



NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2016

GEOGRAPHY: PAPER II

MARKING GUIDELINES

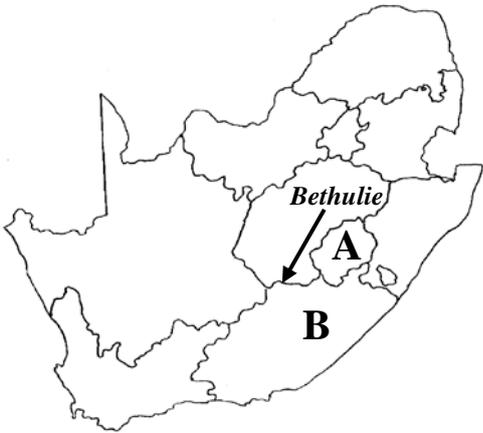
Time: 1½ hours

100 marks

These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.

The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.

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	
Lesotho	X
Namibia	
Swaziland	

(1)

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

Eastern Cape	X
Free State	
Gauteng	
North West	

(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	
Dutch Reformed Church (DR Church)	X
Police Station	
School	

(2)

1.1.4 The approximate true bearing of trigonometrical station6 (C1) Krugerskop from the Louw Wepener Memorial (A2/B2) is ...

33°	
57°	
148°	
212°	X

(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 Provincial boundary

B Boundary of protected area; nature reserve; conservation area

C rocky outcrop (long linear ridge); donga; erosion gully

C Erosion, soil erosion, sand

(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.

With the building of the Gariiep Dam, the old railway would have been

flooded; so a new route had to be built.

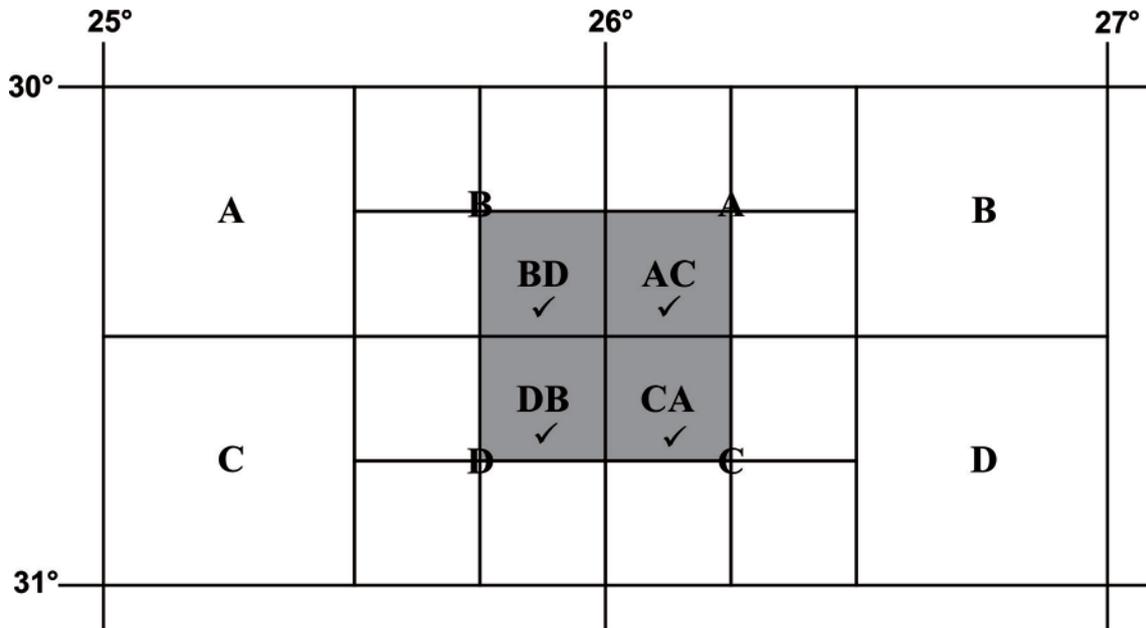
(2)

Width of the dam here is wider than where the new railway is – too costly to build here

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.



1 mark per block

(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	
Northerly	
Southerly	
Westerly	X

(2)

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

- Shore contour line higher on eastern side of map than western side, e.g. 1 280 vs 1 260 m
- Confluence point of the Caledon and Orange River (can give block ref)
- Orange River flows westerly towards the Atlantic Ocean (not map evidence only 1 mark)
- Spot heights along river/dam banks, become lower towards the West
- Eastern side – hilly/contours close tog. Western side – flatter and contours further apart – river flows down gradient

(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.)

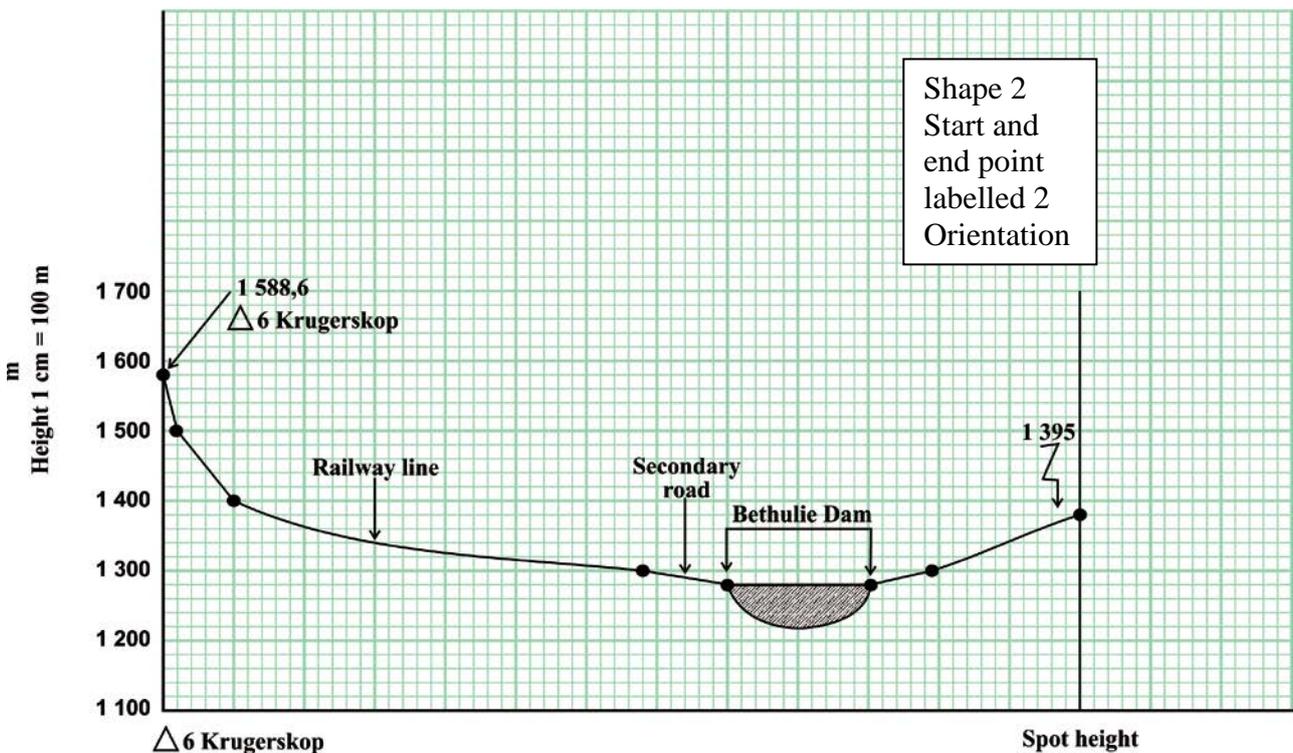
0,10 km	
1,00 km	X
2,00 km	
4,00 km	

(2)

(b) The altitude of the Hennie Steyn Bridge is 1 300 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 – concept of area when indicated

(3)

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

1: 10 000 accept 1/10 000

(2)

(d) **Calculate** the vertical exaggeration for the cross section on page 5.

5 times

Calculations:

<p>(c) 1 cm = 100 m</p> <p>= 100 × 100</p> <p>= 10 000 cm</p> <p>1 : 10 000</p>	<p>(d) $VE = \frac{VS}{HS} \frac{1:10\ 000}{1:50\ 000}$</p> <p>= $\frac{5\cancel{0}\ \cancel{0}\ \cancel{0}}{1\cancel{0}\ \cancel{0}\ \cancel{0}}$</p>
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max 2 marks method; if wrong VS given in (c) can get method marks if answer wrong)

(4)

1.2.5 **Gradient**

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

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

(a) Difference in height: 228.6 m (1)

(b) Distance between the two points: 450 m (1)

(c) Gradient: **1:** 2

Calculations:

<p>(a) 1 588.6 – 1 360</p> <p>= 228.6</p>	<p>(c) $G = 1 : \frac{d}{n}$</p>
<p>(b) 1.4 – 1.6</p> <p>= 700 – 800 m</p> <p>Range 1:3 to 1:3.5 (2 marks) – 1: 4 (1 mark)</p>	<p>1 : 3 – 1: 3.5</p>

(2)

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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.

Summer rainfall region; with low rainfall (below average) – (481 mm/pa)

Seasonal rainfall region; below moderate/median rainfall (2)

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

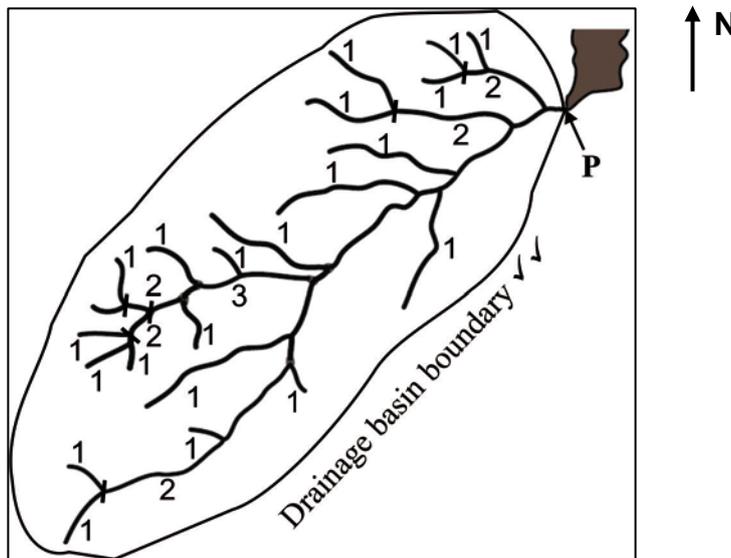
22,7 – 8,3 = 14,4 allow method mark for large value – small value °C (2)

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 Gariep 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 Bethulie map



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

Dendritic ✓✓ branching or tree like ✓ (2)

- (b) **Draw** in and **label** the drainage basin boundary in Figure 1 (page7). (2)
- (c) **Order** the streams in the drainage basin (on Figure 1, up to the point P where the main stream flows into the Gariiep Dam). Complete Table 1 to show the stream order and the number of tributaries of each order.

Table 1: Stream ordering

Stream order	1	2	3
Number of tributaries	22	5	1

(3)

- (d) The drainage density of this river system is... (as shown in Figure 1, page 7).

low	
medium	X
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.

- The farmer has 6 constructed dams on the farm for storage of water.
- There are a number of furrows that could be used for irrigation or effective water movement.

There are a number of wind pumps in the area to use groundwater.

Reservoirs have also been constructed for water storage.

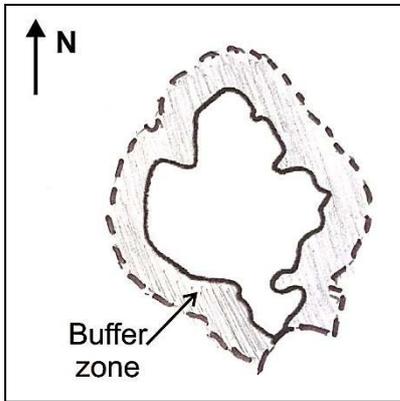
Anti-erosion wall / weirs: for preventing soil loss/trapping silt/damming water

X planting next to river (do not accept) (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.

- Transport routes – 701 and secondary road/other road
- Farming/grazing
- Holiday resort
- Hiking trail / cattle track
- Recreational activities – fishing, water sports (2)

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

Roads would be flooded/transport affected

Farmland will be lost/economic loss

Holiday resort will be flooded/business affected

1 point/explanation – can be positive (2)
[24]

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 Golf course

F Quarry/excavation

G Concentration camp/memorial garden

H Reservoir

(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	X

(1)

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

The shadows of the trees are falling to the SE.

Sun is in the west and shadows fall to the east

(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?

Rural-urban fringe/peri-urban area (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
Golf course	D3; E3
Recreational facilities	D3–4
Sewage works	F3

Track or sports field D3-4; Nature Reserve F3, E4 -5; Quarry D4/D3
Reservoirs D4
Accept: brickworks D3 (rural industry)
cemetery E4
NO hiking (6)

3.4 **Fluvial features**

Refer to the 1:10 000 aerial photograph.

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

Confluence point/river confluence (2)

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

Identify a tree-line and an irregular, winding course.

Dark shading along a river/dark or white line depending on water level (2)

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

- There is no "beach" (sand) surrounding the dam. White shading
- It would appear that the dam could be overflowing – some of the wall cannot be seen.
- Darker shade – deeper water; island of land – only 1 small piece; closeness of the road to dam on photograph – not same on map (2)

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QUESTION 4 ECONOMIC ACTIVITIES

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

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

Secondary – making bricks out of clay. (2)

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

Down slope/gradient from the town – no smell./no seepage into water table

Treated effluent can run into Gariep Dam. (close to dam)

A distance away from town.

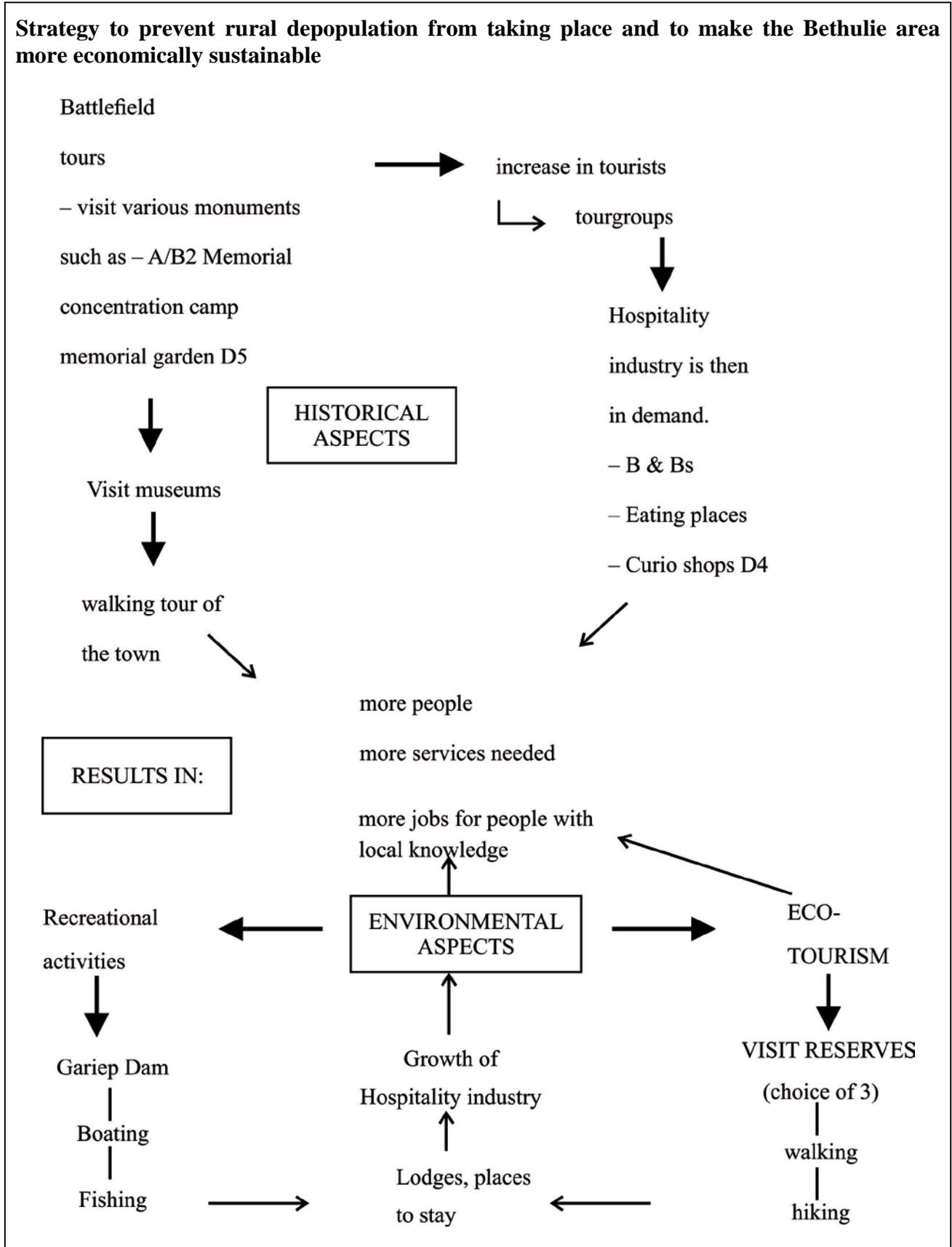
A distance away from the town – unpleasant smell/ not very attractive

Could look at space and flat land for development of such an activity (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.

MIND MAP (Question 4.2)



(10)

Mind map (2) map evidence (2) Development of sustainable strategy (6 – look for what; how and benefits) – Could accept 1 or 2 or 3 strategy ideas)

[14]

Total: 100 marks