GEOGRAPHY

MAP BOOK

GRADE 12

basic education
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

Read to Lead
A Reading Nation is a Leading Nation

2030 NDP

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Foreword

In order to improve learning outcomes the Department of Basic Education conducted research to determine the specific areas that learners struggle with in Grade 12 examinations. The research included a trend analysis by subject experts of learner performance over a period of five years as well as learner examination scripts in order to diagnose deficiencies or misconceptions in particular content areas. In addition, expert teachers were interviewed to determine the best practicesto ensure mastery of thetopic by learners and improve outcomes in terms of quality and quantity.

The results of the research formed the foundation and guiding principles for the development of the booklets. In each identified subject, key content areas were identified for the development of material that will significantly improve learner's conceptual understanding whilst leading to improved performance in the subject.

The booklets are developed as part of a series of booklets, with each bookletfocussing onlyon one specific challenging topic. The selected content is explained in detail and include relevant concepts from Grades 10 - 12 to ensure conceptual understanding.

The main purpose of these booklets is to assist learners to master the content starting from a basic conceptual level of understanding to the more advanced level. The content in each booklets is presented in an easy to understand manner including the use of mind maps, summaries and exercises to support understanding and conceptual progression. These booklets should ideally be used as part of a focussed revision or enrichment program by learners after the topics have been taught in class. The booklets encourage learners to take ownership of their own learning and focus on developing and mastery critical content and skills such as reading and higher order thinking skills.

Teachers are also encouraged to infuse the content into existing lesson preparation to ensure in-depth curriculum coverage of a particular topic. Due to the nature of the booklets covering only one topic, teachers are encouraged to ensure learners access to the booklets in either print or digital form if a particular topic is taught.

2. How to use this Study Guide

- The guide provides basic mapwork skills that cut across Grades 10-12.
- It should be used in conjunction with a relevant textbook and CAPS and exam guidelines specific for a particular grade.
- It explains important terms and key concepts.
- It develops key skills in reading, analysing and interpreting topographical and orthophoto maps.
- Theory and mapwork are integrated.
- Application of GIS concepts.

3. Study and Examination Tips

Some tips to approach the examinations.

3.1 PAPER 2 (MAPWORK)

This is a 1½-hour question paper. It will be written second on the day of the Geography examination.

- The question paper consists of **four questions** that are **compulsory**, as follows:

QUESTION 1: Multiple-choice questions - **15** (single marks) (Cut across the syllabus.)

QUESTION 2: Geographical techniques and calculations (includes cross-sections and application) - **20** (single marks)

QUESTION 3: Application of theory/map and photo interpretation - **25** (Single marks for definitions and identification of features such as landforms, slopes, drainage patterns, settlement patterns, street patterns, etc. Double marks for providing reasons, application, interpretation, analysis and evaluation.)

QUESTION 4: Geographical Information Systems (GIS) - **15** (Single marks for definitions.Double marks for providing reasons, application, analysis and evaluation.)

- The cognitive level rating of both question papers isas follows:

3.2 Topic specific

3.2.1 Topographic maps (1:50 000)

All the geographical skills and knowledge studied in Grades 10 and 11 are relevant to Grade 12.

Mapwork techniques

These concepts should be taught in an integrated fashion.

- Contour lines, contour interval, height and conventional signs.
- Compass direction.
- True/ geographic bearing.
- Magnetic declination and bearing.
- Map scale - types of scales and comparing the scales of topographic maps, orthophoto maps and aerial photographs.
- Calculating straight-line distance in reality.
- Calculating area of regular features.
- Map reference numbers/ map index.
- Alphanumeric reference/ grid reference.
- Map coordinates/ fixing position - stating the coordinates.
- Calculation and interpretation of gradient.
- Cross-sections - drawing cross-sections, indicating the position of features on cross-sections and identifying features represented by cross-sections.
- Intervisibility.
- Calculating vertical exaggeration.

Topographic map application

- 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 the syllabus covered in the theoretical section of Geography.
- Interpreting 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.

3.2.2 Photographs

- Types of photographs.
- Advantages and disadvantages of different types of photographs.
- Orthophoto maps.
- 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.
- Compare orthophoto maps to topographic maps.
- All techniques mentioned under mapwork techniques are applicable to orthophoto maps.

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.

3.2.3 Types of maps

- Reference maps.
- Thematic maps - defining, identifying and interpreting different types of thematic maps with the aid of an atlas.

3.2.4 Geographical Information Systems (GIS)

- Concepts of:
    - GIS
    - Remote sensing
- Resolution
- Pixels
    - Spatial resolution
    - Spatial and attribute data
    - Vector and raster data
    - Spatial objects
- Points/Nodes
- Lines
- Area/Polygons
- Concept of layering information
- Components of GIS
- Sources of information for GIS
- Data manipulation and analysis:
    - Concept of data manipulation
    - Data integration
    - Buffering
    - Querying
    - Statistical analysis
- Data standardisation
- Data sharing
- Data security
- Application of GIS by:
    - Government
    - The private sector
- Developing a 'paper GIS' from existing maps, photographs and other sources of information on layers of tracing paper.
- Identifying and interpreting concepts using given data, such as satellite images, topographic maps, orthophoto maps, aerial photographs, pictures and statistics indicated on graphs and tables.

4.1 Mapwork skills and techniques
Lines of latitude and longitude

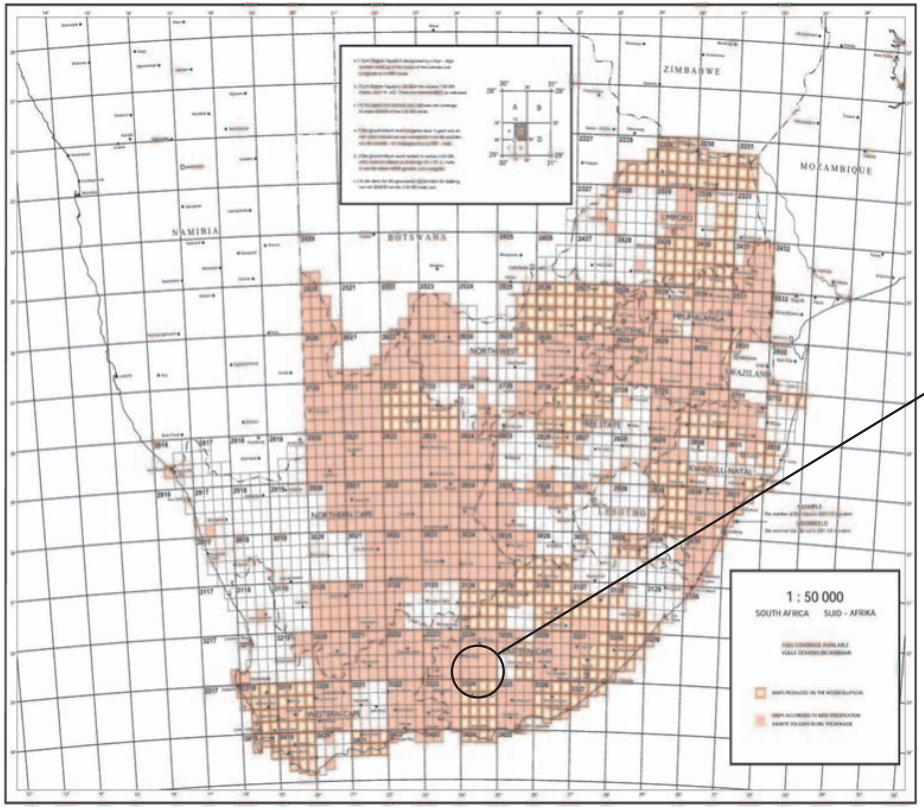
Location

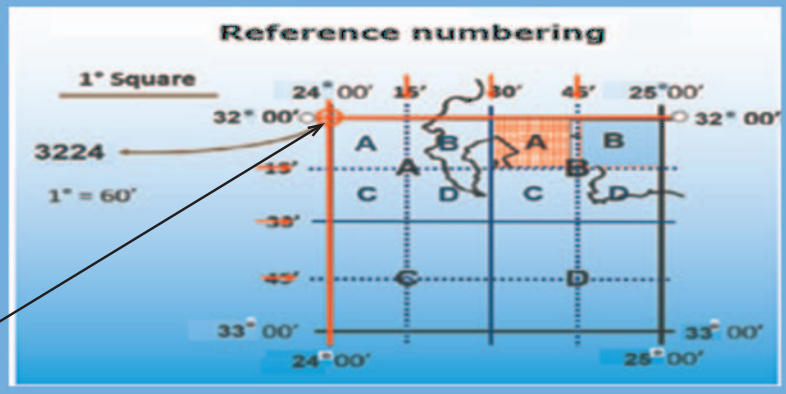
As a geographer, it is important to determine the exact location of phenomena on the earth's surface.
To do this, we make use of what is termed the coordinate system.

Latitude and longitude

- Special imaginary lines are used to describe where places are found in the world.
- These imaginary lines are called lines of latitude and lines of longitude.
- Lines of latitude run parallel with the equator. The 0° line of latitude is the equator. It goes all the way around the globe. It divides the earth into a northern and southern hemisphere.
- The 0° line of longitude runs parallel with the Greenwich meridian . The Greenwich meridian divides Earth into a western and an eastern hemisphere.

Map Reference

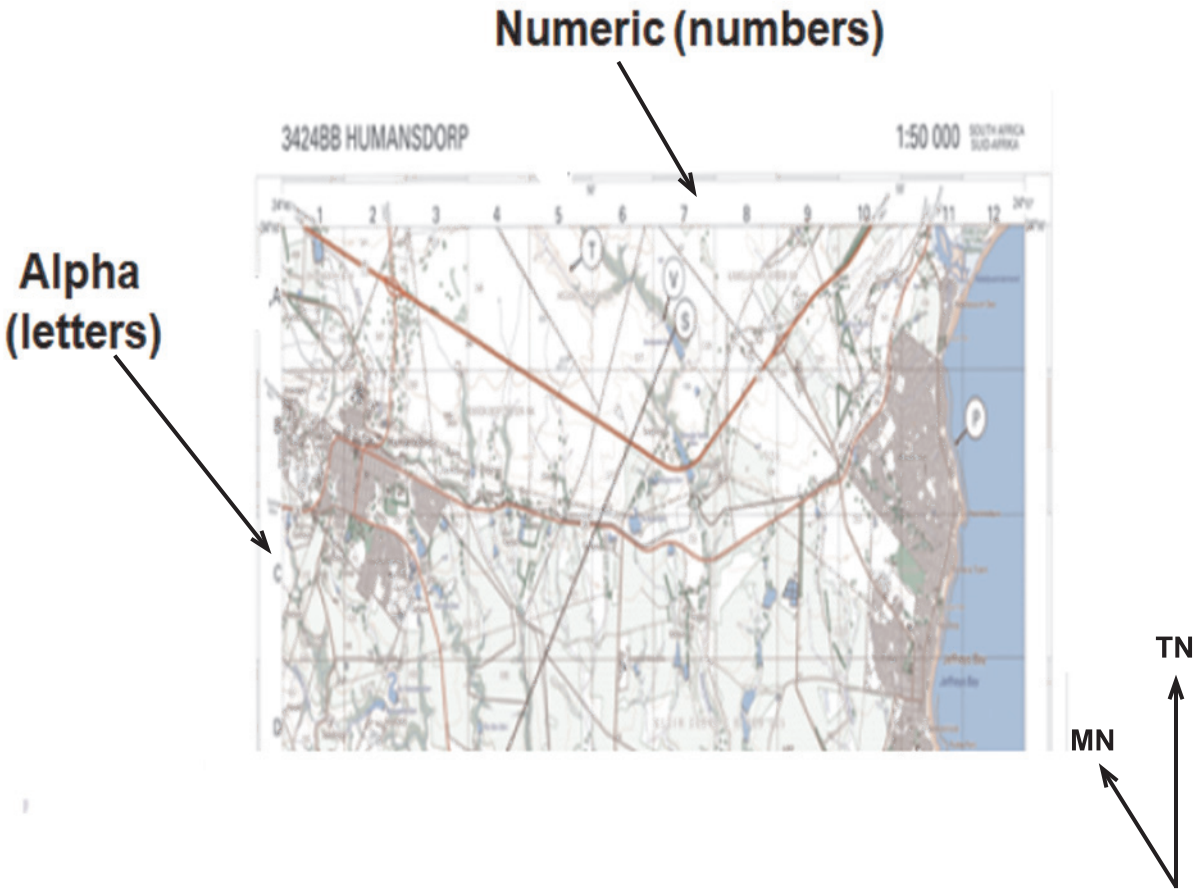




South Africa is located south of the equator and east of the Greenwich meridian.
Latitude is always represented first, using the letter S. It isfollowed by longitude, which is represented with the letter E. The latitudinal values increase southwards and the longitudinal values increase eastwards.

All topographical maps in South Africa are referenced according to their relevant latitudinal and longitudinal position on earth. In the diagrams, the map reference is 3224BA, which stands for 32°S and 24°E.

Maps are divided into 16 sub-areas between two latitude and longitude lines. The area between the latitude and longitude lines is divided into 4 equal blocks: A to D.
The 4 blocks are further sub-divided into smaller blocks, also A to D. Therefore, 3224BA is in the bigger block B and the smaller block A, as indicated in the shaded area in the diagram above.

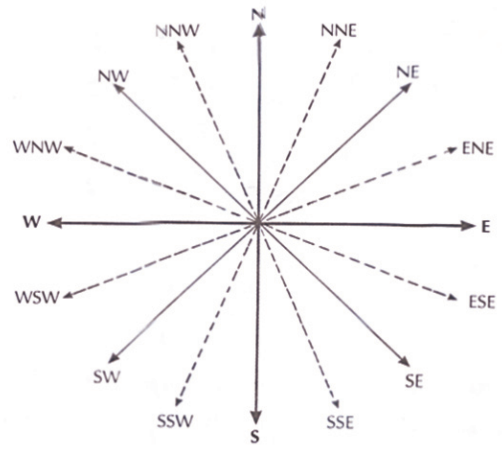


Alpha-numeric grid

The alpha numeric grid serves as the first step in understanding the concept of location.
Refer to the map on this page and:

- locate the **letter** (alpha) along the side of the map indicated by the horizontal row.
- locate the corresponding **number** (numeric) along the top of the map indicated by the vertical row.
- The letters represent latitude.
- The numbers represent longitude.

Compass direction



Direction

This is used to describe the position of one place in relation to another. Direction uses 16 cardinal points, the four main ones being: north, south, east and west.

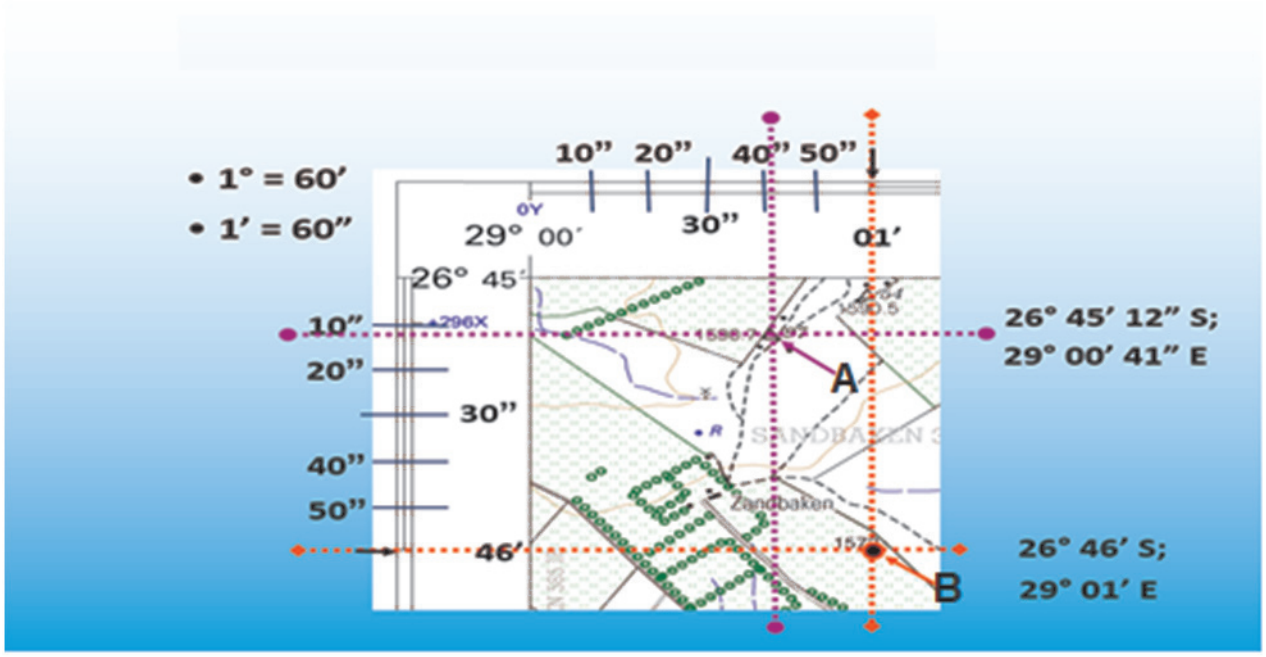
Note: There are always two points involved when giving direction.

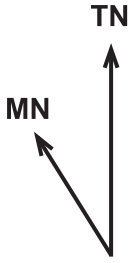
- The place where one is calculating direction from.
- The place that you want the direction of.

Examples:

- The direction from spot height 534 (at A) to spot height 487 (at B) is **North East.**
- The direction from spot height 524 (at C) to the sewage disposal works (at D) is **SouthSouthwest**.

Geographic co-ordinates





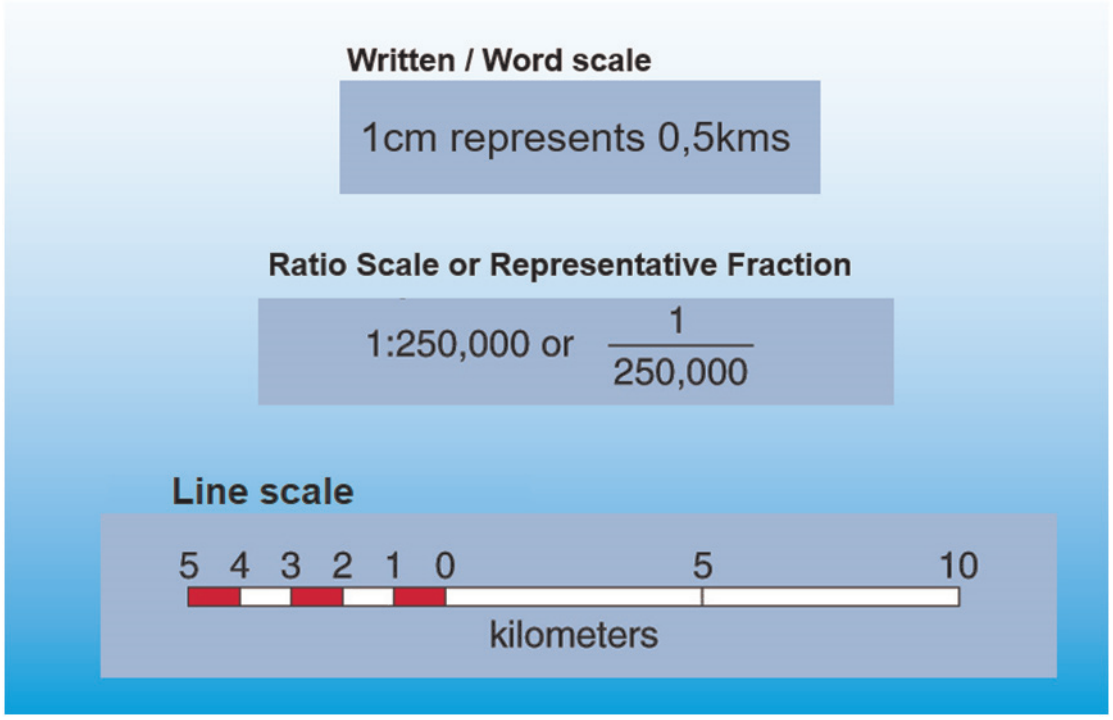
Geographic co-ordinates

- Lines of latitude and longitude are used to locate places on a map.
- The point where a line of latitude crosses a line of longitude is called a coordinate.
- A coordinate is named by: its latitude, which is expressed numerically in degrees (0), minutes (’),seconds (”) S of the equator; and longitude in degrees (0), minutes (’), seconds (”) E of Greenwich meridian. Such a location is also referred to as absolute location.

Examples:

- On the sketch, the co-ordinates of A are 26°45'12"S; 29°00'41"E.
- On the sketch the co-ordinates of B are 26°46'S; 29°01'E.

Types of scales

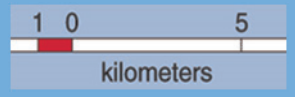


Scale

A scale denotes the relationship between distances on a map and distances in real life. All South African topographic maps have a scale of 1:50 000. This means that 1cm on the map represents 50:000 cm on the ground.

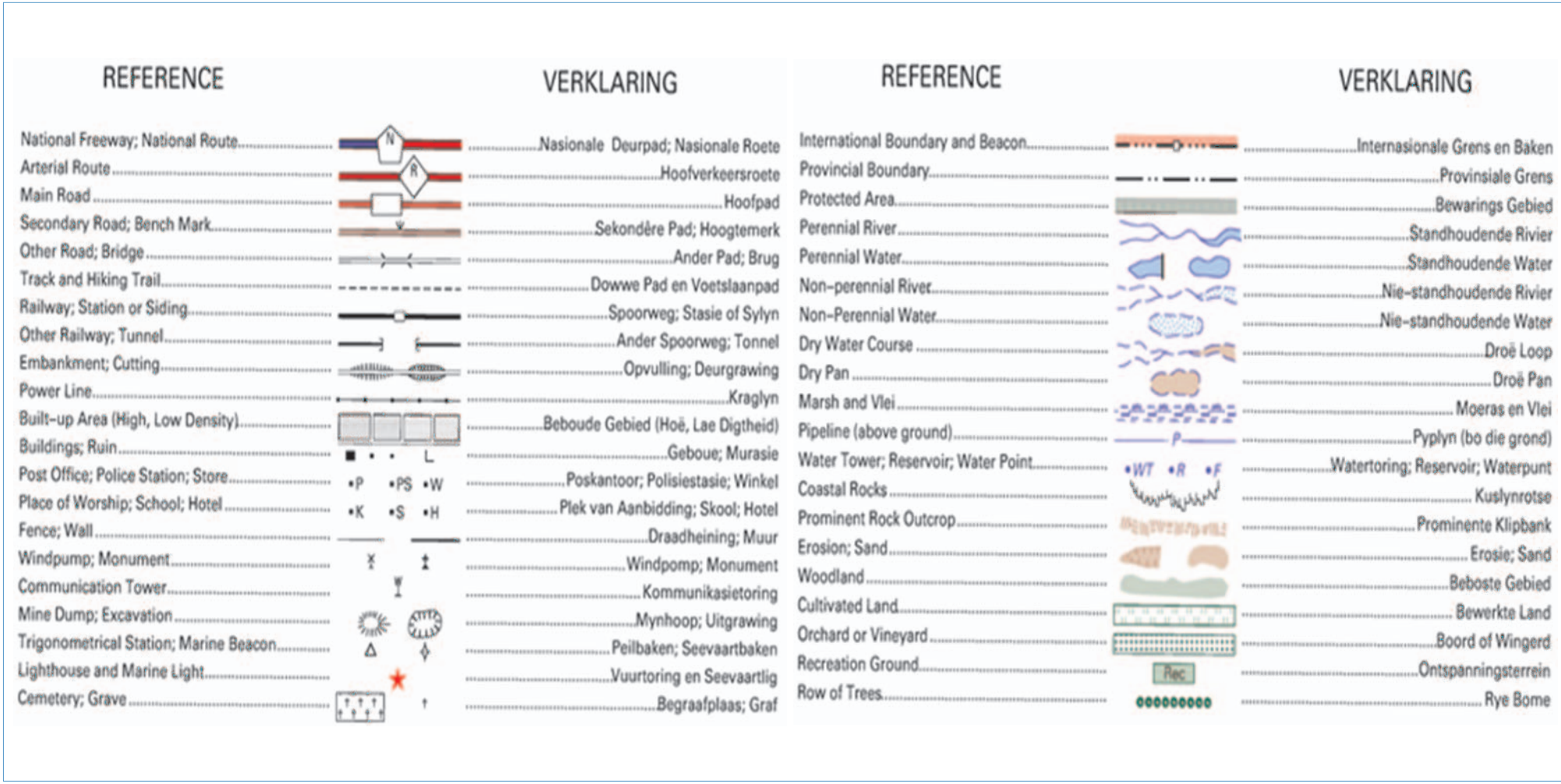
Scale can be represented in three ways:

- Ratio scale (1:50 000) / representative fraction (1/(50 000))
- Word scale expresses the scale in words OR 1cm represents 50:000 cm on the ground.
- Linear scale is a straight line sub-divided to represent ground distances.

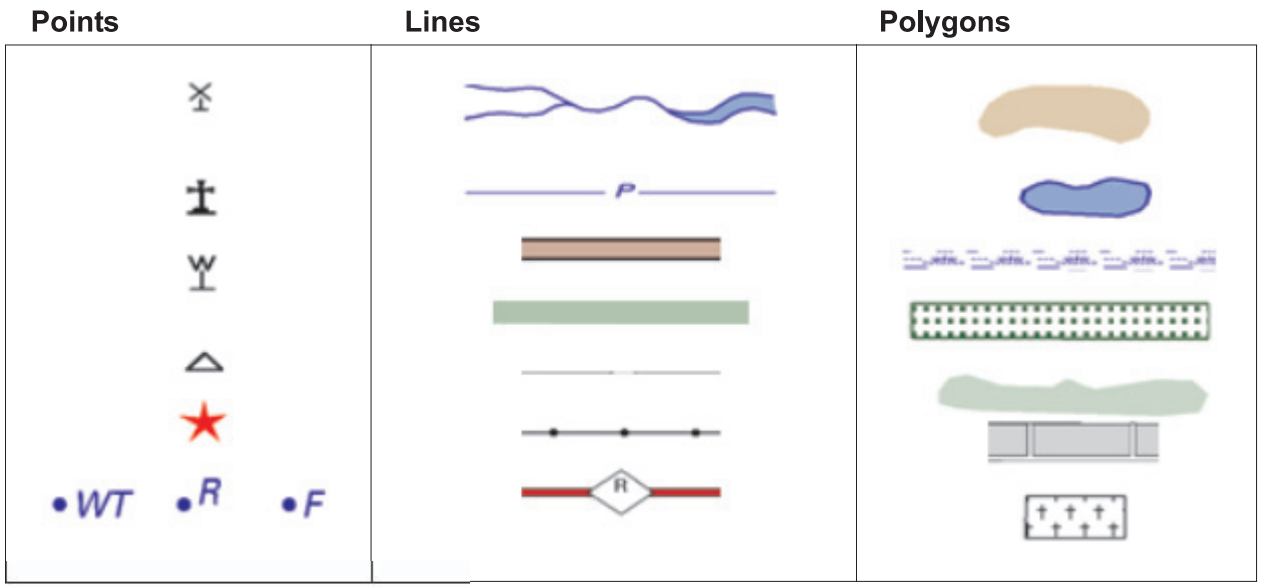


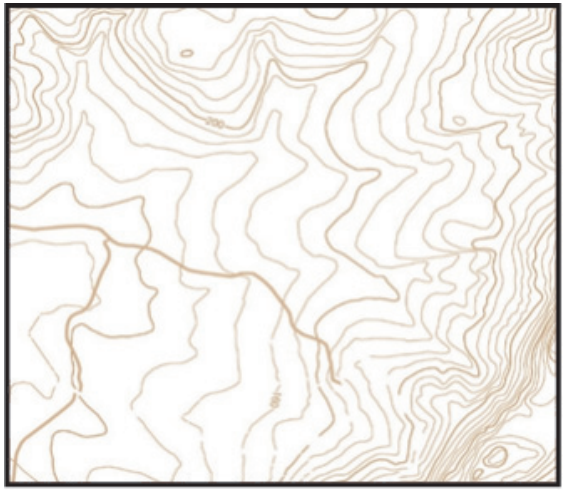
CONVENTIONAL SIGNS

These are internationally-accepted letters or symbols that indicate a real-life feature.
The following are standardized conventional signs on South African topographic maps

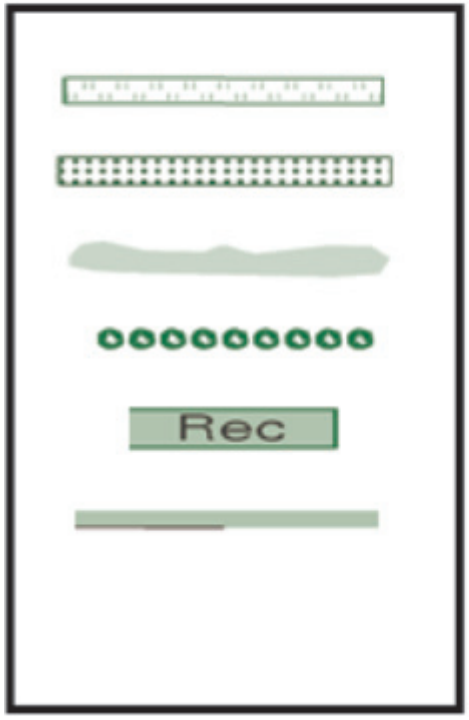


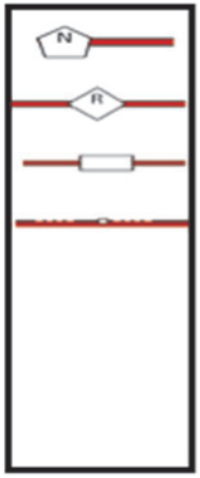
Standardised colours on a topographical map

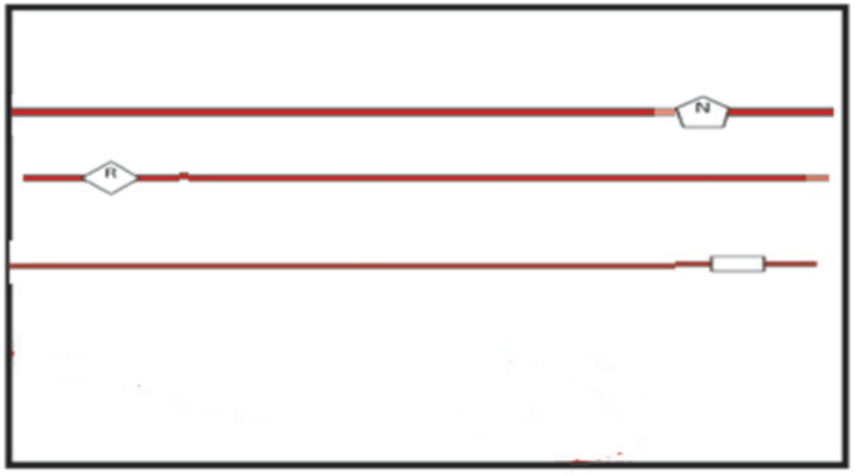




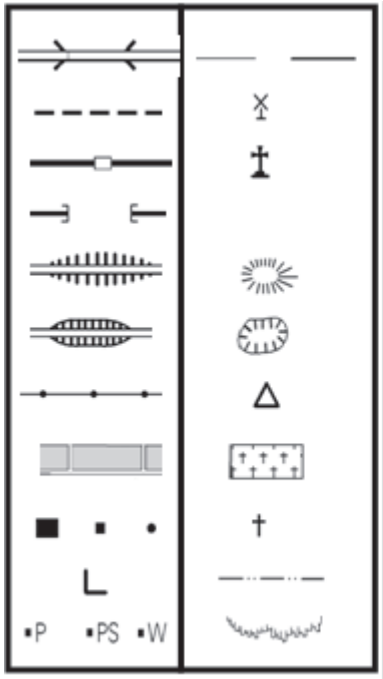
Symbol - Green

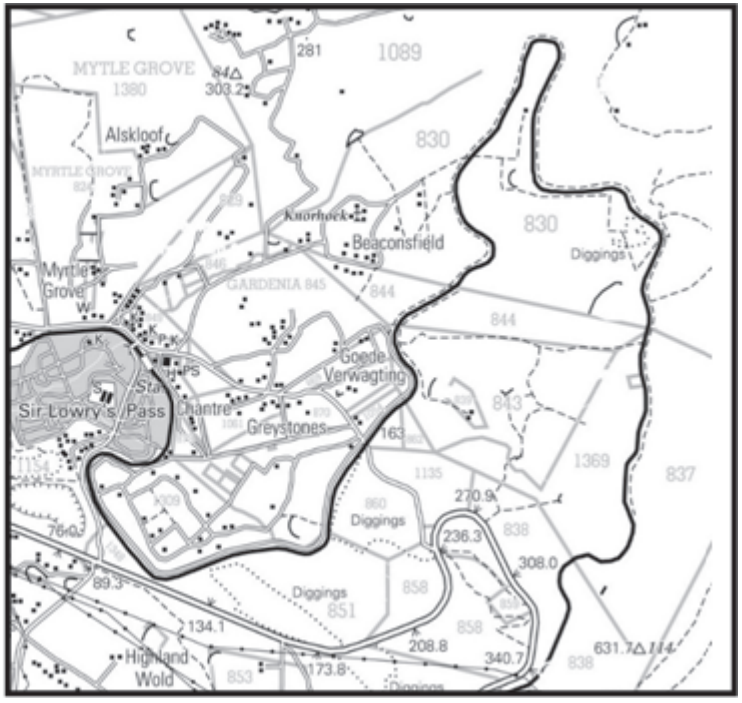






Symbol - Black





Indicators of height on a topographic map

Indicators of height on a topographic map

Height is indicated in the following ways: contour lines, spot heights, trigonometrical beacons and benchmarks.

Contour lines
Contour lines are lines on the map that join places of the same height above sea level.

- A contour line is a brown line on the topographic map.
- The contour interval is the difference in height between two contour lines that are next to one another. Its value does not change.
- The contour interval used on topographic maps is 20 meters.
- They are one way of showing height above sea level.
- Contour lines connect places of equal altitude.
- Contour lines do not cross each other, but can touch.
- Contour lines are continuous.
- Index contour lines are thick brown lines that are in multiples of 100m.
- The arrangement of contour lines depicts various landforms and slopes on a map.

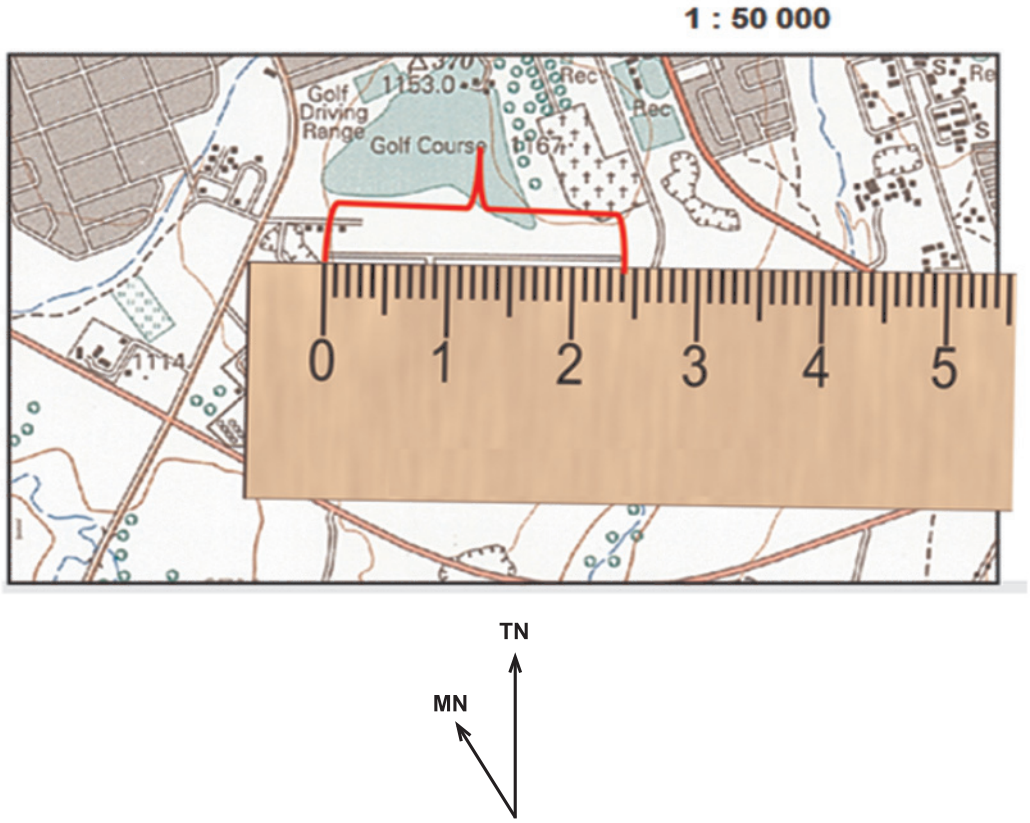
By "reading" the contour lines, we can determine what the terrain in an area looks like.

Spot height
This is shown as a dot with the figure for the height next to it.

Trigonometrical beacon
This is indicated by a triangle, with two values on the map.
The value below the triangle is the height.
The value on the side is the number of the beacon.

Benchmarks
These are usually found along roads and railways.
The height is indicated by a black arrow.

Calculations
Calculation of a straight line distance



Measuring and calculating distance in km

- You can measure the distance between the two points, in centimetres. In this case, the distance is 2.4 cm.
- To get the actual distance in reality:
  - Multiply the map distance by the map scale.

E.g. 2.4cm X 50 000
= 120 000 cm
Convert to km: $\frac{120\ 000}{100\ 000}$
= 1.2 km

Converting cm to km

Km	h	dam	m	dm	cm	mm
1	0	0	0	0	0	

- You can measure the distance between the two points in millimetres. In this case, the distance is 24 mm.
- To get the actual distance in reality:
  - Multiply the map distance by the map scale.

E.g. 24mm X 50 000
= 1 200 000
Convert to km: $\frac{1\ 200\ 000}{1\ 000\ 000}$
= 1.2 km

Converting mm to km

Km	h	dam	m	dm	cm	mm
1	0	0	0	0	0	0

Measuring and calculating distance in km

- You can measure the distance between the two points in centimetres. In this case, the distance is 2.4 cm.
- To get the actual distance in reality:
  - Multiply the map distance by the map scale.

E.g. 2.4cm X 50 000
= 120 000 cm
Convert to km: $\frac{120\ 000}{100}$
= 1 200m

Converting cm to m

Km	h	dam	m	dm	cm	mm
			1	0	0	

- You can measure the distance between the two points in millimetres. In this case, the distance is 24 mm.
- To get the actual distance in reality:
  - Multiply the map distance by the map scale.

E.g. 24mm X 50 000
= 1 200 000
Convert to km: $\frac{1\ 200\ 000}{1\ 000}$
= 1.200 m

Converting mm to m

Km	h	dam	m	dm	cm	mm
			1	0	0	0

Method of calculating area

- Measure the length and multiply this by the scale of the map; then convert to kilometres/metres.
- Measure the breadth and multiply this by the scale of the map; then convert to kilometres.
- Multiply the length and breadth (remember your final answer must be in km²/m²).

Example of the calculation of area A on the topographic map - in km²

Formula: **Area = length (L) × breadth (B)**

Length: 3.7 cm x 50 000

= 185 000cm / 100 000

= 1.85km

Breadth: 3.2 cm x 50 000

= 160 000 cm / 100 000

= 1.6km

Area = 1.85km x 1.6km = 2.96 km²

Example of the calculation of area A on the topographic map - in m²

Formula: **Area = length (L) × breadth (B)**

Length: 37 mm x 50 000

= 1 850 000mm / 1 000

= 1 850m

Breadth: 32 mm x 50 000

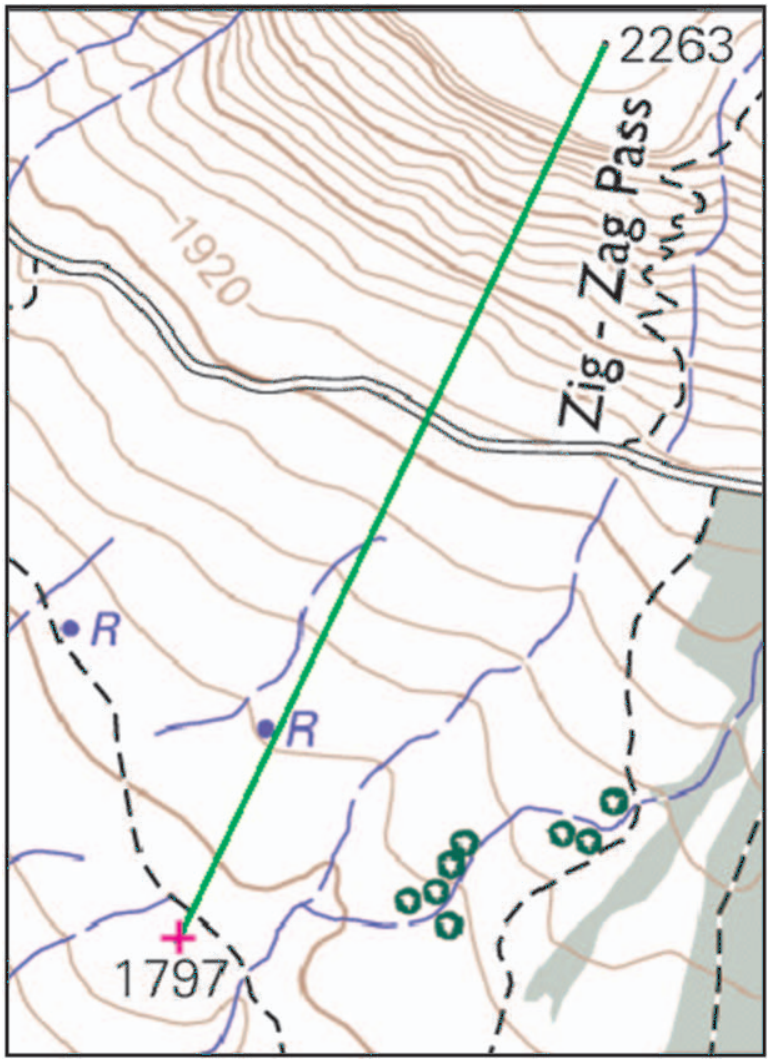
= 1 600 000 cm / 100 000

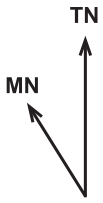
= 1 600m

1850m x 1600m = 2 960 000 m²

Note: **(When calculating the distances of the length and the breadth, refer tothe metric scale for conversions, as illustrated in the examples above.The length value is always more than the breadth value.)**

1 : 50 000





Average Gradient
The formula for gradient is:

Gradient = $\frac{\textbf{Vertical interval}\textit{(VI)}}{\textbf{(Horizontal equivalent}\textit{(HE)}}$

How to calculate average gradient

- **Vertical interval:** Measure the difference in height between the two points (A and B).
- **Horizontal equivalent:** Measure the actual distance between the two points (A and C).

Step 1 - vertical interval

2263m - 1797m = 466m

Step 2 - horizontal equivalent

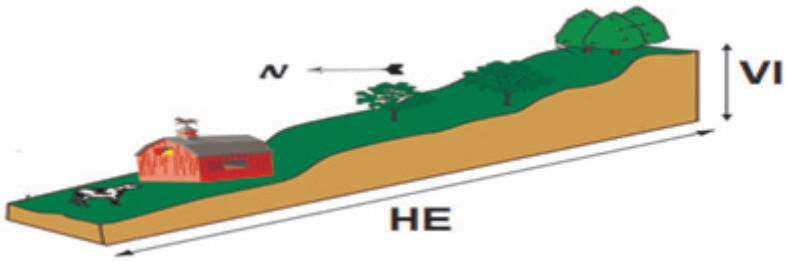
$$\frac{3.8 \text{ cm} \times 50\,000}{100} = 1900 \text{ m}$$

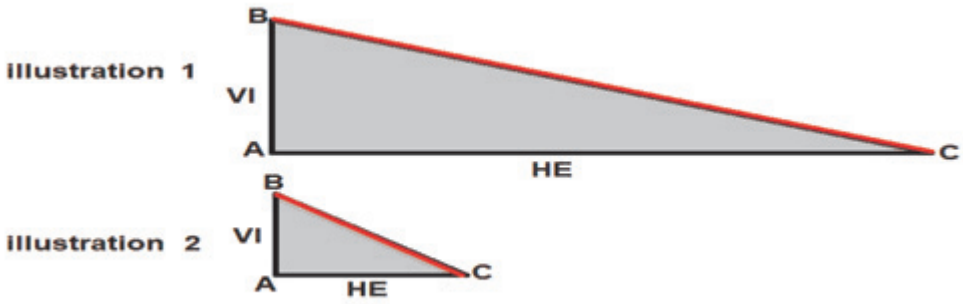
Gradient = $\frac{\text{VI}}{\text{HE}}$

= 466m ÷ 466
1900m÷ 466

= 1: 4.07
(range 3.96 - 4.3)

Diagrams to Illustrate the concept of gradient



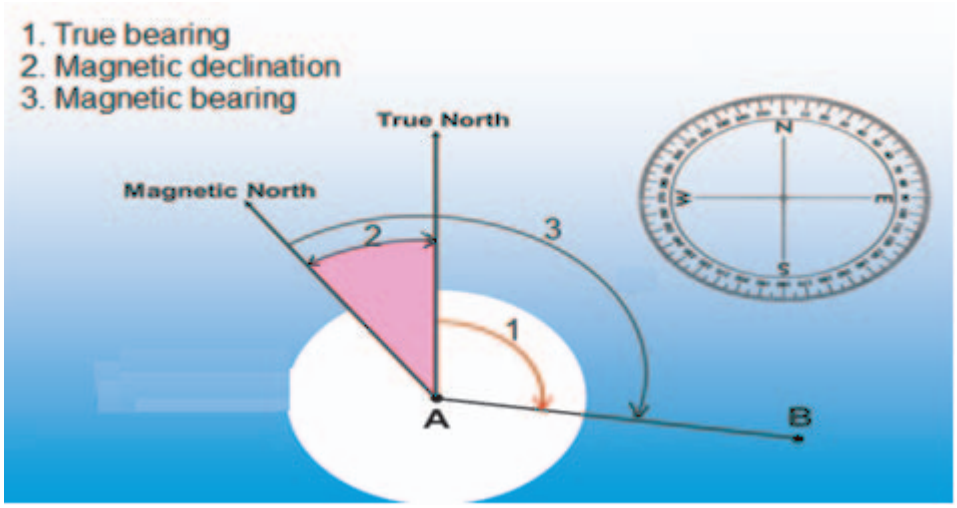


In the example provided:

Illustration 1 - The gradient is 1 : 66
Illustration 2 - The gradient is 1 : 15

The horizontal equivalent of illustration 1 is more than the horizontal equivalent of illustration 2; therefore the gradient of illustration 2 is steeper.

Bearing



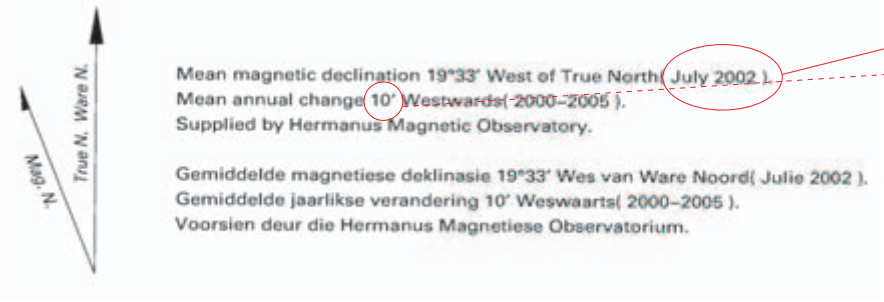
Definition of bearing

1. True bearing is the angle between true north and a given point, measured in a clockwise direction.

2. Magnetic bearing is the angle between magnetic north and a given point, measured in a clockwise direction.

3. Magnetic declination is the angle between magnetic north and true north.

Calculating magnetic declination



How to calculate true bearing

- Draw a north-south line across the place from which the measurement is to be taken.
- Draw a line between the two places (A-B/A-C/A-D) in question.
- Place your protractor along the true-north line with 0° at the north.
- Measure the angle from the true-north line clockwise. (Use the outside numbers on the protractor.)
  - ✓ A-B = 143°
  - ✓ A-C = 217°
  - ✓ A-D = 283°

How to calculate magnetic declination (MD)

- **Calculate difference in years:** Current year **minus** The year the last MD was calculated

2018 - 2002 = 16 years

- **Mean annual change:** Given in minutes - 10' W
- **Total change:** Multiply the difference in years by the mean annual change to find the total annual change in minutes

16 years x 10' = 160' [2°40'W]

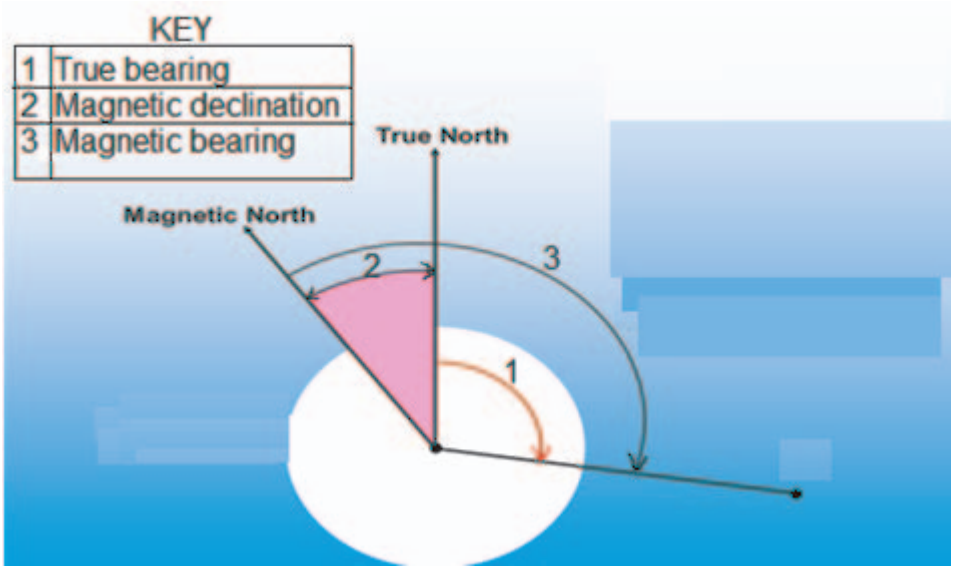
- **Calculate the magnetic declination for the current year:** add the total annual change to the magnetic declination indicated on the map.
  - ✓ Magnetic declination is always west of true north.

- ✓ The Mean annual change can either be westwards or eastwards. If the mean annual change is to the West we add, if East we subtract.

19°33'W
+ 2°40'W
21°73'W
= 22°13'W

If the minutes are 60 or more, they should be converted into degrees, e.g. 160' = 2°40'
1° = 60'

Calculating magnetic bearing



How to calculate magnetic bearing (MB)

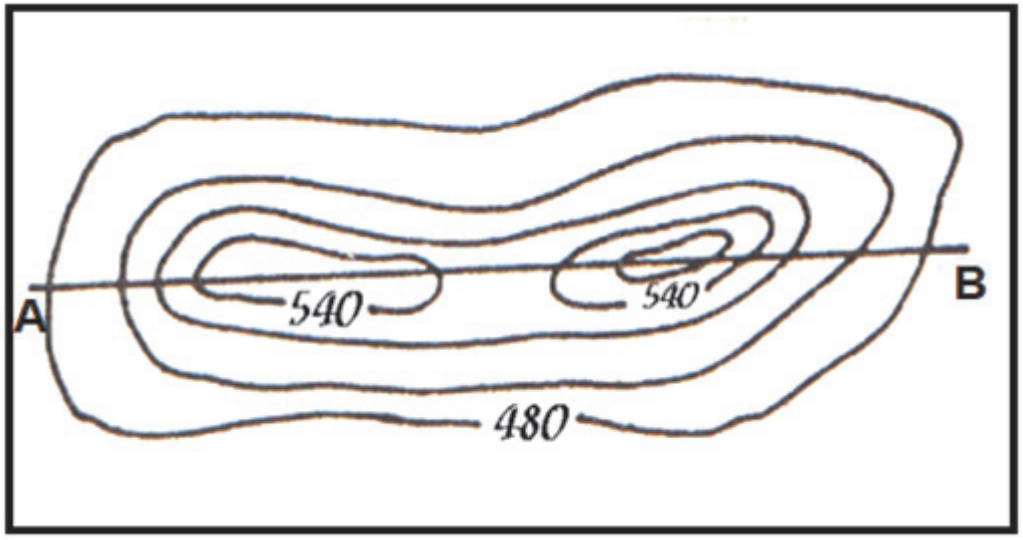
- Add the true bearing to the current magnetic declination.

Formula: magnetic bearing = true bearing + magnetic declination

Magnetic bearing from A to B (Above)

143° + 22°13'W = 165°13'W

Step 1

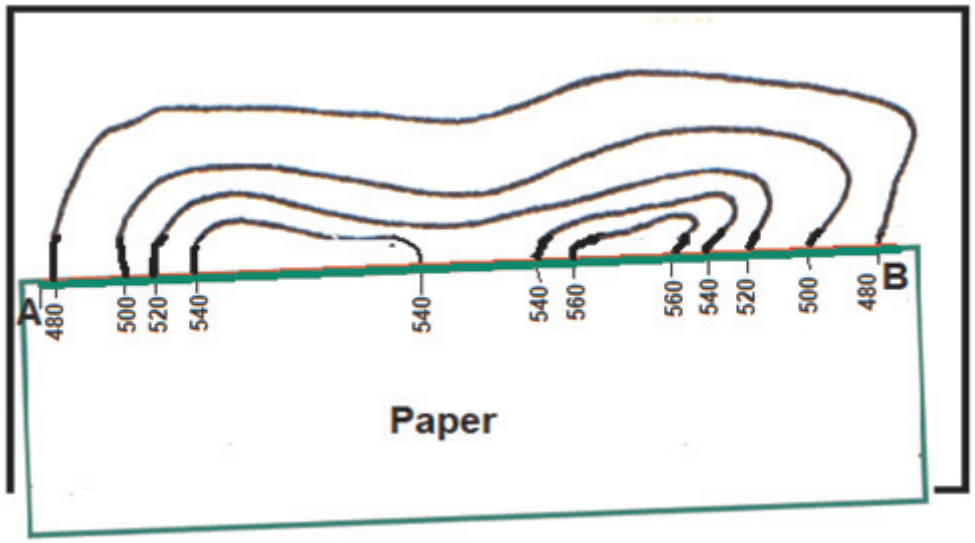


Method to draw a cross section

Step 1

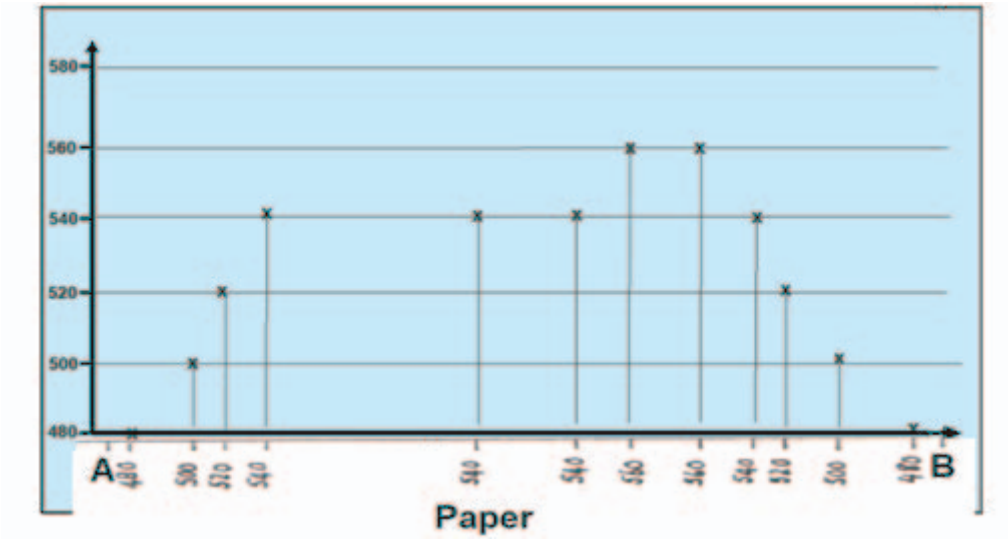
Find the two points on the map between which you will be drawing the cross section. (Points A and B in the example.)

Step 2



Step 2
Use a piece of paper and mark off all the contours between the two points in the cross section onto the piece of paper. Work out the height of the contour lines and mark this on the strip of paper.

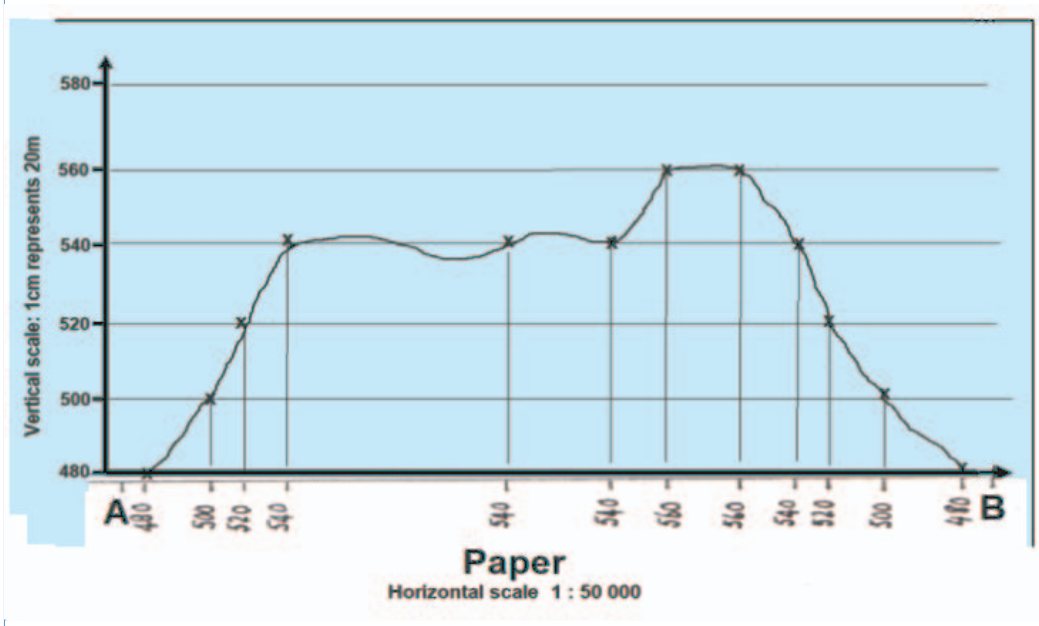
Step 3



Step3
Draw the vertical and horizontal axis of the cross section by drawing two lines at 90° to each other on an A4 sheet of paper. Decide on the vertical scale. This is usually given to you, for example 1cm=20.

NOTE: The lowest contour line value that you have recorded should be the first point on the vertical scale.
The horizontal scale is labelled as the scale of the map you are using, e.g. 1:50 000.
Place the strip of paper on the horizontal line. Make a mark directly above the contour mark (on the blank page) in line with the correct height shown on the vertical scale.

Step 4



Step 4

Join all the points on your graph free-hand.
Keep checking your map, as there may be a river on the map that will require a dip between two points, rather than just a straight line.
Look out for hills that will form a bump in your graph between two points of equal height.
Remember to label your cross section correctly.

What is vertical exaggeration?

It refers to the amount by which the vertical scale of a cross section is made bigger compared to the map scale.

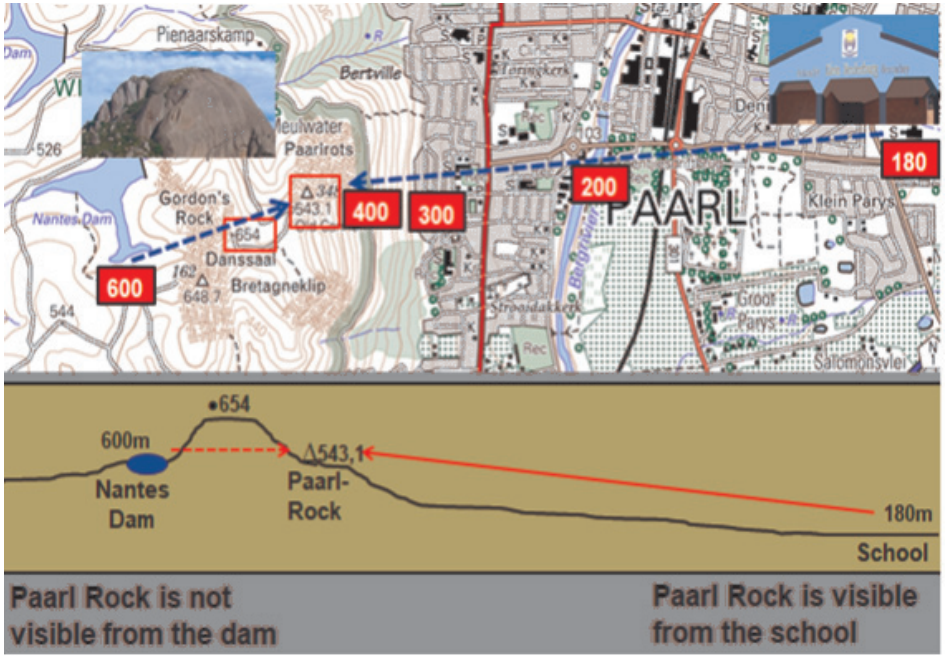
- If the vertical scale is not exaggerated, then it will not be possible to see the relief feature clearly, as it will be flat.
- A vertical exaggeration of 25 is reasonable. If it is bigger, the relief feature becomes distorted.
- The vertical and horizontal scale is required to calculate vertical exaggeration.

Calculating the vertical exaggeration
NB: both the vertical scale and horizontal scale must be a ratio.

Therefore if the vertical scale is 1cm=20m, the vertical scale must be converted into a ratio scale

Step 1
Example : 1cm = 20m [100cm=1m]
20 x 100 = 2000
Vertical scale = 1:2000

Intervisibility



Step 2

$$\frac{1}{2000}$$

$$\frac{1}{50\ 000}$$

$$\frac{1}{2000} \quad X \quad \frac{50\ 000}{1}$$

25 times

Determining intervisibility

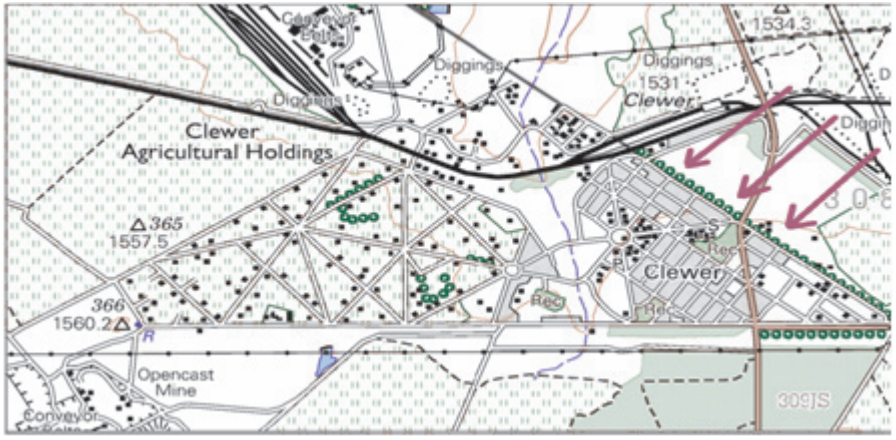
This refers to whether one point on a map is visible (can be seen) from another point. In the diagram provided:

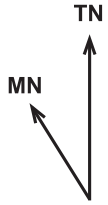
- Paarl rock is visible from the school, because there are no obstacles preventing you from seeing the rock from the school.
- Paarl rock is not visible from the dam, because there is a high-lying area between the dam and Paarl rock, which prevents or blocks one from seeing the dam or the rock.

4.2 Map interpretation and application

Climate and weather

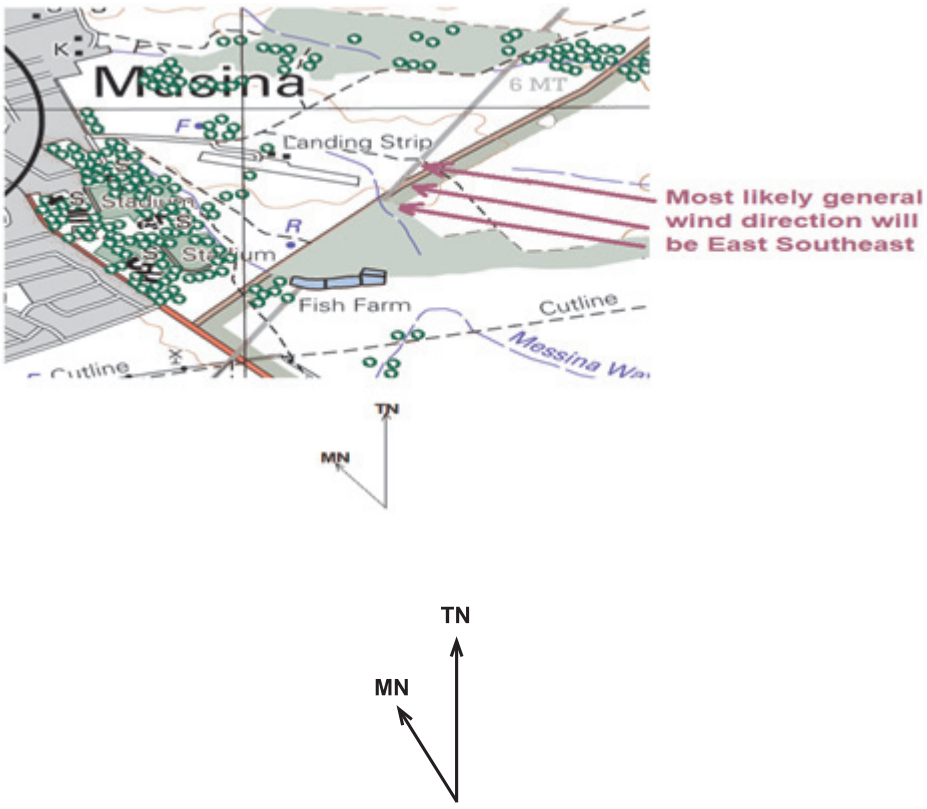
Interpreting wind direction: Wind direction is not annotated (marked) on a map. However, it is possible to interpret the general wind direction on topographic and orthophoto maps. The following will help to interpret the general wind direction.



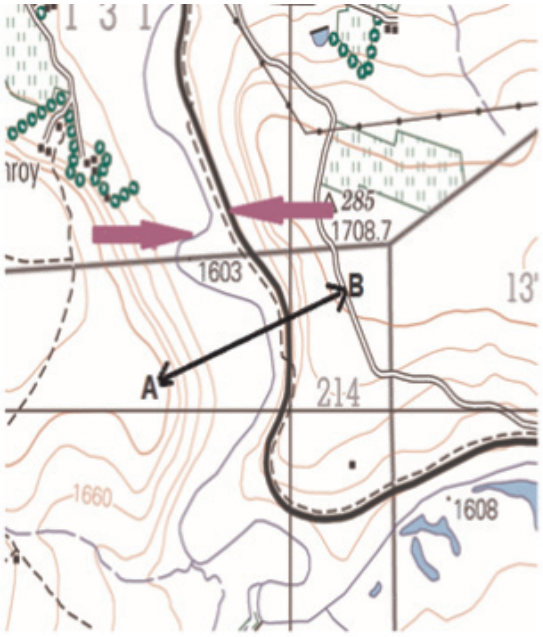


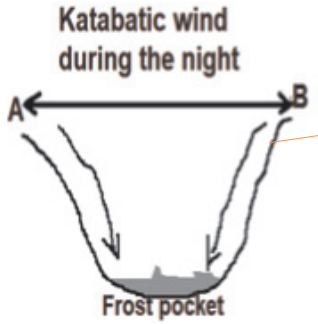
On the map, arow of trees has been planted on the north-eastern part of the settlement (Clewer). It is therefore deduced that the prevailing wind in this area comes from the north-east.

The way the landing strip is constructed

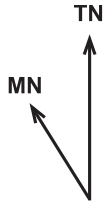


A landing strip is where aircraft land and take off. Generally, aircraft take off against the wind. In this map extract, the aircraft will most likely take off in an east-southeasterly direction.





Line A-B represents a valley



How to read katabatic flow

On the diagram:

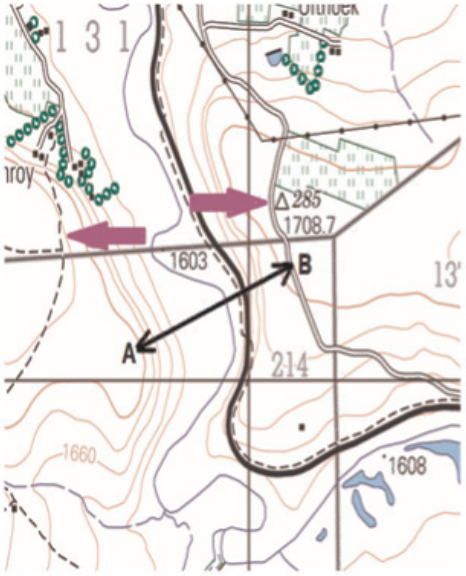
- Line A-B represents a valley (according to contour line arrangement), as illustrated by the insert.
- The arrows pointing towards each other illustrate air movement during the night.
- This air movement is called katabatic wind.

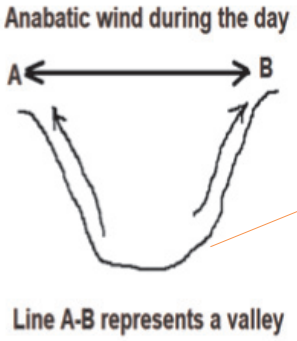
Katabatic wind has the following characteristics:

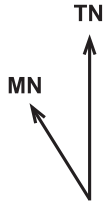
- It blows during the night.
- It flows down-slope.
- It is a cold and heavy wind.

Precipitation:

- A frost pocket on the valley bottom due to inversion.
- Radiation mist/fog on the valley bottom.







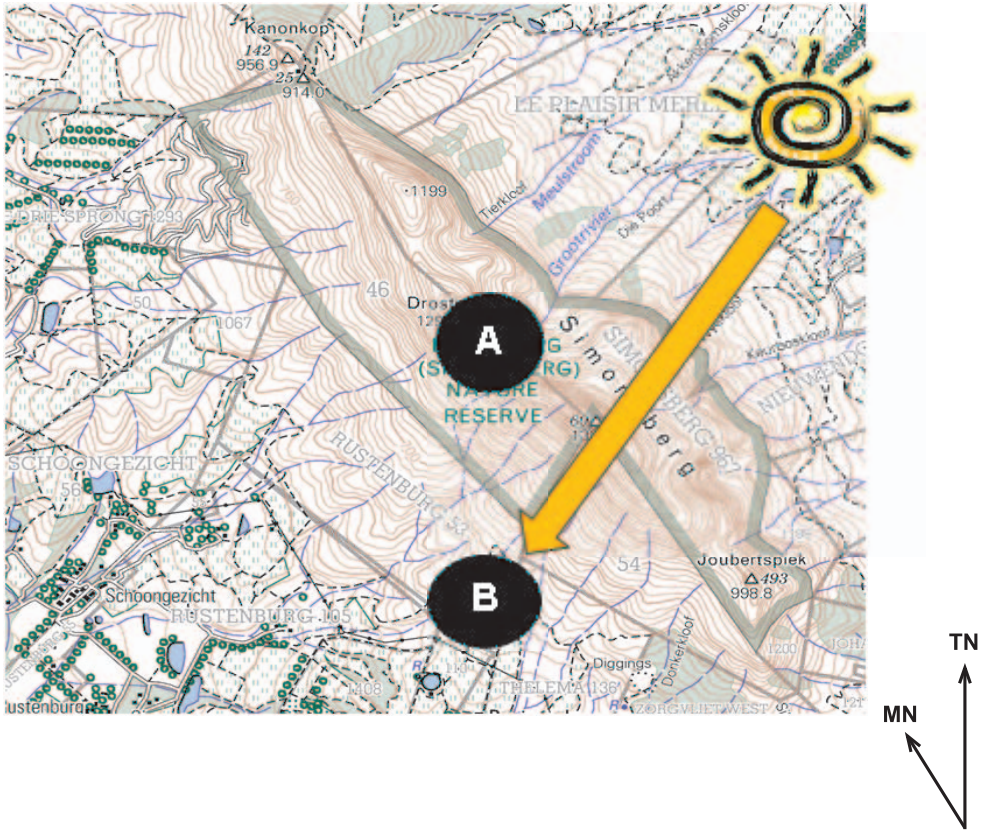
On the diagram:

- Line A-B represents a valley (according to the contour line arrangement), as illustrated by the insert.
- The arrows pointing away from each other illustrate the air movement during the day.
- This air movement is called anabatic wind.

Anabatic wind has the following characteristics:

- It blows during the day.
- It flows up-slope.
- This wind is relatively warmer and lighter.

Aspect/ slope direction



Identifying aspect/ slope direction

The north-facing slopes in the Southern Hemisphere (SH) are generally warmer than the south-facing slopes.

In the diagram:
By reading the contour lines on the adjacent diagram, letters A and B are situated on different valley slopes.

- B is the north-facing slope. It will generally be warmer than the south because of direct insolation.
- A is the south-facing slope. It will generally be cooler because it is in the shadow zone
  (facing away from the direct insolation).

Urban vs Rural Temperatures

Identifying and interpreting urban vs rural temperatures

On the diagram:

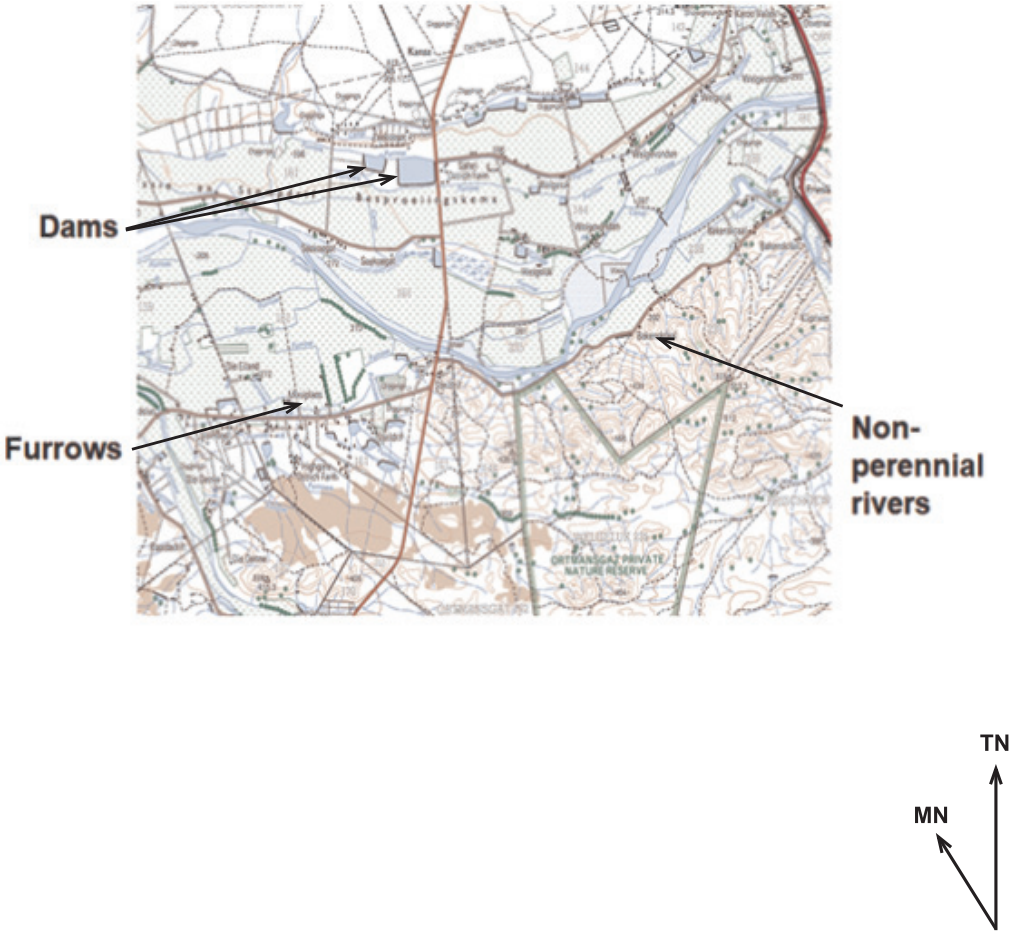
X is situated in the rural-urban fringe.

Y is situated in the urban, built-up area.

The temperature at Y is higher than the temperature at X.

Reasons

Y - Urban, built-up area	X - Rural-urban fringe
At Y, there is more artificial production of heat (more vehicles, more factories , more ovens, etc.).	At X, there is less artificial production of heat.
At Y, there are more artificial surfaces (tar, cement, glass, etc.).	At X, there aremore natural surfaces (vegetation, soil, etc.).
At Y, there are more high-rise (tall) buildings that trap heat.	At X, there are no high-rise (tall) buildings.
The atmosphere is hot and dry because water is channeled away from the built-up area, i.e. less water and therefore less	The atmosphere is cool and humid because water is kept on the earth's surface, i.e. more water, therefore more evaporation.



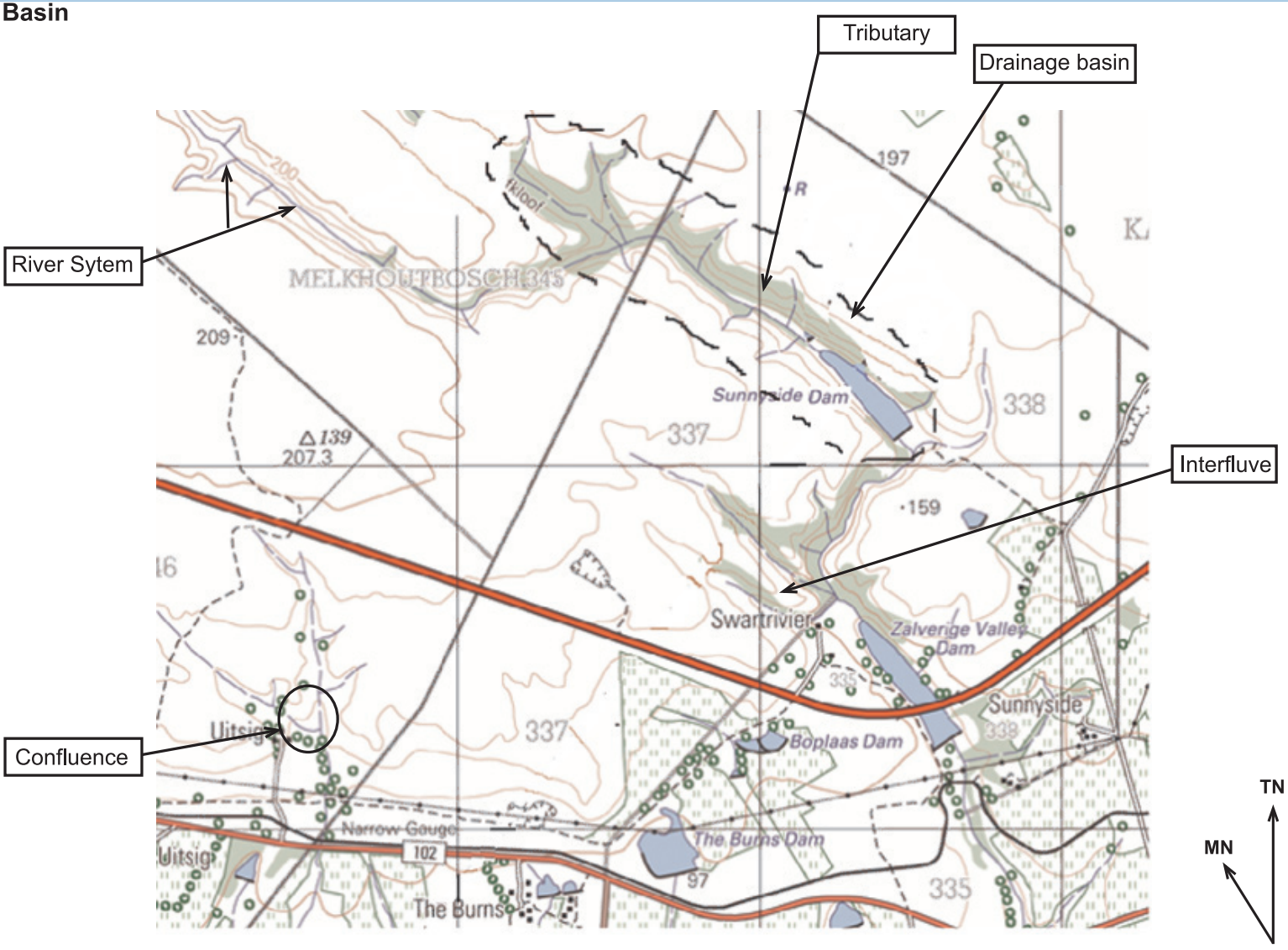
ndications of seasonal rainfall on this topographic map

- Non-perennial rivers
- The presence of dams
- Furrows

Other indications might be:

- Canals
- Wind pumps
- Dry pans
- Sparse vegetation

Concepts of Drainage Basin



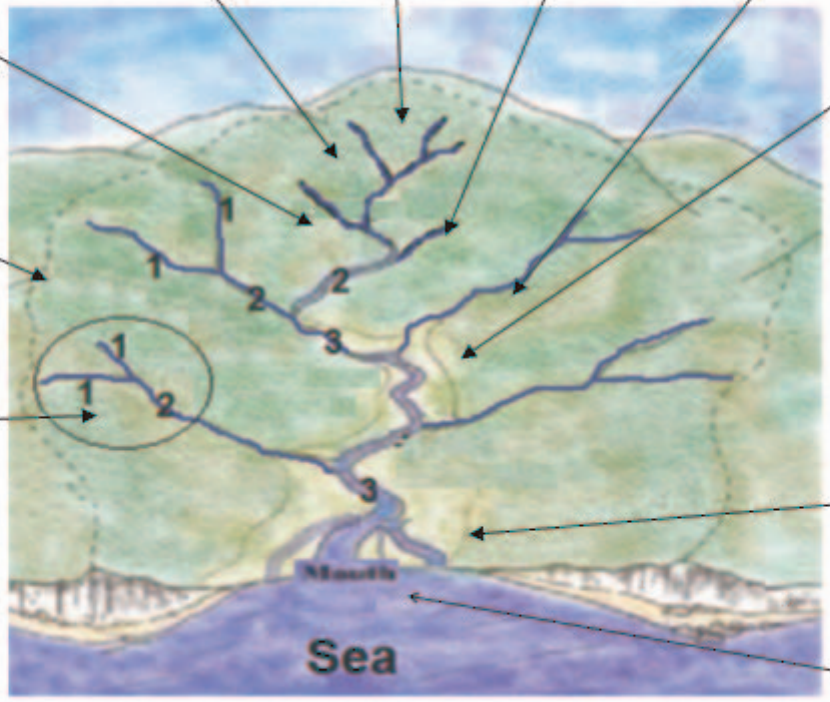
Catchment are:
The area over which rain falls. This rain water is captured by the drainage basin.

Drainage basin:
The area drainage by a river and its tributaries.

Source:
The place where the river begins, e.g Watershed.

River System:
All the rivers or stream channels in a drainage basin.

Tributary:
A smaller river that joins a larger river.



Confluence:
A place where two or more rivers join.

Watershed:
A high lying area that separates two river systems.

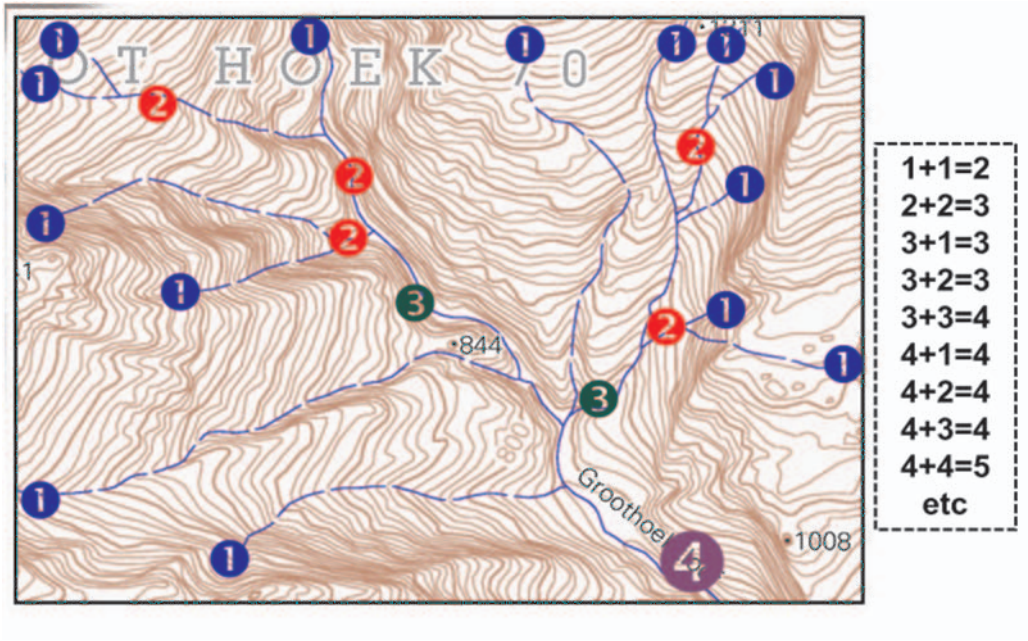
Interfluve:
A high-lying area that separates two streams of the same river system.

Stream order:
1+1=2
1+2=2
2+2=3

Delta:
Formation of tributaries from the same river into the sea.

River mouth:
Where the river ends, i.e the

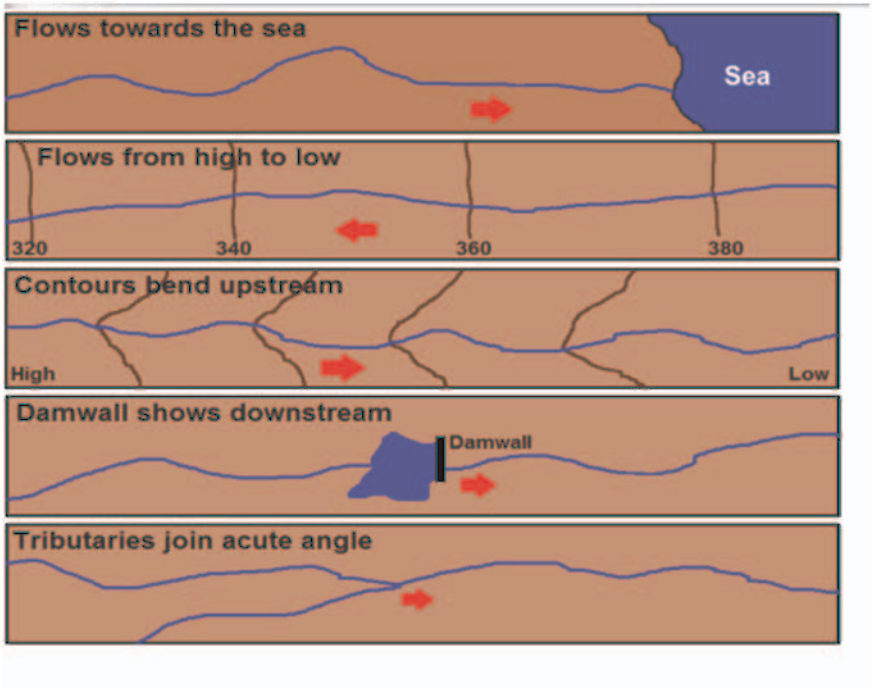
ssssStream orders



Determining stream order

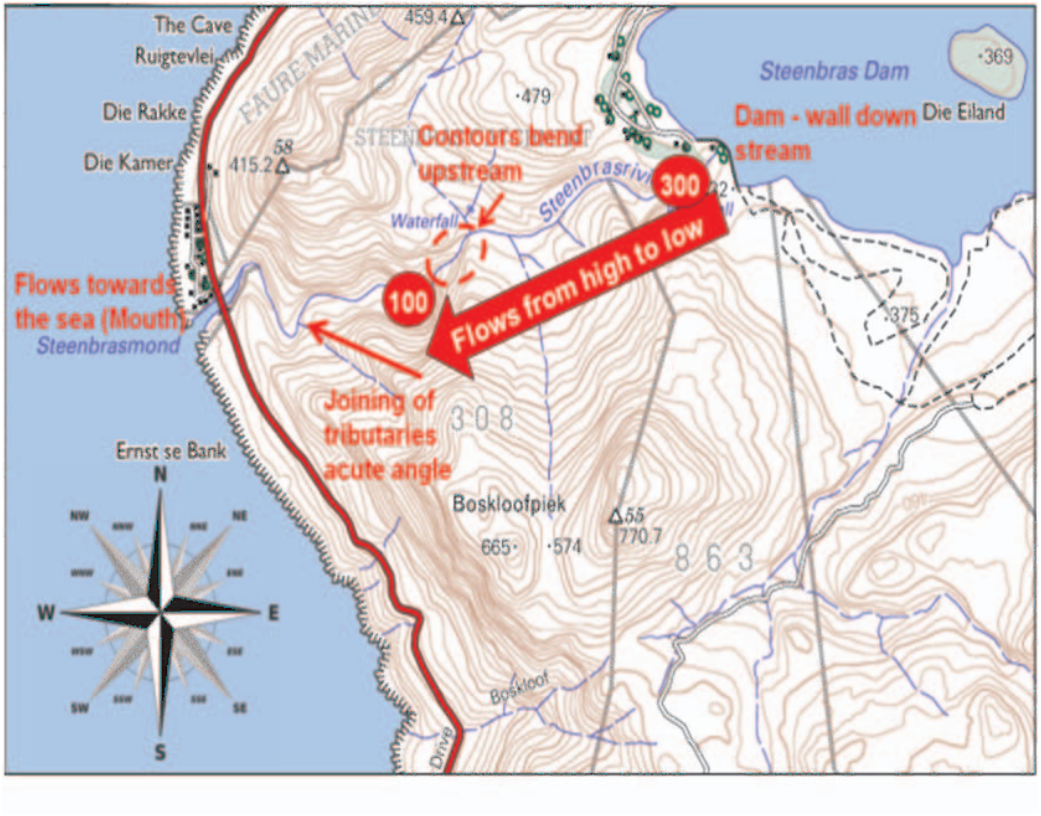
- The smallest streams are classified as first order streams.
- When two first order streams meet at a confluence, they form a second order stream.
- When two second order streams meet, they form a third order stream.
- The order of the stream will continue to increase in the manner described above.
- When streams of different orders meet, there is no increase in the order.

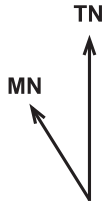
Direction of flow of the river



How to determine the direction in which the river flows

- Rivers flow towards the sea.
- Rivers flow from higherareasto lower areas.
- Contours bend upstream.
- A dam wall shows the downstream direction.
- Tributaries join at an acute angle.

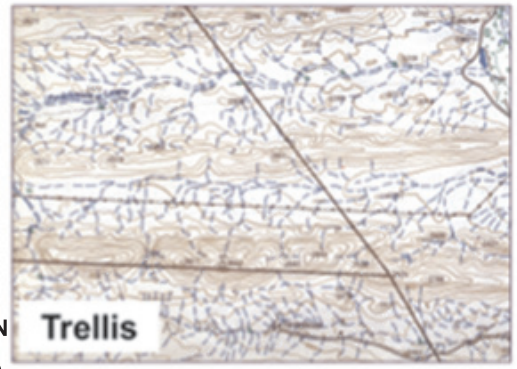




Flow direction of the Steenbras river indicated on the map

- This river is flowing in a WSW direction towards the sea.
- The tributaries join at an acute angle.
- It flows from a high are to a low area (contours).
- The contours bend upstream.
- The dam wall is downstream.

Drainage patterns



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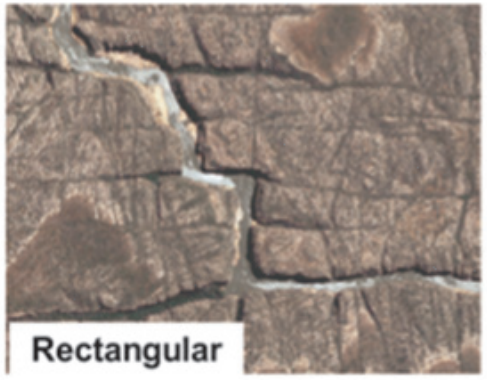
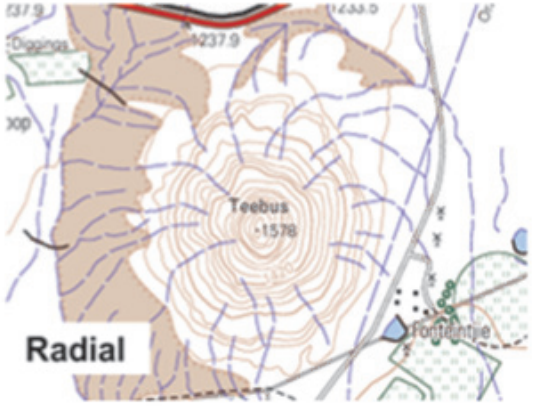




Types of drainage patterns

Dendritic

- Looks like the branches of a tree

Trellis

- Tributaries enter the main river at an approximately 90-degree angle, causing a trellis-like appearance of the drainage system.
- Trellis drainage is characteristic of folded mountains.

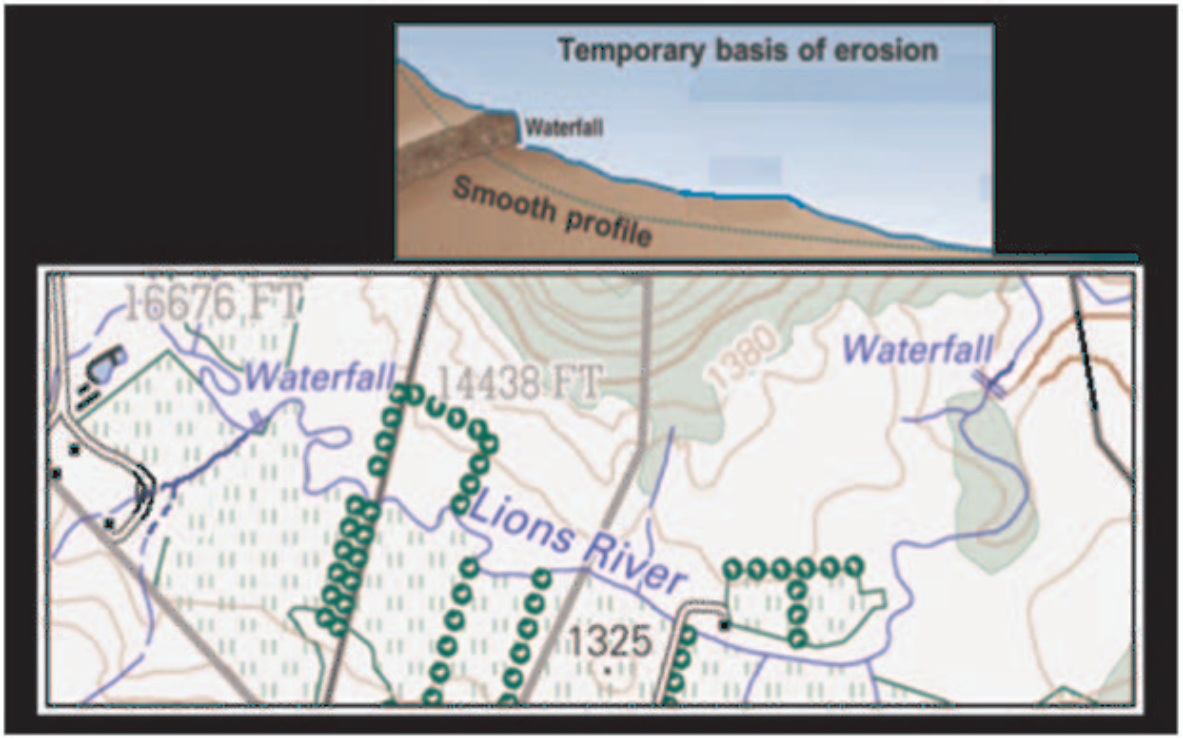
Rectangular

- Astraight-line stream with right angle bends and tributaries joins with larger streams at right angles.

Radial

- The river flows away/outwards from a central high point, such as a dome.

Fluvial landforms - Waterfalls



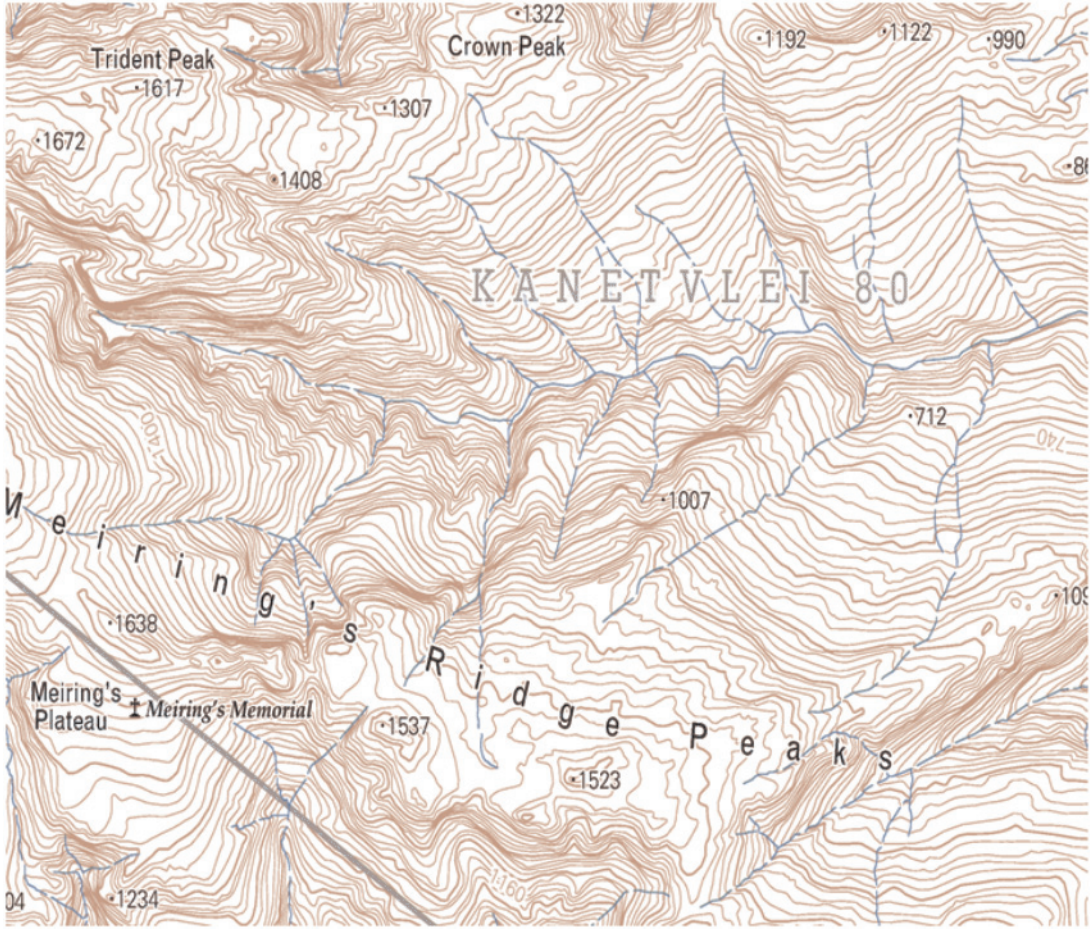
Identification of fluvial landforms

Waterfalls

- This landform is mostly found in the upper course of a river.
- It is a temporary baseline of erosion.

Identifying the different stages of a river

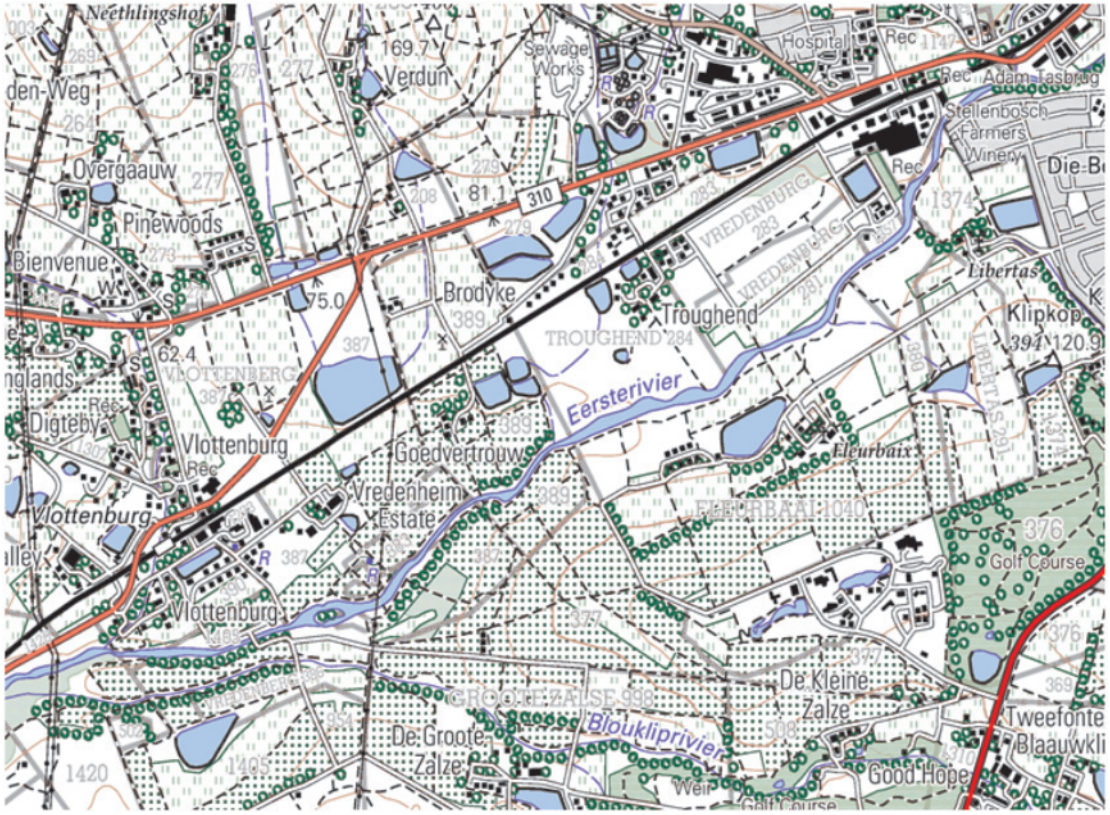
The upper course



Upper course

- The area is steep, with V-shaped valleys.
- Fast-flowing non-perennial rivers.
- Downward/ vertical erosion.
- Flow is turbulent.
- Waterfalls, rapids and interlocking spurs can be found.

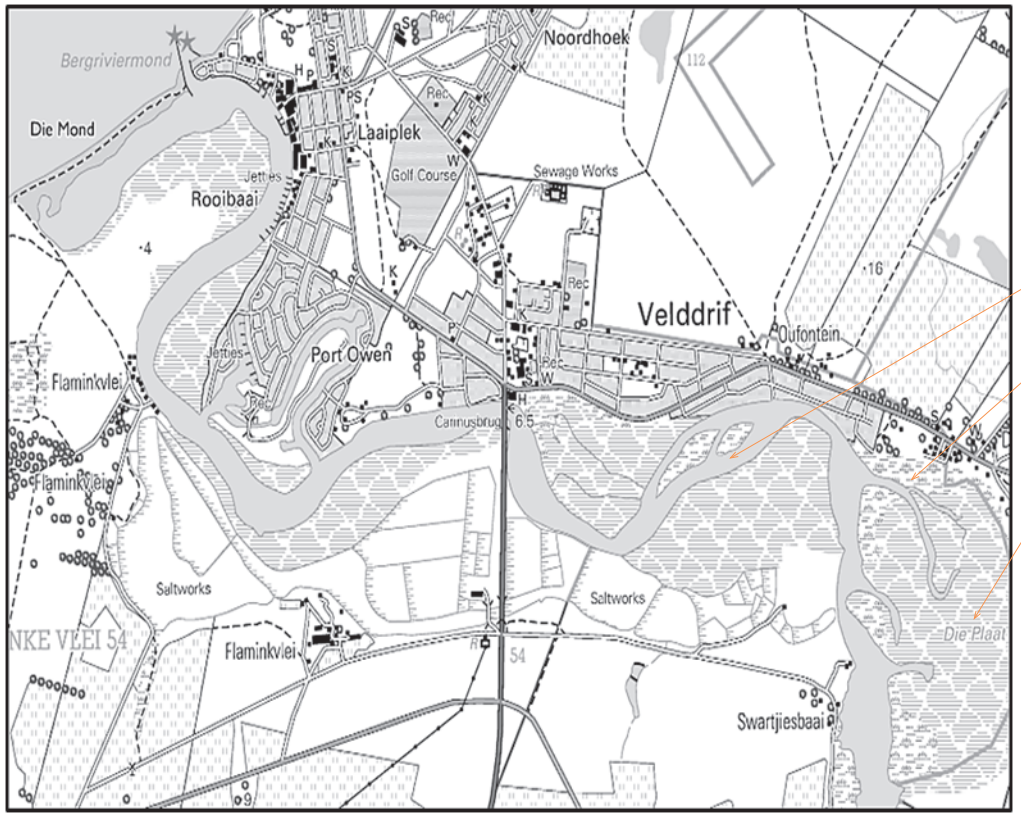
Middle course



Middle course

- The slope in the area is gradual.
- The river flows more slowly as it starts to meander.
- Lateral erosion opens the area.
- Meandering rivers and spurs can be found.

Lower course



Lower course

Identification of fluvial landforms and features

Flat and smooth - very few or no contour lines
Braided streams
Flood plains
Excessive meandering
Marshes
Sandbanks
Mouth
Other:Oxbow lakes

Rural settlement: site and shape

The site of a settlement indicates the physical nature of the area where it is located.

Factors identifiable on the diagram

- Flat land - very few or no contour lines
- Quality of soil - arable land is indicated by orchards, vineyards and cultivated land.
- Fresh water supply - rivers anddams.

Other factors

- building material
- climate - aspect
- shelter and defence

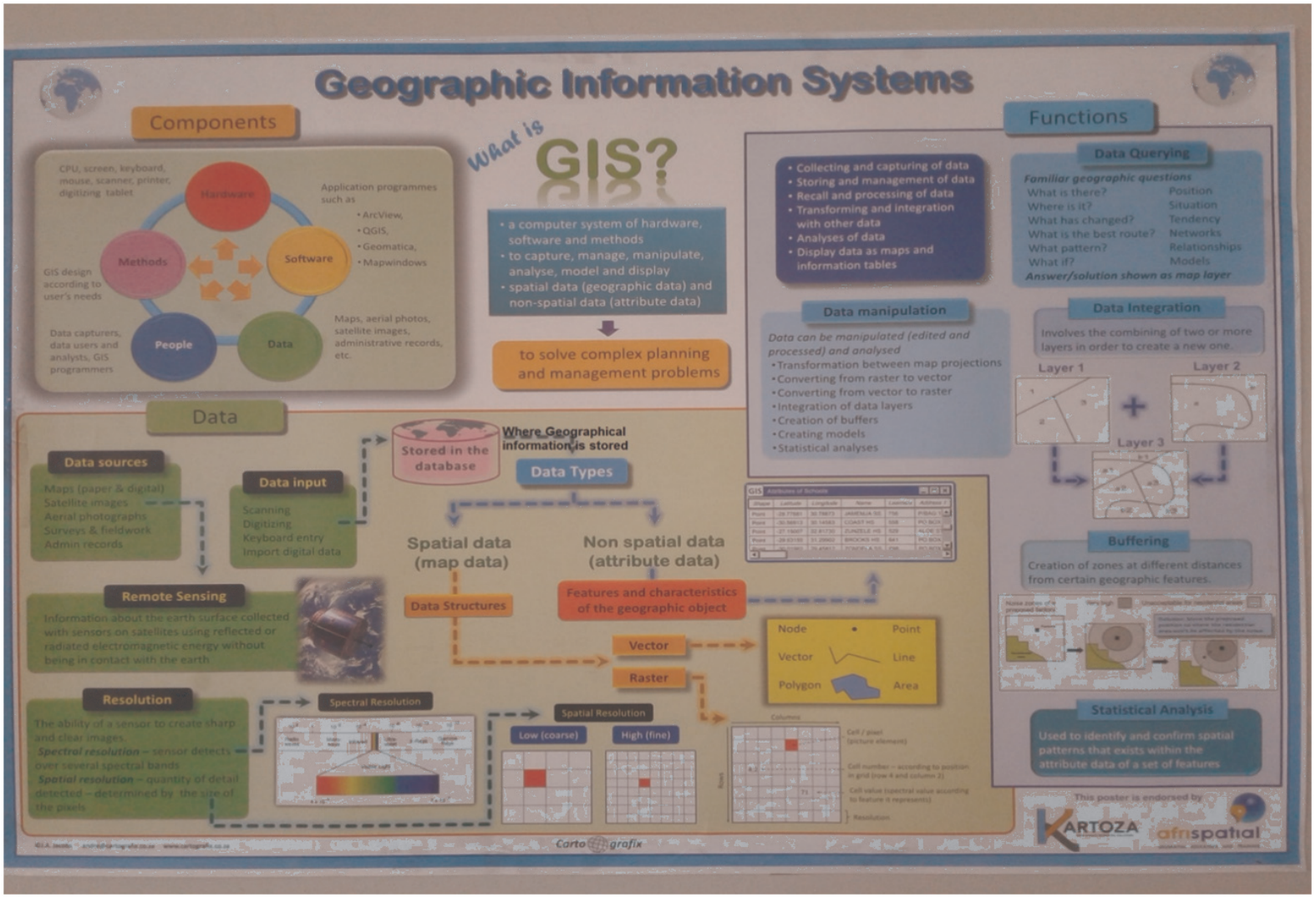
Shape is the external appearance of rural settlements whenseen from above.

Types of shapes and how they are identified on maps

- T-shaped - at the T-junction of roads
- Linear shape - along transport routes, rivers and between physical features such asmountains

Other shapes

- Round - around a central feature like a dam
- Cross road - where important roads intersect


Geographic Information Systems
Components
CPU, screen, keyboard, mouse, scanner, printer, digitizing tablet
Hardware
Application programmes such as
• ArcView,
• QGIS,
• Geomatica,
• Mapwindows
Methods
Software
GIS design according to user's needs
People
Data
Data capturers, data users and analysts, GIS programmers
Maps, aerial photos, satellite images, administrative records, etc.
What is GIS?
• a computer system of hardware, software and methods
• to capture, manage, manipulate, analyse, model and display
• spatial data (geographic data) and non-spatial data (attribute data)
to solve complex planning and management problems
Functions
• Collecting and capturing of data
• Storing and management of data
• Recall and processing of data
• Transforming and integration with other data
• Analyses of data
• Display data as maps and information tables
Data Querying
Familiar geographic questions
What is there? Position
Where is it? Situation
What has changed? Tendency
What is the best route? Networks
What pattern? Relationships
What if? Models
Answer/solution shown as map layer
Data manipulation
Data can be manipulated (edited and processed) and analysed
• Transformation between map projections
• Converting from raster to vector
• Converting from vector to raster
• Integration of data layers
• Creation of buffers
• Creating models
• Statistical analyses
Data Integration
Involves the combining of two or more layers in order to create a new one.
Layer 1
Layer 2
Layer 3
Data
Data sources
Maps (paper & digital)
Satellite images
Aerial photographs
Surveys & fieldwork
Admin records
Data input
Scanning
Digitizing
Keyboard entry
Import digital data
Stored in the database
Where Geographical information is stored
Data Types
Spatial data (map data)
Non spatial data (attribute data)
Data Structures
Features and characteristics of the geographic object
Vector
Raster
Node
Point
Vector
Line
Polygon
Area
Buffering
Creation of zones at different distances from certain geographic features.
Remote Sensing
Information about the earth surface collected with sensors on satellites using reflected or radiated electromagnetic energy without being in contact with the earth
Resolution
The ability of a sensor to create sharp and clear images.
Spectral resolution – sensor detects over several spectral bands
Spatial resolution – quantity of detail detected – determined by the size of the pixels
Spectral Resolution
Spatial Resolution
Low (coarse)
High (fine)
Statistical Analysis
Used to identify and confirm spatial patterns that exists within the attribute data of a set of features
This poster is endorsed by
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4.3Geographic Information Systems (GIS)

WHAT IS GIS?

GIS is:

- A computer-based set of procedures for assembling, storing, manipulating, analysing and displaying geographically referenced information.
- A system that uses geographical data for a purpose, such as providing information that can be used for making decisions.
- A complex computer system thatcan hold and use data that describes places on the Earth's surface.

COMPONENTS OF GIS

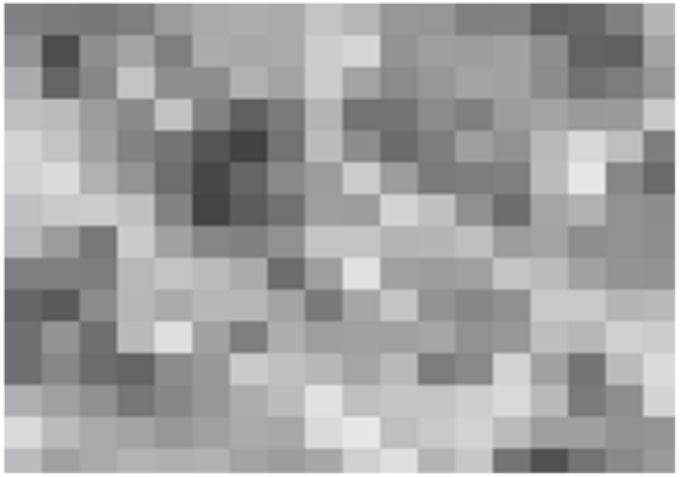
Hardware	CPU, screen, keyboard, mouse, scanner, printer, digitizing tablet.
Software	Application programme such as ArcView.
Data	Maps, aerial photos, satellite images, administrative records, etc.
People	Data capturers, data users, GIS analysts.
Methods	GIS design according to user's needs.

REMOTE SENSING

Collecting informationregarding aspects ofthe Earth's surface,without actually being in contact with it (e.g. using weather balloons, aeroplanes and satellites).

RESOLUTION

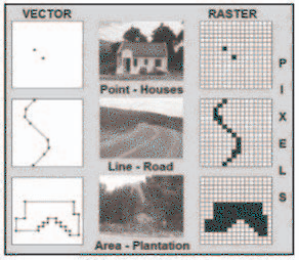
The ability of a remote sensing sensor to create a sharp and clear image.

HIGH RESOLUTION	LOW RESOLUTION
	
Many pixels; small pixels; objects easily recognised.	Less pixels; larger pixels; objects not easily recognised.

There are two types of geographical information: Locational (Spatial) data; Non-locational (Attribute) data.

Spatial data describes the location of, connections between, and relationships betweenpoint line and area features.
Attribute gives the characteristics of the point, line and area features in terms of certain attributes, which may be either qualitative (e.g. the type and names of roads in a given area) or quantitative (e.g. the width of roads).

RASTER AND VECTOR DATA



With **vector data**, objects on the Earth's surface are represented by using a **point**, a **line** or an **area** (polygon).

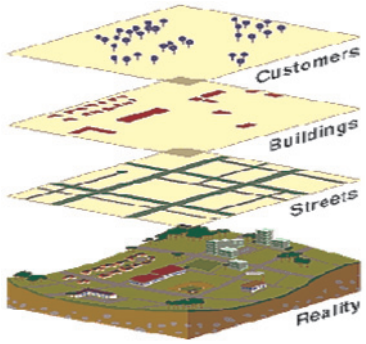
With **raster data**, objects on the surface of the Earth are represented by rows and columns of evenly sized blocks, called **pixels**. Pixels are the smallest unit of data storage

GIS LAYERS

All spatial data, whether it is vector data or raster data, are shown in layers.

Each layer represents a single entity/theme.

It is this characteristic that enables a GIS to manipulate, integrate and query data.



DATA MANIPULATION

What is data manipulation?
Data manipulation involves puttingthe different data sources into a format that can be integrated.

Explain why data manipulation is important in a GIS.
When all the data layers are in similar data files, the data can be integrated (put together).
Statistical information must be manipulated into this file format so that it can be used in the GIS software and linked to specific spatial features. Errors in the database can be eliminated during manipulation.

DATA INTEGRATION

The integration of data involves combining two or more data layers in orderto create a new one.

WHY DOES GIS MATTER?

Geographical Information Systems are a special class of information system that keeps track of: events, activities, things, and of where these events, activities and things happen or exist.

Problems that involve an aspect of location - either in the information used to solve them, or in the solutions themselves - are termed geographical problems.

Here are some examples:

- Health care managers solve geographical problems when they decide where to locate new clinics and hospitals.
- Delivery companies solve geographical problems when they decide on the route and schedule for their vehicles.
- Transportation authorities solve geographical problems when they select a route for a new highway.
- Forestry companies solve geographical problems when they determine how best to manage forests, where to cut trees, where to locate roads and where to plant new trees.
- Governments solve geographical problems when they decide how to allocate funds to build sea defenses.
- Travelers solve geographical problems when they find their way through airports, give and receive driving directions and select hotels in unfamiliarcities.
- Farmers solve geographical problems when they employ new information technology to make better decisions about the amount of fertilize rand pesticide to apply to their fields.

Some examples of industries that use GIS in their planning, operation and decision making are indicated in the table below .

Industry	How the industry uses GIS
Oil	Planning and managing pipelines
Military	Planning troop movements or field study
Mobile phone companies	Positioning and managing existing and new masts
Mining	Locating mineral reserves, i.e. geological mapping
Agriculture	Finding the most suitable location to grow particular crops, land use decisions, mapping soils, vegetation, etc.
Ambulance services	Planning the quickest route to assist patients.
Police services	Planning the quickest route to a crime scene.

GIS can be done manually using transparency overlays (Paper GIS). This method is tedious and does not allow for changes in scale.
The advantage of the modern GIS that uses computers is that it is faster, more efficient and can manage large volumes of data over large study areas.

BUFFERING
It is sometimes necessary to identify zones at different distances from certain geographic features.
Definition: ***A line used to demarcate an area around a spatial feature.***

Examples:
- Noise buffers next to roads.
- Safety buffers for areas that are danger or are in danger of human exploitation .

5 Message to Grade 12 learners from the writers

Every challenging and difficult time that you have gone through in your life has shaped you into the winner you are today. Hard times are not permanent andshould be seen as part of your normal growth. Just make a decision that you are going to keep on moving forward and will complete the race.
Portia January

It is through hard work and sacrifices that you will one day look back with pride and satisfaction and say to yourself: "This has been the story of my life:falling and crying, but, most importantly, rising again." Your triumph over the challenges should serve as an inspiration and assurance that you are certainly a winner.
Hettie Benjamin

Remember that you are not alone. Many have walked the same road before you and succeeded.
Do not give up. Keep on believing in yourself and know that there is something in you that is greater than any challenge.
With Geography, you will always know where you are going - just keep on pushing on.
Jerome Meyer

Human beings are interesting creatures: they tend to learn the most when they do not get their own way.
Use whatever setbacks you in your life tobecome a mentally stronger person. Every successful person has gone through the ups and downs of life, but what is unique aboutthem isthat "they kept on believing in themselves". So keep the faith.
Mosebetsi Mofokeng

Geography is one of the most interesting subject as it empowers learners with important skills needed in the 21st Century World.
Mapwork is exciting as most of the answers are found on the map itself. Learners should use map symbols to unlock on the map itself.
Learners should intergrate theory to unlock interpretation questions when working with maps.
Be dedicated and work smarter, then you will succeed
Pule Rakgoatha

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GEOGRAPHY
MAP BOOK

GRADE 12

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