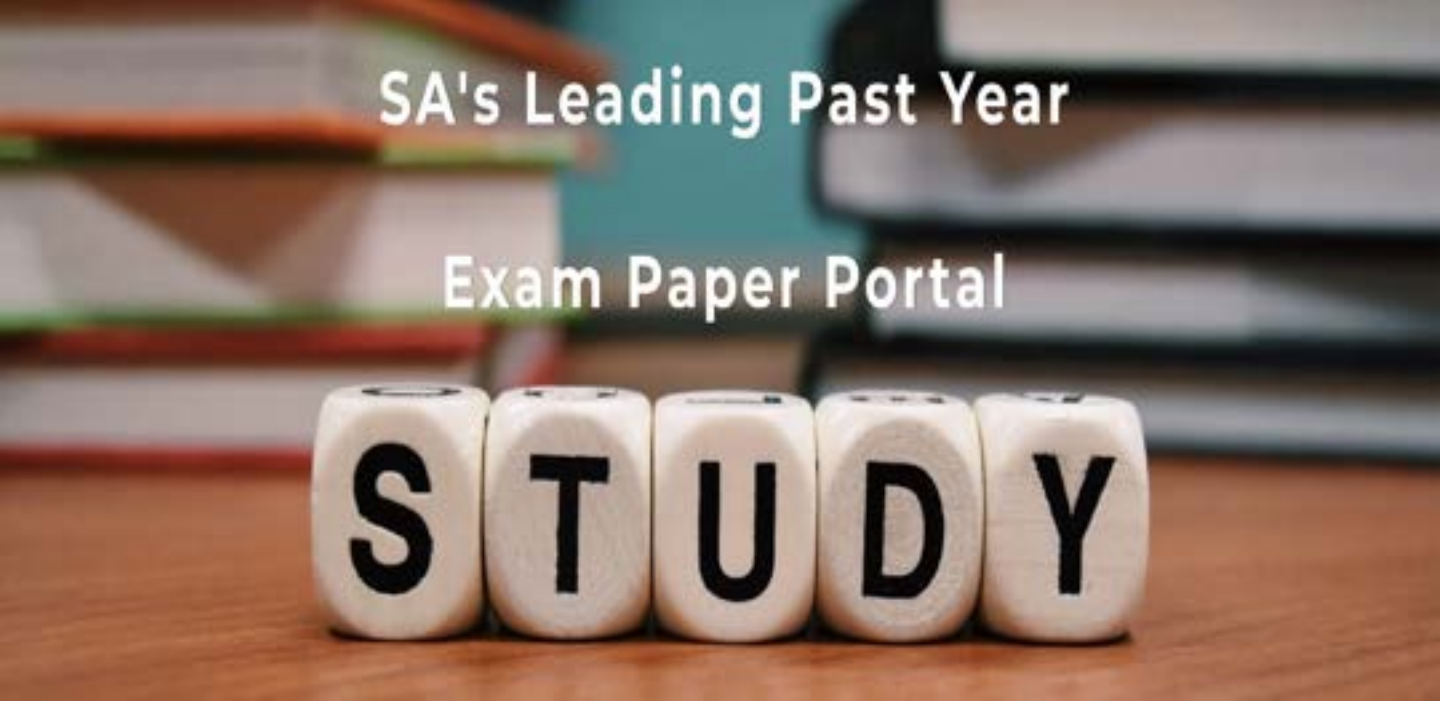

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SENIOR CERTIFICATE EXAMINATIONS

GEOGRAPHY P2

2016

MEMORANDUM

MARKS: 75

This memorandum consists of 15 pages.

RESOURCE MATERIAL

1. An extract from topographical map 2525DC MAFIKENG

2. Orthophoto map 2525 DC 13 MAFIKENG

3. **NOTE:** The resource material must be collected by schools for their own use.

INSTRUCTIONS AND INFORMATION

1. Write your EXAMINATION NUMBER and CENTRE NUMBER in the spaces on the cover page.

2. Answer ALL the questions in the spaces provided in this question paper.

3. You are provided with a 1 **:** 50 000 topographical map (2525DC MAFIKENG) and an orthophoto map (2525 DC 13 MAFIKENG) of a part of the mapped area.

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

5. You may use the blank page at the back of this question paper for all rough work and calculations. Do NOT detach this page from the question paper.

6. Show ALL calculations and formulae, where applicable. Marks will be allocated for these.

7. Indicate the correct unit of measurement in the final answer of calculations. No marks will be allocated for answers with incorrect units.

8. You may use a non-programmable calculator.

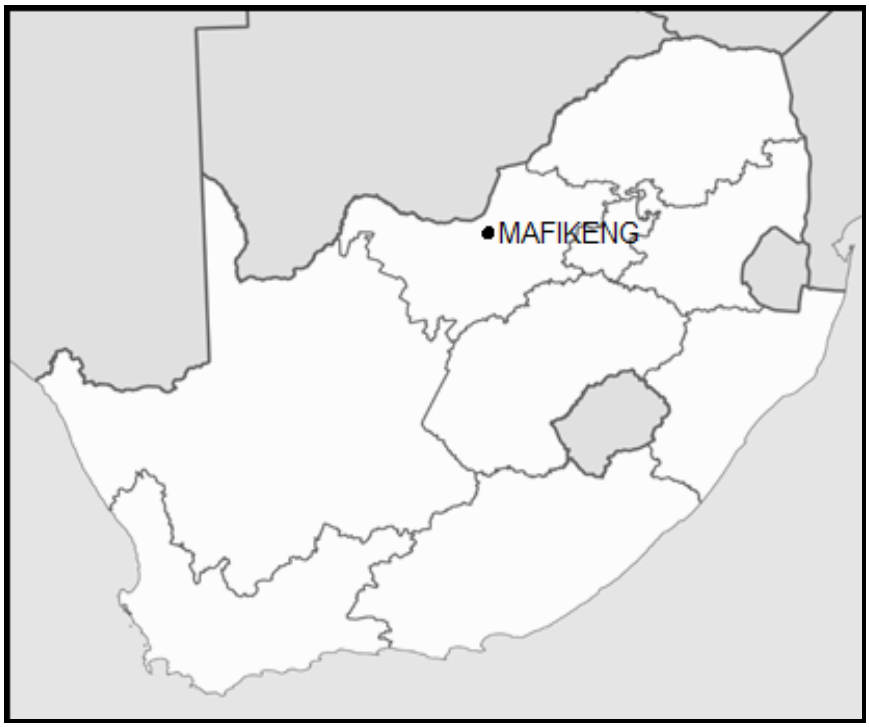
9. The area demarcated in RED on the topographical map represents the area covered by the orthophoto map.

10. The following English terms and their Afrikaans translations are shown on the topographical map:

ENGLISH	**AFRIKAANS**
Diggings	Uitgrawings
Furrow	Voor
Gold Mine	Goudmyn
Golf Course	Gholfbaan
Landing Strip	Landingstrook
River	Rivier
Sewage Works	Rioolwerke
Waterworks	Waterwerke

GENERAL INFORMATION ON MAFIKENG

Mafikeng, now known as Mahikeng, is the capital city of the province of North West in South Africa. In 2001 it had a population of 49 300. In 2007 Mafikeng was reported to have had a population of 250 000. The town is built on open veld at an elevation of approximately 1 500 m on the banks of the Upper Molopo River. The Madibi Goldfields are approximately 15 km south of the town. Mafikeng also briefly served as the capital city of Bophuthatswana in the 1970s. The temperature averages 18,5 °C. Mafikeng has an average annual rainfall of 559 mm.



[Source: Examiner's map]

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

The questions below are based on the 1 **:** 50 000 topographical map 2525DC MAFIKENG, as well as the orthophoto map of a part of the mapped area. Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) in the block next to each question.

1.1 During the apartheid era Mafikeng was part of the … homeland.

A Ciskei
B Bophuthatswana
C Transkei
D Venda ✓

B

1.2 The map index/reference of the topographical map to the south-west of Mafikeng is …

A 2525CD
B 2625BB.
C 2625AB.
D 2625BA. ✓

C

1.3 The direction of **1** from **2** on the orthophoto map is …

A north-east.
B south-west.
C south-east.
D north-west. ✓

D

1.4 The true bearing of spot height 1306 (**K**) in block **G9** from trigonometrical station 101 (**L**) in block **H9** is …

A 201°.
B 207°.
C 21°.
D 27°. ✓

C

1.5 The diggings (**O**) in block **J10** indicates that this is a/an …

A archaeological site.
B agricultural area.
C construction site.
D mining area. ✓

D

1.6 The grid reference/coordinates/position of the excavation in block **A6** is …

A 25°46'30"S 25°37'06"E/25°46,5'S 28°37,1'E.
B 25°37'06"S 25°46'30"E/28°37,1'S 25°46,5'E.
C 25°46'48"S 25°37'30"E/25°46,8'S 28°37,5'E.
D 25°37'30"S 25°46'48"E/28°37,5'S 25°46,8'E. ✓

A

1.7 The general street pattern of the urban area in block **F7** is …

A radial.
B planned irregular.
C unplanned irregular.
D a gridiron. ✓

D

1.8 Features are larger on the orthophoto map than on the topographical map because the orthophoto map …

A is bigger.
B has a smaller scale.
C covers a larger area.
D has a larger scale. ✓

D

1.9 The actual distance between (**P**) in block **I1** and (**Q**) in block **H4** is …

A 10 km.
B 5 km.
C 12 km.
D 7 km. ✓

B

1.10 The general direction of the flow of the river in block **F2** is …

A north-west.
B south-west.
C north-east.
D south-east. ✓

B

1.11 Feature **3** on the orthophoto map is a/an …

A main road.
B other road.
C canal.
D railway line. ✓

D

1.12 Land-use zone **4** on the orthophoto map is a …

A residential area.
B heavy industrial area.
C light industrial area.
D central business district. ✓

A

1.13 The feature found at **5** on the orthophoto map is …

A a water purification system.
B a man-made lake.
C a water storage facility.
D sewage works. ✓

D

1.14 The stream order at **N** in block **J2** is …

A 2.
B 3.
C 1.
D 4.

✓ **A**

1.15 The primary activity in the mapped area is …

A mining.
B forestry.
C crop farming.
D fishing.

✓ **A/C**

(15 x 1) **[15]**

QUESTION 2: MAP CALCULATIONS AND TECHNIQUES

2.1 Refer to the magnetic declination indicated on the topographical map.

2.1.1 Calculate the magnetic declination of 2525DC Mafikeng for the present year. Indicate the unit of measurement in your final answer. Show ALL calculations. Marks will be awarded for calculations.

Difference in years: *= 2016–1997*
= 19 (years) ✓

Mean annual change: *= 1'(W)* ✓

Total change: *= 19 x 1'W*
= 19'(W) ✓

Magnetic declination for 2016: *= 16°9'W* + ✓*19'W*
= 16°28'W ✓ (5 x 1) (5)

2.1.2 State the importance of calculating the magnetic declination for the present year.

By correcting the magnetic declination it will allow you to get the correct direction when using a map in the field. ✓
By correcting the magnetic declination it will allow you to calculate the correct magnetic bearing. ✓
You will be able to get the correct direction when using a magnetic compass as you will have the correct magnetic declination. ✓
Prevent getting lost ✓
Determine True North ✓
Orientate the map ✓
Magnetic declination changes constantly ✓
[Any ONE] (1 x 1) (1)

2.2 Refer to the area demarcated in RED on the topographical map, which represents the area covered by the orthophoto map. Use the demarcated area to calculate the surface area of the orthophoto map in km². Indicate the unit of measurement in your final answer. Show ALL calculations. Marks will be awarded for calculations.

Formula: **area = length (L) x breadth (B)**

Length = 10.1 (cm) ✓*x 0.5 = 5 km* *Range of cm:9.9 cm to 10.2 cm*
Range: 4.95 km to 5o10 km
Breadth = 9.3 (cm) ✓*x 0.5 = 4.65 km* *Range of cm:9.1 cm to 9.4 cm*
Range: 4.55 km to 4.7 km
Area = 5.05 km ✓*x 4.65 km* ✓
= 23.25 km² ✓ *Range: 22.50 km² to 23.97 km²*

[Accept other formulas to calculate length and breadth. If the unit is not given in the final answer, NO marks will be awarded for the final answer.] (5 x 1) (5)

2.3 Refer to spot height 1306 (**K**) in block **G9** and trigonometrical station 101 (**L**) in block **H9** on the topographical map.

2.3.1 Calculate the average gradient between spot height 1306 (**K**) and trigonometrical station 101 (**L**). Show ALL calculations. Marks will be awarded for calculations.

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

VI = 1 308.6 m – 1 306 m = 2.6 (m) ✓
HE = 3.8 cm x 500 m = 1 900 (m) ✓RANGE (3.7 cm to 3.9 cm)
Range: 1 850 m to 1 950 m
Gradient = $\frac{2.6}{1\,900}$ ✓ (Accurate substitution of calculated values into formula)

$= \frac{1}{730.77}$ ✓ $\left\{ \frac{\frac{2.6}{2.6}}{\frac{1\,900}{2.6}} \right.$

= 1 : 730.77 ✓
[Range: 1 : 711.54 to 1 : 750] (5 x 1) (5)

2.3.2 Is the average gradient between spot height 1306 and trigonometrical station 101 calculated in QUESTION 2.3.1 a true reflection of the gradient in reality? Give a reason for your answer.

Yes/True ✓
The average gradient is very gentle/flat and on the topographical map there are no contour lines between spot height 1306 and trigonometrical station 101. ✓
[Concept] (1 + 1) (2)

2.3.3 Is spot height 1306 visible from trigonometrical station 101? Give a reason for your answer.

Yes/It is visible. ✓
There are no obstructions (hills/mountains/high lying areas) between spot height 1306 and trigonometrical station 101. ✓
*[If **No**, must be qualified]* (1 + 1) (2)
[20]

QUESTION 3: APPLICATION AND INTERPRETATION

3.1 Refer to the table below, the information on Mafikeng (on page 3) and the topographical map to answer the questions that follow.

Average monthly precipitation (mm) for Mafikeng

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
114	81	68	49	21	4	1	5	10	52	72	82

3.1.1 Name the season that experiences the lowest precipitation.

Winter ✓ (1 x 1) (1)

3.1.2 Name the high-pressure cell that is responsible for the low precipitation in the season named in QUESTION 3.1.1.

Kalahari High Pressure cell (Anticyclone) ✓
Continental High Pressure cell (Anticyclone) ✓ (1 x 1) (1)

3.1.3 Explain why the high-pressure cell in the answer to QUESTION 3.1.2 causes a low precipitation.

Well-formed during winter and the subsiding air pushes the inversion layer below the level of the escarpment, limiting moisture from reaching the plateau. ✓✓
*The stronger/dominant **subsiding** air during winter results in stable air conditions.* ✓✓
[Any ONE] (1 x 2) (2)

3.1.4 State TWO ways, visible on the topographical map, in which farmers around Mafikeng have prepared for drought conditions often experienced in South Africa.

Built storage dams ✓
Built reservoirs ✓
Wind pumps ✓
Water towers ✓
Water points ✓
Furrows ✓
Canals ✓
Water Tanks ✓
(Accept names of dams)
[Any TWO – Answer must be visible on the topographical map] (2 x 1) (2)

3.2 The post-apartheid industrial development committee is considering developing Mafikeng. Refer to the topographical map and the orthophoto map and discuss TWO favourable factors that they should consider.

It has a good transport network linking it to other areas, e.g. national roads/ railway lines/airport. ✓✓
The large labour force. ✓✓
There is sufficient space for development. ✓✓
The whole area has flat land. ✓✓
Availability of raw materials, e.g. crops ✓✓
Availability of minerals e.g. diamonds/gold. ✓✓
Available water supply facilities in times of water shortage. ✓✓
Existing industrial infrastructure. ✓✓
Basic services needed for industries already in place. ✓✓
The presence of the university will provide a skilled labour force. ✓✓
[Any TWO] (2 x 2) (4)

3.3 Compare block **F6** on the topographical map with the same area on the orthophoto map and state ONE way in which the democratic government has provided the poorer communities with basic needs.

Housing has been provided in the area. ✓✓
Roads have been provided in the area. ✓✓
[Any ONE] (1 x 2) (2)

3.4 3.4.1 State ONE advantage and ONE disadvantage of the Upper Molopo River flowing through the town of Mafikeng.

Advantage:
The Molopo River provides water to the Mafikeng area. ✓
Candidates can give examples, e.g. water for domestic use. ✓
It has a cooling effect on Mafikeng. ✓
It creates recreational spaces in the town. ✓

Disadvantage:
The Molopo River could cause flooding to the Mafikeng area. ✓
Candidates can give examples, e.g. flooding could damage infrastructure. ✓
Drop in temperature. ✓
River can be polluted by residents/town effluent. ✓
Waterborne diseases e.g. cholera. ✓
[Any ONE advantage and disadvantage] (2 x 1) (2)

3.4.2 Explain TWO ways in which the Mafikeng municipality can limit the effects of the disadvantage in your answer to QUESTION 3.4.1.

Flooding
Build levees on the banks of the river to increase the carrying capacity of the river ✓✓
Re-channel water before it reaches the town so that less water reaches the town ✓✓
Conserve and maintain catchment areas in the upper regions which will retain water, therefore slowing the flow of water to the town ✓✓
Build storage dams on the river upstream of the town so that less water reaches the town ✓✓
Build weirs to slow down and drain off the water ✓✓
Lining the river bed and banks with cement (canalising) to reduce friction and increase the flow of the water ✓✓
Protect natural vegetation on the river banks ✓✓
Create a buffer zone where no construction of buildings may take place on either side of the river ✓✓
Awareness of flood control measures ✓✓
Pollution
Buffering to prevent inhabitants getting close to rivers to pollute it. ✓✓
Legislation and fines for culprits. ✓✓
Community awareness. ✓✓
Diseases
Vaccinations/Inoculations to reduce the impact of waterborne diseases. ✓✓
*[**The response must be linked to a disadvantage identified in QUESTION 3.4.1**].*
[Any TWO] (2 x 2) (4)

3.5 Refer to the industrial area in blocks **E6** and **E7**.

3.5.1 Is this a heavy industrial area or a light industrial area?

Heavy industrial area ✓
OR
Light industrial area ✓ (1 x 1) (1)

3.5.2 Discuss TWO factors that influenced the location of this industrial area.

Heavy	Light
There is a good transport network (national roads and railway lines) for bulk transportation. ✓✓ *Availability of open space for the expansion of the industrial area.* ✓✓ *It is built on flat land.* ✓✓ *Canals supply water to the industrial area.* ✓✓ *It is close to the market.* ✓✓ *It is close to a large labour force.* ✓✓ *Availability of raw materials e.g. crops and minerals.* ✓✓ *Outskirts of the town/Away from built-up area/CBD.* ✓✓	*There is a good transport network (roads) for transportation of good to local markets.* ✓✓ *Availability of open space for the expansion of the industrial area.* ✓✓ *It is close to the local market.* ✓✓ *It is close to a skilled labour force.* ✓✓ *Availability of raw materials needed to produce products.* ✓✓ *Close enough to town/CBD to transport perishable products.* ✓✓

[Any TWO] (2 x 2) (4)

3.6 State ONE difference between the settlement pattern at **M** in block **B4** and the settlement pattern at **R** in block **D2**.

M: *Nucleated/Clustered* ✓

R: *Isolated/Dispersed* ✓

[Candidates may describe the pattern.] (2 x 1) (2)
[25]

QUESTION 4: GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

4.1 Refer to the topographical map and the orthophoto map of Mafikeng.

4.1.1 Which one, the topographical map or the orthophoto map, is made up of:

Pixels/Grid cells: *Orthophoto map* ✓

Point, line and polygon symbols: *Topographic map* ✓ (2 x 1) (2)

4.1.2 State TWO ways in which a high resolution will be of greater assistance when examining features.

The images will have more clarity. ✓
The images will be sharper. ✓
You will be able to see the features in more detail. ✓
The shadows created by features will allow you to estimate their height. ✓
The shadows created by features will allow you to estimate the time the photograph was taken. ✓
[Any TWO] (2 x 1) (2)

4.2 Refer to the golf course in block **C7**.

4.2.1 Explain the term *data layer*.

It is a layer of information. ✓
[Concept] (1 x 1) (1)

4.2.2 Name TWO data layers that influenced the location of the golf course.

Drainage/Perennial water ✓✓
Topography/Relief/Flat land ✓✓
Geology/Underground rock structures ✓✓
Type of soil/Ground structure/Water holding capacity of soil ✓✓
Infrastructure/N 18 allows access ✓✓
Land-use/Close to high income residential area/Close to hotel/In rural-urban fringe ✓✓
[Any TWO – Candidates can give relevant examples of data layers found on the map.] (2 x 2) (4)

4.3 Spatial data and attribute data are used when examining features on a map.

4.3.1 Differentiate between *spatial data* and *attribute data.*

Spatial data describes the shape and position of geographical features✓✓*, whereas attribute data is information that describes the spatial objects or features*✓✓*.*
[Concept] (2 x 2) (4)

4.3.2 State TWO attributes of the stream (**N**) in block **J2** on the topographical map.

It is a non-perennial stream.✓
There are dams situated along the stream. ✓
The stream's general direction of flow is north east/ east-north-east. ✓
The stream has one tributary.✓
The stream has a dendritic pattern. ✓
It is a second-order stream. ✓
Flows over a flat/gentle gradient/floodplain. ✓
The river is named. ✓
[Any ONE] (2 x 1) (2)
[15]

TOTAL: 75

AMMENDMENT FOR GAUTENG

2.2 Refer to the area demarcated in RED on the topographical map, which represents the area covered by the orthophoto map. Use the demarcated area to calculate the surface area of the orthophoto map in km². Indicate the unit of measurement in your final answer. Show ALL calculations. Marks will be awarded for calculations.

Formula: **area = length (L) x breadth (B)**

Length = 9.6 (cm) ✓ x 0.5 = 4.8 km *Range: (9.4 cm to 9.7 cm) 4.7 km to 4.85 km*

Breadth = 8.9 (cm) ✓ x 0.5 = 4.45 km *Range: (8.7 cm to 9 cm) 4.35 km to 4.5 km*

Area = 4.8 km ✓ x 4.45 km ✓

= 21.36 km² ✓ *Range: 20.45 km² to 21.83 km²*

[Accept other formulas to calculate length and breadth. If the unit is not given in the final answer, NO marks will be awarded for the final answer.] (5 x 1) (5)

2.3 Refer to spot height 1306 (**K**) in block **G9** and trigonometrical station 101 (**L**) in block **H9** on the topographical map.

2.3.1 Calculate the average gradient between spot height 1306 (**K**) and trigonometrical station 101 (**L**). Show ALL calculations. Marks will be awarded for calculations.

Formula: **gradient = vertical interval (VI) / horizontal equivalent (HE)**

VI = 1 308.6 m – 1 306 m = 2.6 (m) ✓

HE = 3.6 cm x 500 m = 1 800 (m) ✓ *Range (3.5 cm to 3.7 cm) 1 750 m to 1 850 m*

$$\text{Gradient} = \frac{2.6}{1\,800} \checkmark \text{ (Accurate substitution of calculated values into formula)}$$

$$= \frac{1}{692.3} \checkmark \quad \left\{ \frac{\frac{2.6}{2.6}}{\frac{1\,800}{2.6}} \right.$$

$$= 1 : 692.3 \checkmark$$

Range: 1 : 673 to 1 : 711.5 (5 x 1) (5)