Western Cape Government
Education

Directorate: Curriculum FET

TELEMATICS 2018

GEOGRAPHY
Grade 12

Dear Grade 12 Learner

The Telematics Teaching Project stems from cooperation between the Western Cape Education Department and the Stellenbosch University.

To be able to have success at the end of the year it will be very important to keep on learning and applying the prescribed key concepts/processes and process skills in the different knowledge areas throughout the year. Make sure that you are able to analyse and interpret geography related concepts in newspapers and magazines to the concepts and content you have discussed in the classroom. In addition spend at least a few hours per week studying / reading / making summaries about the four components in the theory section and attempt to integrate it with the map work section.

This resource pack includes the following:

- **Theory**: Mind maps of the lessons that will be broadcasted. This is an excellent summary of your class notes and can help you with your examination preparation.
- **GIS**: Notes and applications of important GIS concepts and a guide as to how to use GIS in a given situation or scenario.

TELEMATICS TEACHING SCHEDULE FOR 2018

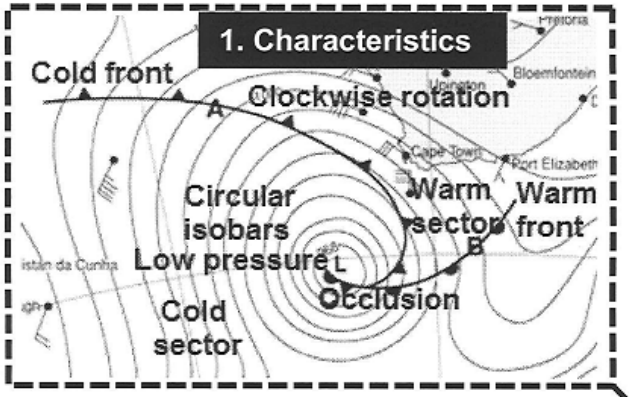
GRADE 12 GEOGRAPHY SUPPORT – FIRST QUARTER			
DATE		**TIME**	**TOPIC**
Wednesday	28 February	16:00-17:00	Climate

GRADE 12 GEOGRAPHY SUPPORT – SECOND QUARTER			
DATE		**TIME**	**TOPIC**
Monday	16 April	16:00-17:00	Geomorphology
Monday	14 May	16:00-17:00	GIS

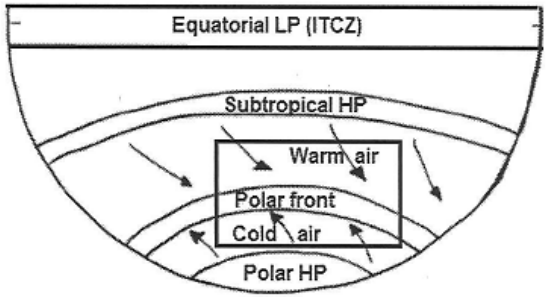
GRADE 12 GEOGRAPHY SUPPORT – THIRD QUARTER			
DATE		**TIME**	**TOPIC**
Monday	23 July	16:00-17:00	Settlement

MID-LATITUDE CYCLONES

1. Characteristics



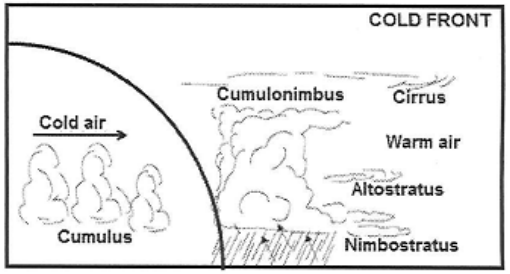
2. Where formed?

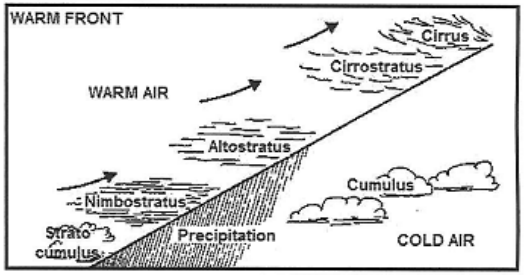


3. Conditions

- Two large high pressure systems.
- Subtropical HP - warm, moist air mass.
- Polar HP contains cold dry air.
- The air masses meet at the polar front.
- Warm air is forced upwards and cold air flows in.

4. Cold and warm fronts





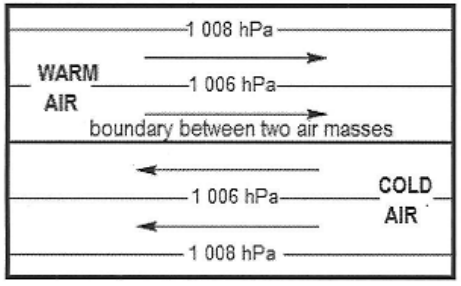
7. Impact

- Flooding
- Snow hazards in high-lying areas
- Loss of livestock
- Negative impact on economy

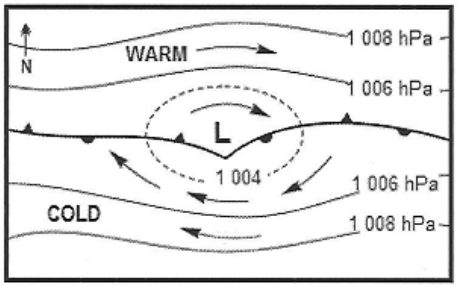
6. Weather patterns

	Cold front	Warm front
Temp	Sudden drop	Sudden rise
Air pressure	Increases	At lowest
Wind change	NW to SW	NE to N / NW
Cloud cover	Thick	Decreases
Rainfall	Heavy	Stops

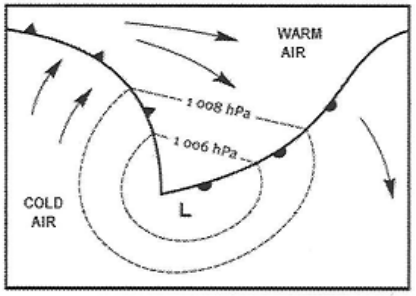
5. Stages



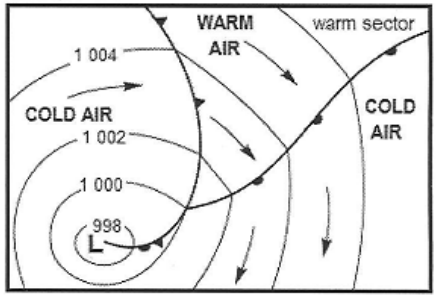
1 Initial stage



2 Development stage



3 Mature stage



4 Occlusion

TROPICAL CYCLONES

1. General characteristics

- Intense low pressures.
- Named in alphabetical order.
- During late summer or autumn.
- Move from EAST to WEST. AWAY from the equator. Turns EAST at 30°.
- Causes destruction by hurricane force winds, storm surges and heavy rainfall.

2. Where formed?

- In tropical regions
- Over tropical oceans
- Further than 5° of Equator

3. Conditions

- Sea temperature at least 26°C.
- High humidity.
- Unstable air.
- Little surface friction.
- Light variable winds
- Air pressure below 950 hPa
- Air divergence in upper levels

4. Weather patterns

5. Stages

1 Formative stage(above 1000hpa) 2 Immature stage(below 1000hPa) 3 Mature stage(far below 1000hPa) 4 Degenerating stage(rises 1000hPa)

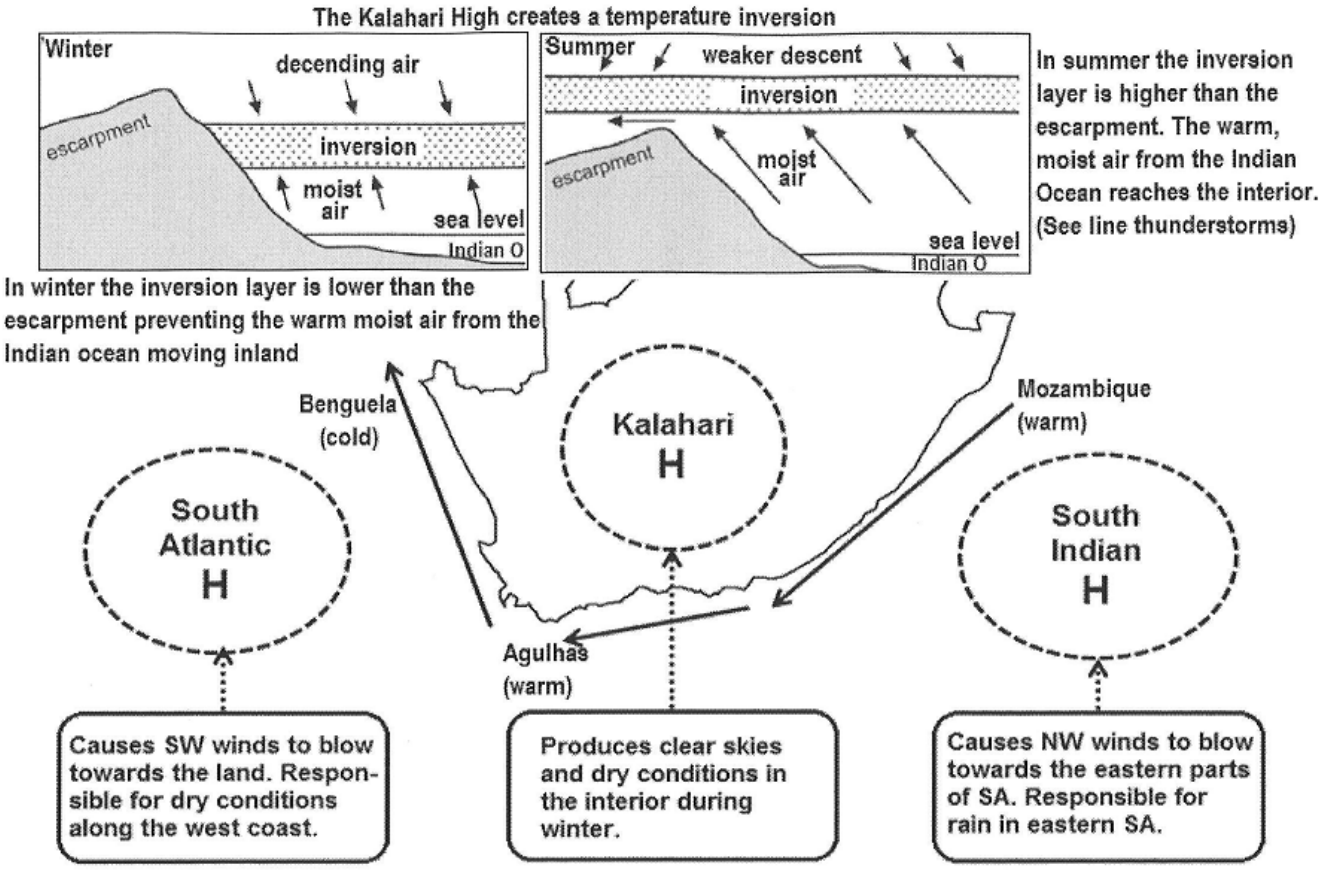
6. Impact

- *Infrastructure*: Roads/bridges/pipelines
- *Economy*: Business/crops/costs
- *Social*: Deaths/property damaged
- *Environment*: Erosion/water polluted

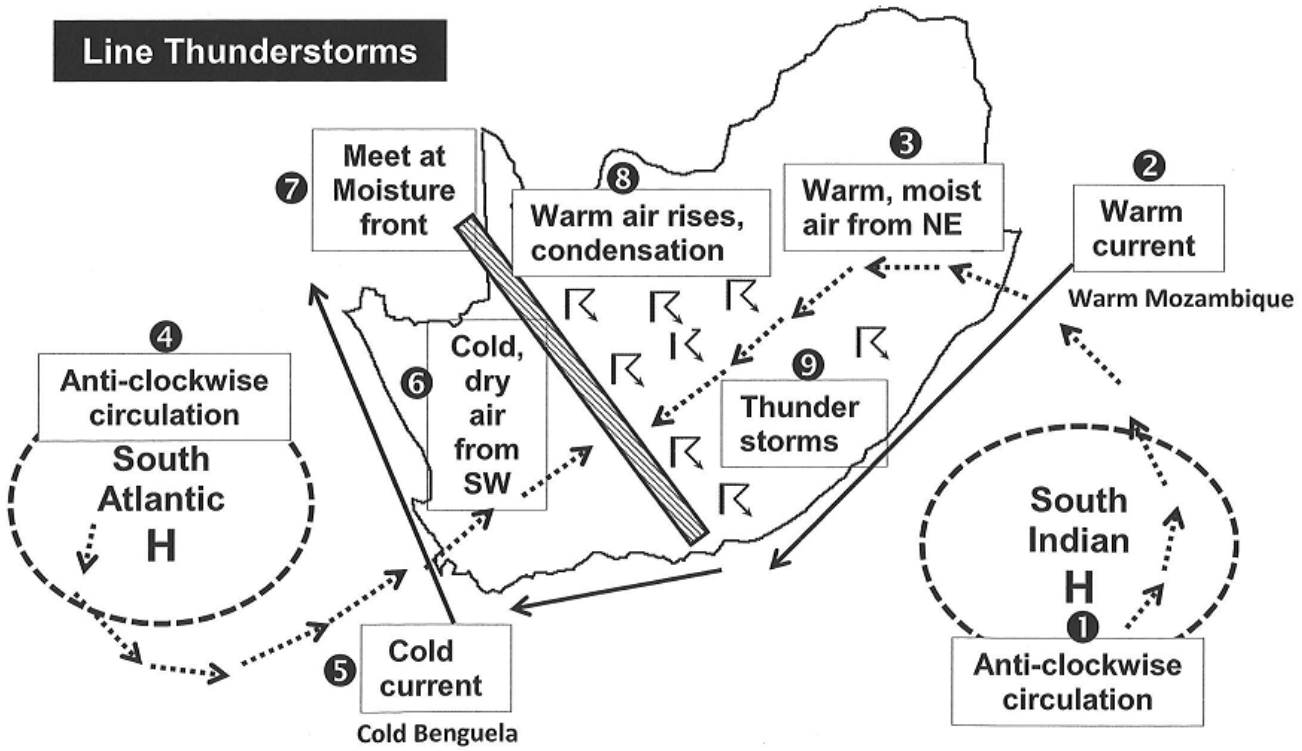
7. Strategies

- Good weather forecasts.
- Keep public informed by tracking storm
- Early warning systems.
- Medical- and rescue services on alert.
- Build houses with strong materials.
- Evacuation routes and procedures
- Avoid crossing strongly flowing rivers

High pressure cells that affect the weather of SA



Line Thunderstorms



VALLEY CLIMATES
❶
Aspect: The direction in which a slope faces.
South-facing slope
NORTH
-Indirect rays of sun
-Larger area heated
-Slope cooler
In SH: North-facing slope warmer
In NH: South-facing slope warmer
North-facing slope
SOUTH
-Direct rays of sun
-Smaller area heated
-Slope warmer
❷ Anabatic and Katabatic winds
During DAY - Anabatic winds
Slopes and air above them heated. Warm less dense air rises up the valley sides
During NIGHT - Katabatic winds
Slopes and air above them are cooled. Dense air subsides down the valley slopes
❸ Inversions
HOW AN INVERSION TRAPS ATMOSPHERIC POLLUTANTS
Warm air
INVERSION LEVEL
Pollution trapped
Cold air
Cold air sinks to the valley floor
❹ Frost Pockets
Cold air moves down slope.
Temp drops below freezing point.
Frost forms on valley floor.
Frost resistant crops are planted on valley floor.
Crops sensitive to frost are planted higher up the slope
(See impact on human activities)
❺ Radiation fog
Formed as a result of radiation from the Earth's surface.
Formed in valleys when nights are cold, clear and cloudless.
Earth's surface and layer of air above it cools rapidly.
Condensation occurs tiny droplets formed
Small droplets are suspended in the air
Disappears after insolation starts
❻ Impact on human activities
termal belt
frost pocket
SETTLEMENT
Develop on mid-slope (X) in thermal belt
Night time temperatures will be higher.
Cold air sinks to valley floor
FARMING
In SA vineyards planted on warmer north-facing slopes.
Frost-resistant crops planted in frost pocket (Y)
Crops sensitive to low temperatures planted in thermal belt (X)

CAUSES

Caused by air pollution from

- Industries
- Domestic fires
- Car exhaust fumes.
- Burning of fossil fuels
- Inversions that trap pollution

1 Why are cities warmer than rural areas?

CAUSES

- Building materials: Concrete, tar, brick absorb heat.
- Tall buildings trap heat.
- Air pollution helps to trap heat.
- Burning of fuels.
- Transport
- Industries release heat.
- Central heating from shops.
- Large concentration of people.

3 POLLUTION DOME

Trapped mass of polluted air over the city

EFFECTS

- Insolation blocked during day.
- Precipitation increases as pollutants act as condensation nuclei.
- Triggers allergic reactions, breathing difficulties and asthma attacks.
- Lead poisoning from petrol fumes.
- Cause smog which reduces visibility.
- Global climate change

2 An urban HEAT ISLAND is when the city has warmer temperatures than the surrounding rural areas

EFFETS

- Human discomfort.
- Heat stress and death.
- Release of Greenhouse gasses.
- Increased smog concentration.
- Reduces visibility
- Increased use of energy in summer.
- Pollution levels increase.

4 HOW REDUCED?

- Energy saving strategies
- Green belts
- Roof gardens
- Public transport
- Use lighter-coloured materials
- Shade parking areas

1 FEATURES

Catchment area	Area over which rain falls and is caught by a drainage basin	Watershed	High lying area separating two drainage basins
Infiltration	Movement of water through soil into the ground	Water table	Upper level of underground saturated rock
Confluence	Place where two rivers join	Run-off	The surface flow of water
Tributary	A river that joins a larger river	Groundwater	Water found under the ground
River mouth	Sea or lake where river ends	Interfluve	High lying are between two river valleys
Source	Where river begins	River system	Main river with all its tributaries

2 TYPES OF RIVERS

Type	Description	Example
Permanent	Flows all year	Amazon
Periodic	Flows in rainy season	Limpopo
Episodic	Flow after heavy rainfall	Auob
Exotic	Spans two types of climatic regions	Nossob Nile Orange

3 DRAINAGE DENSITY

DRAINAGE BASINS

4 STREAM ORDERS

1+1=2
2+1=2
2+2=3
3+1=3
3+2=3
3+3=4
and so on

5 RIVER DISCHARGE

Laminar flow

- Water flows as parallel sheets
- River bed is even
- Less erosion

Turbulent flow

- Water flows bubbling/turbulent
- River bed is uneven
- More erosion

DRAINAGE PATTERNS

Pattern	Dendritic	Trellis	Radial	Rectangular	Centripetal	Deranged	Parallel
Diagram							
Description	Looks like branches of a tree. Tributaries join at acute angles.	Strong main stream joined by short tributaries at right angles	Looks like spokes of a wheel when viewed from above	Tributaries join at right angles and have bends of 90°	Opposite of radial pattern.	Small streams that have no specific pattern	Streams flow parallel to each other
Underlying structures	Uniform rocks of similar hardness	Gently sloping alternating layers of hard and soft rock	Rivers flow away from a high central point such like a butte or mesa	In areas with hard rock that is well jointed.	Streams flow towards a central basin such as a marsh or lake	Very flat areas that have experienced recent glaciation	Common along a ridge or hills.

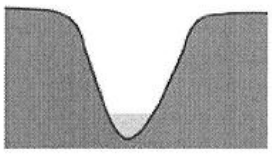
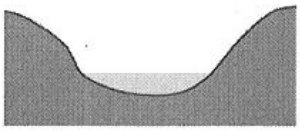
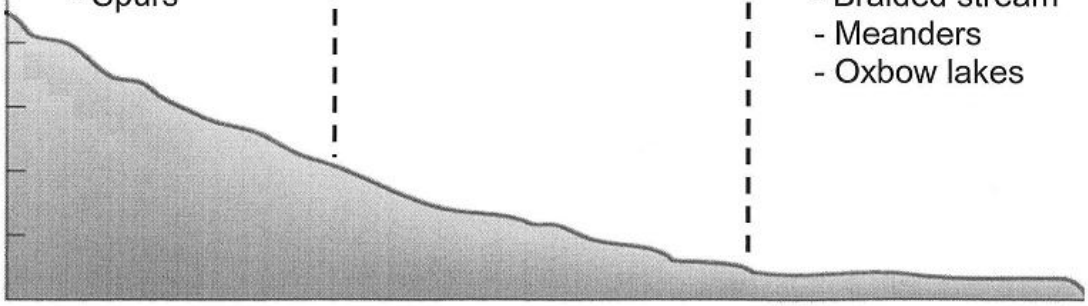
You must be in a position to do the following:

- Identify each of the patterns on diagrams.
- Identify stream patterns on topographic maps.
- Give a description of the patterns.
- Describe the underlying structures that caused the stream pattern.

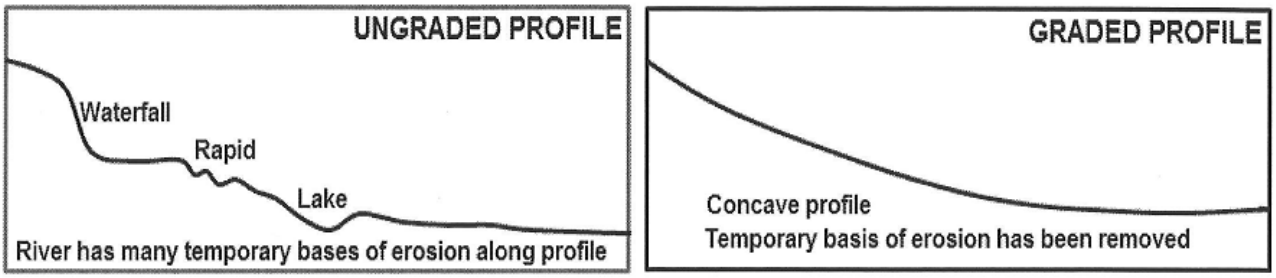
LONGITUDINAL- AND CROSS PROFILES

Longitudinal profile: The 'side view' of a river from its source to its mouth

Cross profile: The shape of the river valley from one bank to the opposite bank

COURSE/ STAGE	UPPER COURSE (YOUNG STAGE)	MIDDLE COURSE (MATURE STAGE)	LOWER COURSE (OLD STAGE)
CROSS PROFILE			
GRADIENT	Steep	Gradual	Almost flat
SPEED	Flows fast	Flows slower	Flows very slowly
PROCESSES	Downward erosion	Lateral erosion	Deposition
LANDFORMS	- Waterfalls - Rapids - Spurs	- Meanders - Spurs	- Sandbanks - Marshes - Braided stream - Meanders - Oxbow lakes
LONGI-TUDINAL PROFILE			
VIEWED FROM ABOVE			

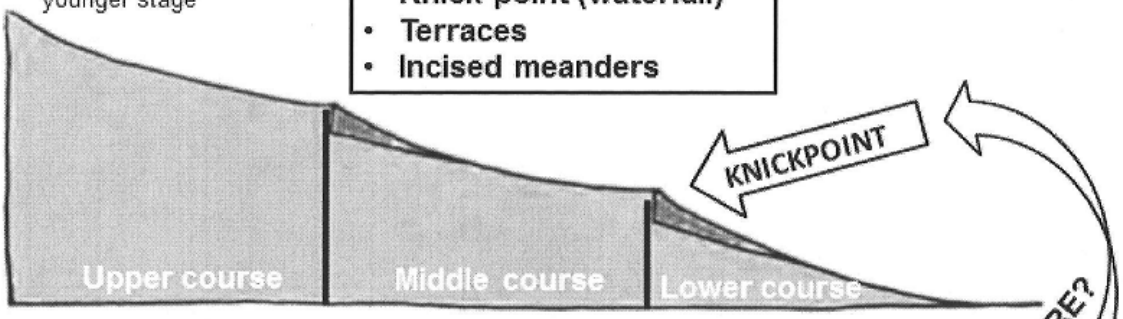
GRADED AND UNGRADED RIVER PROFILES



RIVER REJUVENATION

REJUVENATED:
Made to look younger.
River showing renewed characteristics of a younger stage

FEATURES/LANDFORMS
- **Knick point (waterfall)**
- **Terraces**
- **Incised meanders**



Young river flows fast

Mature river flows slower

Old river flows very slow

REJUVENATION
River starts to flow faster. Has renewed energy and increased erosion.

HOW?

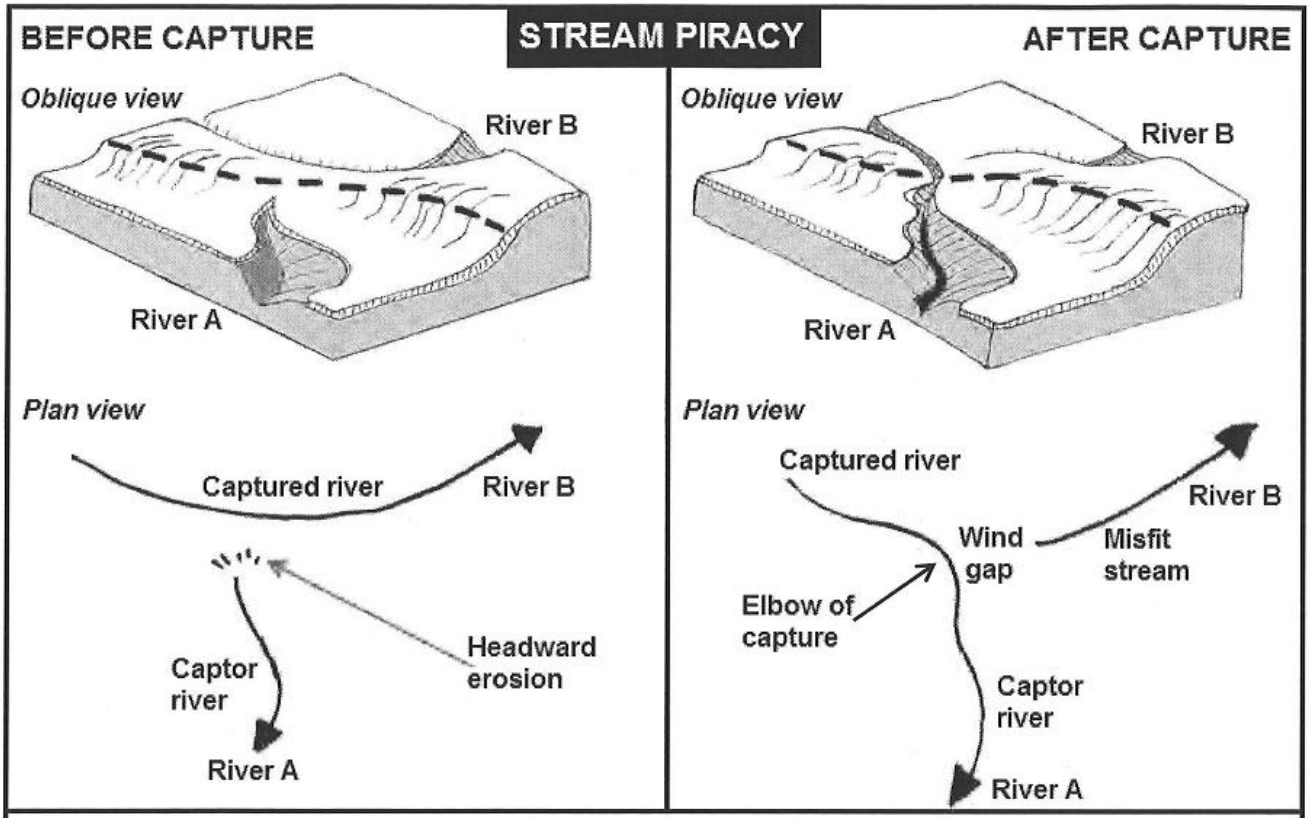
- **Drop in sea level**
- **Land rises**
- **Increase in rainfall**
- **Fast flowing tributary**
- **Stream piracy**

You must be in a position to do/answer the following:
- Identify the process of rejuvenation on a diagram.
- Define the concept, rejuvenation.
- Explain how rejuvenation occurs.
- Identify/describe the features/landforms of rejuvenation.

1 NATURAL LEVEES
A BEFORE FLOOD
B DURING FLOOD
Sediment deposited
C AFTER MANY FLOODS
Natural levees built up
2 CROSS PROFILE: MEANDER
Small river cliff
Slowest flow
Fastest flow
Deposition
Erosion
Undercut slope
Slip-off slope
3 FORMATION OF AN OX-BOW LAKE
1 Neck of land separates two banks where erosion occurs
2 The river cuts through this neck. made easuer by flooding
3 Deposition seals the end. Oxbow lake formed
Deposition
FLUVIAL LANDFORMS
Floodplain
Meander
Oxbow lake
Natural levees
4 BRAIDED STREAM
Islands
- Deposition
- Multiple channels
- Islands between streams
5 DELTAS
Shoreline
Large amount of material deposited in the sea
River divides into smaller channels
6 WATERFALLS
5 Waterfall retreats upstream
2 Hard rock forms a ledge
1 Soft rock erodes faster
3 Overhang collapses
4 Plungepool formed

STREAM PIRACY

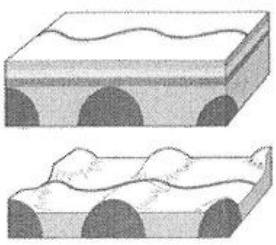
Stream piracy (river capture) takes place when the energetic stream (captor stream) cuts back and intercepts (takes) the water from the other river (captured/beheaded river).



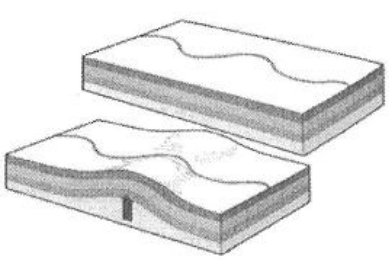
Headward erosion at river A resulted in the capturing of the water of river B.

FEATURE	EXPLANATION
Captor river	The energetic stream that intercepts (takes) the water of the other river.
Captured river	The river which water was intercepted (taken) by the captor river.
Misfit stream	The river that has lost its water. (Also called beheaded stream)
Elbow of capture	The place where stream piracy has taken place
Wind gap	The dry river valley between the elbow of capture and the misfit stream
Waterfall	May form at the point where the captured river flows into the captor river

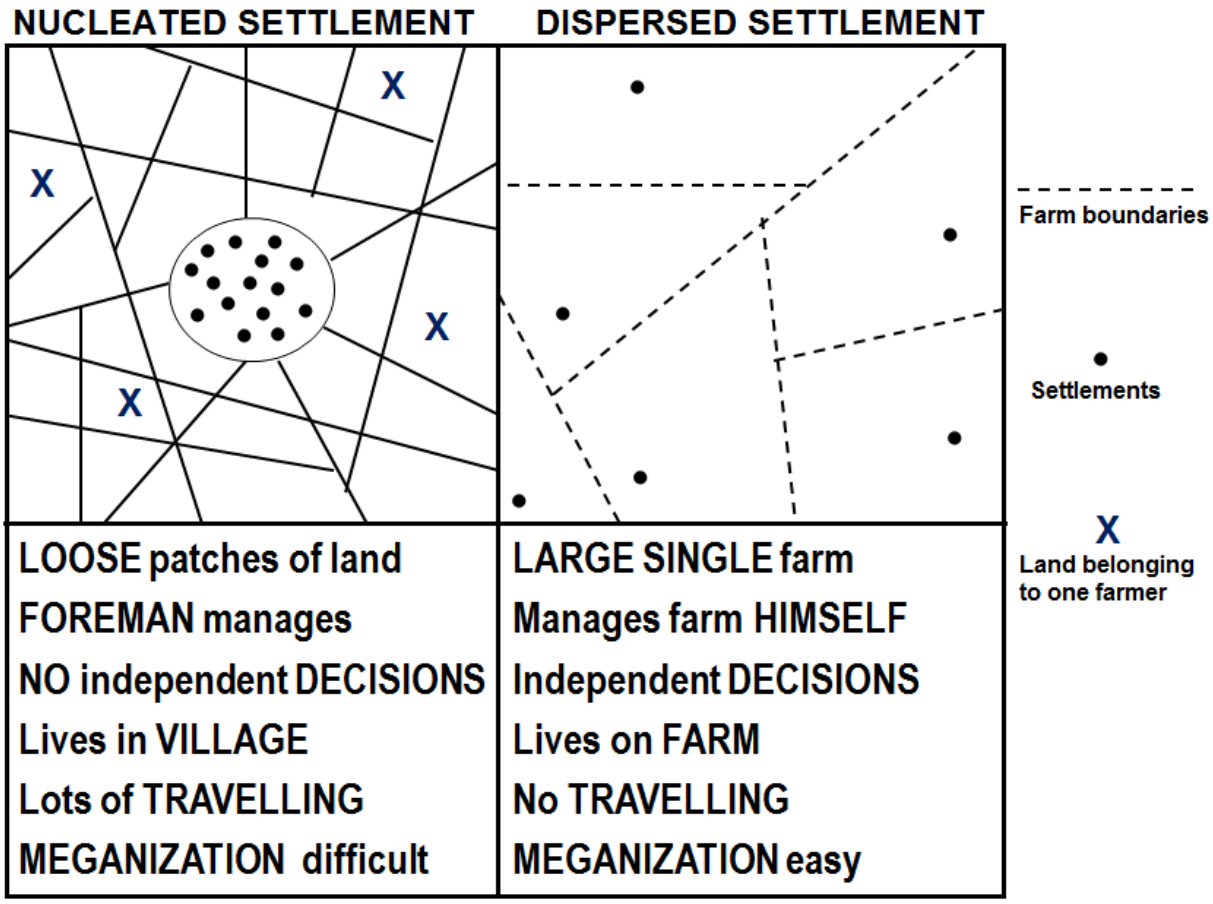
SUPERIMPOSED AND ANTECEDENT DRAINAGE

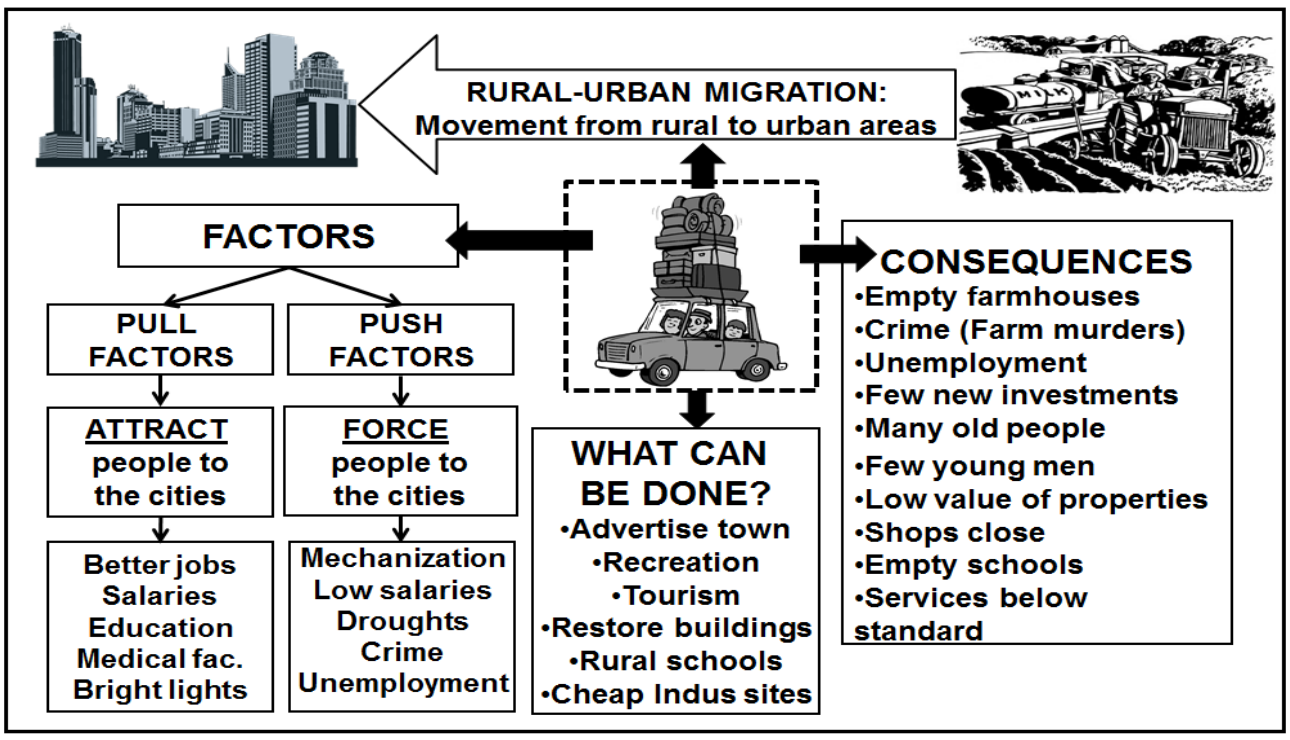


The river is younger than the features it flows over and erodes into.

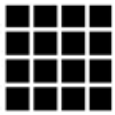


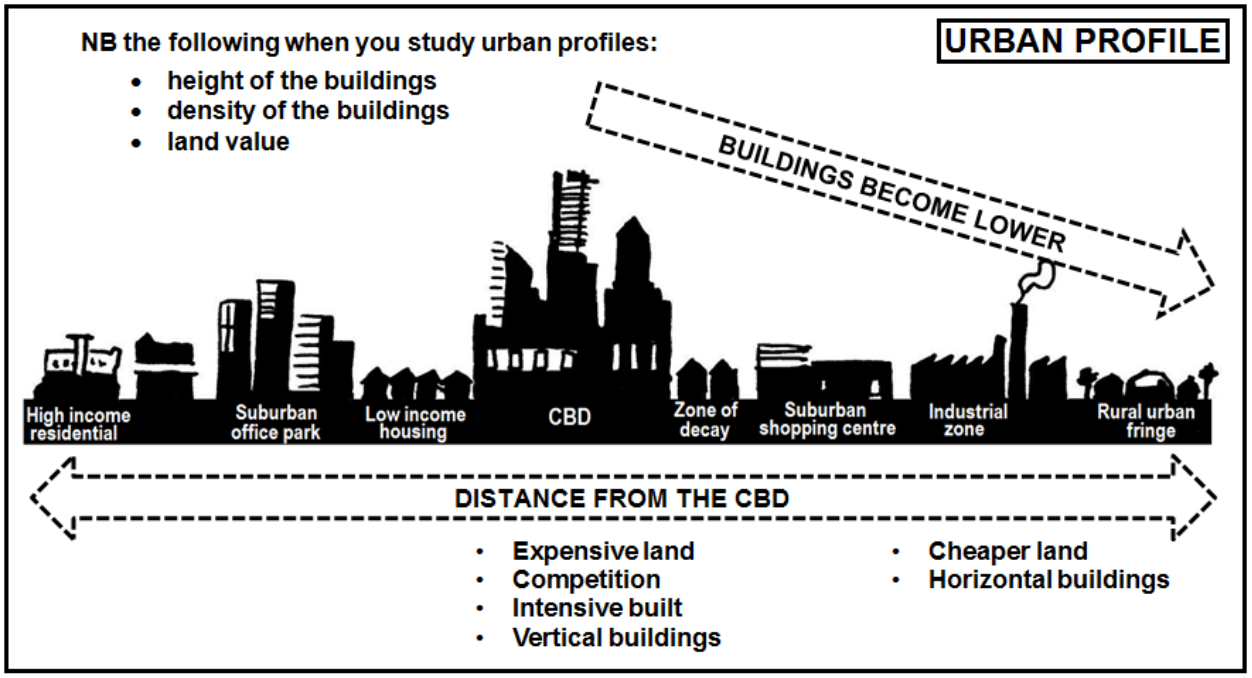
The river is older than the structures it flows over


NUCLEATED SETTLEMENT
DISPERSED SETTLEMENT
X
X
X
X
Farm boundaries
Settlements
X
Land belonging to one farmer
LOOSE patches of land
FOREMAN manages
NO independent DECISIONS
Lives in VILLAGE
Lots of TRAVELLING
MEGANIZATION difficult
LARGE SINGLE farm
Manages farm HIMSELF
Independent DECISIONS
Lives on FARM
No TRAVELLING
MEGANIZATION easy


RURAL-URBAN MIGRATION:
Movement from rural to urban areas
FACTORS
PULL FACTORS
PUSH FACTORS
ATTRACT people to the cities
FORCE people to the cities
Better jobs
Salaries
Education
Medical fac.
Bright lights
Mechanization
Low salaries
Droughts
Crime
Unemployment
WHAT CAN BE DONE?
•Advertise town
•Recreation
•Tourism
•Restore buildings
•Rural schools
•Cheap Indus sites
CONSEQUENCES
•Empty farmhouses
•Crime (Farm murders)
•Unemployment
•Few new investments
•Many old people
•Few young men
•Low value of properties
•Shops close
•Empty schools
•Services below standard

LAND-USE ZONES			
Land use zone		**Where?**	**Characteristics**
CBD		• Most accessible • Where transport routes meet • In the city centre	• Highest land values • Highest building density • Tallest buildings • Concentration of shops and offices • High-order commercial functions
Industries	**(a) Light industry**	• Often near CBD or residential areas • In planned industrial estates • Near road transport	• Little noise and air pollution • No heavy machinery
	(b) Heavy industry	• On outskirts of the city on cheap land • Near major road and rail networks • On flat land • Near water source	• Lots of air and noise pollution • Dangerous
Residential	**(a) Middle to high income**	• Found away from CBD • Good view	• Larger properties • Good services • Recreational areas
	(b) Low income	• Closer to CBD	• Houses close together • Fewer facilities • Poor services • Smaller properties
	(c) Informal settlement	• On the city outskirts	• Houses built out of plastic, wood, zinc • Unhealthy conditions • No service delivery • Poverty • Crime
Zone of decay (Transition zone)		• Just outside the CBD	• Mixed functions (residential, commercial, light industry) • Decayed buildings • Renewal • Valuable land
Rural-urban fringe		• On edge of urban area	• Urban functions invade rural area • Both Urban and rural functions • Large properties because of cheaper land • Plots and small holdings • Airports, cemeteries, power stations, golf courses, sewage works
Green belt		• In/around CBD	• Parks and sports fields • No buildings in this area • Cleans air in urban areas • For recreation purposes • Very dense housing

Name	Gridiron/Rectangular	Radial	Irregular
			
Characteristics	Roads intersect at right angles	Roads radiate outwards from central point like spider's web	• No clear structure • Can be planned or unplanned
Advantages	• Easy to plan • Land divided easily • Easy to find way	• Easier flow of traffic • All roads lead to central point	• Improves traffic flow • Fewer intersections • Accommodates topography
Disadvantages	• Traffic congestion • Monotonous • Accidents	• Traffic jams • Traffic is slow • Wasted space	• Difficult to plan • Easy to get lost • Not easy to expand or subdivide



	CONGESTION	URBAN DECAY	SENTRALISATION
CAUSES	•Too many people using own cars •Not enough public transport •Old street pattern	•Too many people living in the city •Empty buildings	•High demand for land in city •Too many people living in the city
EFFECTS	•Air pollution •More accidents •Stress, health problems road rage	•Slums develop •Services decline •Increased pollution •Area becomes dirty	•Increased pollution •Health problems •Destruction of environment •Production of too much waste
SOLUTIONS	•Improve public transport •Lift schemes •Decentralisation of businesses •Synchronise traffic lights	•Renovation •Renewal •Reduce housing density •Improve services	•Decentralisation of functions •Green belts •Stricter control of pollution

GEOGRAPHIC INFORMATION SYSTEMS (GIS)

1 WHAT IS A GIS?

A GIS is a

- a computer system of hardware, software and methods
- to capture, manage, manipulate, analyse, model, display
- spatial data (geographic objects) and
- non-spatial data (attribute data)
- **to solve planning and management problems.**

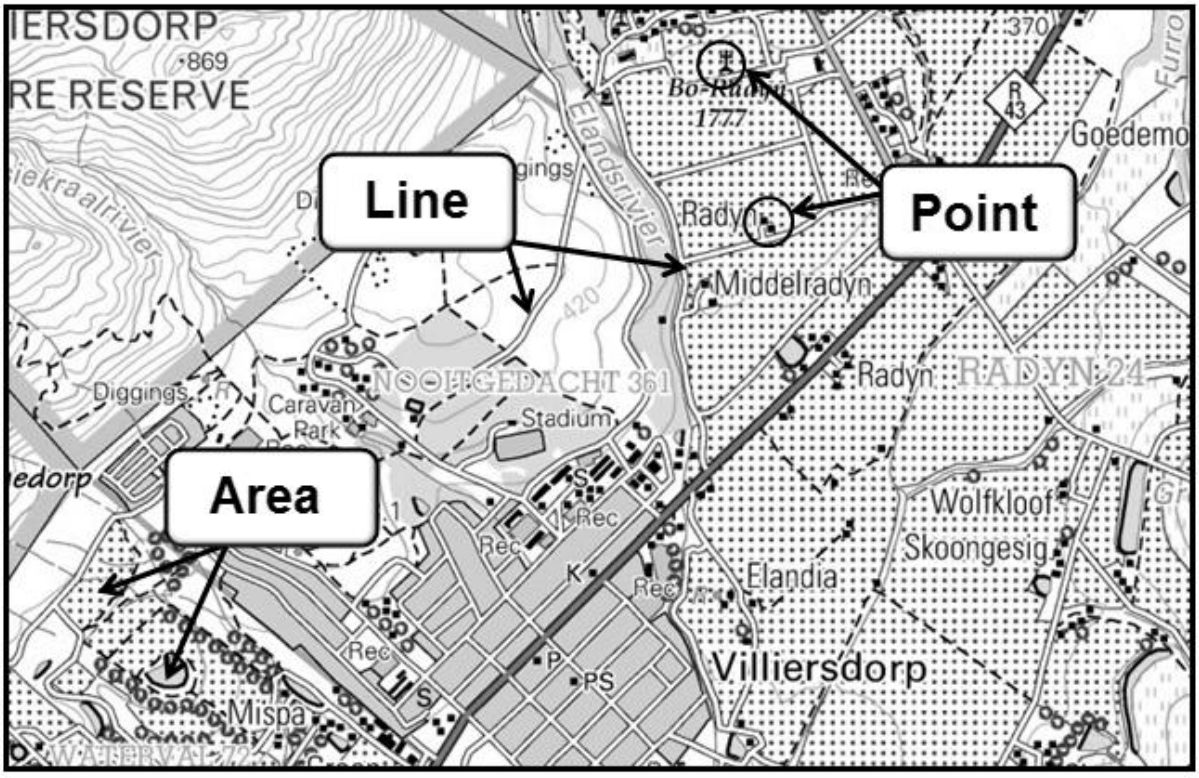
2 COMPONENTS OF GIS

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.

3 REMOTE SENSING

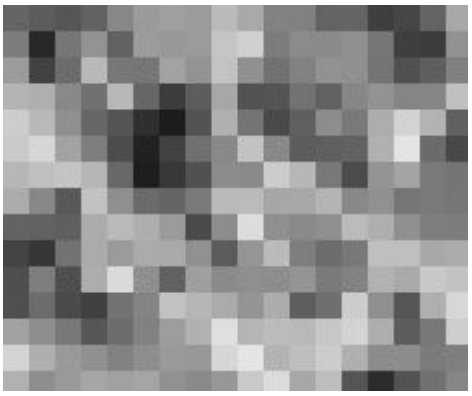
The collecting of information of the earth's surface **without actually being in contact with it.** (weather balloons, aeroplanes and satellites)

4 SPATIAL OBJECTS



5 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

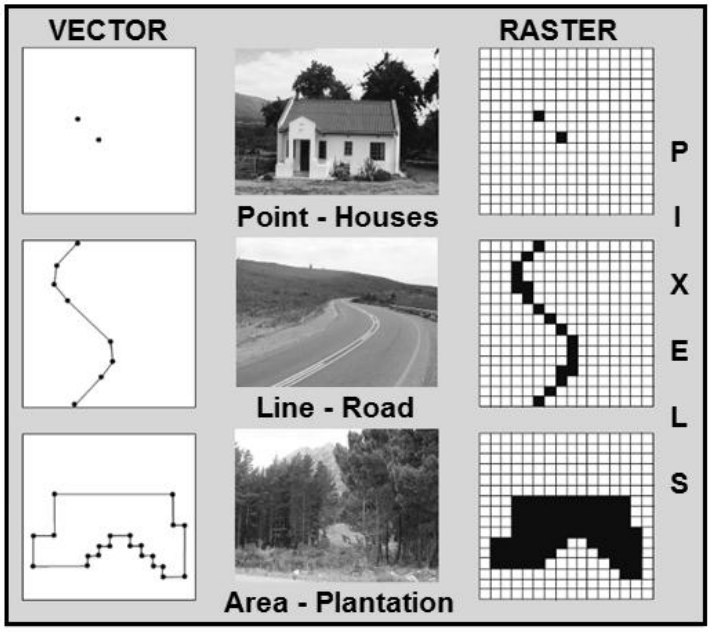
6 SPATIAL DATA

All geographic features/objects both natural and man-made [Map data]

7 RASTER AND VECTOR DATA

In **VECTOR DATA** objects on the surface of the Earth are represented by using a **point**, a **line** or an **area** (polygon).

In **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.

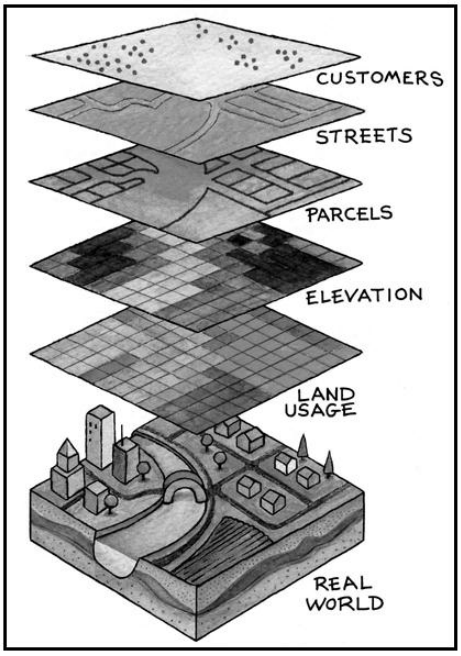


8 ATTRIBUTE DATA

Characteristics/description/information of the geographic objects.

ATTRIBUTES FOR HOSPITAL				
Name	**Address**	**Number of doctors**	**Number of nursing staff**	**Number of beds**
Seaview General Hospital	**Kam Street Stanford**	**6**	**24**	**60**

9 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.

10 DATA MANIPULATION

What is data manipulation?

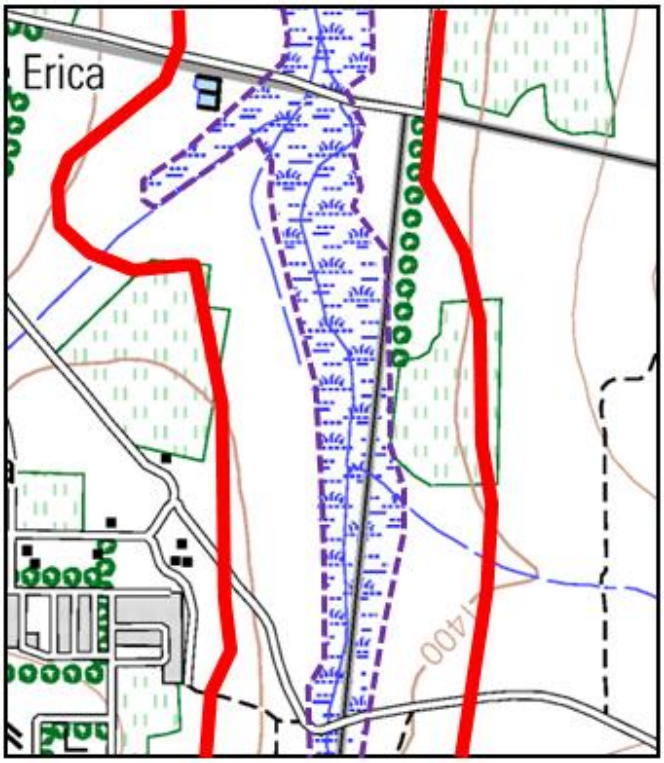
Data manipulation involves getting the different data sources into a format that can be integrated

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 such a file format that it can be used in the GIS software and linked to specific spatial features
- Errors in the database can be eliminated during manipulation

11 DATA INTEGRATION

The integration of data involves the combination of two or more data layers in order to create a new one



12 BUFFERING

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

Examples

- noise buffers next to roads
- safety buffers for dangerous areas.

Exam question
Create a buffer zone of 250m around marsh/vlei area.

Remember that 250m in reality will be 5mm on a 1:50 000 map.

13 HOW TO USE GIS

Grade 12 Paper 2 GIS Question asks questions relating to analysis.

- Determine/identify/name which data layers to use in solving a problem.
- Without thinking about GIS identify factors/issues that play a role or relates to the problem.
- This will also be the data layers needed in the analysis to get the solution to the problem?

SHOPS

1. Available plots
2. Costs of plots
3. Distance to other shops
4. Client base
5. Client buying habits
6. Central place
7. Influence sphere

CRIME

1. Type
2. Location
3. Time
4. Frequency
5. Risk zones
6. Neighbourhood characteristics

TELECOM

1. Relief (contours)
2. Viewsheds
3. Intervisibilty
4. Distance between towers
5. Signal strength

TERRAIN ANALYSIS

1. Vegetation type
2. Vegetation structure
3. Soil type
4. Soil texture
5. Soil moisture
6. Slopes
7. Aspect
8. Surface roughness

FLOODS

1. Relief (contours)
2. History
3. Rainfall figures
4. 50 year flood line
5. Development above 50yfl
6. Development below 50yfl
7. Bridges
8. Residential areas affected
9. Evacuation routes