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SECONDARY SCHOOL IMPROVEMENT PROGRAMME (SSIP) 2016 REVISED GEOGRAPHY SESSION 14: MAPWORK LEARNER BOOK



GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GRADE 12

TABLE OF CONTENTS

SESSION NO	TOPIC	PAGE
14	MAPWORK SHORT QUESTIONS AND CALCULATIONS	
15	MAP WORK INTERPRETATION AND GIS	
16	MAPWORK CONSOLIDATION	

STUDY TIPS

Paper 2 consist of the following sections:

- 15 Marks Multiple Choice (Info in margins, map code, direction etc.) (Done before)
- 20 Marks Calculations (Done before)
- 25 Marks map interpretation (This section)
- 15 Marks GIS (This section)
- Total: 75
- Duration: 1 ½ Hour

In this session we focus on the map interpretation part by studying map clips of different areas.

SESSION NO: 14

TOPIC 14: MAP WORK – Short Questions and Calculation

SECTION B: NOTES ON CONTENT

Terminology / Definitions

Important concepts and explanations

Study tips: the more you practice map work the better you will get at it. Do as many as possible old exam papers. This section did not change much from the previous syllabus and thus you can still work out the previous old paper for practice.

The map work papers consist of 4 different parts namely

1. Multiple choice questions – $15 \times 1 = 15$ marks
2. Calculations - 20 marks
3. Interpretations of theory on the map – 25 marks
4. GIS – 15 marks

You need to know the conventional symbols of by heart. You must be able to identify them, and understand the relationship between the occurrence of groups of these symbols. These symbols are like the alphabet to read maps.

The symbols represent real world features as either points, lines or polygons (areas). Therefore the legend / key can be seen as the layers of a GIS showing vector data.

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1000
Metres

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REFERENCE

VERKLARING

National Freeway; National Route.....		Nasionale Deurpad; Nasionale Roete
Arterial Route.....		Hoofverkeersroete
Main Road.....		Hoofpad
Secondary Road; Bench Mark.....		Sekondêre Pad; Hoogtemerk
Other Road; Bridge.....		Ander Pad; Brug
Track and Hiking Trail.....		Dowwe Pad en Voetslaanpad
Railway; Station or Siding.....		Spoorweg; Stasie of Sylyn
Other Railway; Tunnel.....		Ander Spoorweg; Tonnell
Embankment; Cutting.....		Opvulling; Deurgrawing
Power Line.....		Kraglynn
Built-up Area (High, Low Density).....		Beboude Gebied (Hoë, Lae Digtheid)
Buildings; Ruin.....		Geboue; Murasie
Post Office; Police Station; Store.....		Poskantoor; Polisiestasie; Winkel
Place of Worship; School; Hotel.....		Plek van Aanbidding; Skool; Hotel
Fence; Wall.....		Draadheining; Muur
Windpump; Monument.....		Windpomp; Monument
Communication Tower.....		Kommunikasietoring
Mine Dump; Excavation.....		Mynhoop; Uitgraving
Trigonometrical Station; Marine Beacon.....		Peilbaken; Seevaartbaken
Lighthouse and Marine Light.....		Vuurtoring en Seevaartlig
Cemetery; Grave.....		Begraafplaas; Graf

Cadastral information supplied by the Surveyor-General
Original Farms

REFERENCE

VERKLARING

International Boundary and Beacon.....		Internasionale Grens en Baken
Provincial Boundary.....		Provinsiale Grens
Protected Area.....		Bewarings Gebied
Perennial River.....		Standhoudende Rivier
Non-perennial River.....		Standhoudende Water
Non-Perennial Water.....		Nie-standhoudende Rivier
Dry Water Course.....		Nie-standhoudende Water
Dry Pan.....		Droë Loop
Marsh and Vlei.....		Droë Pan
Pipeline (above ground).....		Moeras en Vlei
Water Tower; Reservoir; Water Point.....		Pyplyn (bo die grond)
Coastal Rocks.....		WT • R • F
Prominent Rock Outcrop.....		Watertoring; Reservoir; Waterpunt
Erosion; Sand.....		Kuslynrotse
Woodland.....		Prominente Klipbank
Cultivated Land.....		Erosie; Sand
Orchard or Vineyard.....		Beboste Gebied
Recreation Ground.....		Bewerkte Land
Row of Trees.....		Boord of Wingerd
		Ontspanningsterrein
		Rye Bome

Kadastrale inligting verskrek deur die Landmeter-generaal
Oorspronklike Plase

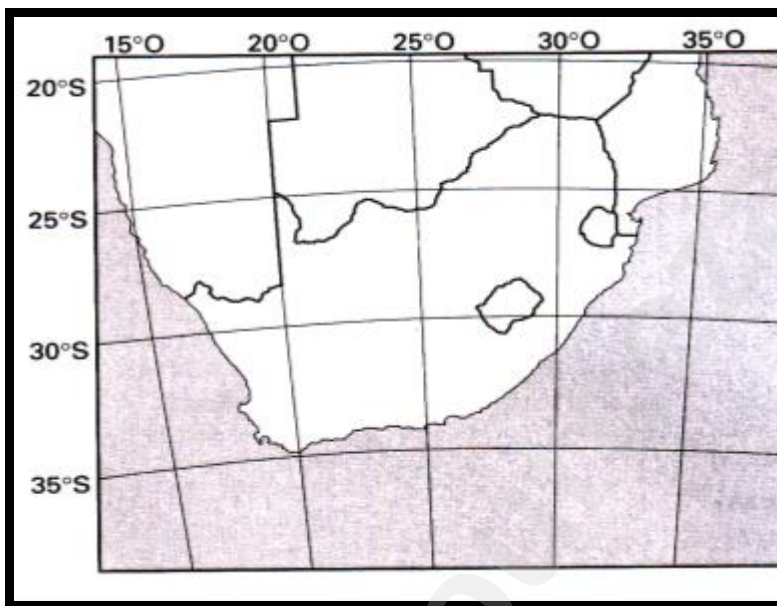
Map code – each map has a name and reference



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- ▶ There is about 1916 1: 50 000 maps that cover South Africa
- ▶ South Africa is divided into 1° latitude by 1° longitude blocks. But this cover to large an area to draw a 1: 50 000 map
- ▶ The latitude longitude grid is further divided into big blocks and this is further divided into small blocks.
- ▶ Latitude and longitude is used to classify the maps and to identify specific maps
- ▶ Each map code consist of Latitude, Longitude, Big block, small block and the name of the largest settlement on the map, e.g. 2529CC Witbank



The latitudes in South Africa increase from the top to the bottom as one moves further away from the Equator. The Longitudes increases from left to right as one goes further east.

How is a map code or map reference number Compiled?

Example
2529CC Witbank

25° South – Latitude
29° East – Longitude
C – Big block - the bold A, B, C, D.
C – Small block
Witbank – settlement

	29° E		30° E	
25° S	A	B	A	B
26°15' S	C	D	C	D
26°30' S	A	B	A	B
26°45' S	C	D	C	D
26° S	C	D	C	D

Grid reference



25°50,9'S ; 29°12,8'S
Or
25°50'54" S ; 29°12'48" S

Contour lines connect all places with the same altitude and on the 1:50 000 there is a 20m difference (contour interval) between one contour and the next. This map is at sea level and thus the first contour would be at 20m. Notice that the contours that are on intervals of 100m are printed slightly thicker. When contours are spaced near to each other it means that the slope is very steep. If the contours are far apart, the landscape is very gradual.

The smaller contours are usually higher and represent the hill tops of the area. When you look at a topographic map you should see the small contours as the highest areas. Compare the spot heights in the smallest contours to identify the highest areas.

Scale

- Large scale maps
 - Cover a small part of reality
 - Show a lot of detail
 - Has less distortion on
 - Reality not reduced so much
 - Illustrate a city, province
 - E.g. 1 : 25 000 and 1 : 50 000 maps
- Small scale maps
 - Cover a large part of reality
 - Show little detail
 - Has a lot of distortion
 - Reality has been reduced a lot
 - Illustrate a country, continent or the World
 - E.g. 1 : 1 000 000 and 1 : 25 000 000 maps

Map work formulas

1. Map code: 2528AC Pretoria
 25: Latitude (South)
 28: Longitude (East)
 A: Big block
 C: Small Block
 Pretoria: Settlement

25°E

28°S

A

B

A	B	A	B
C ^A	D	C ^B	D
A	B	A	B
C ^C	D	C ^D	D

2. Scale: Ratio scale 1: 50 000
 Line Scale:
 Word Scale: 1cm on the map represents 5km in reality

Large scale: reality not reduced so much 1: 10 000

Small scale: reality has been reduced a lot 1: 1 000 000

How to change distance units:

Km	hm	Dm	m	dm	cm	mm
1	10	100	1 000	10 000	100 000	1 000 000
x multiply						y divide
0.000001	0.00001	0.0001	0.001	0.01	0.1	1

1mm = 0.1 cm

1cm = 10mm

1m = 1000mm

1km = 1 000 000mm

1km = 100 000cm

1km = 1000m

3. Distance: = map distance x scale (50 000 on topographic map
 = 12.4cm x $\frac{50\,000}{100\,000}$ (to change cm to km)
 = 6.2km (x 1 000 = 6200m)
 or 10 000 or other on photo)
4. Area: = (map distance x scale) x (map distance x scale)
 = (3cm x 0.5) x (6cm x 0.5) (it will be different on photo)
 = 1.5 km x 3km (never change km² to m² or vice versa)
 = 4.5km² (1500m x 3000m = 4 500 000m²)
5. Gradient: = $\frac{\text{Height}}{\text{Distance}}$ (highest point – lowest point or contour)
 = $\frac{1520\text{m} - 1480\text{m}}{1.6\text{cm} \times 500}$ (altitude always in m on maps)
 = $\frac{40\text{m}}{800\text{m}} \div 40$ (100 000 / 100 to cm to m)
 = $\frac{1}{20}$ (to get 1 because it is a ratio,
 it is not a fraction!)
 = 1:20 (vertical)
 (horizontal)
 (1:0 is a cliff, 1:100 -gradual)

6. Grid reference:

- ☺ Latitude always first: put the ruler horizontally over the map and read the latitude of the side. In SA this is always South.
- ☺ Longitude second: put the ruler vertically over the map and read the longitude at the top or bottom. In SA this is always East.
- ☺ 27°15, 2'S; 28°45, 8'E

7. Direction:

- ☺ We indicate the direction of rivers by identifying the direction that it flows toward.
- ☺ We name winds from where they come.

8. Magnetic declination:

$$\begin{array}{rcl}
 2011 & & \text{(the present year)} \\
 - 1998 & & \text{(the first year mentioned on the map)} \\
 \hline
 16\text{years} & & \text{(time that has elapsed)} \\
 \times 10'\text{East} & & \text{(the annual change on the map)} \\
 \hline
 160'\text{E} = 2^\circ40'\text{E} & & \text{(if it is } \geq 60' \text{ change it to } ^\circ \text{ and ')} \\
 & & \text{(Read the mag. dec. from the map for 1990)} \\
 & & \text{change it if it is } 21,2^\circ\text{W } \text{☺}, 2 \times 6 = 12') \\
 & & \text{(W+W; angle larger, W - E; angle smaller)} \\
 & & \text{(Present magnetic declination - the difference between North and mag. North)}
 \end{array}$$

9. Magnetic Bearing: = True bearing (angle from True north on map)
+ Magnetic declination (calculated by you)

$$\begin{aligned}
 \text{MB} &= \text{TB} + \text{MD} \\
 &= 301^\circ + 18^\circ32' \text{ (remember if it is larger than } 180^\circ \text{ add } 180^\circ) \\
 &= 319^\circ32' \text{ (leave out West, it is always clockwise from N)}
 \end{aligned}$$

10. Vertical exaggeration: = $\frac{\text{Vertical scale}}{\text{Horizontal Scale}}$ (given with Cross Section)
(map or photo scale)

(First change the vertical scale that is usually in the form of a word scale 1: 2 000 to a ratio scale.)

1cm: 20m (20m x 100 to get cm)
1cm : 2 000cm (cancel same units)
(ratio scale allow calculations)

$$\begin{aligned}
 \text{VE} &= \frac{\text{VS}}{\text{HS}} &= \frac{1 \times 50\,000}{2\,000} &= 25 \\
 &= \frac{1}{2\,000} && \\
 &= \frac{1}{50\,000} && \\
 &&& \text{= the vertical scale is 25 times larger than the horizontal scale}
 \end{aligned}$$

11. Distance: = Speed x time

12. Speed: = $\frac{\text{Distance}}{\text{Time}}$

13. Time = $\frac{\text{Distance}}{\text{Speed}}$



14. Photo scale: = $\frac{\text{Photo distance}}{(\text{Map distance} \times \text{scale})}$ (the same distance on map and photo) or the distance in reality

$$= \frac{10\text{cm}}{5\text{cm} \times 50\,000} \quad (\text{on photo})$$

$$= \frac{10\text{cm} \div 10}{250\,000\text{cm} \div 10} \quad (\text{distance calculation cm})$$

$$= 1:25\,000 \quad (\text{to get 1})$$

$$\quad \quad \quad (\text{do the same below the line})$$

$$\quad \quad \quad (\text{round off - no decimals})$$

Map work improves with practice! You do not need to be a genius to do well in map work, just keep on trying and you will succeed.

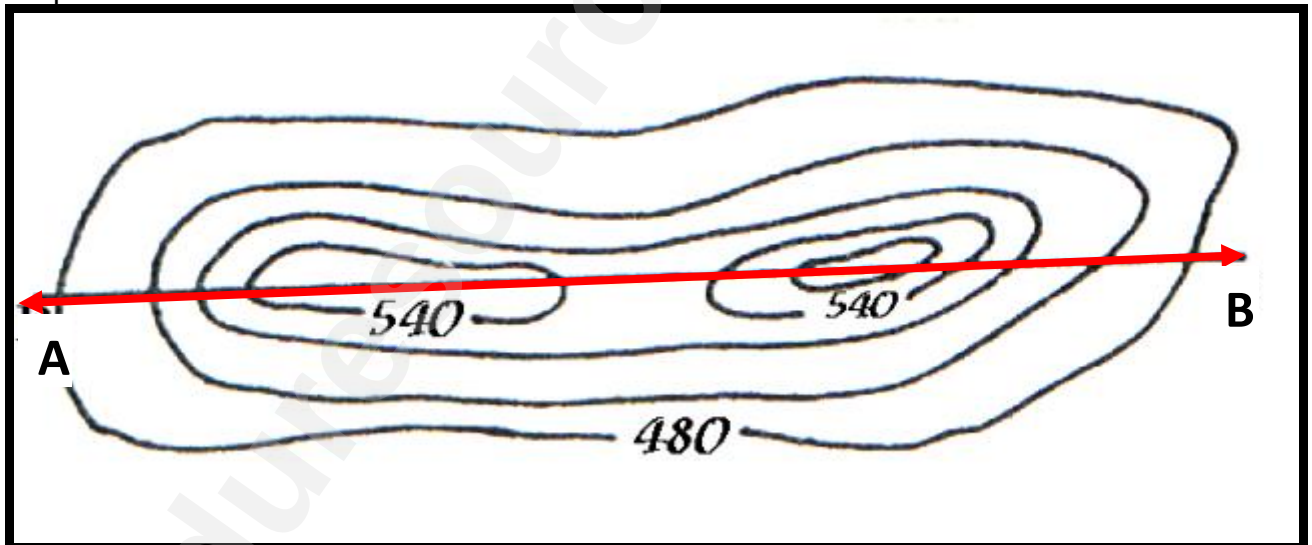
Look at the topics on interpretation on p. 35 and on in Map work made Easy. Good luck with the Exam.

1. Introduction

We draw cross section of the landscape to see what the relief or topography looks like. Distance on Earth is much more significant than altitude and to show the altitude we need to exaggerate the vertical scale of the cross sections. This means we reduce distance more than height on the cross sections. You must also be able to draw a freehand cross section from looking at the contours and then drawing the landform. You can refer back to the unit on slopes and land forms in this module.

2. Drawing Cross Sections

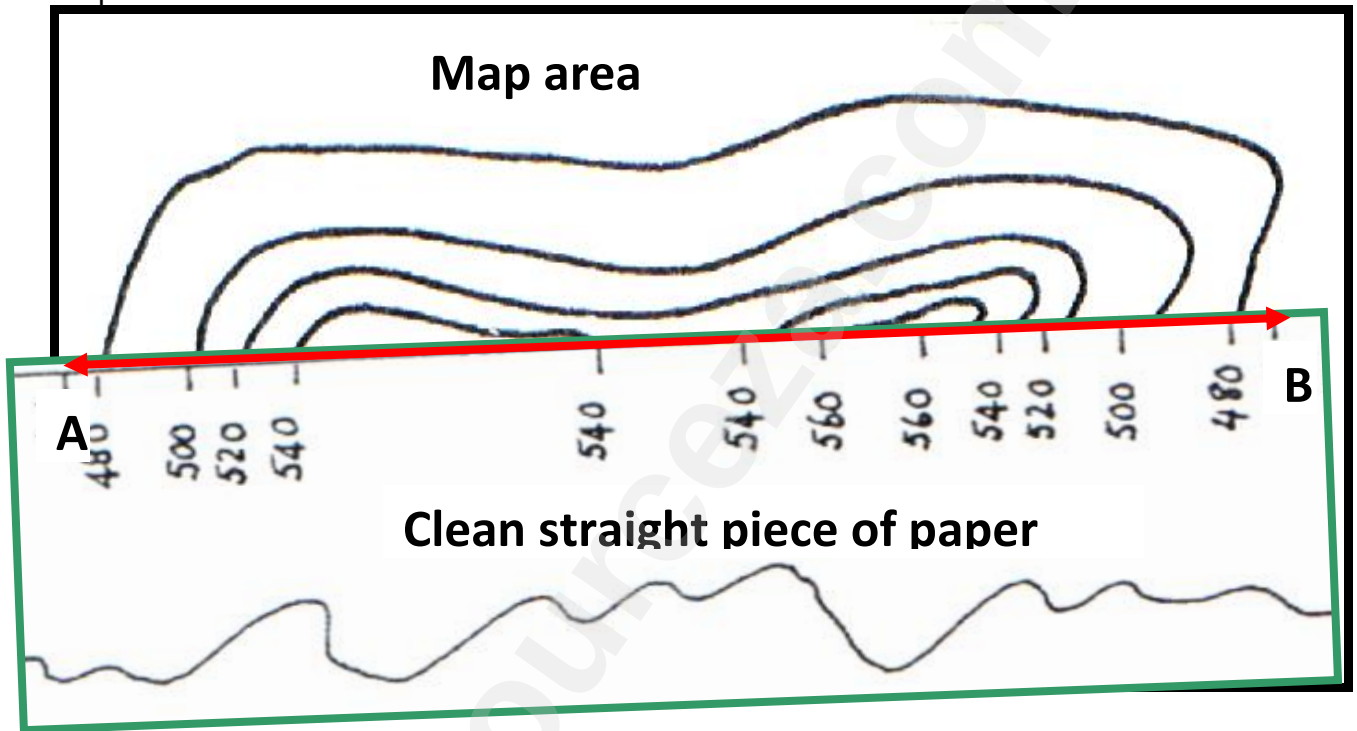
Step 1



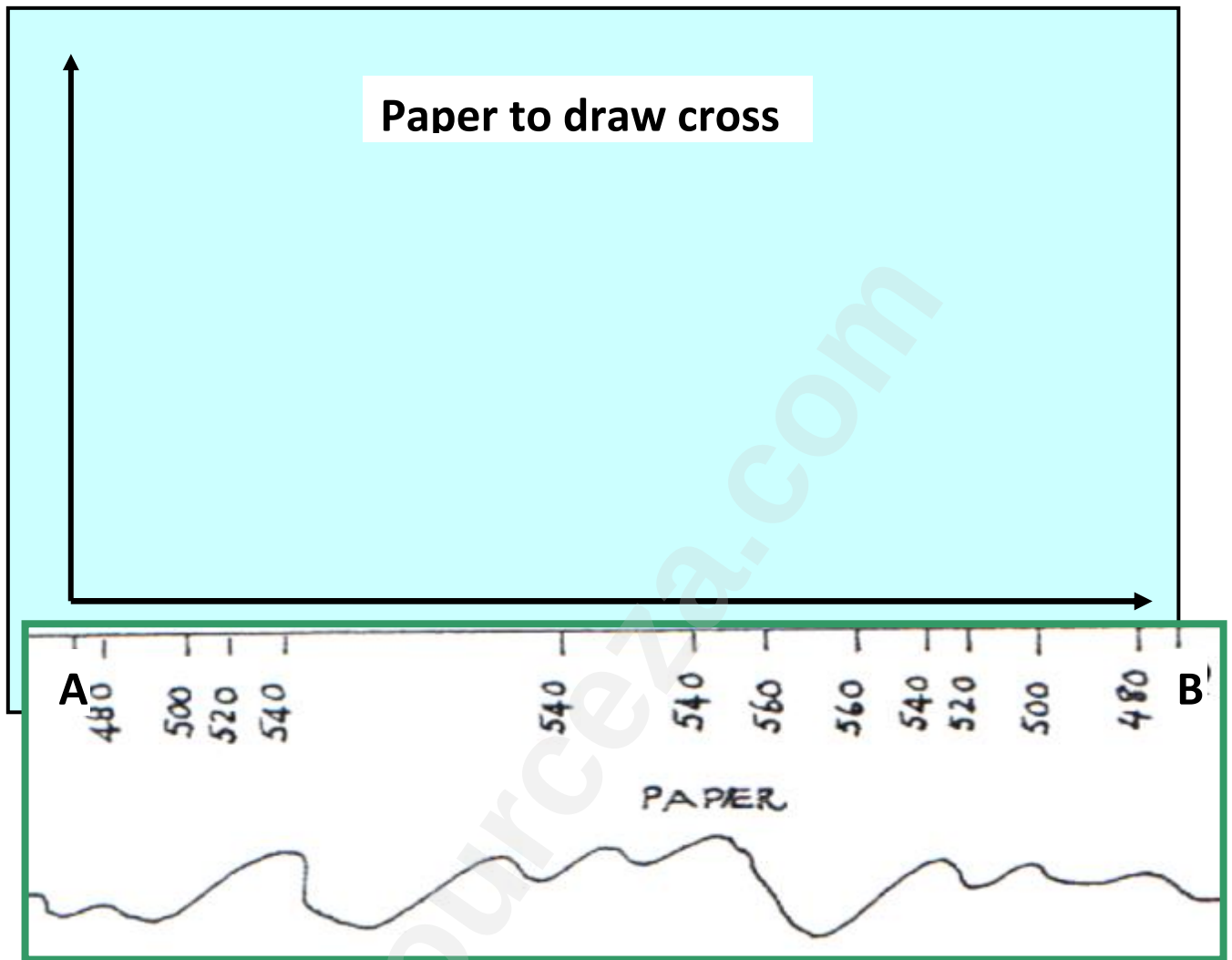
- Step 1: Locate the place from where and the place to where you must draw the cross section. (In this case From A to B)
- Step 2: Connect the 2 places with a pencil line and take paper (see green frame on map below) and put it from A to B along the line.
- Mark of where any contour lines disappear under the paper.
- Find the values of the contour lines you have marked. Look under the paper and further away to find the values of the contours. In this example all the values are under the paper. Compare the map above and below.
- Step 3: Then take the piece of paper and mark the contours and the values onto graph paper with a vertical axis (on the left of the paper) and a horizontal axis (at the bottom of the paper) already indicated on it.

- Step 4: Add in the vertical scale which will be given to you in the form of a word scale or on a half completed cross section and the map scale as the horizontal scale.
- Plot the values of the contours from the bottom of the sketch at the correct altitudes.
- Connect the points with your freehand. (Never with a ruler)
- Give the cross section a heading.

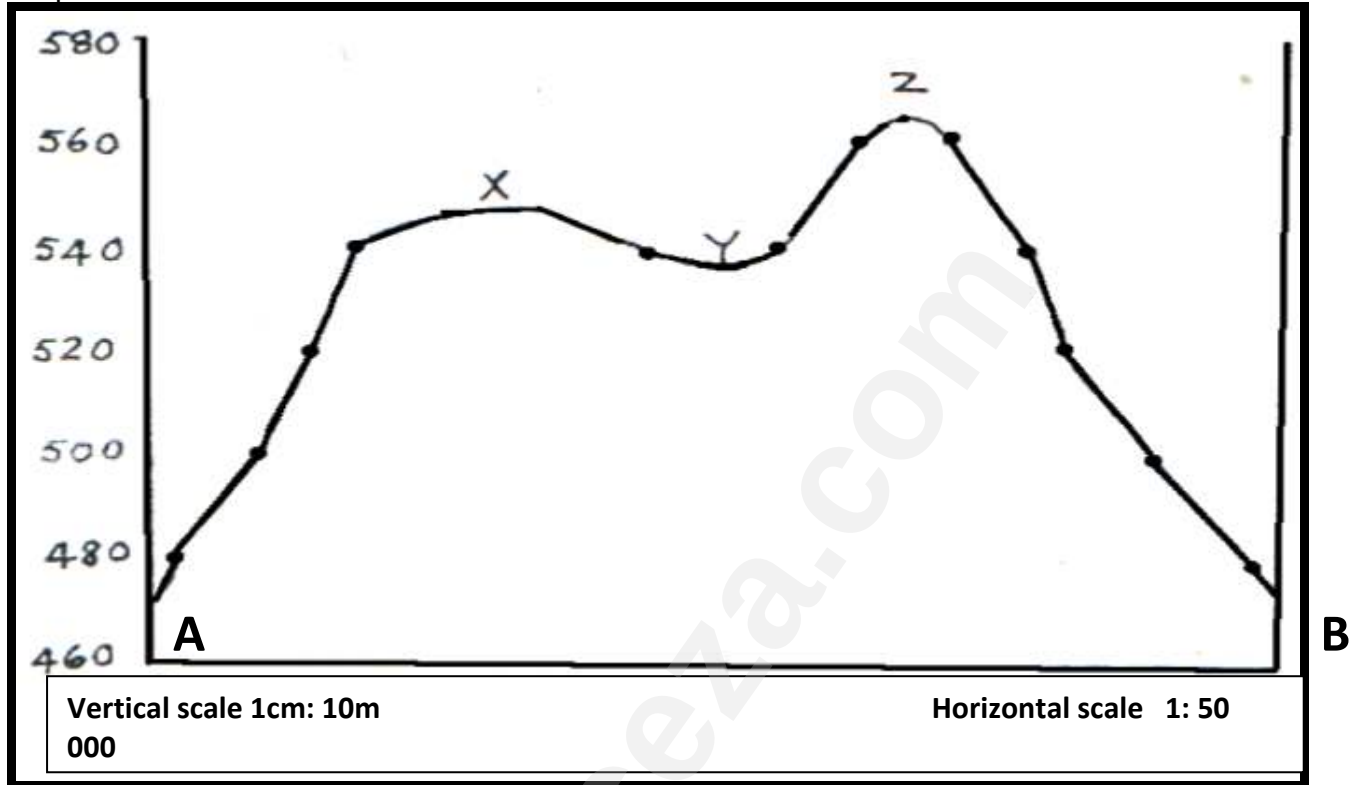
Step 2



Step 3



Step 4: A cross section From A to B



Use the map and the cross section to identify the landforms on the cross section. Land forms X and Z are peaks on the ridge or watershed. Y is a neck or a saddle.

3. Vertical exaggeration

Calculate how much larger is the vertical scale than the horizontal scale. First change the vertical scale into a ratio scale.

1cm: 10 m (change the m to cm)
 1: 1000 (if the units on either side of the scale are the same it can be cancelled)

Vertical exaggeration = $\frac{\text{Vertical scale}}{\text{Horizontal scale}}$

$$= \frac{1/1000}{1/50\,000}$$

$$= \frac{1}{1000} \times \frac{50\,000}{1}$$

$$= 50$$

(The vertical scale is 50 x larger than the horizontal scale)

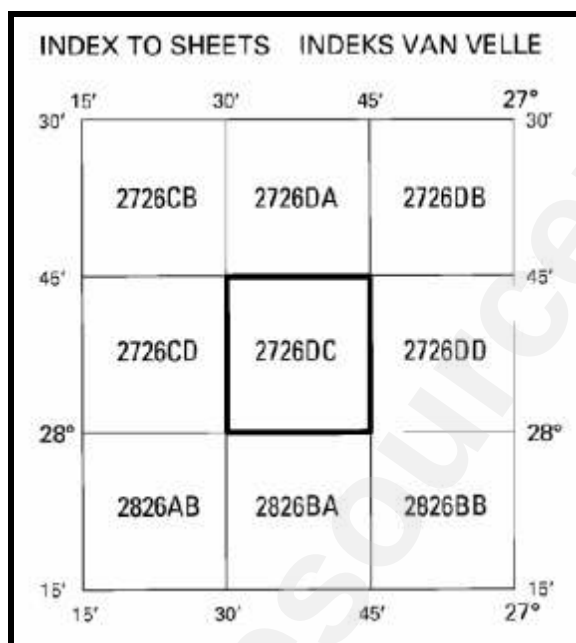
SECTION B: TYPICAL EXAM QUESTIONS

QUESTION 1: 10 minutes [12] (Adapted from DoE Exemplar 2008)

HINT: A lot of the short questions in map work comes from information in the margin

The following questions are based on the 1:50 000 topographical map, 2726DC, ODENDAALSRUS as well as the orthophoto map of the same area. Various possible options are provided as answers to the following questions. Choose the answer and write only the letter (A – D) in the block next to each question (1.1 – 1.12).

1.1 The number of the map to the west of map 2726DC ODENDAALSRUS is ...

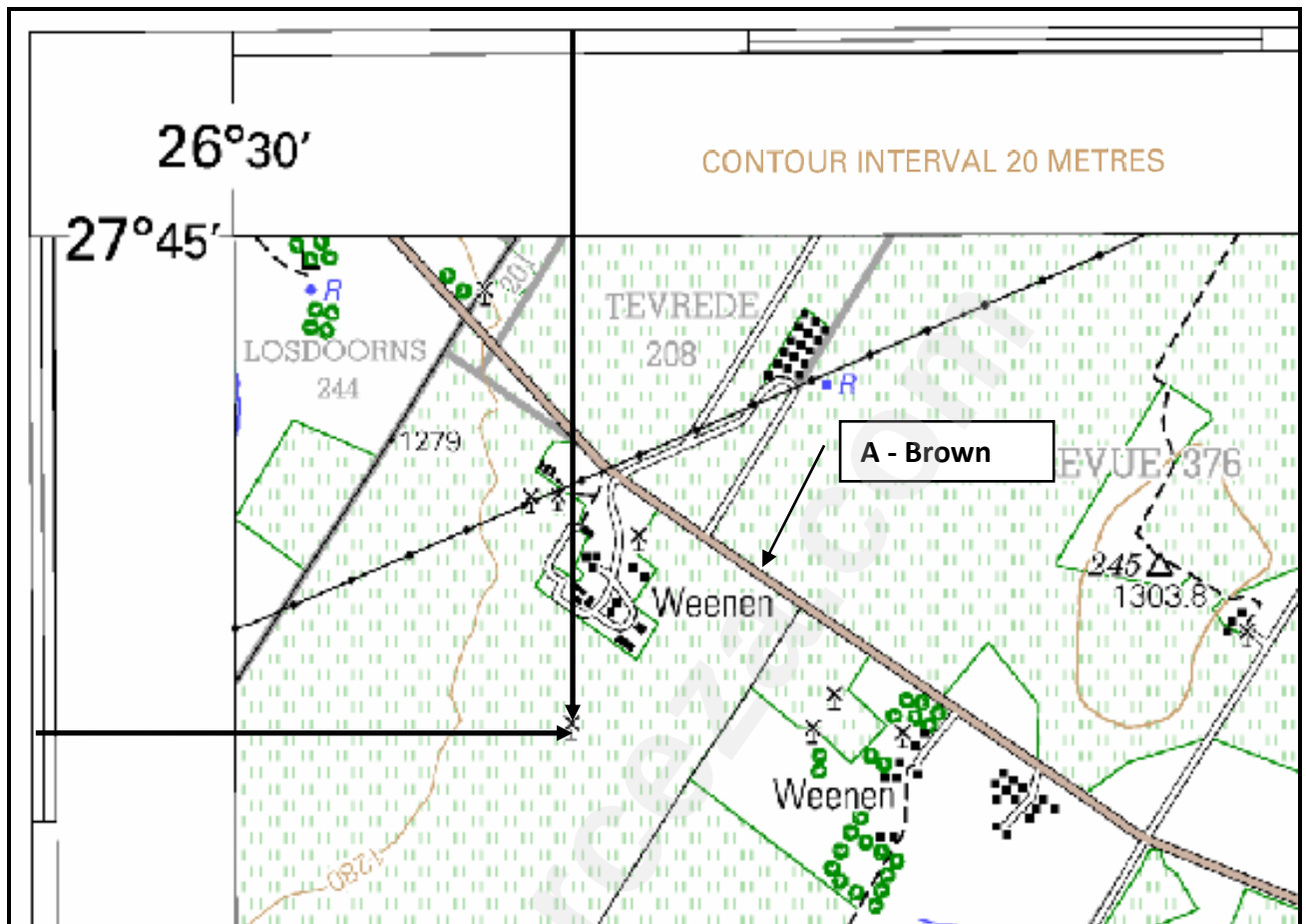


This is printed at the bottom of the map and if the map is near any provincial boundaries it will be on this as well.

- A 2726DA
- B 2826BA
- C 2726DD
- D 2726CD

1.2. The exact location (coordinates) of the windmill at the indicate arrows are (Refer to map clip on next page to get the answer)

- A 26°45'09"S 27°45'05"E
- B 27°45'50"S 26°30'40"E
- C 26°30'05"S 27°45'10"E
- D 27°45'10"S 26°30'50"E

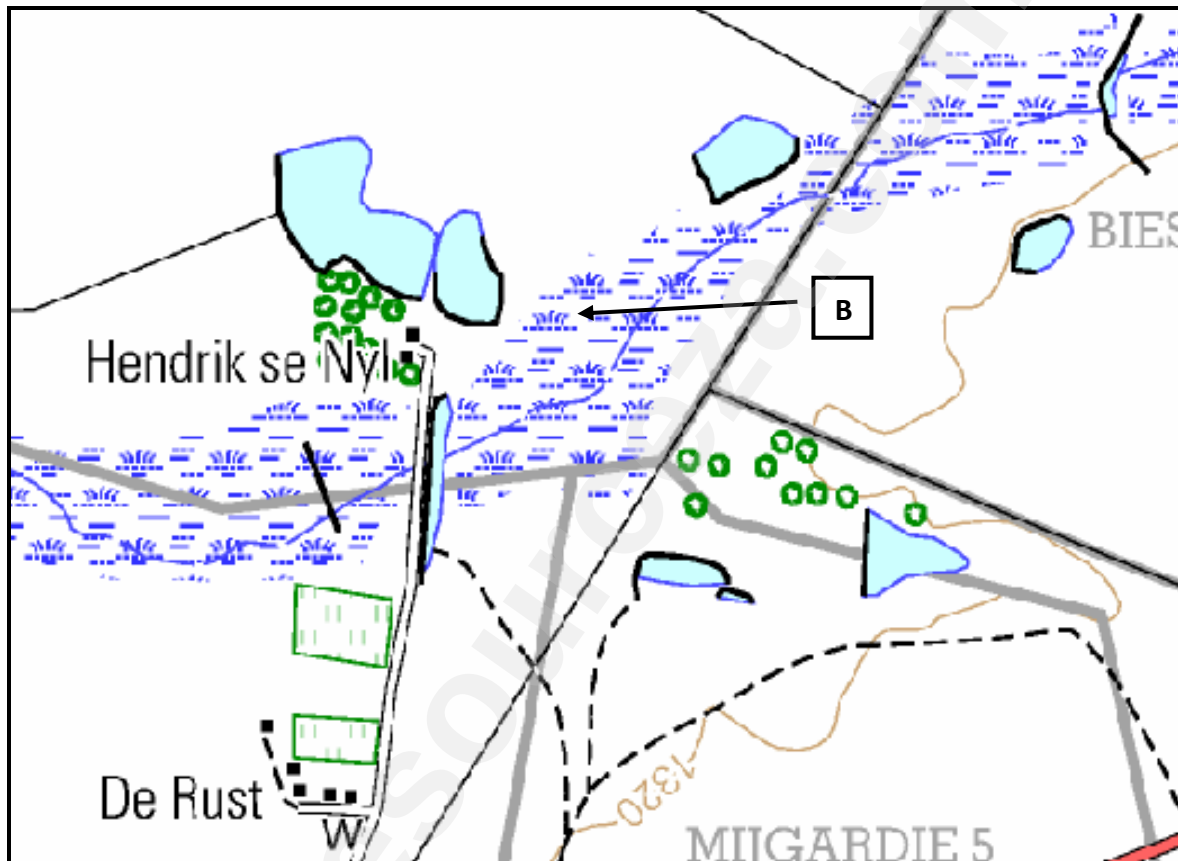


- 1.3. The altitude of the trig station on the topographic map clip above is ...
- A 376m
 - B 245m
 - C 1303,8mm
 - D 1279m
- 1.4 The direction of spot height 1279 from ▲245...
- A South-west
 - B West North West
 - C South-east
 - D East South East
- 1.5 The man-made feature labelled A on the topographical map is a/an ...
- A main road
 - B arterial route
 - C secondary road
 - D national road

1.6 The contour interval of the topographical map is ...

- A 5 m
- B 20 m
- C 10 m
- D 25 m

1.7 The natural feature marked B on the topographical map is a ...

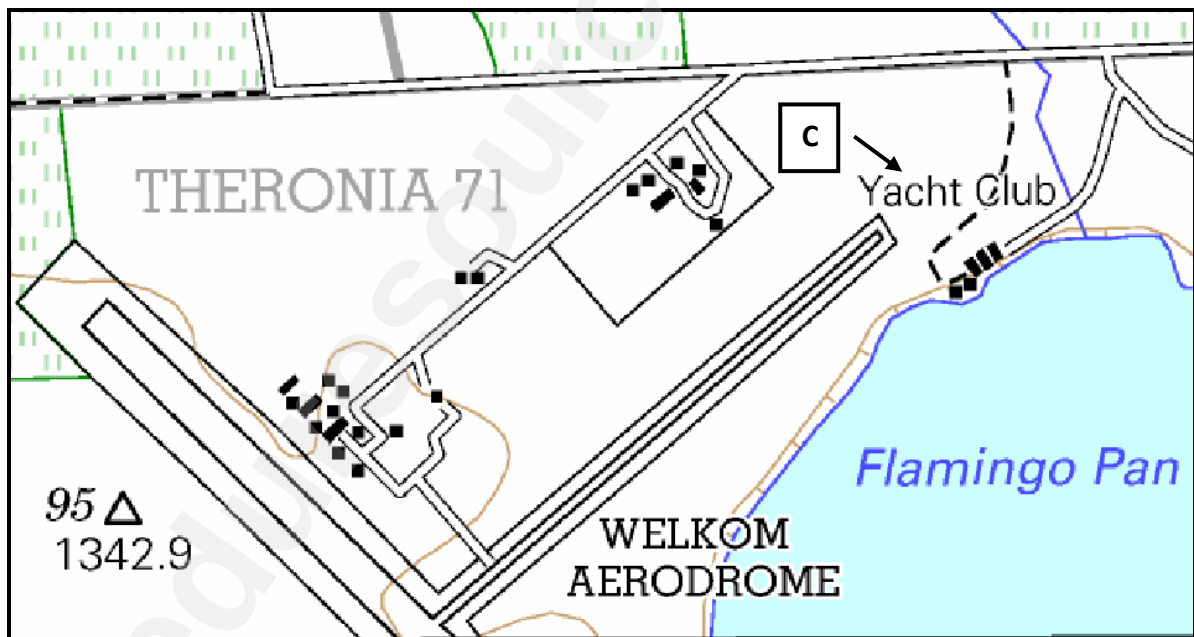


- A dry pan
- B perennial river
- C non-perennial river
- D marsh and vlei

1.8. The dams on the map clip above are used to ... (which one does not fit)

- A prevent flooding
- B Store water for irrigation
- C farm with fish
- D supply households.

- 1.9 The map projection used on the orthophoto map is ...
(The following is printed at the bottom of the map)
**Gauss Conform Projection. Central Meridian 27° East.
Hartebeesthoek 94 Datum (WGS84 Ellipsoid).**
- A Mercator
B Lambert
C Gauss conform
D universal transverse
- 1.10 The orthophoto map with a scale of 1:10 000 depicts ... part of the
topographical map.
A 1/5 of the map
B 1/2 of the map
C 1/4 of the map
D 1/25 of the map
- 1.11 Aeroplanes can land in a direction at the Welkom Aerodrome



- A Northerly
B Southerly
C North Westerly
D Easterly

1.12 The area marked C map is (a) ...

- A mining area
- B non-perennial water
- C mine dump
- D recreational area

(12 x 1) (12)

QUESTION 2: 8 minutes [10] (Adapted from DoE November 2008)

HINT: You must be able interpret map symbols and what they imply about the area.

The following questions are based on the 1:50 000 topographical map, 3227DD, CAMBRIDGE, as well as the orthophoto map of a part of the same 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

2.1. The topographical map reference number represents ...

- A 32°N 27°W
- B 32°S 27°E
- C 32°W 27°N
- D 32°E 27°S

2.2. The scale of the topographical map (1:50 000) is ... than that of the orthophoto map (1:10 000).

- A 5 times smaller
- B 5 times larger
- C 40 times smaller
- D 40 times larger

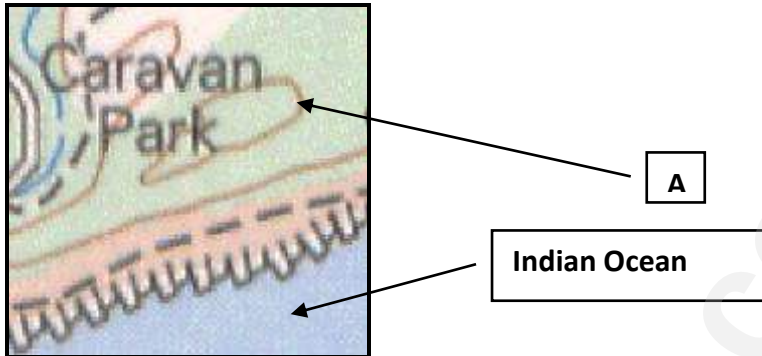
2.3. The contour interval of the orthophoto map is ...

- A 5 m
- B 20 m
- C 10 m
- D 25 m



2.4. The coastline in block J7 depicted below on the topographical map is mainly ...

- A smooth
- B dry
- C rocky
- D sandy



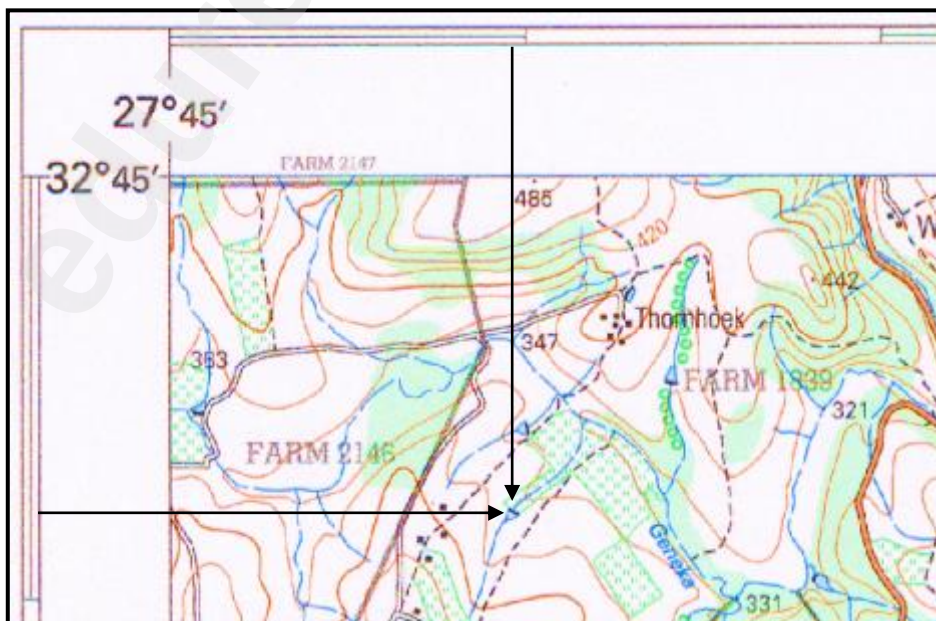
2.5. The altitude of the contour line labelled A in the map clip above is

- A 0m
- B 20m
- C 40m
- D 60m

2.6. The caravan park will experience ... winds during the night

- A Sea breezes
- B Katabatic winds
- C Anabatic winds
- D Land breezes

2.7. The location (coordinates) of the farm dam is ...



- A 27°45'13"E 32°45'8"S / 27°45,2'E 32°45,2'S
- B 32°45'29"S 27°46'23"E / 32°45,5'S 27°46,4'E
- C 32°45'8"E 27°46'13"S / 32°45,2'E 27°46,2'S
- D 27°46'13"S 32°45'8"E / 27°46,2'S 32°45,2'E

2.8. The direction of flow of the tributary of the Geneka river in 2.7 is

- A West
- B South
- C East
- D North

2.9. The function of the dam in 2.7 is (Which one does not fit?)

- A Recreation
- B Store water
- C regulate flooding
- D supply Cambridge with water

2.10 The highest altitude on the map clip in 2.7 is.... meters

- A 347
- B 485
- C 442
- D 1389

(10 x 1) (10)

Question 3 8 minutes (10) (Source: DoE November 2010)

The questions below are based on the 1:50 000 topographical map 3424BB HUMANSDORP, 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)

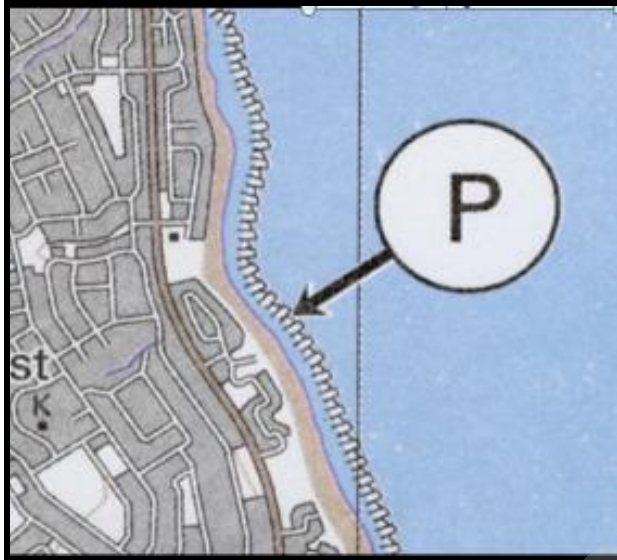
3.1 The earth's curved surface is represented on the topographical map through the ... projection.

- A Mercator
- B Gauss Conform
- C Lambert
- D Transversal

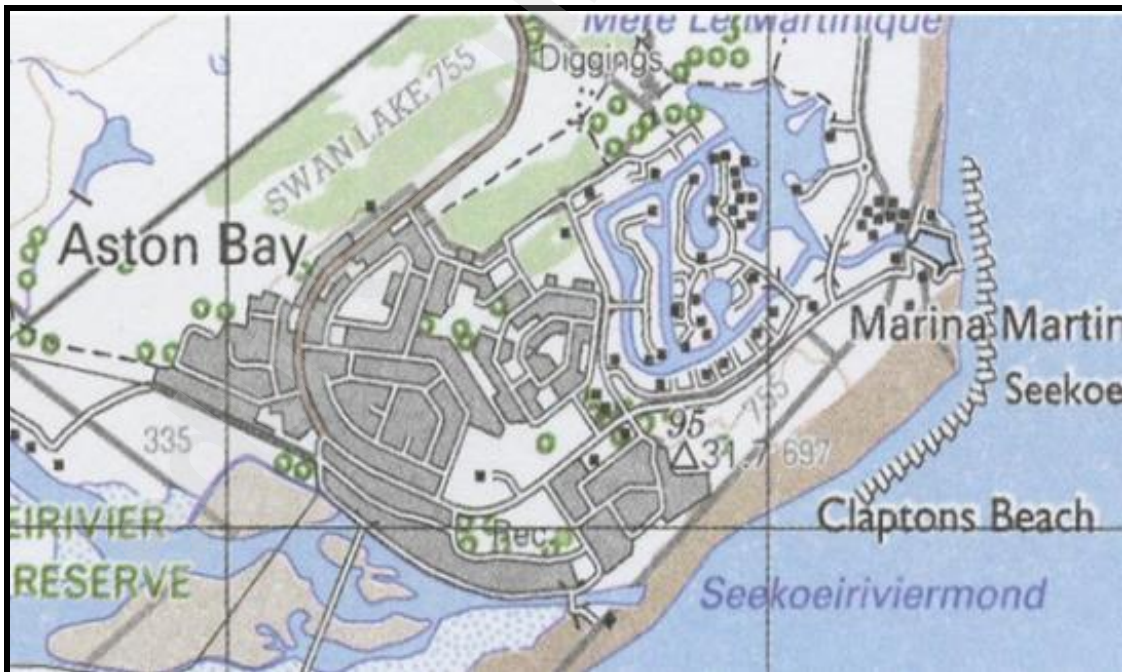
**Gauss Conform Projection. Central Meridian 25° East.
Hartebeesthoek 94 Datum (WGS84 Ellipsoid).**

3.2 The landform that is found at P in block B11, is a ...

- A rocky outcrop
- B cape
- C sandy beach
- D coastal rock



3.3 Ashton Bay has a/an ... street pattern.



- A grid iron
- B radial/cobweb
- C planned irregular/free
- D unplanned irregular

3.4. The slope south of Kwa Nomzamo (C2) is ...



- A gentle
- B steep
- C convex
- D concave

3.5 An aerial photograph which shows contour lines, spot heights, trigonometrical stations and other labelled features, is called a/an ...

- A oblique aerial photograph
- B topographical map
- C orthophoto map
- D vertical aerial photograph

3.6 The mean magnetic declination of this map in 2011 was ...

- A $26^{\circ}59'$ east of true north
- B $26^{\circ}59'$ west of true north
- C $23^{\circ}59'$ west of true north
- D $23^{\circ}59'$ east of true north



Mean magnetic declination 25°29' West of True North(July 2001).

Mean annual change 9' Westwards(1995–2000).

Supplied by Hermanus Magnetic Observatory.

Gemiddelde magnetiese deklinasie 25°29' Wes van Ware Noord(Julie 2001).

Gemiddelde jaarlikse verandering 9' Weswaarts(1995–2000).

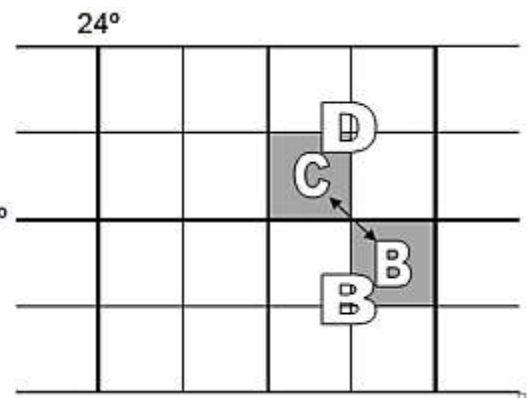
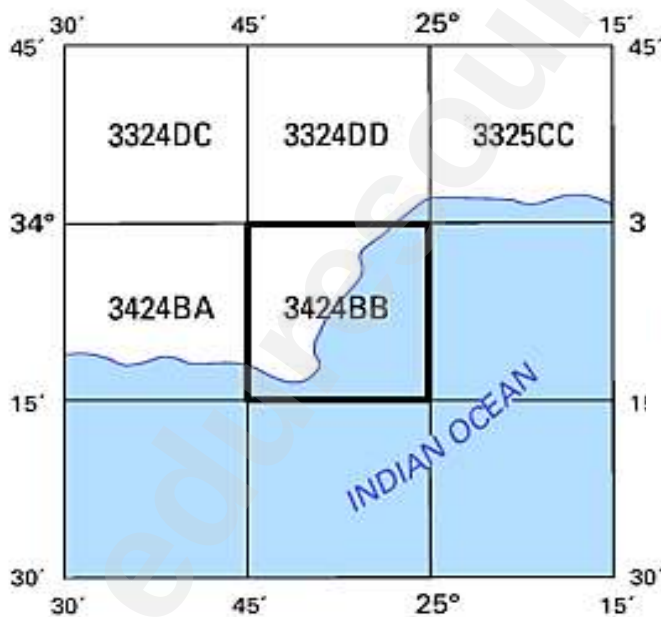
Voorsien deur die Hermanus Magnetiese Observatorium.

3.7 The index of the map sheet northwest of Humansdorp is ...

- A 3324DC
- B 3324DD
- C 3325CC
- D 3424BA

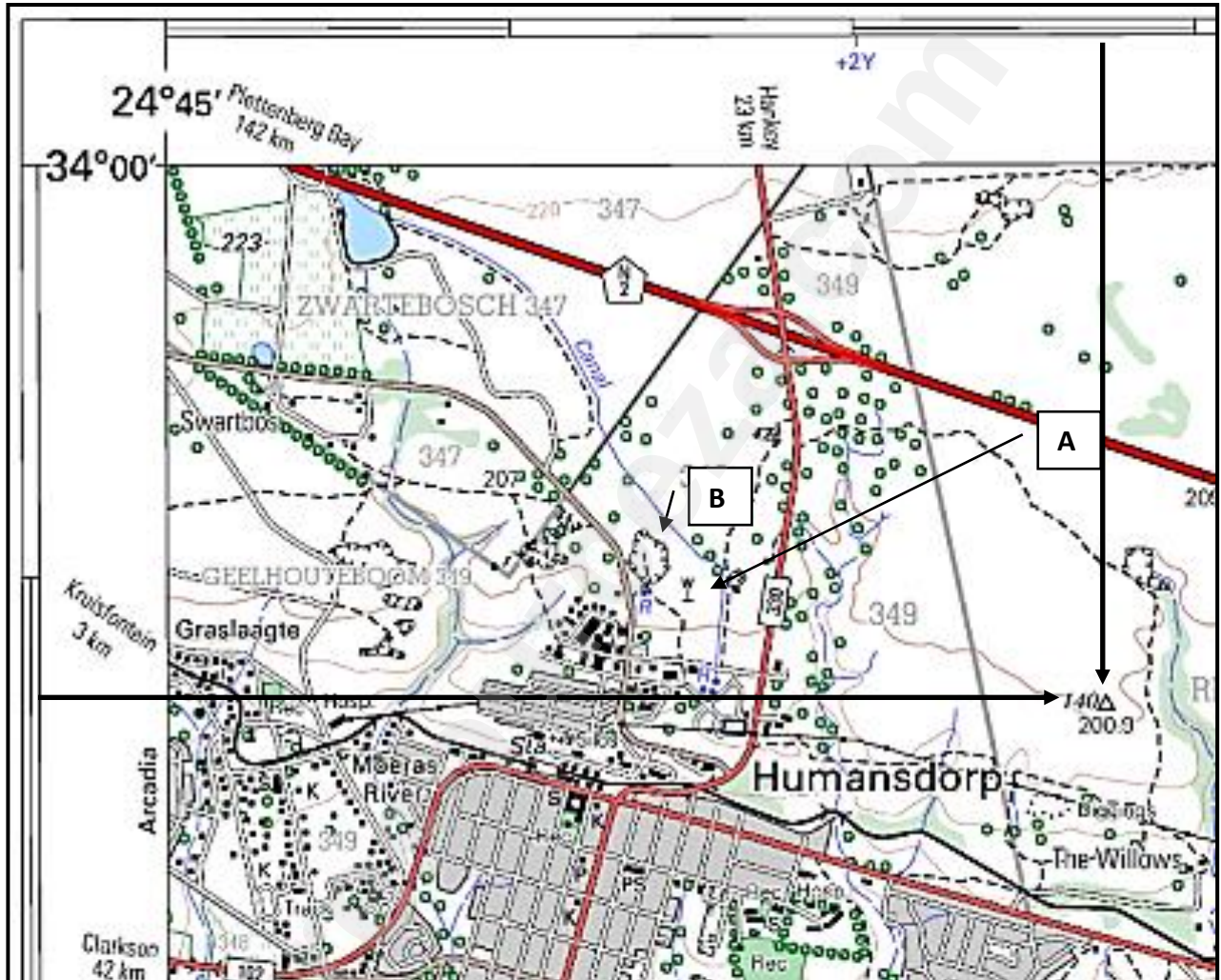
Use any one of the explanation

INDEX TO SHEETS INDEKS VAN VELLE



3.8 The co-ordinates of trigonometrical station 140 in block B3 are ...

- A $34^{\circ}01'20''S 24^{\circ}47'44''E$ / $34^{\circ}01,3'S 24^{\circ}47,7'E$
- B $34^{\circ}02'40''S 24^{\circ}48'16''E$ / $34^{\circ}02,7'S 24^{\circ}48,3'E$
- C $34^{\circ}01'20''E 24^{\circ}47'44''S$ / $34^{\circ}01,3'E 24^{\circ}47,7'S$
- D $34^{\circ}02'40''E 24^{\circ}48'16''S$ / $34^{\circ}02,7'E 24^{\circ}48,3'S$



3.9 The feature numbered A on the map clip above is a ...

- A Wind pump
- B Monument
- C Communication Tower
- D Grave site

3.10 The feature labelled B on the map clip above is a

- A Excavation
- B Mine dump
- C Donga
- D Dam

(10 x 1) (10)

QUESTION 4: 45 minutes (37) (Adapted November 2009 and March 2010)

HINT: You must practice to use your equipment to make accurate measurements. Ask if you do not know how to measure or calculate. You must practice map work often as it a practical skill like kicking goals.

4.1. The diagram below is a cross-section from spot height 578 (A) to spot height 553 (B) on the orthophoto map.

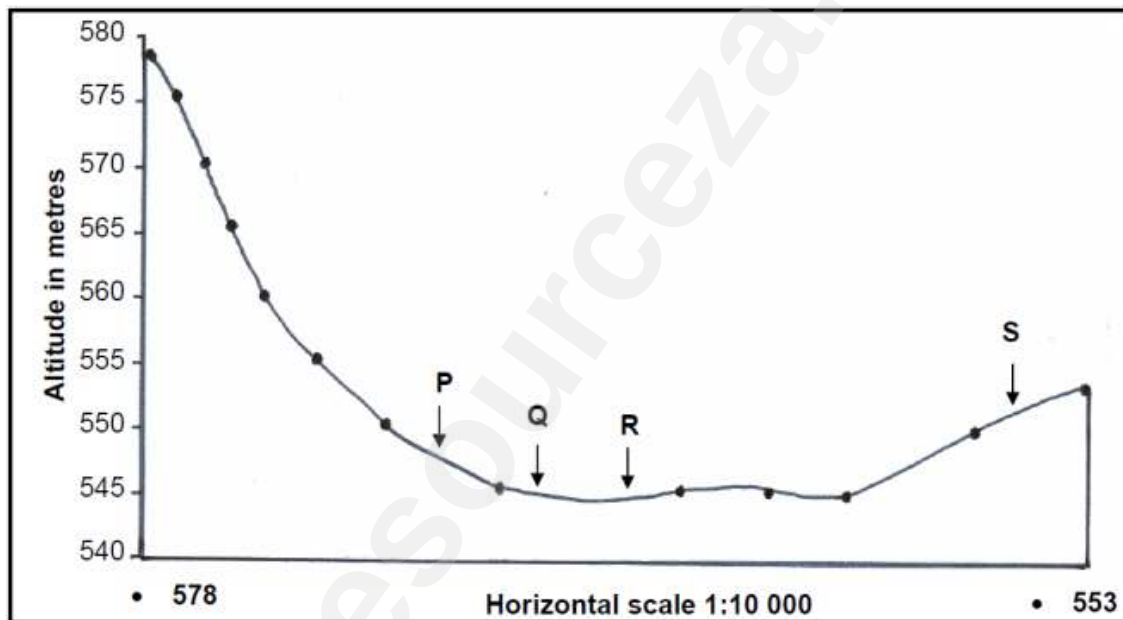
4.1.1. Are features P and R intervisible? (1)

4.1.2. Give ONE reason for your answer to QUESTION 1.1.1. (1)

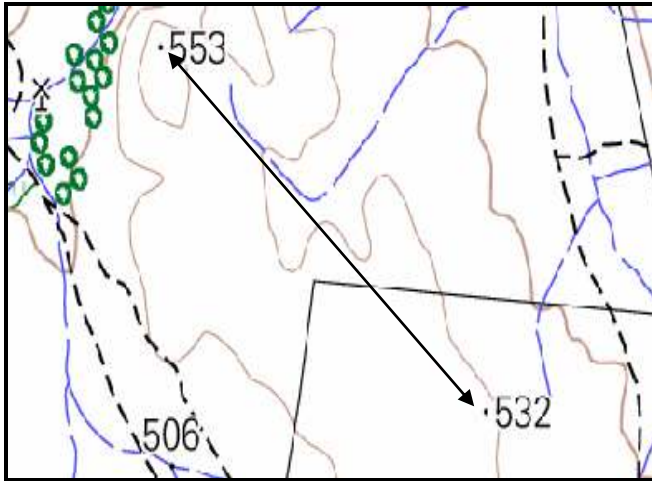
4.1.3. Calculate the vertical exaggeration for the given cross-section. Show ALL your calculations.

The vertical scale is 1cm: 5m and the horizontal scale is 1:50 000.

(4)



4.2.1. Calculate the average gradient between spot height 532 (F3) and spot height 553 (E2) on the topographical map. Show ALL your calculations. (The distance should be 2.5cm but it can be wrong due to reduced notes.) (5)



4.2.2. Would you consider the gradient that you have calculated in QUESTION 1.2.1 to be steep or gentle? (1)

4.2.3 Explain your answer to QUESTION 4.2.2. (2)

4.2.4 Give evidence from the topographical map to support your answer to QUESTION 4.2.3. (1)

4.3. Calculate the area of the rifle range (E) on the map in km^2 . Show ALL your calculations. (6)

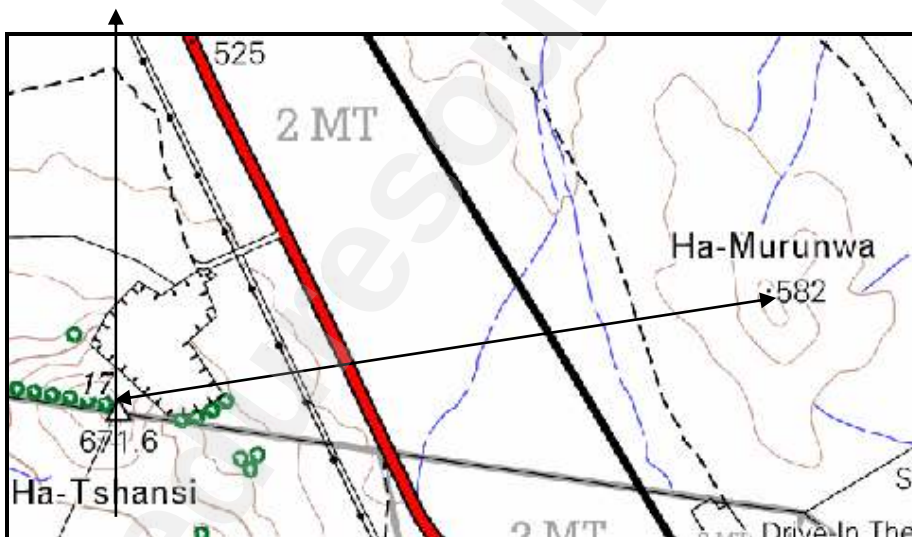
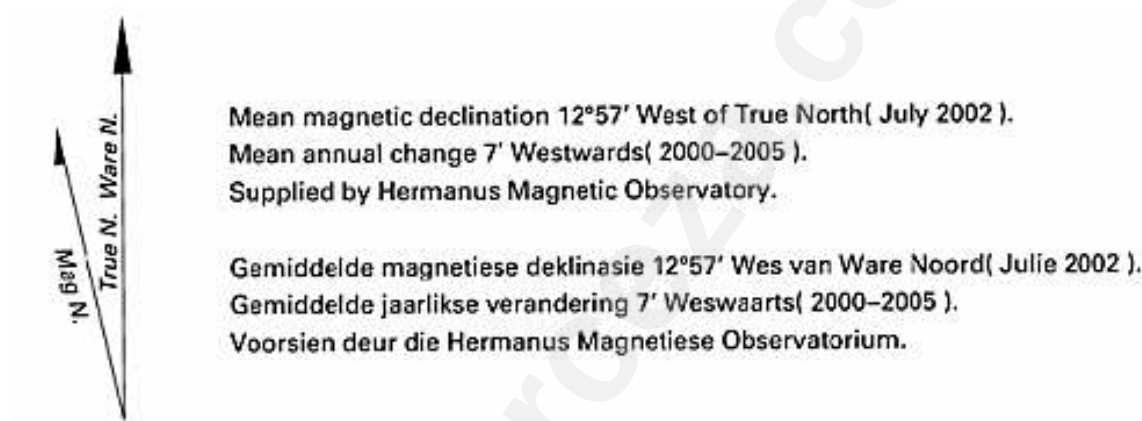
(This calculation will only be correct if the length is 2cm on the notes)



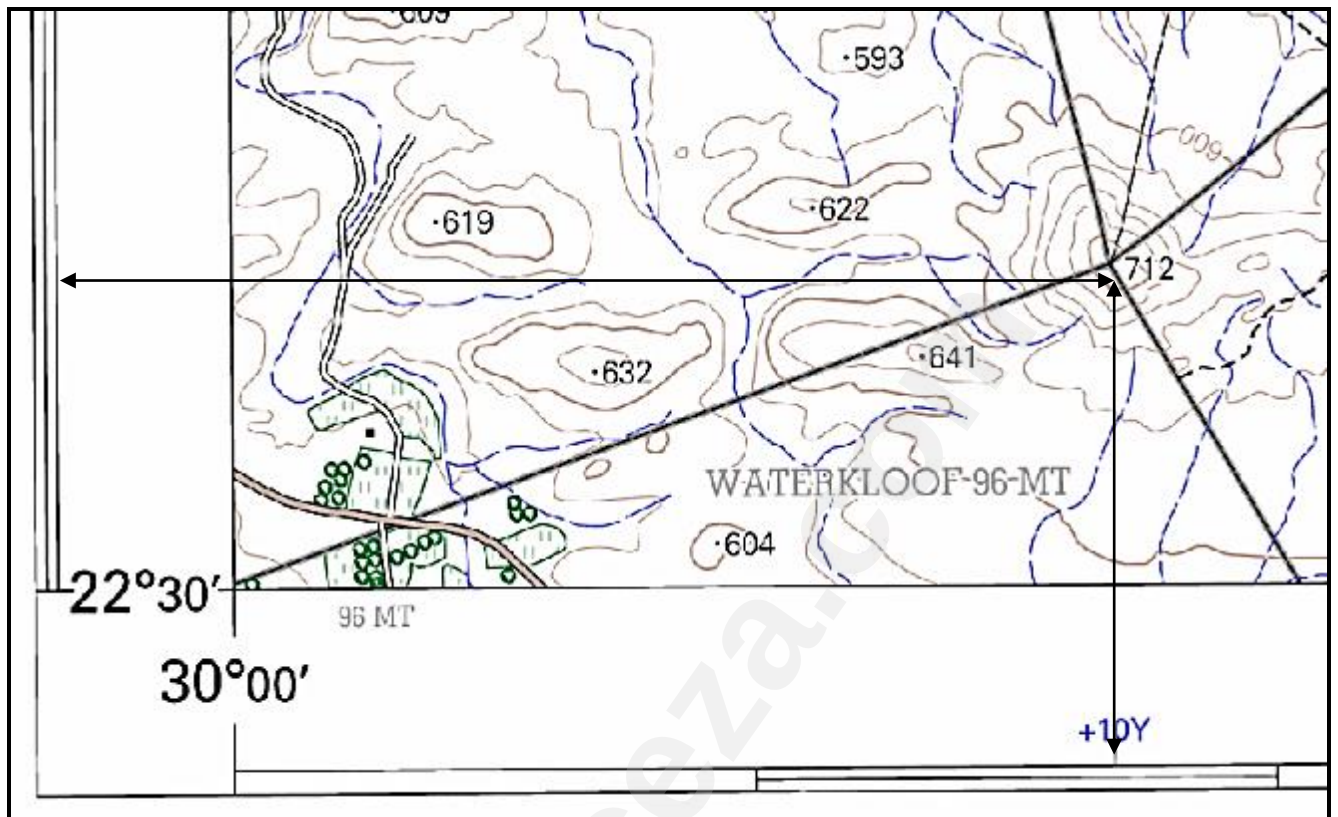
4.4. Determine the present magnetic bearing from trigonometrical station 17 (G1) to Spens Shaft (F5). Use the map clips below to do your measurements. (8)

Use the following steps as a guide:

Date of map:
Magnetic declination:
Mean annual change:
Difference in years:
Total annual change:
Magnetic declination in 2010:
True bearing:
Present magnetic bearing:



- 4.5.1. Which one, the topographical map (1: 50 000) or the orthophoto map (1: 10 000), has a larger scale? (1)
- 4.5.2. Motivate your answer in 4.5.1. (3)
- 4.6. Give the co-ordinates (fix the position) of spot height 712. (4)



SECTION C: HOMEWORK QUESTIONS

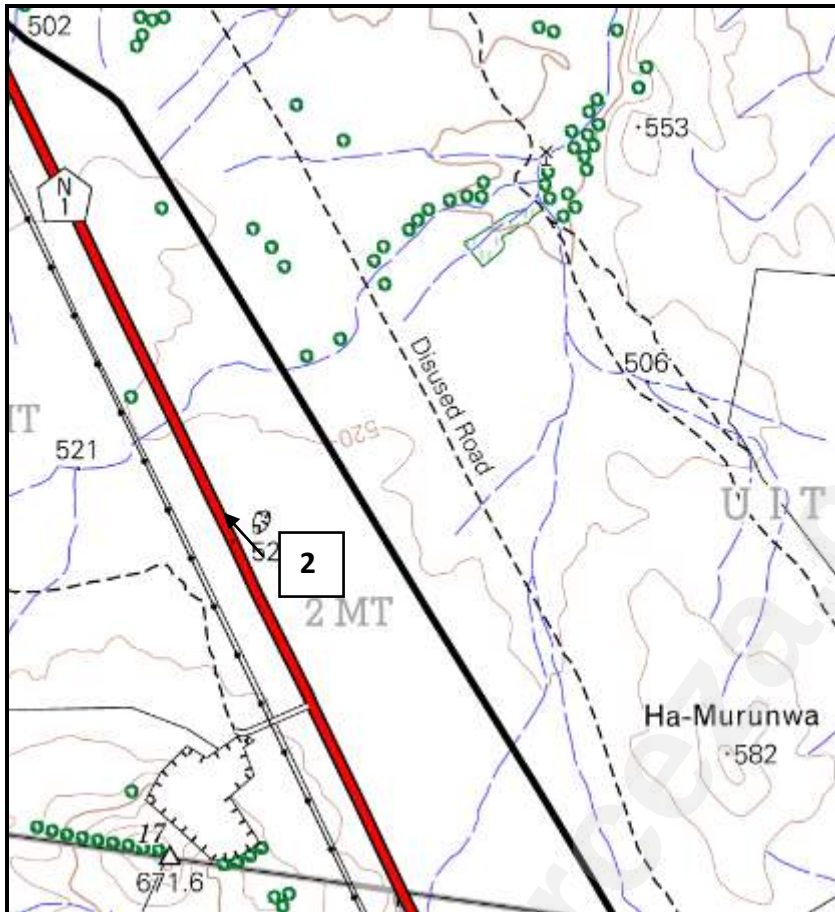
QUESTION 1:13 minutes (16) (Adapted March 2010 & November 2009)

HINT: Practice, practice, practice, with a friend and on your own.

The following questions are based on the 1:50 000 topographical map 2230AA&AC MUSINA 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)

- 1.1 What is the altitude on the trig beacon on the next map clip...
- A 525 m
 - B 521 m
 - C 17 m
 - D 671.6 m



1.2 The height of the N1 National Route at 2...

- A 500 m
- B 520 m
- C 540 m
- D 560 m

3.4 The settlement of Arton Villa (F6) originally developed as a ... settlement.

- A mining
- B farming
- C resort
- D junction



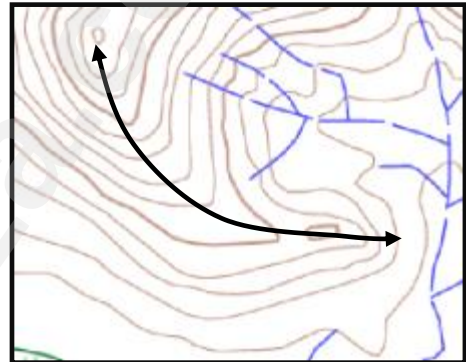
1.4 The feature numbered 3 is a ...

- A wind pump
- B communication tower
- C grave
- D water tower



1.5 The word scale of the orthophoto map is: (The orthophoto scale is 1: 10 000)

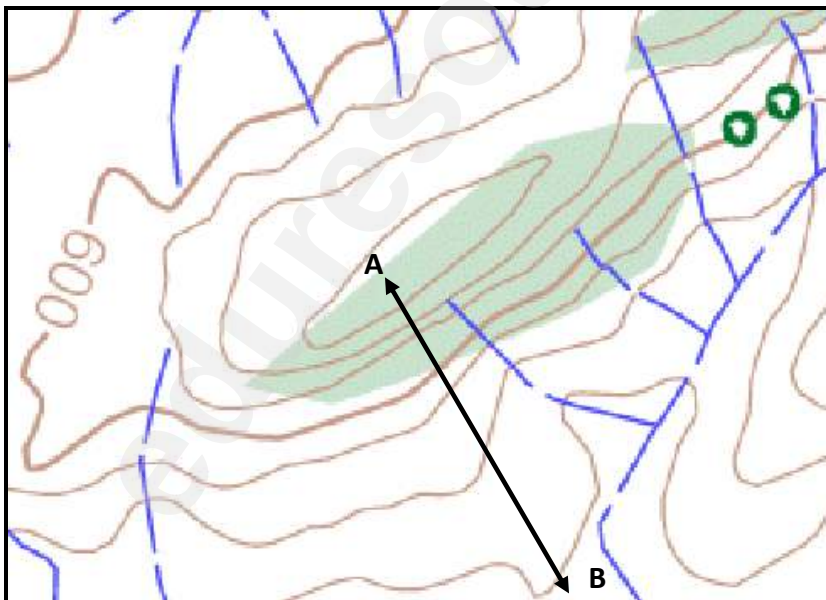
- A 1 cm represents 10 000 m
- B 1 cm represents 1 000 m
- C 1 cm represents 100 m
- D 1 cm represents 10 m



1.6 The landform in the map clip is a ... (arrow)

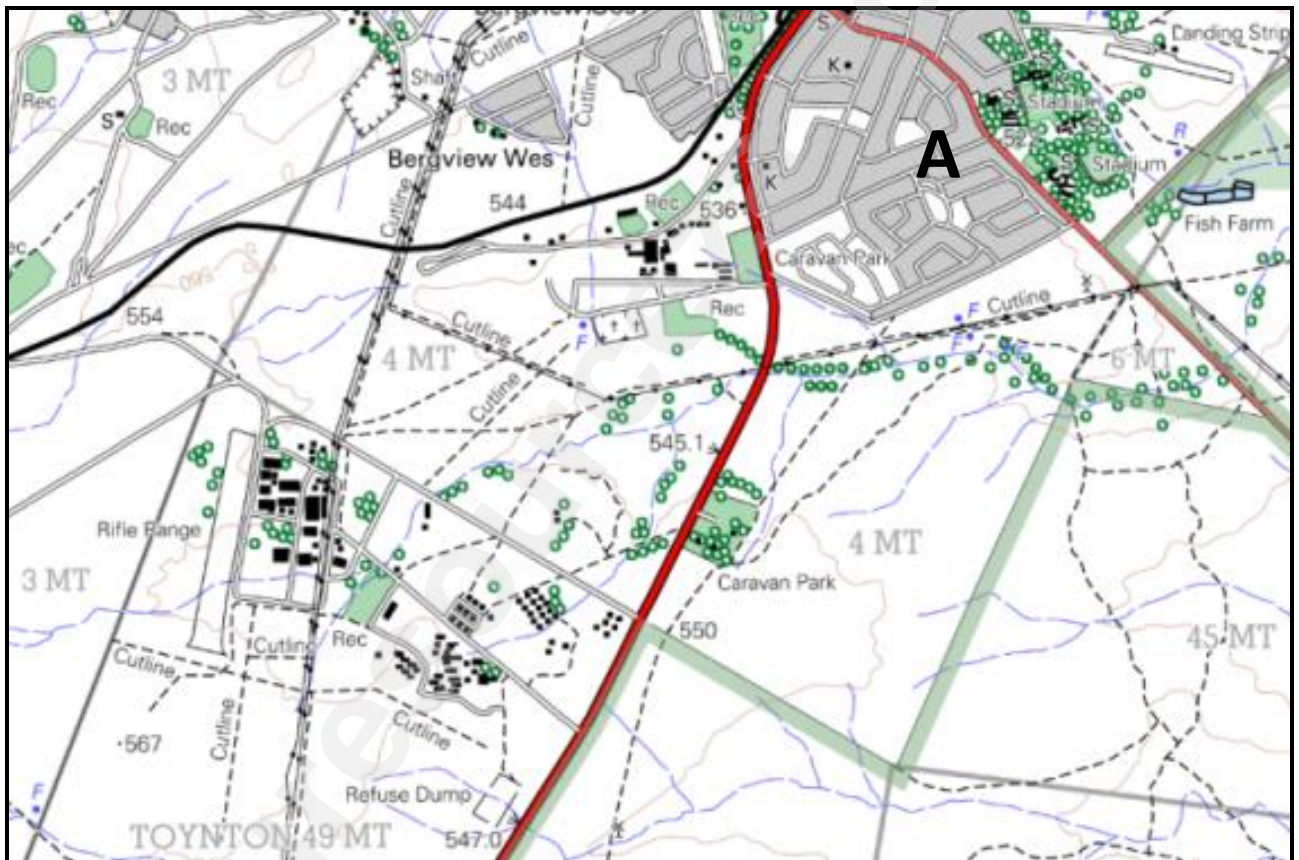
- A cuesta
- B valley
- C spur
- D mesa

1.7 The slope from A to B on the map is ...



- A convex
- B concave
- C gentle
- D terraced

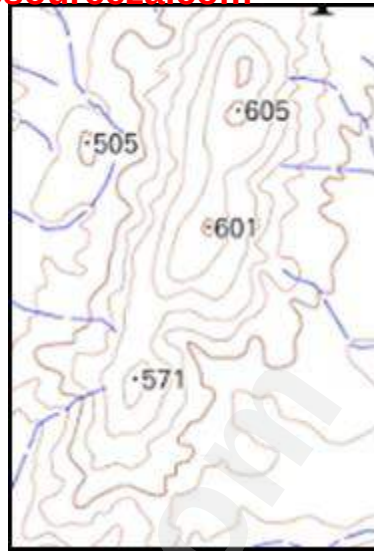
- 1.8 The direction from A to B on the map clip is ...
- A west-northwest
 - B north-northwest
 - C northwest
 - D southwest
- 1.9 The refuse dump at N on the orthophoto map is mainly for ... waste.
- A industrial
 - B domestic
 - C agricultural
 - D mining



- 1.10 The residential area marked A on the map shows a rough ... street pattern.
- A grid-iron
 - B radial
 - C unplanned, irregular
 - D planned, irregular

- 1.11 The landform found between spot height 605 and spot height 601 is a ...

A poort
B saddle
C spur
D valley

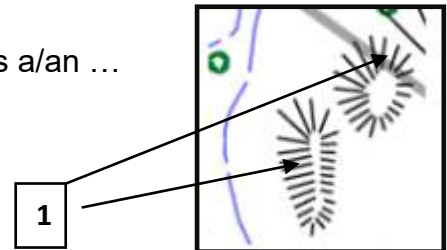


- 1.12 Musina is an example of a ... town. (The main function is supplying the local rural community with services)

A central place
B junction
C gap
D bridge

- 1.13 The feature marked 1 on the topographical map is a/an ...

A mine dump
B cutting
C embankment
D excavation



- 1.14 An orthophoto map is a ... photograph which has contour lines, spot heights, trigonometrical stations and other labelled features drawn onto it.

A high oblique
B low oblique
C horizontal
D vertical

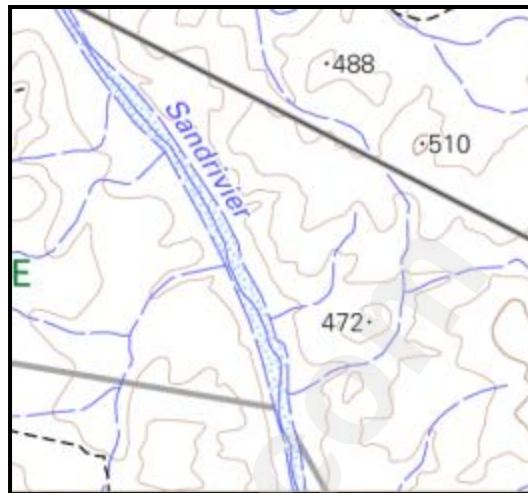
- 1.15 The R572 and 521 (thinner red lines) on the map is a/an ... roads.

A arterial
B main
C secondary
D other



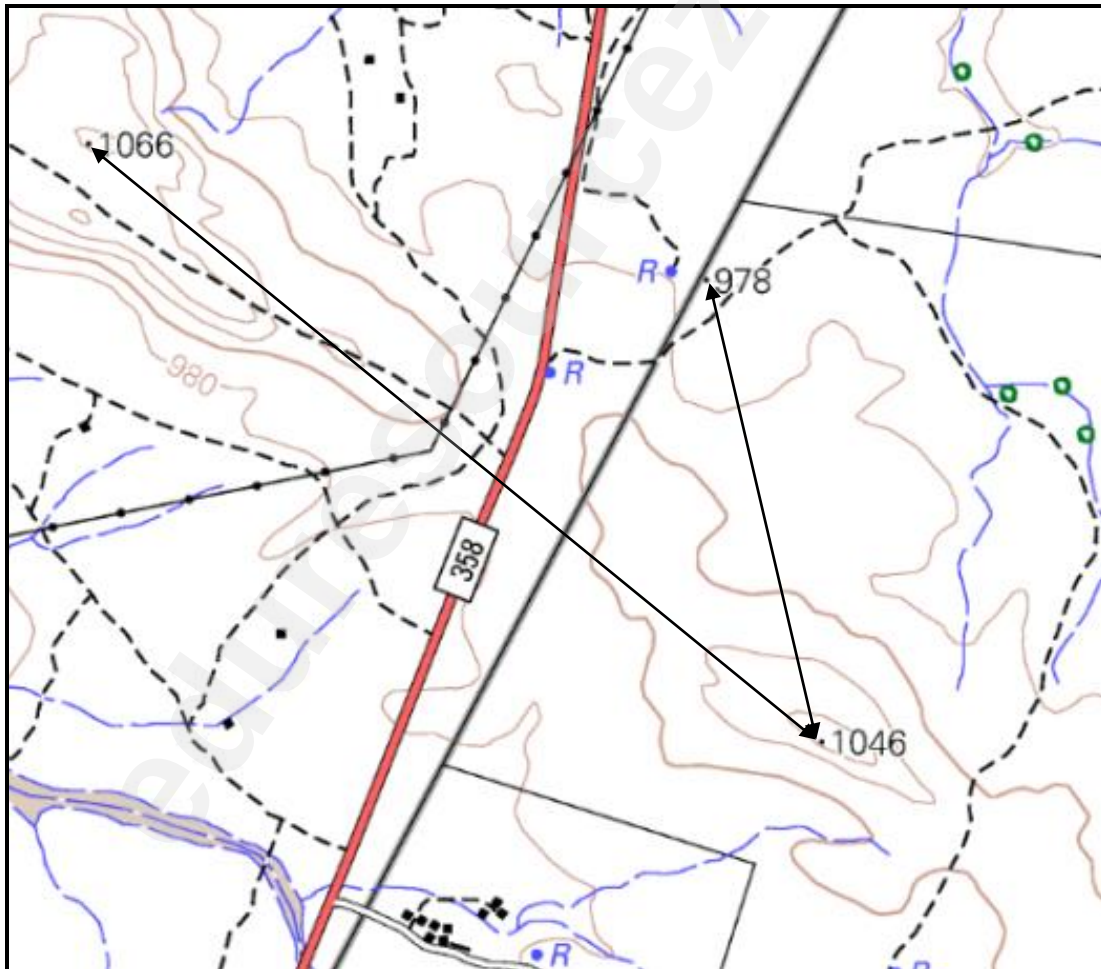
1.16 The Sand River (Sandrivier) that flows in the mapped area is a/an ... river.

- A periodic
- B episodic
- C permanent/perennial
- D exotic



(16 x 1) [16]

QUESTION 2: **30 minutes** (26) (Source: Adapted from November 2008)



- 2.1. Calculate the area covered by the map clip above if the scale is 1: 50 000 (4)
- 2.2. Calculate the gradient between spot height 978 and 1046. (5)
- 2.3.1. Draw an accurate cross section from spot height 1066 to 1046. (8)
The vertical scale is 1cm represent 20m.

- 2.3.2. Calculate the vertical exaggeration for the cross section (4)
 2.3.3. Indicate the road and power line on the cross section. (2)
 2.3.4. Identify the landform you have drawn on the cross section. (1)
 2.3.5. Why does the road pass through this landform? (2)

SESSION NO: 15

TOPIC: MAPWORK INTERPRETATION AND GIS

SECTION B: CONTENT NOTES ON MAP INTERPRETATION AND GIS

Terminology / Definitions for this section are dealt with in the text.

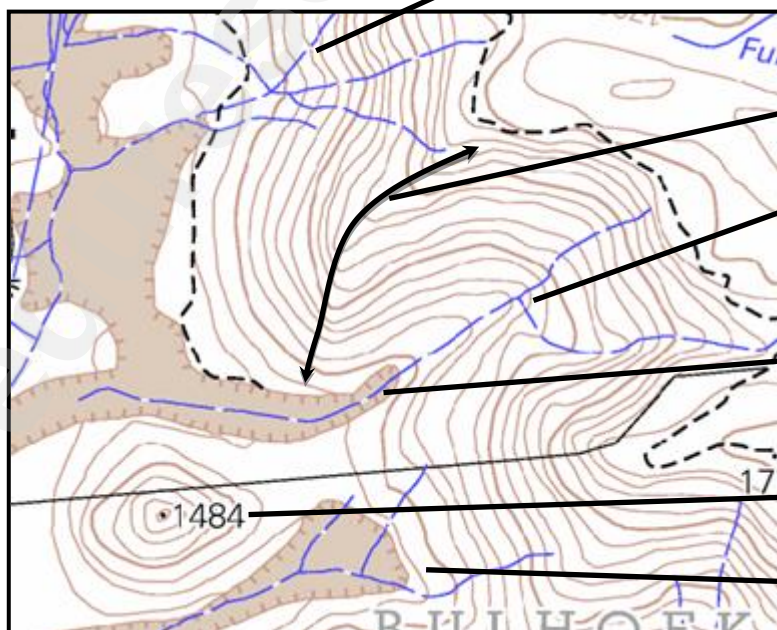
IMPORTANT CONCEPTS AND EXPLANATIONS

1. Topographic Map Application

- 1.1.** Interpretation of 1 : 50 000 topographic maps
- ✓ Interpreting physical features, e.g. relief, drainage, climate and vegetation
 - ✓ Interpreting cultural features, e.g. settlement, land-use and transport networks
 - ✓ Application of all aspects of syllabus covered in the theoretical section of Geography
 - ✓ Interpreting of temperature, rainfall, climate zones and biomes, graphs and tables that are related to the 1 : 50 000 topographic map and the 1 : 10 000 orthophoto map being assessed

CLIP 1: Relief, drainage, Climate, landforms, slopes

Non perennial / periodic rivers in semi dry seasonal rainfall areas



Spur

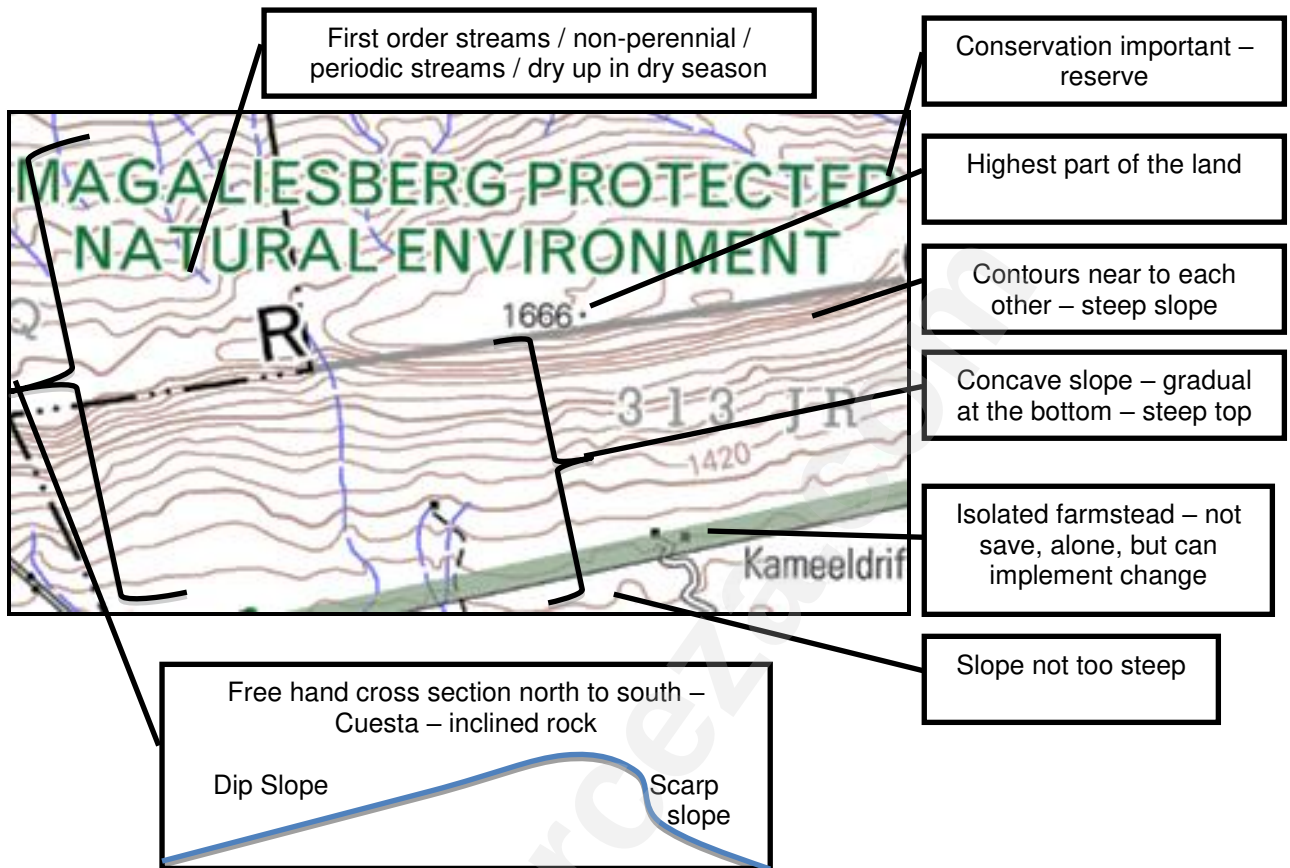
Valley

Donga developed in semiarid areas where erosion cut deep furrows when it rains.

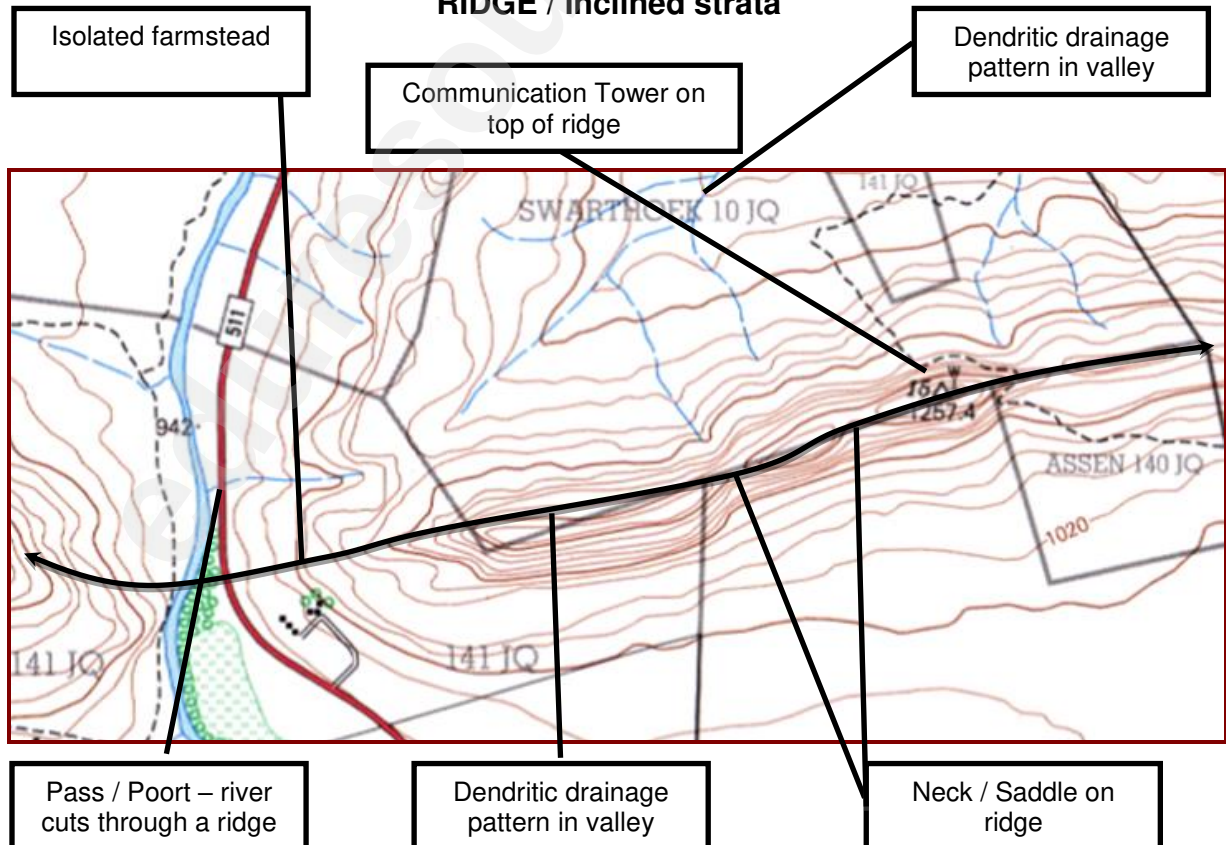
Conical Hill

Dendritic drainage basin

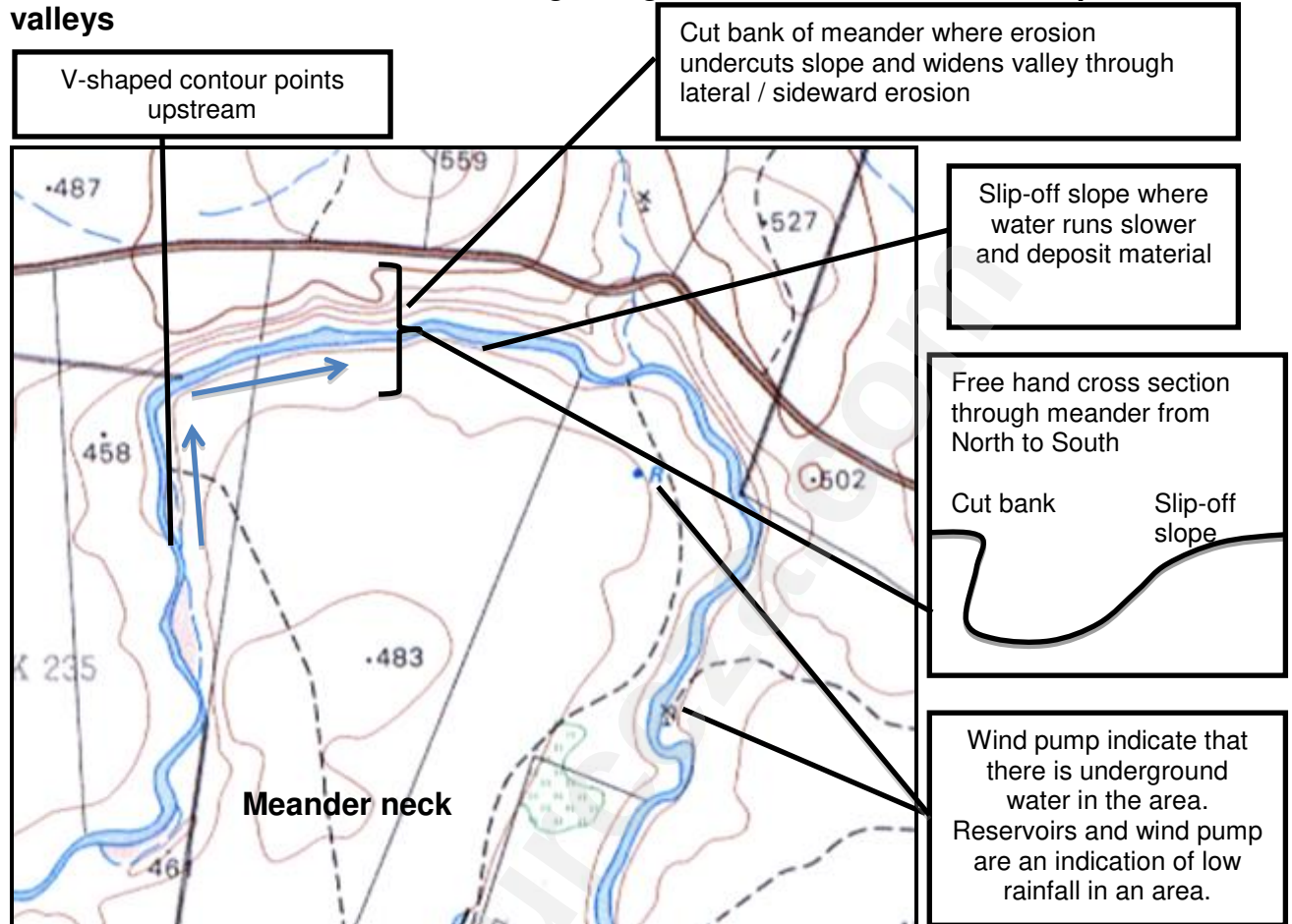
CUESTA in Inclined strata



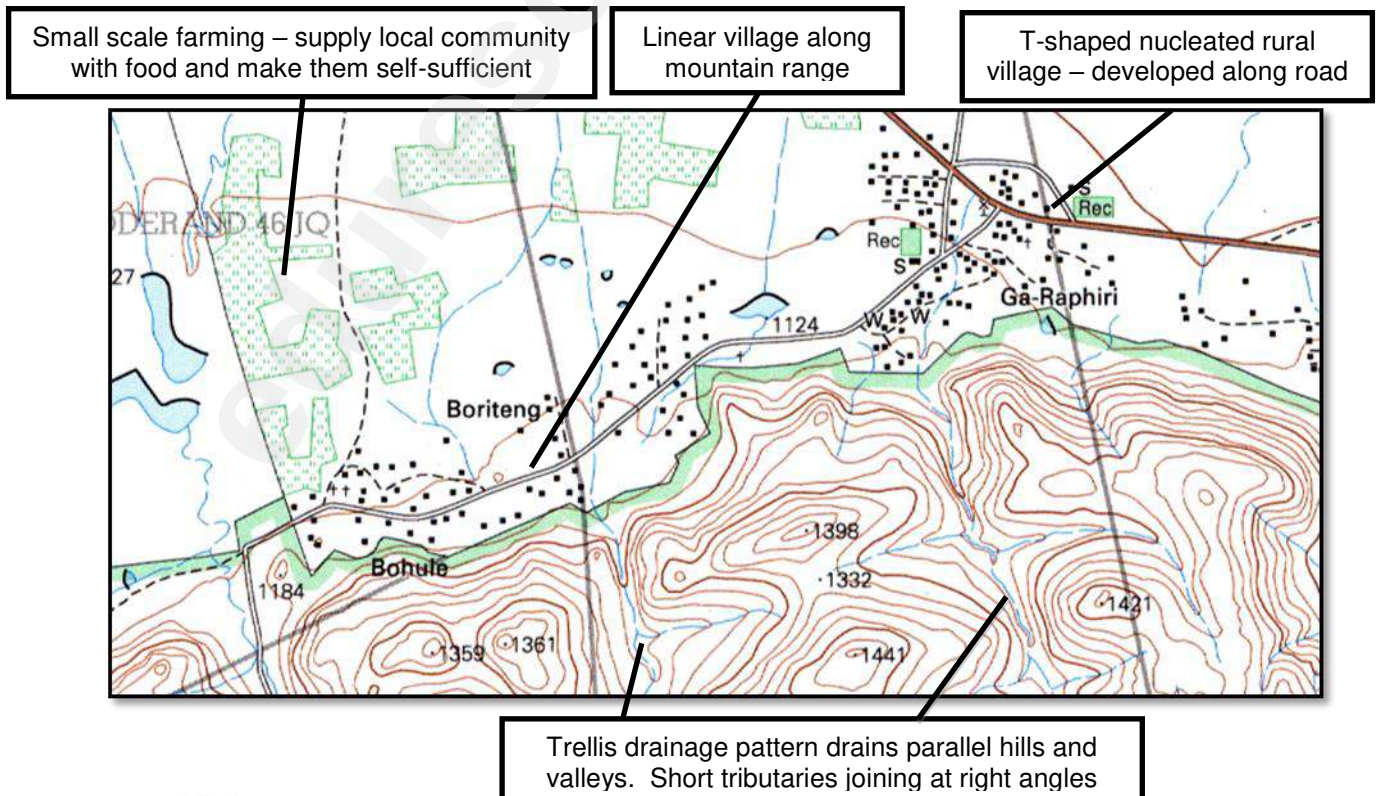
RIDGE / Inclined strata



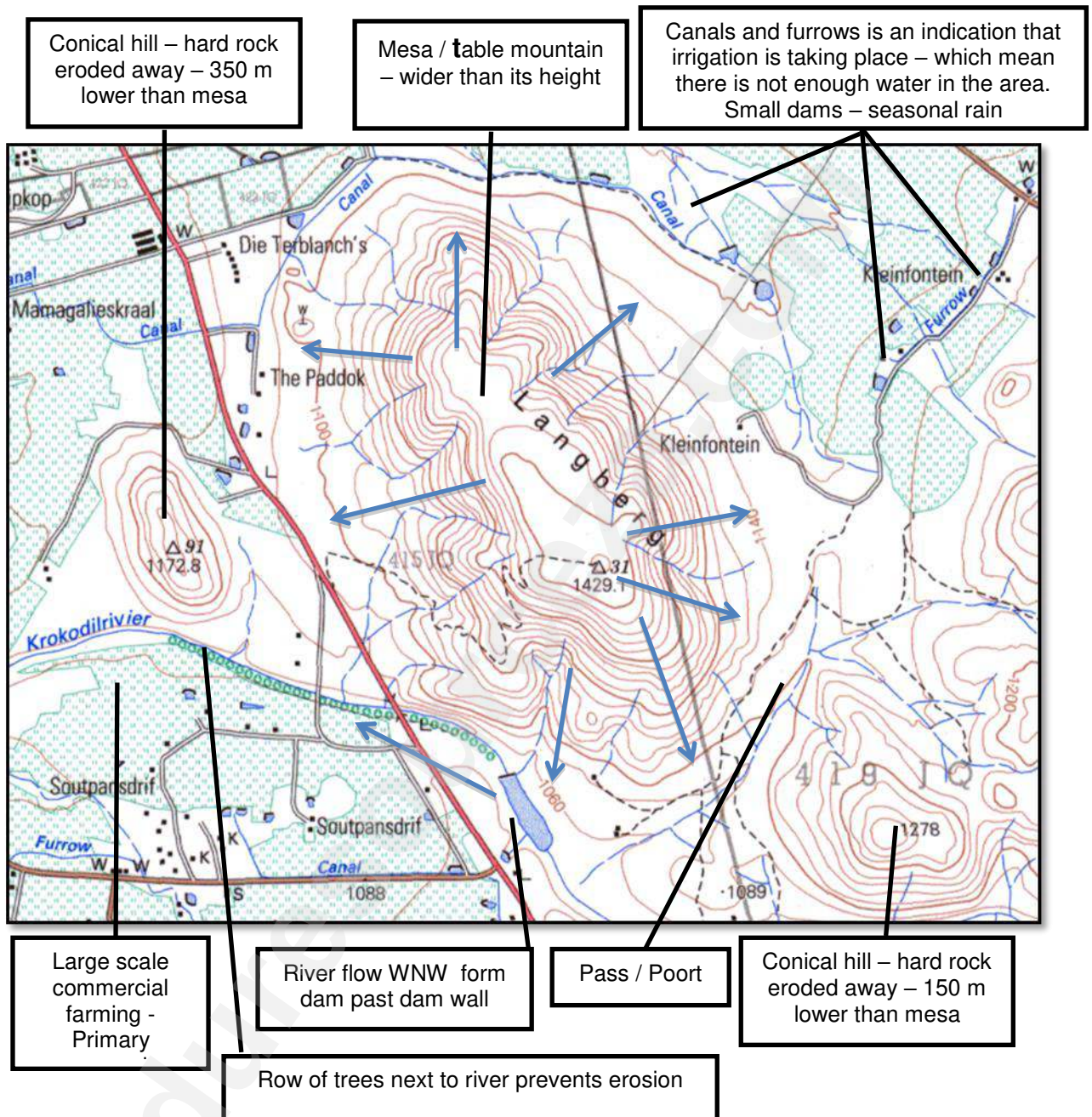
River meander – River in mature stage; large meanders and well developed valleys



Nucleated rural villages next to mountain range



LANDFORMS ASSOCIATED WITH HORIZONTAL STRATA RADIAL DRAINAGE PATTERN – RIVERS FROM MESA OUTWARD



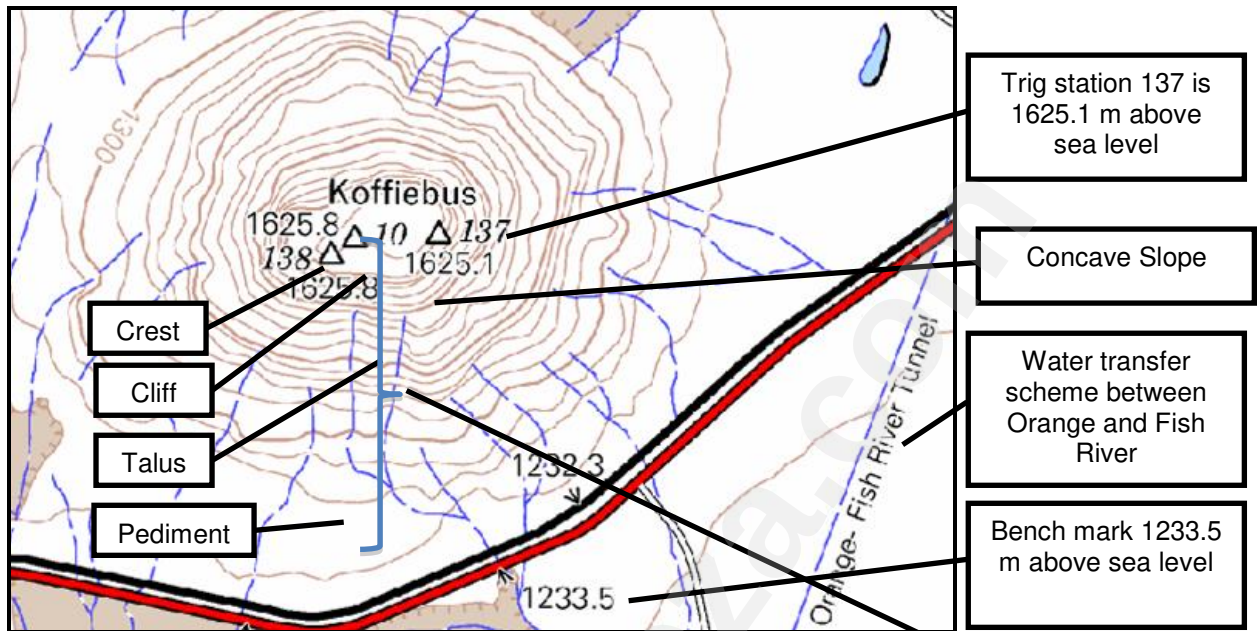
KAROO LANDSCAPE – BUTTE



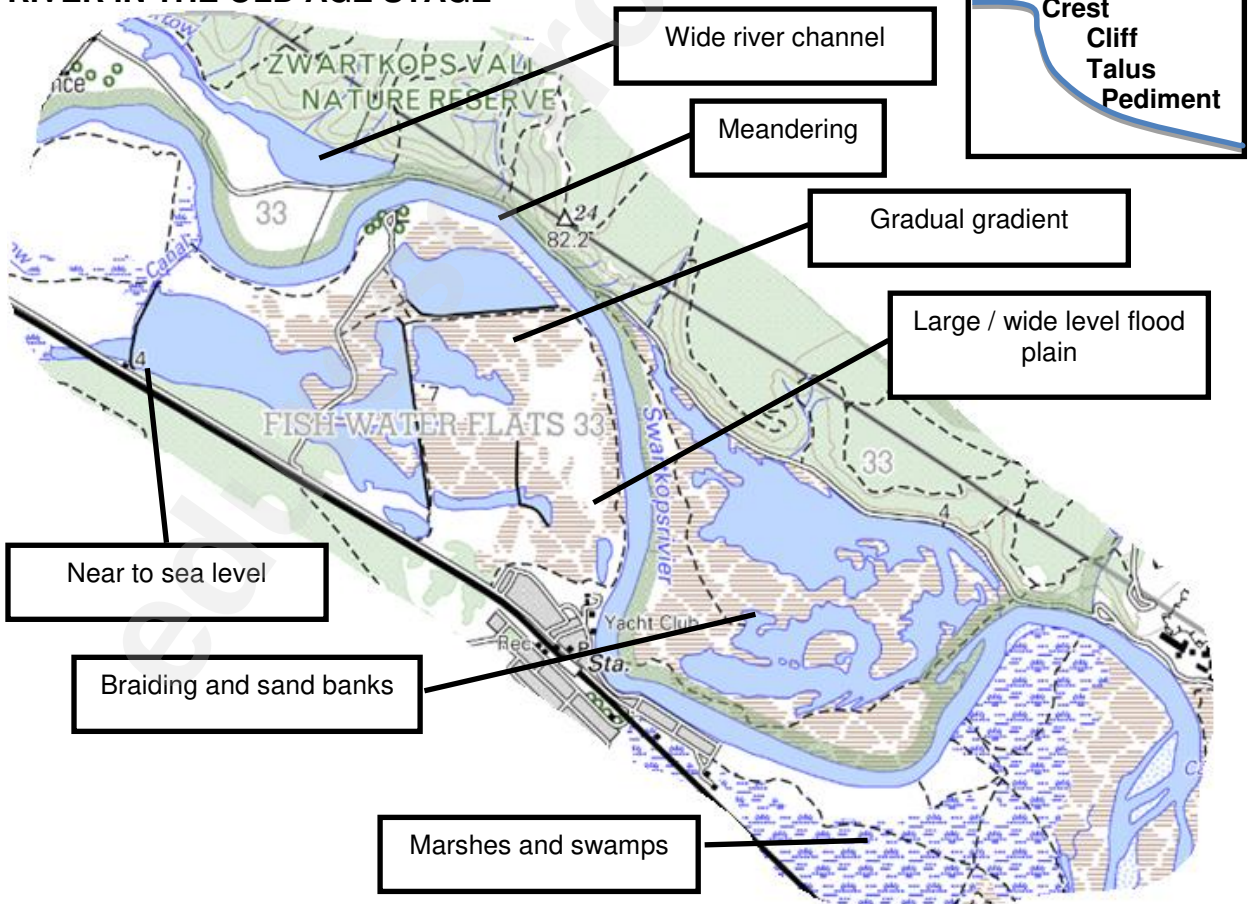
GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

Flat hard topped butte – narrower than its height

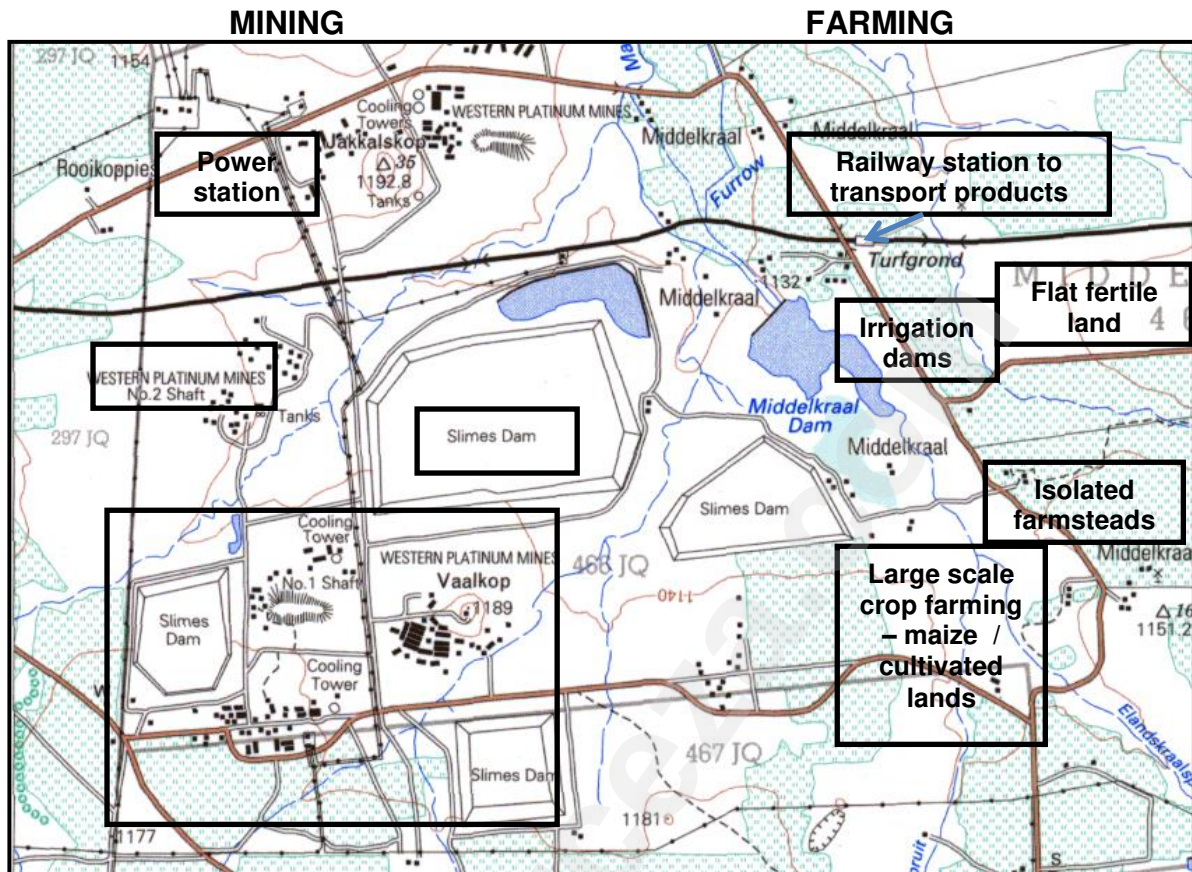
Radial stream pattern from high central feature



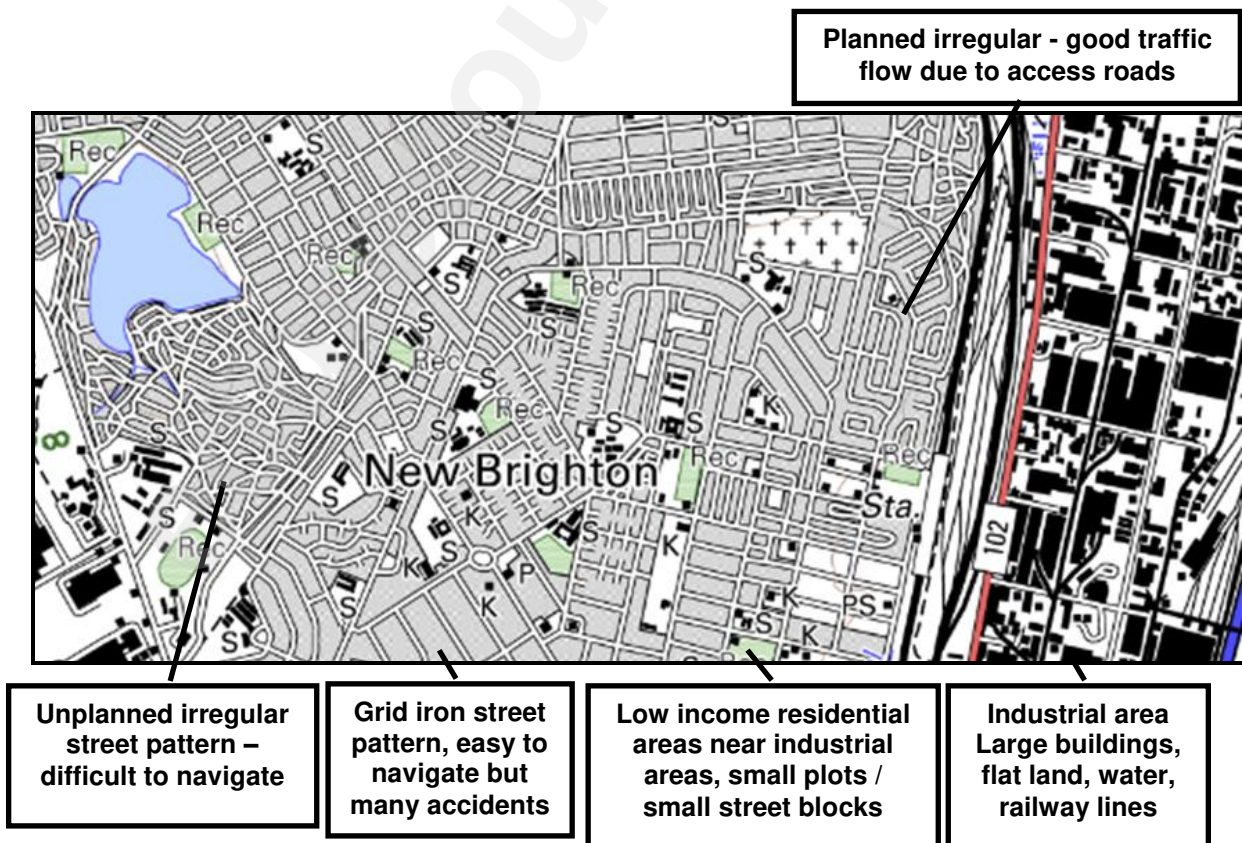
RIVER IN THE OLD AGE STAGE



PRIMARY ECONOMIC SECTOR

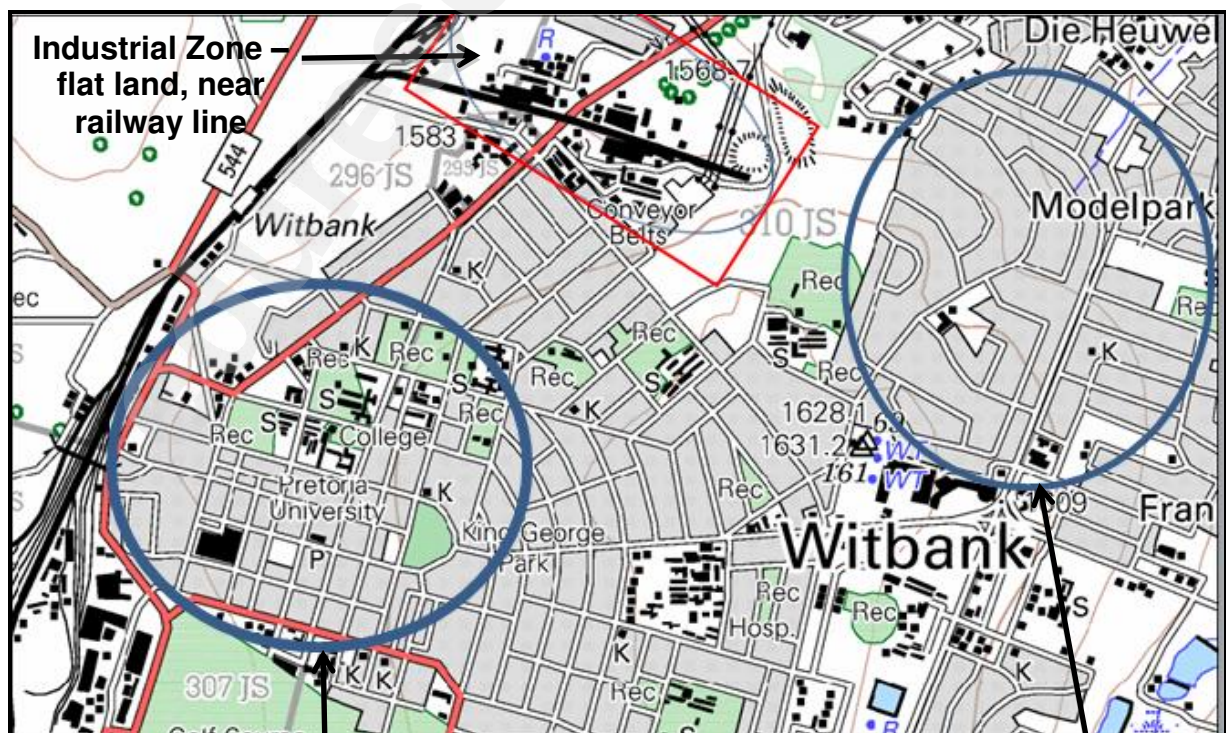


STREET PATTERNS AND URBAN LAND USE ZONES



LAND USE ZONES IN CITIES





**CBD – Accessible centre
near station**

1.2. Photographs

- ✓ Types of photographs
- ✓ Advantages and disadvantages of different types of photographs

Type	Characteristics	Advantages	Disadvantages
Terrestrial Photo	Taken from the ground Horizontal	Normal point of view Easy to identify features	Distorted scale – cannot do calculations Features in front obscure features in the back
Oblique Photo	Taken at an angle High - tilted more than 60° - see horizon Low – tilted less than 60° cannot see horizon	Near to normal point of view – form the side – easy to identify features	Distorted scale – cannot do calculations Features in front obscure features in the back
Vertical Aerial Photo	Taken from above – 90° Bird's eye view	Uniform scale Can be used to do calculations Used to draw maps from Used to develop orthophotos and 3D stereo pair photos	Strange point of view from the top – difficult to identify features Edges are distorted somewhat

- ✓ **Orthophoto maps:** vertical aerial photographs that have been ortho corrected to eliminate distortion. Some points, lines (vector spatial data) and labels (attribute data) have been added to make it easier to read. The scale is usually 1:10 000 (which is 5 times larger than the topographic map scale of 1:50 000)
- ✓ **Interpreting** size, shape, tone, texture, shadow and patterns of vertical aerial photographs to identify features, landforms and activities on photographs and orthophoto maps
- ✓ **Orientation of orthophoto map to topographic map:** use the shaped of rivers and roads to on the photo and find the same shapes but smaller on the map to orientate the photo and the map.
- ✓ Compare orthophoto maps to topographic maps

Topographic maps	Orthophoto
Expensive to produce Smaller scale 1: 50 000 Less detail and symbols (points, lines, areas, represent features – Vector data Generalised through symbols Data based on remotely sensed data	Less expensive and easier to update Larger scale 1: 10 000 All detail are shown by pixels - Raster data Not generalised Remotely senesced data

- ✓ All techniques mentioned under map work techniques applicable to orthophoto maps

1.3. Orthophoto Map Application

- ✓ Interpretation of 1 : 10 000 orthophoto maps
- ✓ Interpreting physical features e.g. relief, drainage, climate and vegetation
- ✓ Interpreting cultural features e.g. settlement, land-use and transport networks
- ✓ Application of all aspects of syllabus covered in the theoretical section of Geography

This is the same as on the topographic maps

2. Concepts of

2.1. GIS – Geographic information systems

Definition: GIS is a collection of computer hardware, software, data, people and processes designed to capture, store, update, manipulate and analyse spatially referenced data.

2.2. Remote sensing: observations from a distance e.g. satellite images and aerial photographs

Resolution: The amount of pixels making up an image which determines the quality / detail for the image - the smaller the pixels the clearer the image.

Pixels: the small squares making up a photograph or image – arranged in a grid.

Spatial resolution: the size of the pixels in an image or the amount of features in a vector data set.

Spectral resolution: the number of bands of the electromagnetic spectrum captured in a satellite image. The spatial resolution increase if more band are captured. (Some sensors on satellites can capture wavelengths that are not visible to the naked eye.)

2.3 Spatial and attribute data

A GIS stores two types of data namely

Spatial data: the shape and the location of geographical features.

Attribute data: the characteristics of geographic features e.g. name, value, intensity, type, classification etc. The labels on the maps often show the attributes.

2.4.1. Vector and raster data is how spatial data can be stored in a GIS on a computer.

Raster data consist of pixels in a grid – images and aerial photographs are examples of raster data.

Vector data consists of point, line and area symbols illustrating geographical features in a GIS or a map.

- ✓ Spatial objects are geographical features with location and shape.
 - Points – a geographical feature that is stored as one set of coordinates in a GIS
 - Nodes – points that form the basis of a line or polygon. Nodes are connected by arcs to form lines and polygons.
 - Lines – a range of connected x,y coordinates representing a linear geographic feature like roads, railways and rivers.

- Area/polygons: a range of connected x,y coordinates in a GIS where the first and last nodes are connected to encircle an area. This resemble features that take up areas e.g. dams, cultivated land etc.
-
- 2.1. **Concept of layering of information** – this is when the different geographical features are place over each other to organise them in the GIS. Layering shows the relationship between different geographical features
- 2.6. **Components of GIS:** hardware, software, data, people and processes
Functional elements: capture, store, update, manipulate and analyse spatially referenced data
- 2.7. **Sources of information for GIS:**
Remote sensing – aerial photos and satellite images
Survey data – roads, railways, altitude
Census data
Measure data e.g. rainfall, temperature, air pressure ect.
Other maps
- 2.8. **Data manipulation and analysis**
 - ✓ Concept of data manipulation – to change the data to make it more useful
 - ✓ Data integration – to put a range of features or data set together in one GIS.
 - ✓ Buffering; to draw an area around a geographic feature to show a zone of influence or exclusion.
 - ✓ Querying: to investigate the data and find answers about specific parts of the dataset.
 - ✓ Statistical analysis: this is when statistical data like population data is sorted and categorised to display spatial patterns which is not clear in the table or captured attributes. Statistical analysis is used to make patterns in number data visible on a map e.g. average rainfall maps are based on statistical analysis.
- 2.9. **Data standardisation** means to make the data similar to other data set so allow data sharing.
- 2.10. **Data sharing:** to make data available for other users to access. Data collection is a laborious and expensive task. Companies rather use data which was already captured by experts like land surveyors.
- 2.11. **Data security:** to ensure that data is safe from tampering and anybody do not have access to sensitive data or data that can be manipulated to obtain a different outcome to the GIS analysis. Backing up data for disaster recovery is also an important part of data security.
- 2.12 **Application of GIS by the**
 - ✓ Government: census, elections, planning, budgeting, research, problem solving.
 - ✓ Private sector: used to improve productivity and solve any geographical query.

PLEASE NOTE:

You are also expected to be able to do the following, but not in the exam.

- Developing a 'paper GIS' from existing maps, photographs and other sources of information on layers of tracing paper

You need to be able to apply the concepts to new situations:

- Identify and interpret concepts by using given data such as satellite images, topographic maps, orthophoto maps, aerial photographs, pictures and statistics indicated on graphs and tables

SECTION B: TYPICAL EXAM QUESTIONS – MAP INTERPRETATION AND GIS

QUESTION 1: Map interpretation: 40 minutes [50] (From SBA TASKS 2013)

1. Climate / Geomorphology interpretation (Rustenburg West map)

1.1. Identify the slope between K and L on the topographic map – refer to the gradient. _____ (1 x 2 = 2)

1.2. Identify the winds that will blow from K to L (block I5) during the night. _____ (1 x 2 = 2)

1.3. Explain how these winds develop during the night . _____ (2 x 2 = 4)

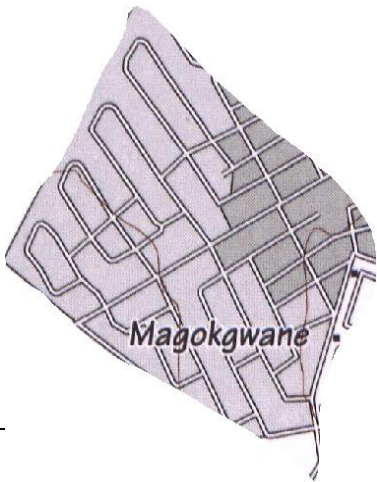
1.4. Determine the direction of flow of the Legadigadi River in block E4 and D4 and 5. _____ (1 x 2 = 2)

1.5. Motivate your answer in 3.1.4 with TWO pieces of map evidence. (2 x 2 = 4)

1.6. This area is not a high rainfall area. Substantiate / prove this statement with evidence from the topographic map. (2 x 2 = 4)

2. Settlement interpretation

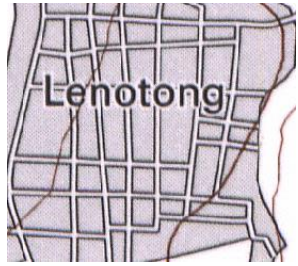
2.1. Compare the street patterns in the following suburbs of Rustenburg by completing the table below. (1 x 9 = 9)

Dithabeng Block C5	Rustenburg North Block H9,10 & G9, 10	Magokwane Block C4
		

	Dithabeng Block C5	Rustenburg North Block H9,10 & G9, 10	Magokwane Block C4
Identify the street pattern			
Give one advantage of this street pattern			
Give one disadvantage of this street pattern			

2.2. Compare the settlements in the following locations according to the factors in the table low. (15 x 1 = 15)

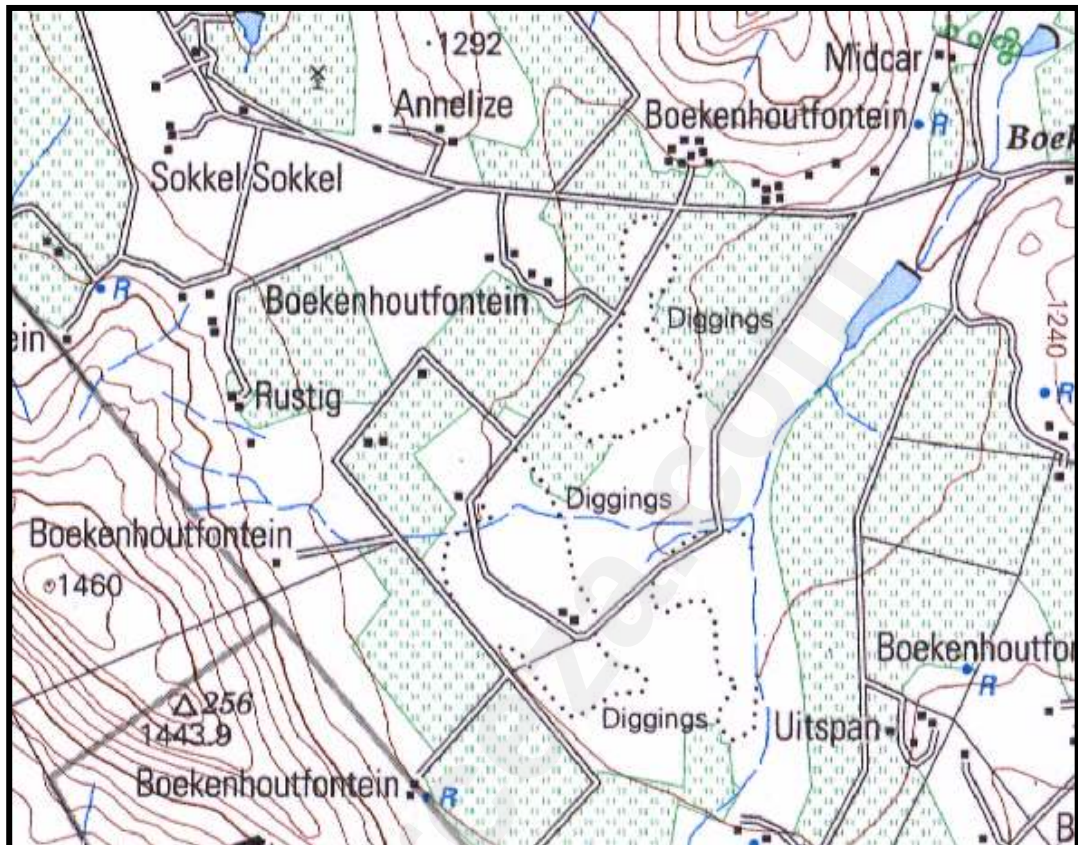
	Kutlwanong Block B8	Rustig Block A1	Lenotong Block C6
--	------------------------	--------------------	----------------------

			
Settlement type			
Settlement pattern			
Functions			
Advantage of living in this type of settlement			
Disadvantage of living in this settlement			

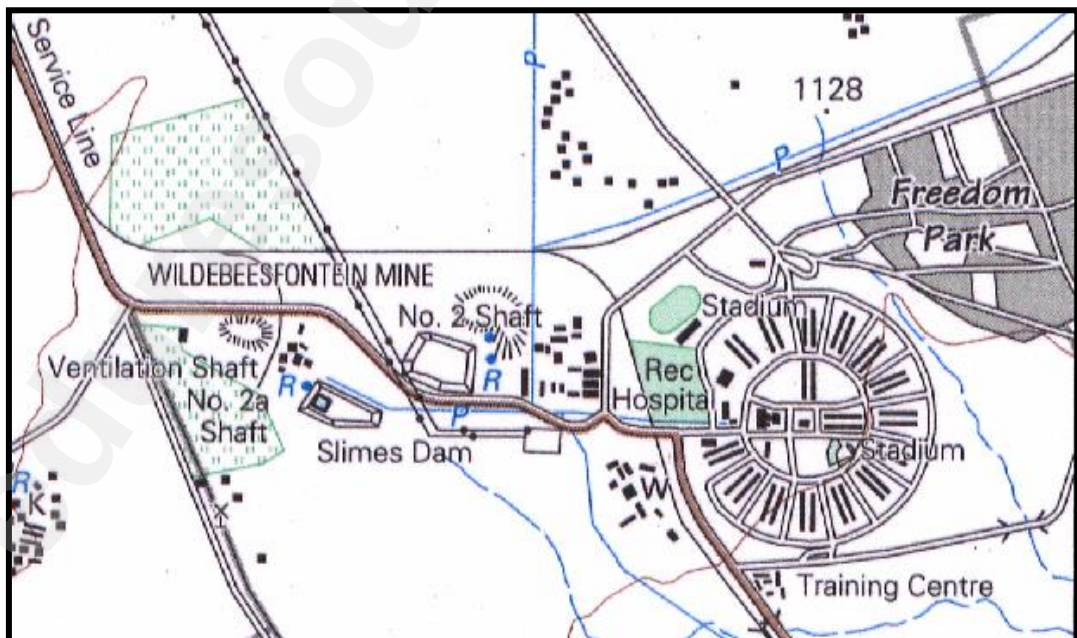
3. Economic interpretation

- 3.1. Compare the economic activities on the map at the following locations by completing the table below. (8 x 1 = 8)

Blocks A2,3,4



Blocks B9,10



3.1.	Block A2, A3, A4 Block B2, B3	Block B9, B10 Block E10
Economic Activity Category		

Economic activity example		
Motivate previous answer		
Reason for location		

Question 2: GIS (12 Minutes) [20] (From SBA task of 2013)

2.1 Give a Definition of GIS. (2 x 2 = 4)

2.2. State whether the following statements are true or false: (6 x 1 = 6)

2.2.1. Spatial data describes the shape and location of geographical features.

2.2.2. Vector and Raster data are examples of spatial data.

2.2.3. Attribute data is stored in related tables in a database and can be displayed as labels, intervals or classification symbols on a map.

2.2.4. Hardware is the programs you need for a GIS analysis

2.2.5. Raster data consist of pixels in a grid and each pixel has a unique value.

2.2.6. Satellite images and aerial photographs are examples of remote sensing.

2.3. Which one of the topographical map and orthophoto consist mostly of raster or mostly of vector data respectively? Motivate you answer.

Map: _____
_____(2)

Orthophoto: _____
_____(2)

2.4. Use block K1 on the map and give TWO examples each of features listed below.

Points: _____
_____(2)

Lines: _____
_____(2)

Polygons: _____
_____(2)

SECTION C: HOMEWORK QUESTIONS

QUESTION 1: General map and photo interpretation (40 minutes) [50]
(Taken from NSC Nov 2013 Paper 1) (Margate MAP)

1.1. Climate interpretation

1.1.1. Complete the following table comparing the day and night winds that could occur between Margate Beach (block E8) and the suburb Faerie Glen (block E7) (6 x 1 = 6)

	Day	Night
Name the wind		
How does the wind influence the coastal temperatures?		
Sketch in the direction of the wind by means of arrows.		
	Land Sea	Land Sea

1.1.2. Draw a simple freehand cross section from R to S. (3 x 1 = 3)

1.1.3. Identify the landform you have drawn in the cross section in 3.1.2. (1 x 2 = 2)

1.1.4. Name the wind that develops during the night in this landform. (1 x 2 = 2)

1.2. Geomorphology interpretation

1.2.1. Study the orthophoto map along with the topographic map to answer the following question.

Match the number from the orthophoto map in Column A to the correct feature in Column B. (8 x 1 = 1)

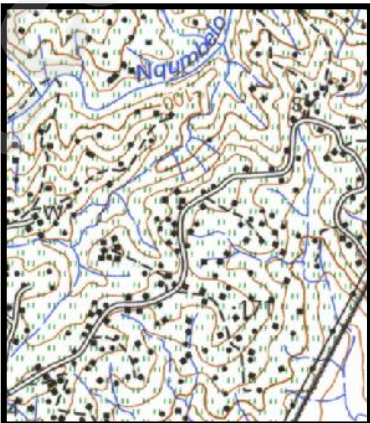
Column A	Column B
3	Sandy beach
4	Rocky coastline
7	Recreational facility / Park
8	Excavation
9	Slip-off slope/bank
10	Cut bank
11	Golf course
13	Farmstead
15	Caravan Park

1.2.2. Identify the stage of the river between D (block H4) and F (block H5) on the topographic map. (1 x 2 = 2)

1.2.3. Give evidence from the map to substantiate your answer in 1.2.2. (2 x 2 = 4)

1.3. Settlement interpretation

1.3.1. Compare the rural settlements at Haxlon (block G4) and at Nkampini (block H2) by completing the following table. (10 x 1 =10)

	Haxlon (block G4)	Nkampini (block H2)
		
Type of settlement		
Settlement pattern		
Advantages this type of settlement pattern		
Disadvantage of this type of settlement pattern		
Large scale / small scale farming		

1.3.2. Identify the street pattern in KwaGamalakhe in blocks B5 and B6 on the topographic map. (1 x 1 = 1)

1.3.3. Give one advantage and one disadvantage of this type of street pattern.

(2 x 1 = 2)

1.4. Economic interpretation

1.4.1. Identify the main economic activity in block I3.

(1 x 2 = 2)

1.4.2. What evidence is there on the map to support your answer in 1.4.1?

(2 x 2 = 4)

1.4.3. Explain why the area in block E6 was suitable for a landing strip to be built there.

(2 x 2 = 4)

Question 2: GIS (12 minutes) [20]

(From SBA task 2013)

2.1 Identify 2 components and 2 functional elements of GIS.

(4 x 1 = 4)



Components: _____

Functional Elements:

2.2. Classify the following pieces of information as mostly spatial or mostly attribute data. (2 x 2 = 4)

2.2.1 The classification of different types of roads on the topographic map.

2.2.2. The bridges over the Mbizane River

2.3. Refer to the map clip of the Mbizane River to answer the following question.

2.3.1. Should the Mbizane River flood, how could GIS be used to avoid harm to the people living in the area as well as reduce the impact of the flood on the traffic in the area? (2 x 2 = 4)

2.3.2. Which 2 GIS layers will be essential for the analysis mentioned in 2.3.1?

_____ (2 x 2 = 4)

2.4. Which of the following 2 diagrams displays raster and vector data

respectively? Motivate your answer.

(4 x 1 = 4)

		
Raster / Vector		
Motivation		

SESSION NO 16: MAP WORK
TOPIC 16: CONSOLIDATION

SECTION A: NOTES ON CONTENT –MAPWORK CONSOLIDATION

TERMINOLOGY / DEFINITIONS: The terminology for the map work can be found in sessions 10 and 15.

IMPORTANT CONCEPTS AND EXPLANATIONS: Refer back to Sessions 10 and 15 to remind yourself about the content.

STUDY TIPS:

You need equipment to do map work: (You need to be able to use it as well)

30 cm well-marked ruler in mm
String

Protractor

Sharpened pencil
Calculator

Triangle

Mapwork is a practical skill (like riding a bicycle) - the more you do it the better you get at it. PRACTICE, PRACTICE, PRACTICE – GET a FRIEND to help you if you battle. Do not rush through the paper.

YOUR MOST IMPORTANT SKILL TO DO MAPWORK IS COMMON SENSE AND LOGIC (Bring it along - 😊)

SECTION B: TYPICAL EXAM QUESTIONS – MAPWORK CONSOLIDATION

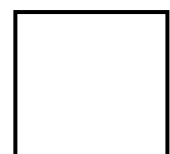
Use the 3030CD Margate Topographic map and the 3030 CD 8 Uvongo Orthophoto map to answer the questions 1 and 2

Question 1: Multiple choice (10 minutes) [10] (SBA 2013)

Choose the correct answer and write the correct letter in the provided space. Select the correct answer from the list and write the corresponding letter in the block/space provided.

1.1. The map code of the orthophoto map North of the Uvongo orthophoto map is

- A. 3030 CD 2
- B. 3030 CD 5
- C. 3030 CD 12
- D. 3030 CD 3



1.2. The province South of the Margate area is ...

- A. Kwa Zulu Natal
- B. Western Cape
- C. Eastern Cape
- D. Freestate

☐

1.3. Margate is a _____ type of town.

- A. Resort
- B. Gap
- C. Junction
- D. Break of bulk

☐

1.4. The contour interval on the topographic map is

- A. 20m
- B. 10m
- C. 5m
- D. 4m

☐

1.5. The grid reference of ▲226 (block J1) is ...

- A. 30°15'54"E; 30°56'20"S / 30°15,9'E; 30°56,3'S
- B. 30°55'20"S; 30°16'54"E / 30°55,3'S; 30°16,9'E
- C. 30°47'20"S; 30°25'54"E / 30°47,3'S; 30°25,9'E
- D. 30°56'20"S; 30°15'54"E / 30°56,3'S; 30°15,9'E

☐

1.6. The pattern and type of settlement is block H2 is ...

- A. Urban nucleated - town
- B. Rural dispersed - farmstead
- C. Rural dispersed - hamlet
- D. Rural nucleated – village

☐

1.7. Ramsgate has a _____ shape

- A. Linear
- B. Circular
- C. Semi-circular
- D. Star

☐

1.8. The true bearing from ▲218 (block C4) to ▲235 (block D3) is...

- A. 49°
- B. 139°
- C. 228°
- D. 319°

1.9. The present magnetic declination will be ...

- A. East of the magnetic declination in 2010
- B. 25°44'W
- C. 25°32'W
- D. 6'W of the declination in 2010

1.10. What type of road is the fastest route between Margate and Durban ?

- A. Main road
- B. National Freeway
- C. National route
- D. Arterial route

(10 x 1 = 10)

Question 2: Map Calculations (20 minutes) [20] (SBA 2013)

2.1.1. Calculate the area in m² which is covered by the orthophoto on the map.

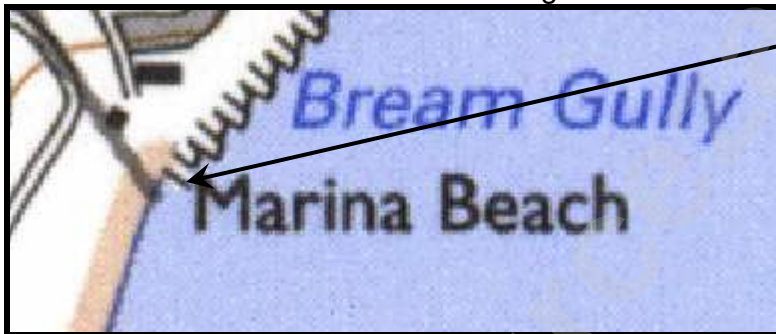
The bold block on the topographic map indicates the location of the orthophoto. Using this bold block, calculate the area covered by the orthophoto on the topographic map.

N.B. Use the topographic map's scale for your calculation (4)

2.1.2. Explain why the area covered by the orthophoto on the topographic map looks smaller than the orthophoto itself. (2 x 1 = 2)

2.2.1. Calculate the gradient from the southern tip of the coastal rocks at Marina Beach (block J4) to $\blacktriangle 390$ (block J3) on the topographic map. (5)

The map clip below indicates, by means of an arrow, the exact point you must use to calculate the gradient.



Do not use this to measure the distance – the map clip is only intended to show which point you must use for the measurement to the coastal rocks

2.2.2. Explain what your answer to 2.2.1 implies / means for a hiker walking from the coastal rocks to the trig station. (2 x 1 = 2)

2.4.1. Calculate the magnetic bearing from ▲218 (block C4) to ▲235 (block D3).

Use your answers in 1.8 and 1.9 to assist you with this calculation.

(4)

2.4.2. Explain how a hiker would make use of the present magnetic bearing to walk from ▲218 (block C4) to ▲235 (block D3). What instrument would he/she use on the hike? (3)

Use the 2527CA Rustenburg map and the 2527 CA 20 Rustenburg Orthophoto map to answer the questions 3 and 4.

QUESTION 3: Multiple choice (10) (15 minutes) SBA 2013 [10]

Choose the correct answer and write the correct letter in the provided space. Use both the topographical map and orthophoto to find the answers.

3.1. The map code of the map Southwest of the 2527CA Rustenburg topographical map is ...

- A. 2527CD
- B. 2527AD
- C. 2526BD
- D. 2526dd

3.2. The nearest neighbouring town to the east of Rustenburg is

- A. Ventersdorp
- B. Brits
- C. Rustenburg
- D. Thabazimbi
- E.

☐

3.3. The orthophoto cover a smaller area but display more detail because it has

- A. the same scale as the map
- B. a larger scale than the map
- C. a smaller scale than the map
- D. a ratio scale

☐

3.4. The orthophoto map covers mostly _____

- A. rural areas
- B. industrial areas
- C. urban areas
- D. mining areas

☐

3.5. The contour interval on the orthophoto map is _____.

- A. 4 m
- B. 5 m
- C. 10 m
- D. 20 m

☐

3.6. The grid reference of ▲260 (block J2) on the topographic is ____.

- A. 27°06'26"S; 25°42'39"E / 27°06,4"S; 25°42,6'E
- B. 25°44'45"E; 27°05'05"S / 25°44,7'E; 27°05,1'S
- C. 27°05'50"E; 25°43'52"S / 27°05,8'E; 25°43,9'S
- D. 25°42'39"S; 27°06'26"E / 25°42,6'S; 27°06,4'E

☐

3.7. Rustenburg is in _____ province

- A. Limpopo
- B. Mpumalanga
- C. Gauteng
- D. North West

☐


3.8. The _____ projection was used to draw the map and orthophoto map.

- A. Mercator
- B. Molweide
- C. Albers
- D. Gauss Conform



3.9. The feature labelled 12 on the orthophoto map is a _____.

- A. golf course
- B. conservation area
- C. sport park
- D. camp sites



3.10. The service in block A7 on the topographic map is a/an _____.

- A. industry
- B. water plant
- C. railway shunting yard
- D. power transmission station



[10 x 1 = 10]

Question 4: Map and orthophoto calculations

[20]

4.1.1. Calculate the road distance from G (block F2) to H (block E4) on the topographic map. (3)

- 4.1.2. Calculate the time it would take to walk the distance you have calculated in (2.1.1) if you are walking at 5km/h. (3)

- 4.1.3. Calculate the gradient between G and H (2.1.1) along the N4 highway on the topographic map. (3)

- 4.1.4. Explain what the gradient answer in (2.1.3) means. (2)

- 4..2. Calculate the area covered by the orthophoto map as a whole in km². Use the orthophoto scale for the calculation. (4)

4.3.1. Measure the true bearing from ▲206(block G7) to ▲257 (block H5) on the topographical map.

_____ (1)

4.3.2. Calculate the present magnetic declination for the map. (2)

4.3.3. Calculate the magnetic bearing for the points mentioned in (2.3.1.) (2)

SECTION C: HOMEWORK QUESTIONS

QUESTION 1 - 4: 90 minutes [80] (Taken from NSC FEB/MARCH 2013 Paper 1)

RESOURCE MATERIAL

1. An extract from topographical map 2829AC HARRISMITH.
2. Orthophoto map 2829AC 3 HARRISMITH.

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

The questions below are based on the 1 : 50 000 topographical map 2829AC HARRISMITH, 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 The map projection used on the Harrismith map is the ... projection.
- A Lambert
 - B Mercator
 - C universal transverse
 - D Gauss conformal

- 1.2 The recreational feature marked B on the topographical map is a ...
A sports field.
B swimming pool.
C golf course.
D plantation.
- 1.3 On the orthophoto map the area labelled 7 is an example of a/an ... residential area.
A high-income
B low-income
C middle-income
D informal
- 1.4 The index of the topographical map sheet to the southeast of 2829AC Harrismith is ...
A 2829CB.
B 2828DB.
C 2829AB.
D 2828BB.
- 1.5 The type of slope labelled 3–4 on the orthophoto map is ...
A concave.
B convex.
C terraced.
D uniform steep.
- 1.6 The drainage pattern in block A13/14 on the topographical map is ...
A trellis
B rectangular.
C dendritic.
D radial.
- 1.7 The N3 is a/an ...
A main road.
B arterial route.
C secondary road.
D national route.
- 1.8 The height of the land at the trigonometrical station number 299 in block C9 on the topographical map is ...
A 299 m.
B 1 757,2 m.
C 299 km.
D 1 751,2 km.
- 1.9 The river in block F13/14 on the topographical map is in the ... course.
A upper
B middle
C lower
D upper and middle

- 1.10 The land-use zone numbered 11 on the orthophoto map is the ... zone.
- A industrial
 - B transition
 - C residential
 - D built up area
- (10 x 1 = 10)

QUESTION 2: CALCULATIONS AND APPLICATION

- 2.1 Calculate the gradient of the slope between spot height 1729 (8) and spot height 1794 (9) on the orthophoto map. (5 x 1 = 5)

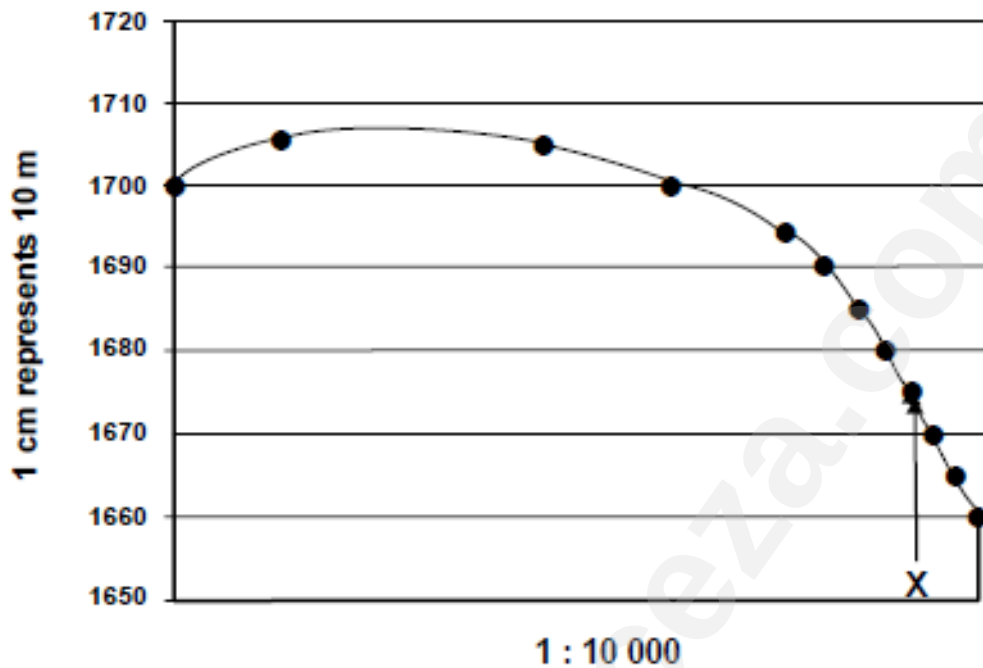
- 2.2 Refer to the cross section below of the feature labelled Blokhuis (4) on the orthophoto map and answer the questions that follow.

- 2.2.1 Calculate the vertical exaggeration of the cross section marked 2–3 on the orthophoto map. (5 x 1) (5)

- 2.2.2 Why is it necessary to exaggerate a cross section vertically? (1 x 1) (1)

2.2.3 Identify the feature labelled X on the cross section.

(1 x 1) (1)



2.3 What is the true bearing of trigonometrical station 299 from spot height 1731 in block C9 on the topographical map?

(1 x 1) (1)

2.4 Calculate the area, in square kilometres, of the urban area demarcated by a dark line on the topographical map (blocks A, B, C/7, 8, 9).

(4 x 1) (4)

2.5 Refer to the orthophoto map.

2.5.1 Was this photograph taken before or after midday (12:00)?

(1 x 1) (1)

2.5.2 Give ONE reason for your answer to QUESTION 2.5.1. (1 x 1) (1)

2.5.3 The photograph was most likely taken during a very dry period of the year.
Explain this statement with reference to block B7 on the topographical map
and the corresponding area on the photograph. (1 x 1) (1)

[20]

QUESTION 3: APPLICATION AND INTERPRETATION [30]

3.1 Refer to the industrial area in block B/C2.

3.1.1 Is this likely to be a heavy or a light industrial area? Give a reason for your
answer. (2 + 2)(4)

3.1.2 Give TWO factors that would have favoured its location in this area. (2 x1) (2)

3.2 The sewage works is located in block B6.

3.2.1 Name the land-use zone in which the sewage works is located. (1 x 2) (2)

3.2.2 Comment on the suitability of its location. (1 x 2)(2)

3.3 Refer to the farm named Rockydale in block E10.

3.3.1 Identify the type of commercial farming practised at Rockydale. (1 x 2) (2)

- 3.3.2 Irrigation is important to farming on Rockydale. Name TWO sources of water available to them. (2 x 2) (4)

- 3.3.3 What is the purpose of the row of trees along the edge of the cultivated land? State TWO purposes. (2 x 2)(4)

- 3.4 Refer to street patterns and answer the questions that follow.

- 3.4.1 Identify the street pattern at Wilgepark. (1 x 2) (2)

- 3.4.2 State ONE advantage and ONE disadvantage of the street pattern in Wilgepark. (2 x 2) (4)

- 3.5 Identify the following fluvial features in block D6: (1 x 2) (2)

- 3.5.1 D _____ (1 x 2) (2)

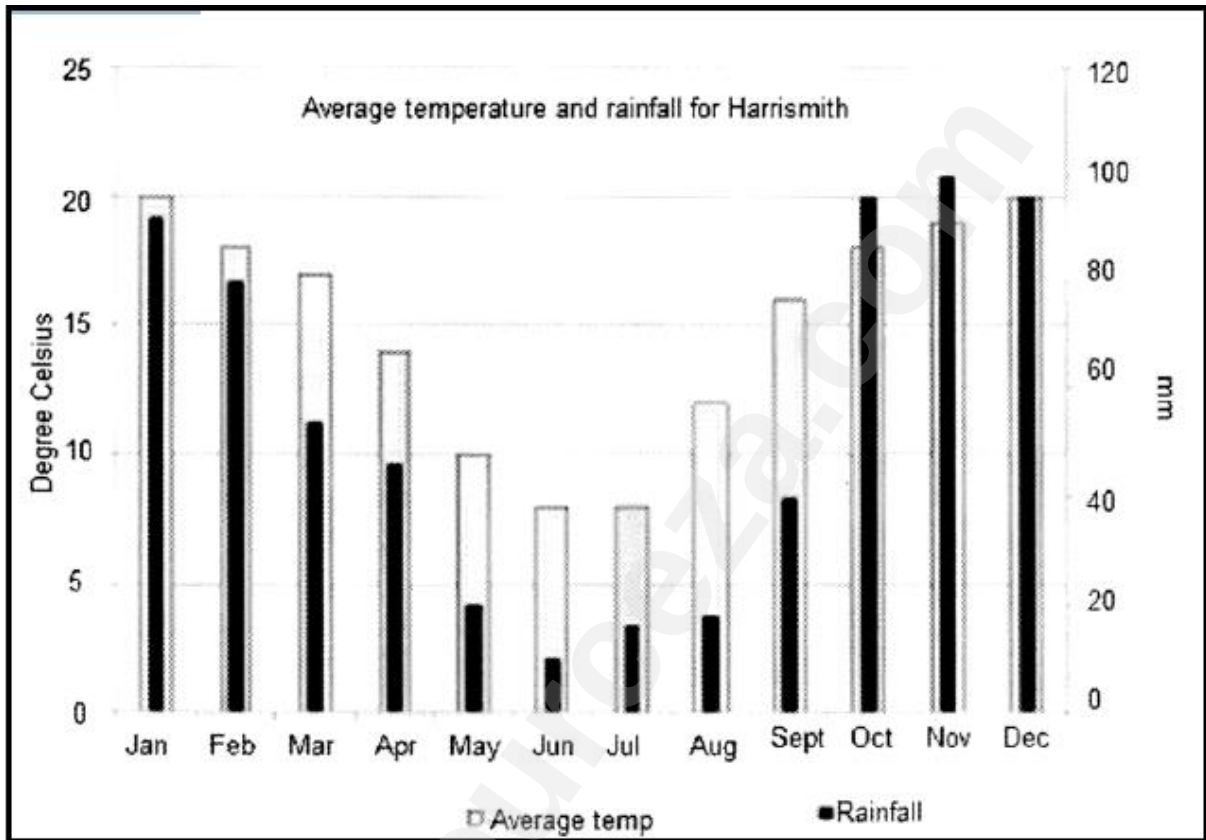
- 3.5.2 E _____

QUESTION 4: GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

- 4.1 Explain the meaning of the term spatial data. (1 x 2)(2)

- 4.2 State the spatial data allocated for Harrismith. (1 x 2)(2)

- 4.3 Study the bar graph (FIGURE 4.3) below, which depicts temperature and rainfall data for Harrismith. A statistical analysis of the data on the graph will be useful for farmers. The bar graph is an example of attribute data.
FIGURE 4.3



- 4.3.1 What is attribute data? (1 x 2)(2)

- 4.3.2 Give ONE attribute provided by the bar graph. (1 x 2)(2)

- 4.3.3 Explain how you can use the attributes provided by the bar graph. (2 x 2)(4)

- 4.4 Refer to the orthophoto map, which shows a high spatial resolution.

- 4.4.1 Explain the term spatial resolution. (1 x 2)(2)

4.4.2 Why can one say that the orthophoto map has a high spatial resolution?

(1 x 2)(2)

4.5 How can GIS assist city planners to determine where a new shopping centre can be built in Harrismith?

(2 x 2) (4)

[20]