TELEMATICS 2016

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 mapwork section.

This resource pack includes the following:
- **Theory**: Mindmaps of the lessons that will be broadcasted. This is a good summary of your class notes and can help you with your examination preparation.
- **Mapwork**: Questions and answers as well as a guideline to calculations.
- **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 2016

#### GRADE 12 GEOGRAPHY SUPPORT – FIRST TERM

<table>
<thead>
<tr>
<th>DATE</th>
<th>TIME</th>
<th>TOPIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday</td>
<td>2 February</td>
<td>16:00 – 17:00</td>
</tr>
<tr>
<td>Tuesday</td>
<td>1 March</td>
<td>16:00 – 17:00</td>
</tr>
</tbody>
</table>

#### GRADE 12 GEOGRAPHY SUPPORT – SECOND TERM

<table>
<thead>
<tr>
<th>DATE</th>
<th>TIME</th>
<th>TOPIC</th>
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<tbody>
<tr>
<td>Thursday</td>
<td>14 April</td>
<td>16:00 – 17:00</td>
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#### GRADE 12 GEOGRAPHY SUPPORT – THIRD TERM

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<th>DATE</th>
<th>TIME</th>
<th>TOPIC</th>
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<tr>
<td>Tuesday</td>
<td>19 July</td>
<td>16:00 – 17:00</td>
</tr>
<tr>
<td>Wednesday</td>
<td>17 August</td>
<td>16:00 – 17:00</td>
</tr>
</tbody>
</table>
1. Characteristics
- Cold front
- Clockwise rotation
- Circular isobars
- Low pressure
- Warm sector
- Warm front
- Cold sector
- Occlusion

2. Where formed?
- Equatorial LP (ITCZ)
- Subtropical HP
- Warm air
- Polar front
- Cold air
- Polar HP

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
- Cold front
- Warm front
- Cumulonimbus
- Cirrus
- Warm air
- Altostratus
- Nimbostratus
- Warm air
- Cold air
- Cumulonimbus
- Cirrus
- Warm air
- Altostratus
- Nimbostratus
- Cold air
- Warm air
- Cold air
- Warm air
- Cold air
- Warm air

5. Stages
- Initial stage
- Development stage
- Mature stage
- Occlusion

6. Weather patterns

<table>
<thead>
<tr>
<th>Temp</th>
<th>Cold front</th>
<th>Warm front</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sudden drop</td>
<td>Increases</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Air pressure</th>
<th>Cold front</th>
<th>Warm front</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increases</td>
<td>At lowest</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wind change</th>
<th>Cold front</th>
<th>Warm front</th>
</tr>
</thead>
<tbody>
<tr>
<td>NW to SW</td>
<td>NE to N / NW</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cloud cover</th>
<th>Cold front</th>
<th>Warm front</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thick</td>
<td>Decreases</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rainfall</th>
<th>Cold front</th>
<th>Warm front</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy</td>
<td>Stops</td>
<td></td>
</tr>
</tbody>
</table>

7. Impact
- Flooding
- Snow hazards in high-lying areas
- Loss of livestock
- Negative impact on economy
High pressure cells that affect the weather of SA

The Kalahari High creates a temperature inversion

In winter the inversion layer is lower than the escarpment preventing the warm moist air from the Indian Ocean moving inland.

Benguela (cold)

South Atlantic H

Causes SW winds to blow towards the land. Responsible for dry conditions along the west coast.

Agulhas (warm)

Produces clear skies and dry conditions in the interior during winter.

Mozambique (warm)

South Indian H

Causes NW winds to blow towards the eastern parts of SA. Responsible for rain in eastern SA.

Line Thunderstorms

Meet at Moisture front

Warm air rises, condensation

Warm, moist air from NE

Warm current

Warm Mozambique

Anti-clockwise circulation

South Atlantic H

Cold current

Cold Benguela

Cold, dry air from SW

Thunderstorms

South Indian H

Anti-clockwise circulation
### Drainage Basins

- **Source**: Where the river begins
- **River mouth**: End of the river where it flows into a larger body of water
- **River system**: Main river with its tributaries

### Features

- **High YIP**: High YIP near supportive streams
- **Outlet**: High YIP near supportive streams
- **Groundwater basin**: Upper level of an underground stream
- **Watershed**: Area over which rain falls and is collected by drainage basins

### Types of Rivers

<table>
<thead>
<tr>
<th>River</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nile</td>
<td>Orange</td>
</tr>
<tr>
<td>Andes</td>
<td>MSGP</td>
</tr>
<tr>
<td>Limpopo</td>
<td>Amazon</td>
</tr>
</tbody>
</table>

### Stream Orders

- **1st Order**: 1
- **2nd Order**: 2
- **3rd Order**: 3
- **4th Order**: 4

### Types of Erosion

- **Hydrological erosion**: Reduction of soil through rain
- **Sheet erosion**: Erosion by rain
- **Stream erosion**: Erosion by water
- **Breakage erosion**: Erosion by river

### Exotic Regions of Climatic Types

- **Rainfall**: Permanent rainfall
- **Flow after heavy rainfall**: Seasonal flows
- **Flow in rainy season**: Periodic flows

### Drainage Density

- **High density**: More interception
- **Low density**: Less interception
### Drainage Patterns

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Description</th>
<th>Structures</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel</td>
<td>Streams flow parallel to each other, no bends or changes in direction.</td>
<td>Common drainage with a ridge of hills.</td>
<td><img src="parallel.png" alt="Diagram" /></td>
</tr>
<tr>
<td>Deranged</td>
<td>Streams flow in a random, scattered pattern.</td>
<td>Common drainage such as a marsh.</td>
<td><img src="deranged.png" alt="Diagram" /></td>
</tr>
<tr>
<td>Rectangular</td>
<td>Streams flow towards a central basin, no bends or changes in direction.</td>
<td>Common drainage with a well-defined central basin.</td>
<td><img src="rectangular.png" alt="Diagram" /></td>
</tr>
<tr>
<td>Radial</td>
<td>Streams flow away from a central point, with branches extending outward.</td>
<td>Common drainage with layers of hard rock and gently sloping terrain.</td>
<td><img src="radial.png" alt="Diagram" /></td>
</tr>
<tr>
<td>Trellis</td>
<td>Streams join to form a branching pattern.</td>
<td>Common drainage with similar hardrock layers and gentle slopes.</td>
<td><img src="trellis.png" alt="Diagram" /></td>
</tr>
<tr>
<td>Dendritic</td>
<td>Streams flow in a radial pattern, with branches extending outward.</td>
<td>Common drainage with similar hardrock layers and gentle slopes.</td>
<td><img src="dendritic.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

*You must be in a position to do the following:*
- **Describe** the underlying structures that caused the pattern.
- **Give a description of the patterns.**
- **Identify** the stream patterns on topographic maps.
- **Identify** each of the patterns on the diagrams.
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

<table>
<thead>
<tr>
<th>COURSE/STAGE</th>
<th>UPPER COURSE (YOUNG STAGE)</th>
<th>MIDDLE COURSE (MATURE STAGE)</th>
<th>LOWER COURSE (OLD STAGE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CROSS PROFILE</td>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
<td><img src="image3" alt="Diagram" /></td>
</tr>
<tr>
<td>GRADIENT</td>
<td>Steep</td>
<td>Gradual</td>
<td>Almost flat</td>
</tr>
<tr>
<td>SPEED</td>
<td>Flows fast</td>
<td>Flows slower</td>
<td>Flows very slowly</td>
</tr>
<tr>
<td>PROCESSES</td>
<td>Downward erosion</td>
<td>Lateral erosion</td>
<td>Deposition</td>
</tr>
<tr>
<td>LANDFORMS</td>
<td>- Waterfalls</td>
<td>- Meanders</td>
<td>- Sandbanks</td>
</tr>
<tr>
<td></td>
<td>- Rapids</td>
<td>- Spurs</td>
<td>- Marshes</td>
</tr>
<tr>
<td></td>
<td>- Spurs</td>
<td></td>
<td>- Braided stream</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Meanders</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Oxbow lakes</td>
</tr>
</tbody>
</table>

*Diagram showing changes in river profile and processes:*
GRADED AND UNGRADED RIVER PROFILES

UNGRADED PROFILE

Waterfall
Rapid
Lake
River has many temporary bases of erosion along profile

GRADED PROFILE

Concave profile
Temporary basis of erosion has been removed

RIVER REJUVENATION

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

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

Upper course
Middle course
Lower course

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.
**Fluvial Landforms**

1. **Natural Leves**: Formed by flooding and sediment deposition.
2. **Formation of an Ox-Bow Lake**: Occurs when a meander cuts off and becomes isolated.
3. **Deposition of the Ox-Bow**: Sediment builds up, creating a new landform.
4. **Mudflow Deposits**: Formed by water erosion and deposition.
5. **Braided Streams**: Multiple channels forming islands between streams.
6. **Delta**: Channels narrow into smaller river delta.
7. **Shoreline Development**: Large amount of material deposited opposite.
8. **Waterfalls**: Formation of a ledge.

**Cross Profile: Meander**

- **Deposition on the Outside**: Material is deposited on the outer side of the meander.
- **Erosion on the Inside**: Eroded material is carried away by the river.
- **說明 Slope of the River**: The river flows down the slope.
- **Formation of an Ox-Bow Lake**: The meander cuts off and becomes isolated.
- **Natural Leves Formation**: Sediment builds up, creating a new landform.
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).

**BEFORE CAPTURE**

**STREAM PIRACY**

**AFTER CAPTURE**

---

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

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

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**SUPERIMPOSED AND ANTECEDENT DRAINAGE**

**SUPERIMPOSED DRAINAGE**

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

**ANTECEDENT DRAINAGE**

The river is older than the structures it flows over.
GEOGRAPHICAL MAPWORK SKILLS AND TECHNIQUES

1 CONTOURS AND SLOPES

- Contour lines join places with the same height above sea level.
- Contours far apart show a gentle slope.
- Contours close together show a steep slope

1.1 Concave slope

1.2 Convex slope

1.3 Terraced slope
MAP REFERENCE

3318DB PAARL

33° S

A B A B

C D C D

A B A B

C D C D

34° S

18° E 19° E

LOCATION IN DEGREES, MINUTES AND SECONDS

1° = 60'
1' = 60"

26° 46' S; 29° 01' E

26° 45' 12" S; 29° 00' 41" E
4 INTERVISIBILITY

5 DIRECTION OF RIVER FLOW

The following methods can be employed in determining the direction of river flow.

1 Flows from the land towards the sea

2 Flows from high to low

3 Contours point upstream

4 Tributaries join downstream

5 The damwall shows downstream

Paarl Rock is not visible from the dam

Paarl Rock is visible from the school
READ AND INTERPRETATION OF MAPS AND ORTOPHOTOS
The goal of this guide is to empower you with regard to the answer of interpretation questions in mapwork. Remember that there is a large amount of information on the topographical and ortophoto map. To answer these questions successfully, you must know what to look at to get to the answer. Most of these questions come from previous exam question papers. Other questions have also been included. Remember that this is not a memorandum which has been given with the questions, but an attempt to show what you should look at to get to the answers. It is important to take note that ALL content, modules and skills can be assessed in the mapwork paper. Use this guide to study and prepare yourself for the mapwork question paper (Paper 2).

CLIMATOLOGY

1 Does the area receive seasonal rainfall or rainfall throughout the year?
   Seasonal: Non-perennial rivers/ dams/ cultivated lands near rivers/ irrigation/ furrows

2 Which slope is the warmest?
   The northward-facing slope – identify the northward-facing slope

3 In which direction will an airplane take off and land?
   (Remember that airplanes take off and land against the wind.)

4 In which direction will the smoke blow if a fire is made in the evening on the middle slopes?
   NB KATABATIC flow. Smoke will move DOWNWARDS towards the valley.

5 Where would you find temperature inversions?
   In the valley

GEOMORPHOLOGY

1 Physical aspects influencing the construction of railways and roads.
   Mountains/ steep slopes/ marshes/ rivers/

2 In which direction does the river flow?
   - To the sea
   - Always from high to low
   - Contours bend upstream
   - Dam wall on downstream side
   - Tributaries join at acute angles

3 Identify the stream pattern in the area
   Types: Dendritic, radial, rectangular, trellis – You must know what each one looks like

4 In what stage is the river on the map?
   • Upper course: Steep/mountainous/waterfalls/short tributaries/ high watersheds
   • Middle course: Gradual slope/ Longer tributaries/ low watershed
   • Lower course: Very gradual/ meanders/ sand deposits/ marshes/ oxbow/ lakes

5 Name temporary basis found in the river
   Waterfall/ dams/ lakes

6 What indication is there that rejuvenation occurred in the river?
   Waterfall
ENVIRONMENTAL STUDIES AND SUSTAINABILITY

1. Evidence of nature conservation
   Nature reserve/ hiking trail/ fire break/ game reserve

2. Evidence of conservational farming.
   Anti-erosion walls/ camps/ rows of trees to reduce wind/ contour ploughing

3. Are there sources of air pollution in the area??
   - Air pollution: Industries
   - Noise pollution: Airport
   - Water pollution: Factories / camping sites/ Power station near river

4. Identify environmental injustice caused by mining
   Groundwater polluted/ landscape scarred/ food chain destroyed

ECONOMIC GEOGRAPHY

(a) PRIMARY ACTIVITIES (FARMING / MINING)

1. Commercial or subsistence farming?
   Commercial: Good infrastructure/ irrigation/ large farms/ farm names/ cellar/ dipping tank/
   experimental farm/ estate/ sugar mill/ service rail/ abattoir/ dairy
   Subsistence: Few roads/ footpaths/ no power lines/ small patches of cultivated land

2. Describe factors that advantage/disadvantage farming activities
   Advantage: Rivers/ dams/ flat land/ power lines/ railway lines
   Disadvantage: Steep slopes/ water scarce/ marshes

3. Identify mining activities
   Excavations/ mine dump/ conveyer belt/ terraces/ names of mines/ old mines/ subsiding ground

4. Identifying of fishing activities
   Fishing harbours/ fishermen’s houses/ factories near coast

5. Identifying of forestry
   Trees/ woodlands/ saw mill/ lookout towers/ fire break/ state forest

(b) SECONDARY ACTIVITIES (INDUSTRIES)

1. Describe the factors that influenced the location of the industries
   Flat surface/ raw material/ Transport (name the types)/ power (power station, power lines, coal mines)/ water/ labour (residential areas)/ Market/ outskirts/

2. Heavy or light industries?
   Heavy: Far from CBD/ railway transport/ Raw material-mining/ large spaces/
   Light: close to CBD / road transport/ raw material - farming
TERTIARY ACTIVITIES (SERVICES)

1 Tourist attractions, holiday resorts, camping sites
   Close to beaches/ close to road railway/ wine tasting/ historical buildings/ monuments/ museums

2 Types of services found
   Electricity supply/ telephone/ medical/ pot office/ education/(school/ college/ university)
   transport (roads airport railway)/ police services etc. (buildings on map)

3 Recreation facilities?
   Golf course/ athletics/ rifle range/ racing track/ etc

4 Factors that determined the location of the airport
   Flat area/ far from built-up area for safety/ noise/ roads/

5 Does the railway line and the road follow the same routs? Why not?
   The same? NB influence of topography
   Road: through mountain pass. Railway around mountain (between Paarl and Worcester)

6 For what is the dam on the map used? Give reasons
   Drinking water: Water purification works
   Irrigation: cannels and furrows
   Recreation: Yacht club, Hotels at dam, camping site, caravan park, slipway, etc.

SETTLEMENT

(a) RURAL SETTLEMENT

1 Why is the settlement located there?
   Flat area/ roads/ river/ mountain/ sea/ etc

2 Is it an urban or a rural settlement?
   Rural: Primary activities
   Urban: Secondary and Tertiary activities

3 Nucleated or dispersed? (pattern)
   Nucleated: Buildings near to each other
   Dispersed: Buildings far

4 Factors influencing shape of settlements
   Linier: Roads / river
   Round: Central point
   Crossroad: Roads that cross or join

(b) URBAN SETTLEMENT

1 Factors influencing site of the urban settlement on the map
   Flan land/ roads/ river/ mountains/ sea/ etc
2 Identify the land-use zone a ..... on the map
- CBD: Accessibility/ functions
- INDUSTRIES: Light or heavy/ influencing factors (see economic)
- COMMERCIAL: In CBD/ Shops in residential areas/ shopping malls
- RESIDENTIAL AREAS: High income- Large plots/ mountain or hill/ tennis courts/ swimming pools/ parks. Low Income: Near industries/ small plots
- RURAL URBAN FRINGE: Racing rack/ power station/ cemetery/ golf course etc

3 Identify street patterns, characteristics
Must be able to identify and describe rectangular, irregular and radial concentric street patterns. Advantages and disadvantages

CALCULATIONS

DISTANCE

FORMULA: Distance = \( \frac{\text{Map distance} \times \text{Scale}}{100 \, 000} \)

Calculate the length of the national road from A to B.

\[ \text{Distance} = 4.8 \text{ cm} \]

\[ \text{Distance} = \frac{4.8 \times 50 \, 000}{100 \, 000} \]

\[ = \frac{480}{100} \]

\[ = 4.8 \text{ km} \]

=2.4 km
Calculate the area of Blok X.

**AREA**

**FORMULA:** \( \text{AREA} = \text{Length} \times \text{Breadth} \)

**STEP 1**
Calculate length of block in \( \text{cm} \)

\[
\text{Length} = \frac{5 \text{ cm} \times 50 \, 000}{100 \, 000} = 2.5 \text{ km}
\]

**STEP 2**
Calculate breadth of block in \( \text{cm} \)

\[
\text{Breadth} = \frac{3 \text{ cm} \times 50 \, 000}{100 \, 000} = 1.5 \text{ km}
\]

**STEP 3**
Place in Formula

\[
\text{Area} = \text{l x b} = 2.5 \times 1.5 = 3.75 \text{ km}^2
\]

**STEP 4**
Answer in \( \text{km}^2 \)
GRADIENT

**FORMULA:**  \[ \text{Gradient} = \frac{VI}{\text{HE}} \]  

(Difference in height) 

(Horizontal distance)

Calculate the gradient from C to D.

**STEP 1**  
Calculate difference in height

\[ 460 - 340 = 120\text{m} \]

**STEP 2**  
Calculate distance

\[
\text{Distance} = \frac{\text{Map distance} \times \text{Scale}}{100 \ 000} \\
= \frac{4.8 \times 50 \ 000}{100 \ 000} \\
= 2.4 \text{ km} \\
= 2400\text{m} 
\]

**STEP 2**  
Convert to METERS

**STEP 4**  
Place in formula and SIMPLIFY

\[
\text{Gradient} = \frac{\text{Difference in height}}{\text{Distance}} \\
= \frac{120\text{m}}{2400\text{m}} \\
= \frac{1}{20} \\
= 1:20
\]

**STEP 5**  
Answer as a ratio
**MAGNETIC DECLINATION AND MAGNETIC BEARING**

Magnetic declination is the difference between true North and magnetic North (on compass).

Mean magnetic declination 23° 53’ West of true north (Julie 2002). Mean annual change 6’ Westwards.

Calculate magnetic declination for 2009.

**STEP 1**
Calculate difference in years

2009 – 2002
= 7 years

**STEP 2**
Calculate total change

6’ x 7 years
= 42’ West

**STEP 3**
Add or subtract from magnetic declination

\[ 23° \text{ 53’} + \frac{42’}{60} = 23° \text{ 53’} + 0° \text{ 07’} = 23° \text{ 60’} = 24° \text{ 05’} \text{ West} \]

**STEP 4**
Remember: Minutes cannot be more than 60!

**MAGNETIC BEARING**
Magnetic bearing is calculated by simply adding the bearing

**NB The following when you work with Magnetic Declination**
1. What is the mean mag. declination (in degrees & minutes?  
2. In which direction is the magnetic declination?  
3. In which year is the magnetic declination given?  
4. What is the mean annual change?  
5. In what direction is the average yearly change?  
6. For what year must the mag. declination be calculated?**
5 VERTICAL EXAGGERATION

**FORMULA:** \( V_E = \frac{\text{VERTICALE SCALE}}{\text{HORIZONTAL SCALE}} \)

*Calculate the vertical exaggeration of the following*

4mm = 20m  
4mm = 20 000mm (same units)  
4 : 20 000  
1 : 5 000

**STEP 1**  
Convert VS to ratio scale

**STAP 2**  
Place in formula

\[
V_E = \frac{1}{5 000} \div \frac{1}{50 000}
\]

\[
= \frac{1}{5 000} \times \frac{50 000}{1}
\]

= 10 Times
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

<table>
<thead>
<tr>
<th>Hardware</th>
<th>CPU, screen, keyboard, mouse, scanner, printer, digitizing tablet.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software</td>
<td>Application programme such as ArcView.</td>
</tr>
<tr>
<td>Data</td>
<td>Maps, aerial photos, satellite images, administrative records, etc.</td>
</tr>
<tr>
<td>People</td>
<td>Data capturers, data users, GIS analysts.</td>
</tr>
<tr>
<td>Methods</td>
<td>GIS design according to user’s needs.</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>HIGH RESOLUTION</th>
<th>LOW RESOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Many pixels</td>
<td>Less pixels</td>
</tr>
<tr>
<td>Small pixels</td>
<td>Larger pixels</td>
</tr>
<tr>
<td>Objects easily recognised</td>
<td>Objects not easily recognised</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>ATTRIBUTES FOR HOSPITAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
</tr>
<tr>
<td>Seaview General Hospital</td>
</tr>
<tr>
<td>Address</td>
</tr>
<tr>
<td>Kam Street Stanford</td>
</tr>
<tr>
<td>Number of doctors</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>Number of nursing staff</td>
</tr>
<tr>
<td>24</td>
</tr>
<tr>
<td>Number of beds</td>
</tr>
<tr>
<td>60</td>
</tr>
</tbody>
</table>
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?

<table>
<thead>
<tr>
<th>SHOPS</th>
<th>CRIME</th>
<th>TELECOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Available plots</td>
<td>1. Type</td>
<td>1. Relief (contours)</td>
</tr>
<tr>
<td>2. Costs of plots</td>
<td>2. Location</td>
<td>2. Viewsheds</td>
</tr>
<tr>
<td>3. Distance to other shops</td>
<td>3. Time</td>
<td>3. Intervisibility</td>
</tr>
<tr>
<td>5. Client buying habits</td>
<td>5. Risk zones</td>
<td></td>
</tr>
<tr>
<td>6. Central place</td>
<td>6. Neighbourhood characteristics</td>
<td></td>
</tr>
<tr>
<td>7. Influence sphere</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TERRAIN ANALYSIS</th>
<th>FLOODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Vegetation type</td>
<td>1. Relief (contours)</td>
</tr>
<tr>
<td>2. Vegetation structure</td>
<td>2. History</td>
</tr>
<tr>
<td>3. Soil type</td>
<td>3. Rainfall figures</td>
</tr>
<tr>
<td>4. Soil texture</td>
<td>4. 50 year flood line</td>
</tr>
<tr>
<td>5. Soil moisture</td>
<td>5. Development above 50yfl</td>
</tr>
<tr>
<td>7. Aspect</td>
<td>7. Bridges</td>
</tr>
<tr>
<td>8. Surface roughness</td>
<td>8. Residential areas affected</td>
</tr>
<tr>
<td></td>
<td>9. Evacuation routes</td>
</tr>
</tbody>
</table>