge	Brug
Concentration Camp	Konsentrasiekamp
Memorial Garden	Gedenktuin
Diggings	Delwerye
Farm	Plaas
Fountain/ spring	Fontein
Furrow	Kanaal of voor
Golf course	Gholfbaan
Hill	Kop/ koppie
Marsh, swamp or wetland	Vlei, moeras of vleiland
Memorial	Gedenkteken
Midpoint	Middelpunt

Mission Station	Sendinghuis
Mountain	Berg
Nature Reserve	Natuurreservaat
Old rail routes	Gewese spoorwegroetes
Power Station	Kragstasie
Ridge	Rant
River	Rivier
Road	Pad
Route	Roete
Sewerage works	Rioolwerke
Stream	Spruit
Water gap	Poort
Waterworks	Waterwerke

Location map: Location of Bethulie in South Africa

	<p>Bethulie, a small sheep and cattle farming town, lies approximately in the centre of South Africa, in the southern Free State. The town is located on the northern banks of the Gariep Dam. Bethulie must hold the record for changing its name in South Africa, for example, Caledon, Verheullpolis and Heidelberg.</p> <p>The Gariep Dam was built in 1970. The dam wall is 88 m high. This is the largest storage reservoir in the country and it generates 360 MW of hydroelectricity.</p> <p>About 7 km from the town, an imposing arched, combined road and rail bridge (known as the Hennie Steyn Bridge F7, G7) spans the Gariep Dam. It is the longest road-rail bridge in southern Africa.</p>
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[Source: <www.bethulie.za.net>]

QUESTION 1 ATLAS USE, MAP ORIENTATION AND TECHNIQUES

1.1 Refer to the location map above, as well as the composite 1:50 000 topographic map extract 3025 BD and DB; 3026 AC and CA BETHULIE, to answer the following questions. Tick the correct box.

1.1.1 The neighbouring country labelled A on the location map above is ...

Botswana	<input type="checkbox"/>
Lesotho	<input type="checkbox"/>
Namibia	<input type="checkbox"/>
Swaziland	<input type="checkbox"/>

(1)

1.1.2 The province labelled B on the location map above is ...

Eastern Cape	<input type="checkbox"/>
Free State	<input type="checkbox"/>
Gauteng	<input type="checkbox"/>
North West	<input type="checkbox"/>

(1)

1.1.3 A constructed feature in the settlement of Bethulie is found at 30° 29' 47" S and 25° 58' 26" E. The ... is located at this point.

Cemetery	<input type="checkbox"/>
Dutch Reformed Church (DR Church)	<input type="checkbox"/>
Police Station	<input type="checkbox"/>
School	<input type="checkbox"/>

(2)

1.1.4 The approximate true bearing of trigonometrical station 6 (C1) Krugerskop from the Louw Wepener Memorial (A2/B2) is ...

33°	
57°	
148°	
212°	

(2)

1.1.5 A number of features (A to D) have been labelled on the composite 1:50 000 topographic map extract 3025 BD and DB; 3026 AC and CA BETHULIE. **Identify** each of these features.

A _____

B _____

C _____

D _____

(4)

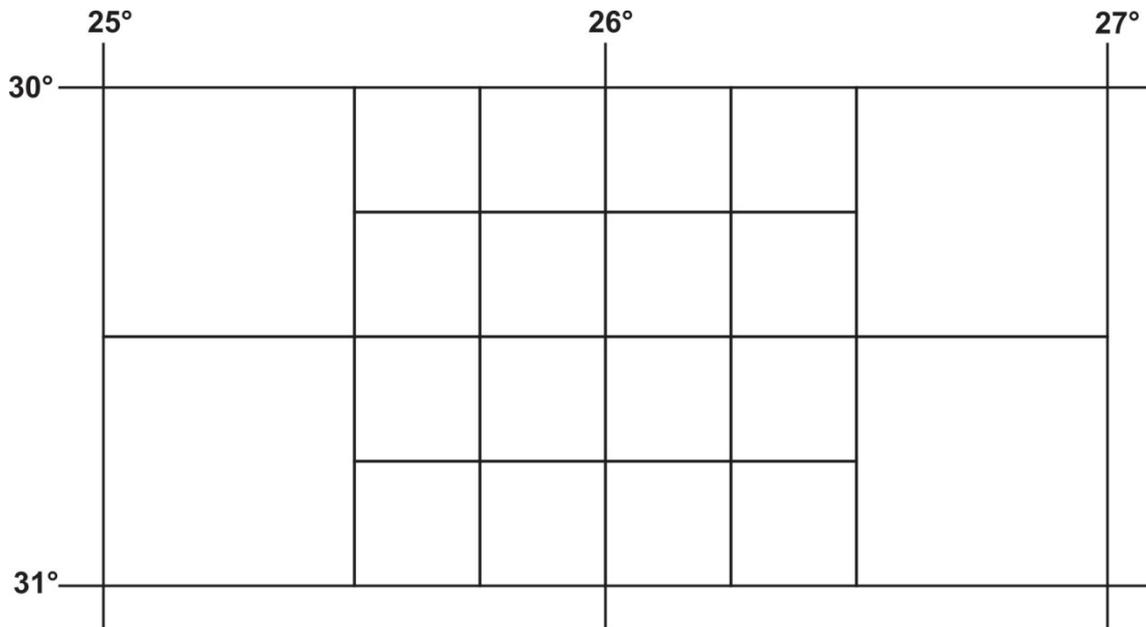
1.1.6 There are old rail routes indicated in E3, G5 and H6. **Explain** why the old railway line had to be rerouted.

(2)

1.2 **Geographic techniques**

Refer to the composite 1:50 000 topographic map extract 3025 BD and DB; 3026 AC and CA BETHULIE to answer the following questions.

1.2.1 Study the topographic map grid from which the composite map originates. **Shade** in the FOUR blocks below that represent the sheets which the composite 1:50 000 topographic map extract 3025 BD and DB; 3026 AC and CA BETHULIE is made up of.



(4)

1.2.2 (a) In which general direction is the water flowing beneath the Hennie Steyn Bridge (F7, G7)?

Tick the correct answer.

Easterly	<input type="checkbox"/>
Northerly	<input type="checkbox"/>
Southerly	<input type="checkbox"/>
Westerly	<input type="checkbox"/>

(2)

(b) **Substantiate** your answer in Question 1.2.2 (a) by using ONE piece of map evidence.

(2)

1.2.3 (a) The length of the Hennie Steyn Bridge (F7, G7) is ... km. Tick the correct answer. (Hint: measure the bridge from bank to bank.)

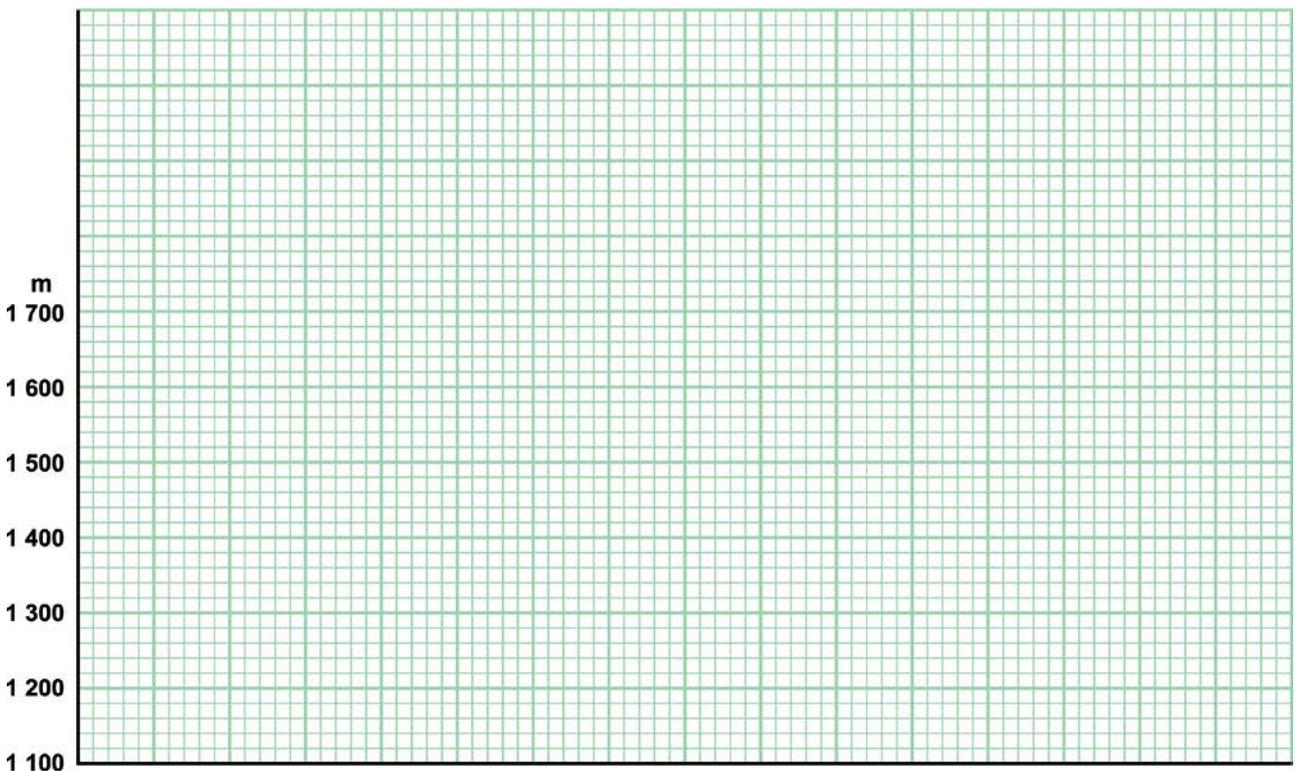
0,10 km	
1,00 km	
2,00 km	
4,00 km	

(2)

(b) The altitude of the Hennie Steyn Bridge is _____ m. (1)

1.2.4 **Cross section**

(a) **Draw** a cross section from trigonometric station 6 (C1) to spot height 1395 (C5). Use a vertical interval of 1 cm = 100 m.



(5)

(b) Fill in and **label** the position of the following on the cross section:

- secondary road
- railway line
- Bethulie Dam

(3)

(c) **Determine** the vertical scale of the cross section as a representative fraction.

1: _____ (2)

- (d) **Calculate** the vertical exaggeration for the cross section on page 6.

_____ times

Calculations:

(4)

1.2.5 **Gradient**

Refer to the composite 1:50 000 topographic map extract 3025 BD and DB; 3026 AC and CA BETHULIE.

Calculate the average gradient from trigonometrical station 6 (C1) to point Y (C2), located at the diggings.

- (a) Difference in height: _____ m (1)
- (b) Distance between the two points: _____ m (1)
- (c) Gradient: 1: _____

Calculations:

(2)
[41]

Q1 subtotal

QUESTION 2 CLIMATE AND DRAINAGE, GIS APPLICATION

2.1 Refer to the Fact File on the climate of Bethulie.

FACT FILE – Climate of Bethulie

Bethulie is located in the summer rainfall region and experiences a below average rainfall of 481 mm per annum. These parts of the southern Free State experience large temperature variations between day and night time. The average summer temperature is 22,7 °C (January) and the average winter temperature is 8,3 °C (July).

[Source: <www.en.climate-data.org>]

2.1.1 **Suggest** why there are many non-perennial rivers in the areas surrounding Bethulie.

_____ (2)

2.1.2 **Calculate** the seasonal range (°C) in the annual average temperature for Bethulie.

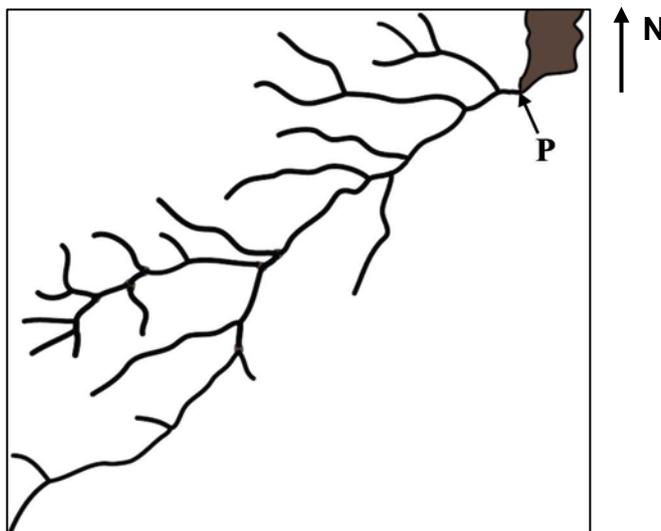
_____ °C (2)

2.2 **Drainage of the area**

2.2.1 Refer to Figure 1 below as well as the composite 1:50 000 topographic map extract 3025 BD and DB; 3026 AC and CA BETHULIE.

A small drainage basin has been redrawn in Figure 1, found on the map in blocks G8–9 and H7–8. The river flows into the Gariiep Dam at point P (G9). Note the drawing has been enlarged and the streams are shown by means of solid lines.

Figure 1: Small drainage basin redrawn from the Bethulie map



(a) **Identify** the dominant drainage pattern in Figure 1.

_____ (2)

- (b) **Draw** in and **label** the drainage basin boundary in Figure 1 (page 8). (2)
- (c) **Order** the streams in the drainage basin (on Figure 1, up to the point P where the main stream flows into the Gariep Dam). Complete Table 1 to show the stream order and the number of tributaries of each order.

Table 1: Stream ordering

Stream order			
Number of tributaries			

(3)

- (d) The drainage density of this river system is ... (as shown in Figure 1, page 8).

low	
medium	
coarse	
very high	

(2)

2.2.2 The owners of the farm Clifton Vale (G11, H10–11 and I10) have managed the drainage basin and catchment area on their farm efficiently. **Verify** this statement by providing TWO pieces of map evidence.

- _____

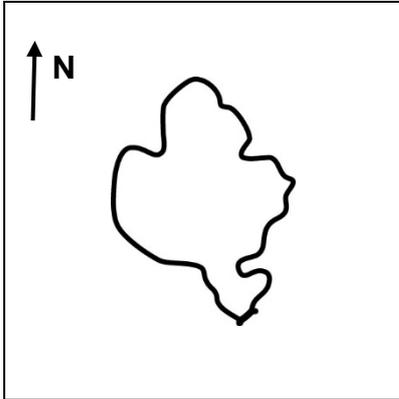
- _____

(4)

2.3 Refer to Figure 2 below, which shows the outline of Bethulie Dam (C3, C4 and D4). Figure 2 is drawn to scale. Photograph 1 shows a view across the dam.

Refer to the composite 1:50 000 topographic map extract 3025 BD and DB; 3026 AC and CA BETHULIE.

Figure 2: Bethulie Dam



Photograph 1: Bethulie Dam



[Source: Examiner]

The Bethulie Dam provides the town with its water supply. As the population of the town has grown considerably, the municipality is looking at increasing the storage capacity of this dam. A GIS company has been tasked to investigate the impacts of raising the dam wall to increase its storage capacity.

2.3.1 **Create** a 0,5 cm buffer zone around the dam on Figure 2. **Label** the buffer zone. (3)

2.3.2 (a) **Identify** TWO facilities/ activities that will be affected by the raising of the dam wall.

- _____
- _____

(2)

(b) **Explain** how these facilities/ activities will be affected.

(2)
[24]

Q2 subtotal

QUESTION 3 PHOTOGRAPH ANALYSIS, RURAL AND URBAN LAND-USE

Refer to the composite 1:50 000 topographic map extract 3025 BD and DB; 3026 AC and CA BETHULIE and the accompanying 1:10 000 aerial photograph. The area shown in the aerial photograph is marked by a red block on the topographic map extract.

3.1 FOUR constructed features (E to H) have been labelled on the accompanying 1:10 000 aerial photograph. **Identify** these features.

E _____

F _____

G _____

H _____

(4)

3.2 3.2.1 The aerial photograph was taken at approximately ... (Tick the correct option/ time.)

08:00	
10:00	
12:00	
14:00	

(1)

3.2.2 **Provide** ONE reason for your answer in Question 3.2.1.

(2)

3.3 Small agricultural holdings are a typical feature on the outskirts of South African towns, for example to the east of Bethulie.

3.3.1 In which land-use zone are the small holdings located?

_____ (2)

3.3.2 Apart from the small holdings, other activities take place on the land-use zone named in Question 3.3.1 above. **Identify** THREE such activities and provide the alphanumeric block reference. (Refer to the topographic map extract.) Note: focus on the areas west and south west of the town.

Activity occurring in zone named in Question 3.3.1	Alphanumeric block reference of the activity (e.g. D2)

(6)

3.4 **Fluvial features**

Refer to the 1:10 000 aerial photograph.

3.4.1 **Identify** the fluvial feature labelled I.

_____ (2)

3.4.2 **Explain** how you would typically identify a river course on an aerial photograph.

 _____ (2)

3.4.3 **Provide** evidence to suggest that the Bethulie Dam is filled close to capacity when the photo was taken.

 _____ (2)
[21]

<p>Q3 subtotal</p>

QUESTION 4 ECONOMIC ACTIVITIES

Refer to the composite 1:50 000 topographic map extract 3025 BD and DB; 3026 AC and CA BETHULIE to answer the following questions.

- 4.1 4.1.1 **Classify** the type of economic activity that is taking place at the brickworks (D3).

_____ (2)

- 4.1.2 **Account for** the location of the sewerage works in F3.

_____ (2)

- 4.2 Many small towns have had to reinvent themselves to become more economically sustainable and to reverse the process of rural depopulation.

Design a strategy to prevent rural depopulation from taking place and to make the Bethulie area more economically sustainable. Use map evidence in your strategic planning.

Present your answer as a mind map on page 14.

MIND MAP (Question 4.2)

Strategy to prevent rural depopulation from taking place and to make the Bethulie area more economically sustainable

(10)
[14]

Q4 subtotal

Total: 100 marks

Rough work (Not for marks)