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KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

CURRICULUM GRADE 10 -12 DIRECTORATE

NCS (CAPS) SUPPORT

HIGH RISK LEARNER REVISION DOCUMENT

LEARNERS and TEACHER

GEOGRAPHY

GRADE 12

2026

NB TEACHER DOCUMENT AFTER Page 63

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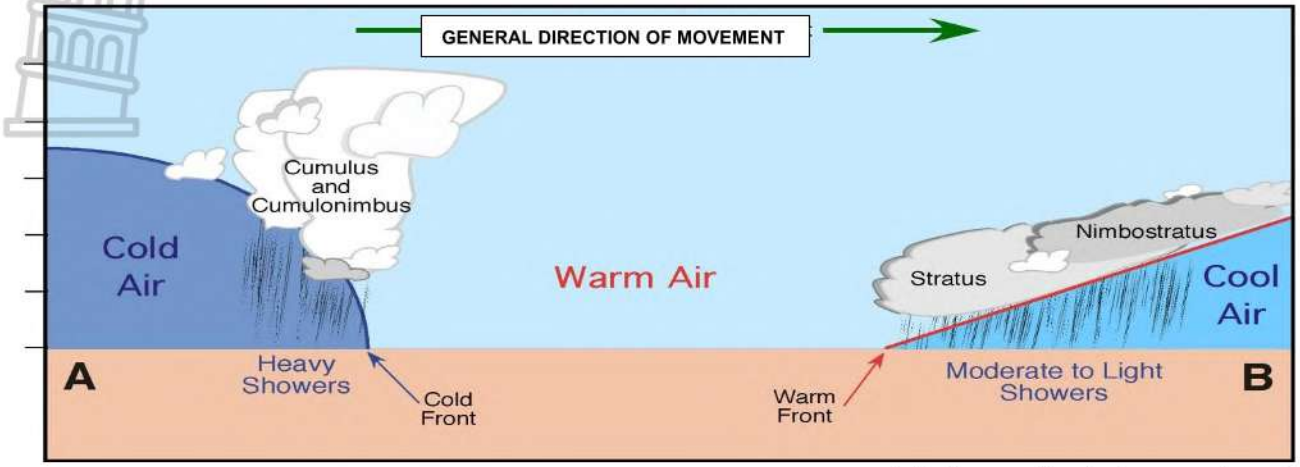
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3.	Rural and Urban Settlements	43 - 63

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CONTENT: CLIMATE AND WEATHER

TOPIC: MIDLATITUDE CYCLONE

Definition: These are low pressure weather systems that occur in the middle latitudes of the earth, usually between 30° and 60° latitude north and south of the equator



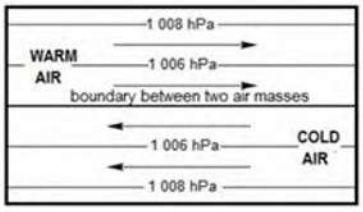
http://www.physicalgeography.net

GENERAL CHARACTERISTICS

- Develops along the polar front (60º N/S)
- Affects areas along 35º-55º N/S
- Affects South Africa in winter
- Has cold and warm front
- Air circulation is clockwise
- Large in diameter
- General direction of movement is eastward/west to east

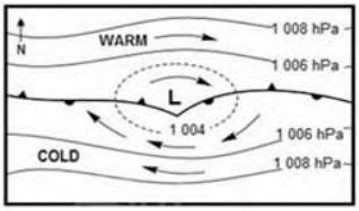
STAGES OF DEVELOPMENT

INITIAL STAGE



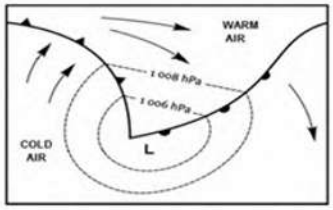
- Polar front is stationary
- Friction between polar easterlies and subtropical westerlies

WAVE STAGE



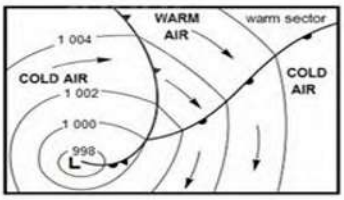
- Warm air rises causing a wave along the polar front
- Atmospheric pressure begins to decrease

MATURE STAGE



- Fully developed cold and warm front
- Cold and warm sector clearly seen
- Warm air is increasingly forced to rise
- destructive weather conditions

OCCLUDED FRONT



- Cold front moves faster and catches up with warm front.
- Warm air is com displaced from the ground.

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IMPACTS OF MIDLATITUDE CYCLONES

	PHYSICAL ENVIRONMENT	SOCIO-ECONOMIC
NEGATIVE	• Result in soil erosion • Biodiversity may be destroyed • Destruction of natural habitat • Destruction of natural vegetation • Loss of wildlife • Destruction of food chains • Will cause mass movements • Fertilisers washed into the rivers (causing eutrophication) • Will result in water pollution • Leaching of soil nutrients • Low-lying areas are flooded Waterlogged conditions saturation of soil	• Rainfall result in slippery roads causing accidents • Strong winds and heavy rains can damage homes, schools, hospitals, and road • May lead to displacement of people and disruption of daily life. • Flooding caused can lead to waterborne diseases such as cholera and dysentery. • Snow and cold temperatures may hinder outdoor activities. • Injuries and fatalities may also occur due to collapsing structures or accidents. • Power outages and communication breakdowns can isolate communities, making it difficult to access emergency services and aid. • Fishing vessels grounded results in loss of profit • Expensive for farmers to protect crops • Increase in insurance claims
POSITIVE	• Water supply for natural vegetation • Replenish the soil fertility (nitrogen fixing) • Sufficient water for wildlife • Level of water table will be higher • Biodiversity increases • Habitats are restored • Ecosystems have sufficient water • Replenish/ purify natural water systems	• Dam water capacity levels increase • More water for production in industries • More water for irrigation. • Reduced cost of production • Increase in production • More profit for farmers • Tourism will be stimulated by snowfall

PRECAUTIONARY MEASURES AND MANAGEMENT STRATEGIES

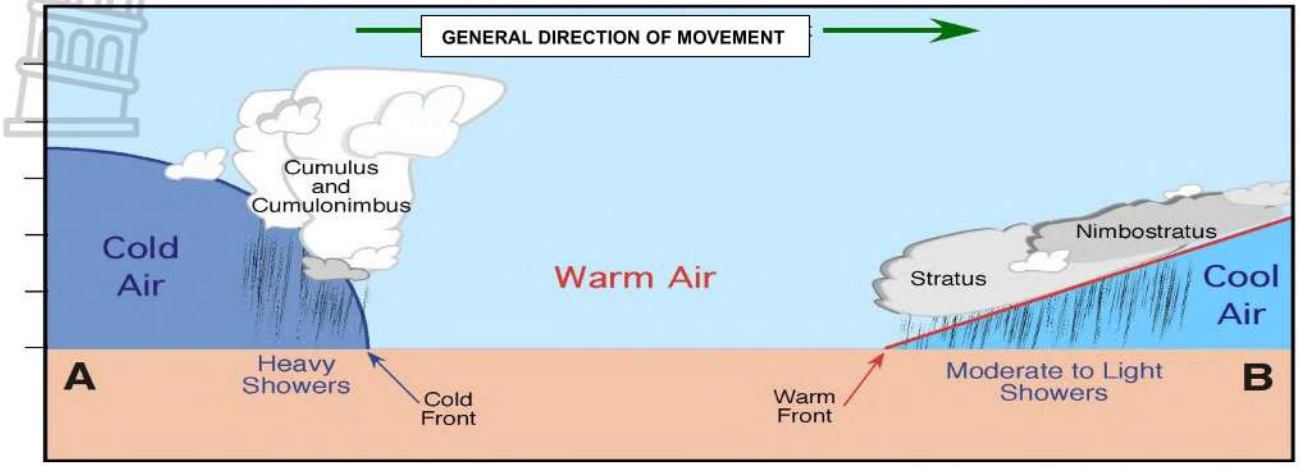
- Monitoring weather reports and satellite imagery to track the movement of the cold front.
- Securing loose outdoor objects and reinforcing roofs to withstand high wind speeds.
- Moving livestock and pets to higher ground or sheltered areas to avoid exposure and flooding.
- Ensuring drainage systems and gutters are clear to prevent localized flooding.
- Stocking up on emergency supplies like food, water, and medical kits.
- Regular cleaning of urban storm-water drains and maintaining coastal barriers to manage storm surges.
- Placing disaster management teams and rescue services on standby in high-risk areas like the Western Cape.
- Advising farmers to delay planting or to protect sensitive crops from frost and heavy rain associated with the passing front.

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CONTENT: CLIMATE AND WEATHER

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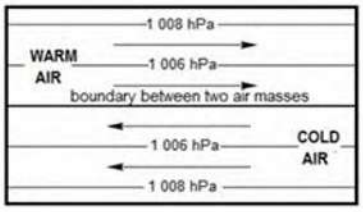
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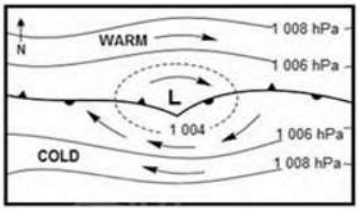
STAGES OF DEVELOPMENT

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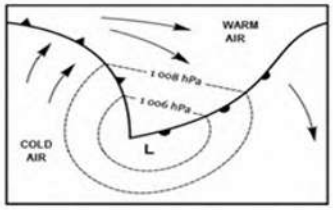
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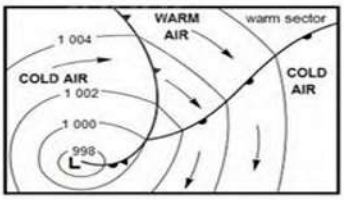
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PRECAUTIONARY MEASURES AND MANAGEMENT STRATEGIES

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1.1. Match column A and Column B

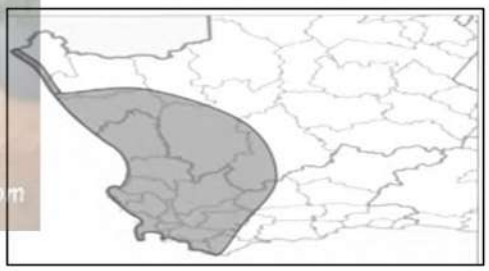
Column A		Column B	
1.1.1	Leading edge of cold air	X Y	Cold Sector Cold front
1.1.2	Wind direction changes from north westerly to south westerly	X Y	Backing Veering
1.1.3	Cold front catches up with warm front.	X Y	Occlusion Dissipation
1.1.4	Area occupied by warm air.	X Y	Warm front Warm sector
1.1.5	Formed because of rapid uplift of warm air	X Y	Cumulonimbus cloud Nimbostratus Cloud
1.1.6	Does not result in rainfall along the warm front	X Y	Stratus cloud Nimbostratus cloud
1.1.7	Shifts north and bring cold front to South Africa	X Y	ITCZ Subtropical low-pressure belt

1.2. Study the infographic below and answer the following questions.

Two cold fronts headed for Cape Town this weekend

The City of Cape Town says it's on standby after the South African Weather Service (SAWS) warned of two approaching cold fronts this weekend.

AFFECTED AREAS



The first cold front is expected to make landfall on Sunday, followed by a second on Monday.

Forecasters say it will bring disruptive rainfall that could lead to localised flooding and gale force winds. Rough seas are also expected along coastal areas. The City's Risk Management spokesperson, Charlotte Powell says they are ready to deal with any weather-related impacts from the recent storm.

"We ask that residents put in place mitigation measures to protect their properties, including clearing gutters and any other blockages on their property. They should also be checking for any roof leakages. Residents should secure any loose items and materials like garden furniture etc. that could be vulnerable to wind gusts. They should also consider digging trenches to lead water away from their homes if in informal settlements."

SA Weather Service (@SAWeatherServic) May 7, 2026

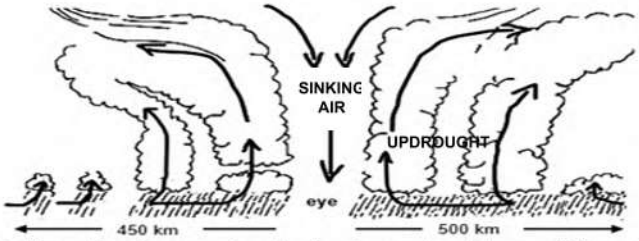
1.2.1	In which season do the cold fronts mentioned in the extract influence the Western Cape?	(1 x 1)	(1)
1.2.2	Give evidence from the extract to support your answer to QUESTION 1.2.1.	(2 x 1)	(2)
1.2.3	Why do cold fronts have a greater impact on the Western Cape during this season (answer to QUESTION 1.2.1)?	(1 x 2)	(2)
1.2.4	Account for localised floods when cold front makes landfall.	(2 x 2)	(4)
1.2.5	Evaluate the impact of rainfall on the agricultural sector in the Western Cape.	(3 x 2)	(6)

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TROPICAL CYCLONES

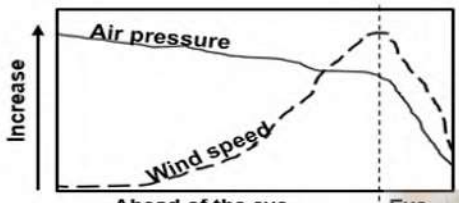
DEFINITION:	An intense low-pressure system that develops in the easterly wind belt from 5 N/S to 30 N/S of the equator.

CROSS-SECTION OF A TROPICAL CYCLONE



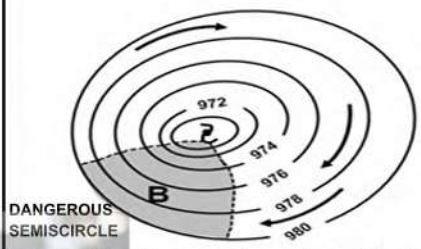
[Adapted from https://www.meteo.physik.unimuenchen.de/~roger/TCLecs/Tropical%20Cyclone]

GRAPH ASSOCIATED WITH A TROPICAL CYCLONE



[Source: Examiner's own drawing]

ISOBARIC REPRESENTATION OF A TROPICAL CYCLONE



[Source: https://www.google.com/search?q=isobars]

GENERAL CHARACTERSTICS

- Intense low pressures.
- Named in alphabetical order.
- Forms in tropical regions, over tropical oceans, further than 5º of Equator (Coriolis force)
- 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.

CONDITIONS NECESSARY FOR THE FORMATION OF TROPICAL CYCLONES

- Presence of Coriolis force
- Ocean surface temperature of at least 26,5 °C
- Calm (surface) conditions for several days/less friction
- Presence of low (air) pressure
- Unstable atmospheric conditions
- Evaporation from the sea surface / rising of warm moist air
- Upper air divergence
- Latent heat

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SOCIAL IMPACTS	ENVIRONMENTAL IMPACTS	ECONOMICAL IMPACTS
• People lose their lives or get injured • Homes are destroyed • People become displaced • Waterborne diseases increase	• Coastal flooding • Re-shaping of coastline • Increased soil erosion • Possibility of mass movement • Destruction of biodiversity • Destruction of habitats • Pollution of water sources • Pollution of soil	• Infrastructure is destroyed • Property is destroyed • Cost of repair is high • High insurance claims • Business halt due to destroyed roads and bridges • Loss of income and profit • Death of livestock and destruction of crops

PRECAUTIONARY MEASURES AND MANAGEMENT STRATEGIES

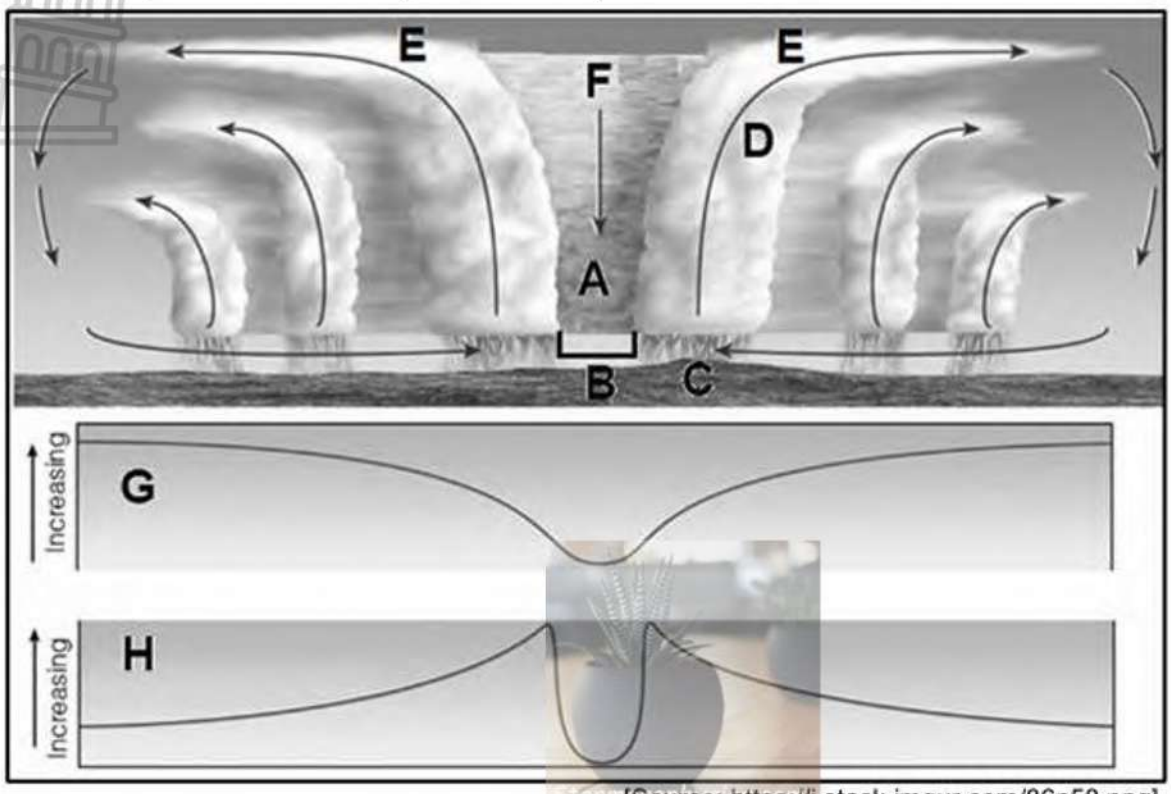
- Early warning systems put in place
- Sandbags to reduce flooding
- Reinforcing existing infrastructure
- Awareness and education programmes
- Evacuation protocols and drills
- Stocking up of emergency supplies and necessities
- Identify high lying areas to evacuate people
- Build above flood lines/ coastal zoning
- Tracking the movement of the tropical cyclone
- Good forecasting/ Use of media to update regularly
- Improve accessibility to evacuate people
- Move people to higher ground
- Development of good rescue and emergency services
- Storage/ provision of clean water and food supplies
- Rescue personnel, police, medical personnel on standby
- Maintain coastal vegetation to act as a buffer against storm surges
- Request National and international aid if necessary



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1.3 Study a cross-sectional view of a tropical cyclone below.

Choose the correct word(s) from those given in brackets which will make each statement geographically CORRECT. Write only the word(s) next to the question numbers (1.3.1 to 1.3.8).

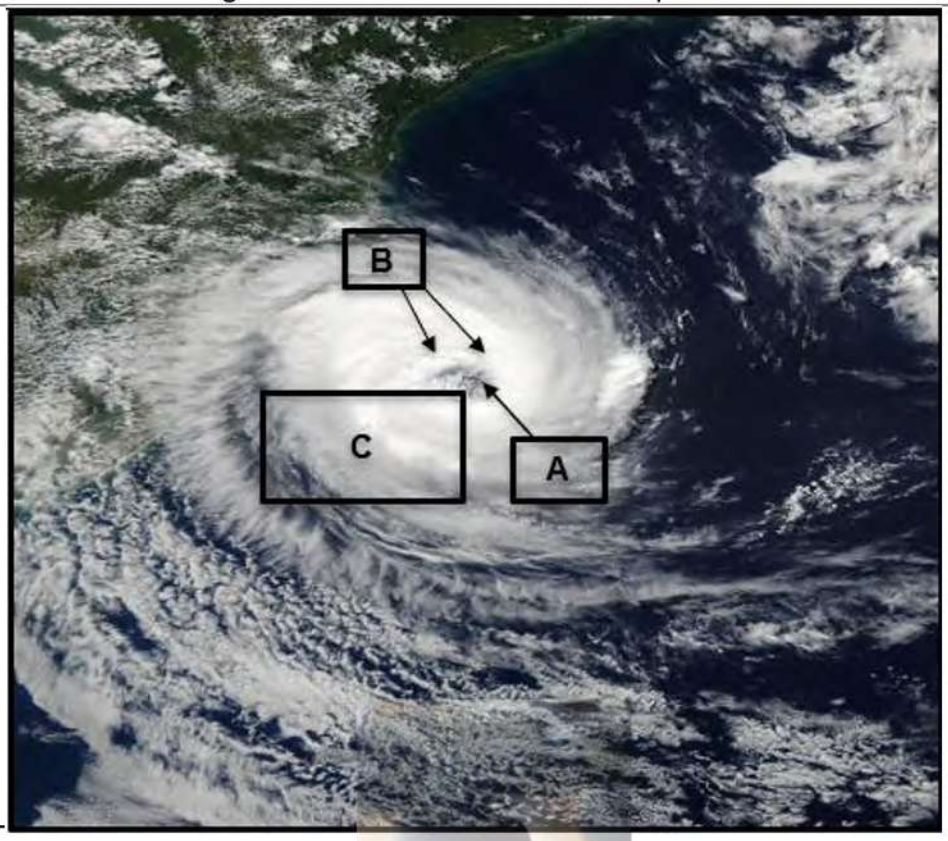


[Source: https://i.stack.imgur.com/86n58.png]

1.3.1 The (eye/vortex) at **A** is characterised by descending air.
1.3.2 The area at **B** is an area of (high/low) air pressure.
1.3.3 (Light/Heavy) rainfall occurs at **C**.
1.3.4 The vertical movements of air at **D** are known as (updraughts/down draughts).
1.3.5 The upper air at **E** is (converging/diverging).
1.3.6 F is associated with (low/high) air pressure.
1.3.7 The graph (**G**) shows air (pressure/temperature) with the passage of the tropical cyclone.
1.3.8 Surface (air temperature/wind speed) is depicted by graph **H**. (8 x 1) (8)

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1.4 Study the satellite image below and match the descriptions with the correct letter.



https://skybrary.aero/articles/south-atlantic-tropical-and-subtropical-cyclones

1.4.1	Air descends.	(1 x 1)	(1)
1.4.2	Characterised by towering cumulonimbus clouds.	(1 x 1)	(1)
1.4.3	Calm conditions.	(1 x 2)	(1)
1.4.4	Air circulating in the systems is in the same direction as the wind pushing the system.	(1 x 1)	(1)
1.4.5	Spiralling updrafts form cumulonimbus clouds.	(1 x 1)	(1)
1.4.6	Intense weather conditions result to severe impact.	(1 x 1)	(1)
1.4.7	Upper air divergence occurs.		

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1.5 Study the infographic below and answer the following questions.

Tropical cyclone Gezani hits Madagascar and threatens Mozambique

Intense tropical cyclone Gezani made landfall in eastern Madagascar on 10 February, with winds of about 180 km per hour and gusts peaking at 230 km/h. The port of Toamasina was worst hit, with severe damage to buildings and infrastructure.

Gezani oved into the Mozambique Channel and is tracking towards southern Mozambique, where soils are already saturated after weeks of heavy rainfall and floods.

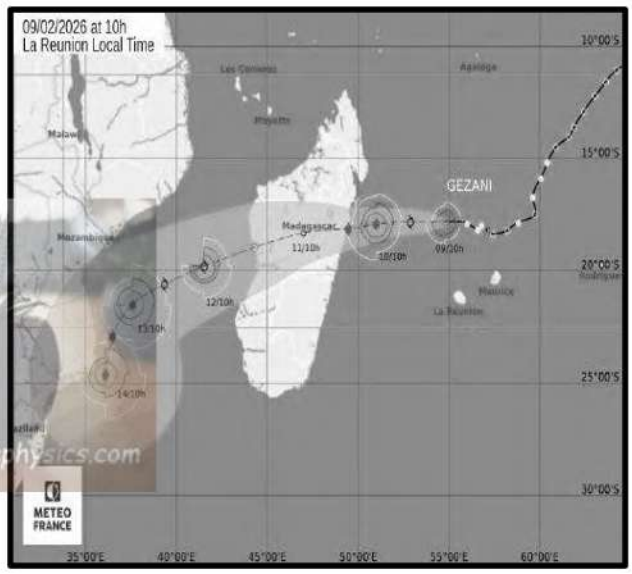
WMO's regional specialized meteorological centre La Réunion (Météo-France) said that Gezani may regain strength to become an intense tropical cyclone as it passes close to the Mozambique coast on 13/14 February.

Mozambique's southern Inhambane province will see very strong winds, very heavy rainfall, waves of up to 10 meters high and a storm surge of up to 1 meter, according to the forecasts.

Breakdown of impact

Deaths:	40 people
Injured:	427 people
Displaced:	16,000 people
Homes Destroyed:	18,000

Path of Gezani across the Indian Ocean



https://wmo.int/media/news/tropical-cyclone-gezani-hits-madagascar-and-threatens-mozambique

1.5.1	What evidence from the infographic indicates that this is an intense tropical cyclone?	(1 x 1)	(1)
1.5.2	How many tropical cyclones have occurred before tropical cyclone Gezani?	(1 x 1)	(1)
1.5.3	Provide a reason for your answer to QUESTION 1.4.2.	(1 x 2)	(2)
1.5.4	Give one piece of evidence that this tropica cyclone Gezani is in the southern hemisphere.	(1 x 1)	(1)
1.5.5	Account for tropical cyclone Gezani reaching wind speed of 230 km/h on the 10 February 2026?	(2 x 2)	(4)
1.5.6	Suggest negative impacts that very strong winds will have on the coastal areas of Mozambique.	(3 x 2)	(6)

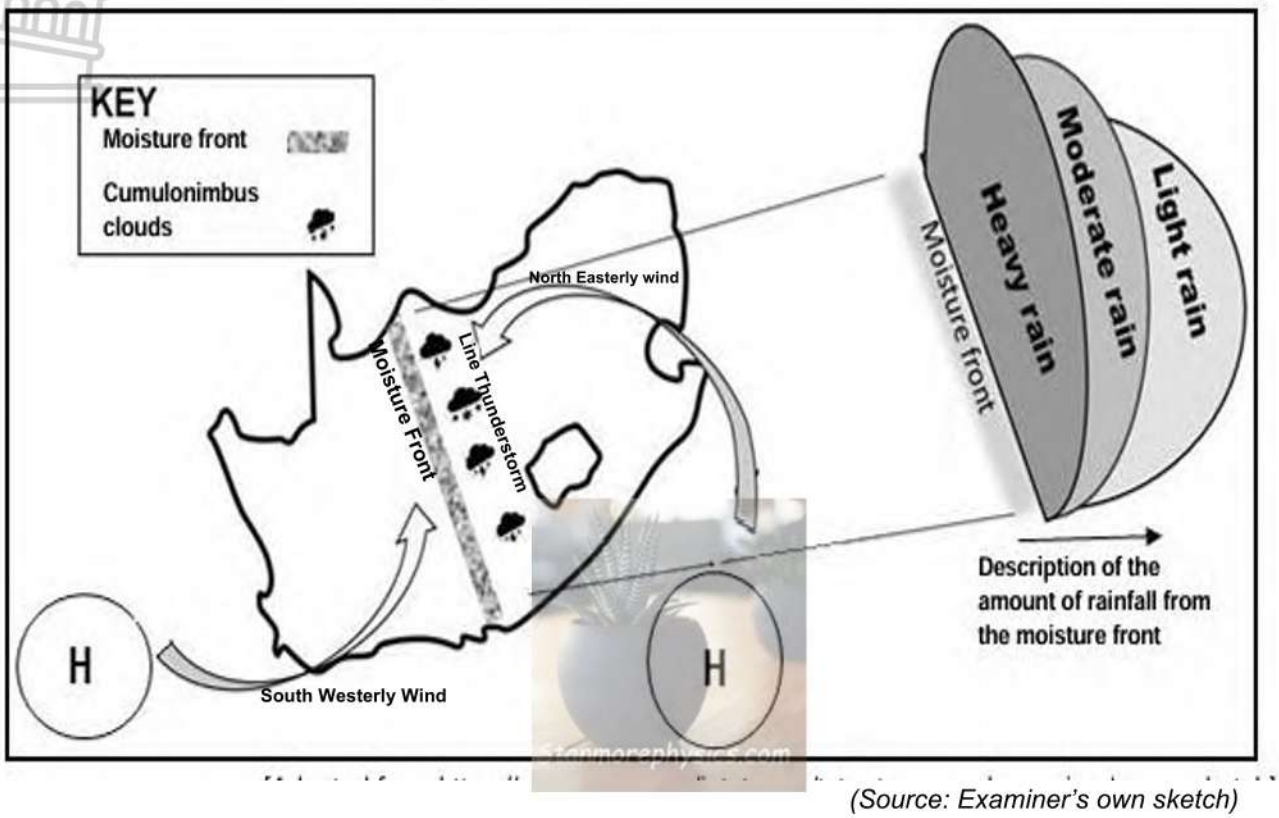
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MOISTURE FRONT AND LINE THUNDERSTOMS

DEFINITIONS:

MOISTURE FRONT: A zone where two air masses of different moisture content meet.

LINE THUNDERSTORMS: A series of storm that occur on the eastern side of the moisture from in the interior of the country.



(Source: Examiner's own sketch)

MOISTURE FRONT FORMATION

1. High temperatures in **summer** results in Thermal Low-Pressure cell over the interior. South Indian Anticyclone and South Atlantic Anticyclone continuously blow onshore winds into the interior. The thermal low pressure increases pressure gradient force.
2. The South Indian Anticyclone blows **warm moist air** (**North Easterly**) because air blows over a warm Mozambique current. South Atlantic Anticyclone blows **cold dry air** (**South Westerly**) into the interior because it blows over cold Benguela current.
3. These two air masses of different moisture content meet over the interior forming a front that that stretches from northwest to southeast across the country.

LINE THUNDERSTORM

4. Cold dry SW air is denser and undercuts warm moist NE air forcing it to rise rapidly on the eastern part of the moisture front.
5. The rapid rise of warm moist air on the eastern part of the moisture front results in greater vertical condensation resulting to the formation of a series of cumulonimbus clouds.
6. The cumulonimbus clouds result in a series of thunderstorm, hail, heavy rainfall and lightning on the eastern side closer to the moisture front.

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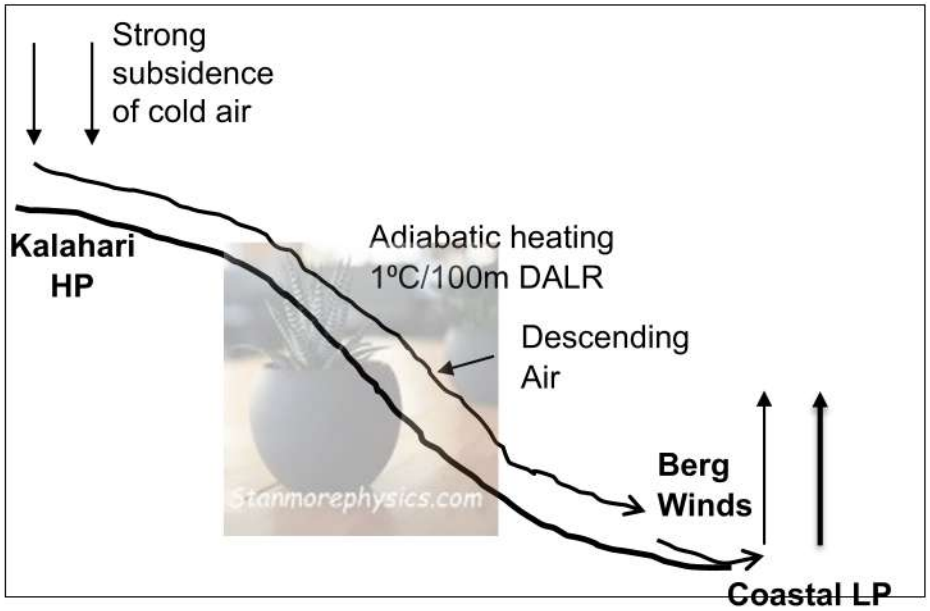
IMPACTS OF LINE THUNDERSTORM

	PHYSICAL ENVIRONMENT	SOCIO-ECONOMIC
NEGATIVE	NEGATIVE • Natural habitats will be destroyed • Ecosystems will be destroyed • Biodiversity will be reduced • Results in soil erosion • Mass movements can be triggered • Wildlife would be displaced/drowned • Trees/natural vegetation can be uprooted/destroyed • Water quality will be reduced • Increased leaching of soil • Silting up/ deposition of material	• Floods will destroy property • Gale force winds can blow away poorly built infrastructure • Increase insurance claims • Hailstones will destroy windows • Hailstones will destroy crops • Lightning may kill livestock • Loss of profit for farmers • People may be killed by lightning or be injured by destruction their houses.
POSITIVE	• Soil fertility increases due to lightening releasing nitrogen. • Wellands thrive attracting biodiverse • Water supply for natural vegetation • Replenish the soil fertility (nitrogen fixing) • Sufficient water for wildlife • Level of water table will be higher • Biodiversity increases • Habitats are restored • Ecosystems have sufficient water • Replenish/ purify natural water systems	• Dam water capacity levels increase • More water for production in industries • More water for irrigation. • Reduced cost of production • Increase in production • More profit for farmers

STRATEGIES TO REDUCE NEGATIVE IMPACTS OF LINE THURNDERSTORMS

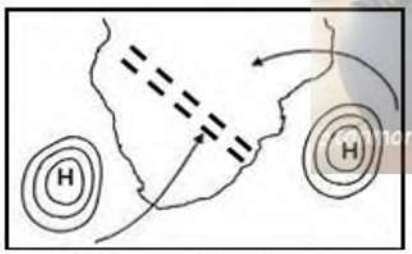
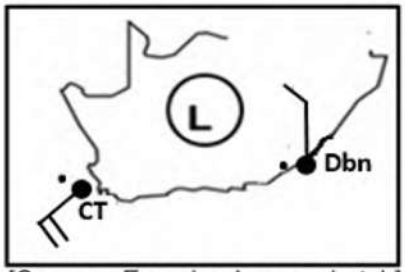
- Issuing early warning to alert people
- Evacuate people from low-lying areas
- Livestock be kept in sheds
- People must stay indoors to avoid lightning strikes
- Install lightening conductors
- Place sandbags to prevent floods

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BERG WINDS	
DEFINITION:	Hot dry and gusty winds that blow down the escarpment.
FORMATION:	1. Forms when the Kalahari High Pressure cell interact with Coastal Low-Pressure cell in winter. 2. Cold winter temperature results in the dominance of high pressure over the interior. 3. Presence of the Coastal LP cell along the coast increases pressure gradient between the two systems dragging cold air towards the coast. 4. Air heats up adiabatically as it descends the escarpment at a Dry Adiabatic Lapse Rate (DALR) of 1ºC/100m. 5. Air is dry because it does not gain moisture due to adiabatic heating and friction. 
IMPACTS	• Funnel veld fires • Veld fires destruct property, vegetation and ecosystems • Vegetation becomes dry • May lead to death of livestock • People may experience fatigue, heat stroke and respiratory problems
MANAGEMENT STRATEGIES	Create fire breaks Build lookout towers Emergency services be on standby Build dams Awareness campaigns

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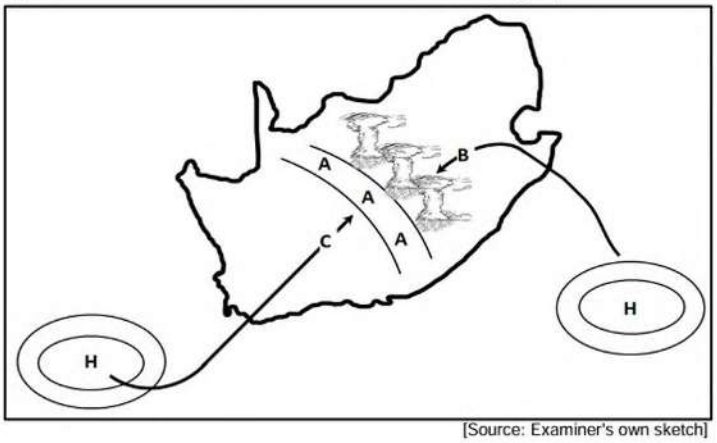
1.6 The questions are based on synoptic weather map interpretation. Complete the statements in COLUMN A with the options in COLUMN B. Write only Y or Z next to the question numbers (1.5.1 to 1.5.8) in the ANSWER BOOK, e.g. 1.5.9 Y.

	COLUMN A	COLUMN B
1.6.1	The name of the air pressure cell that dominates the interior of South Africa in winter	**X** Heat Low **Y** Kalahari High
1.6.2	Air movement associated with high pressure cells	**X** Convergence **Y** Divergence
1.6.3	The general direction of movement of a coastal low-pressure system is …	**X** Easterly **Y** Westerly
1.6.4	The … is known as a blocking high when it is in the path of the mid-latitude cyclone.	**X** South Indian High **Y** Kalahari High
1.6.5	The elongation of isobars extending outwards from a high-pressure cell is referred to as …	**X** Diverging **Y** Ridging
1.6.6	A … is found between two air masses of different moisture contents.	**X** Moisture front **Y** Inter-tropical convergence zone
1.6.7	The conditions represented in the sketch below will lead to …  [Source: Examiner's own sketch]	**X** Line thunderstorm **Y** Berg winds
1.5.8	Rainfall with 20 knots of wind is likely at …  [Source: Examiner's own sketch]	**X** Durban (Dbn) **Y** Cape Town (CT)

(8 x 1) (8)

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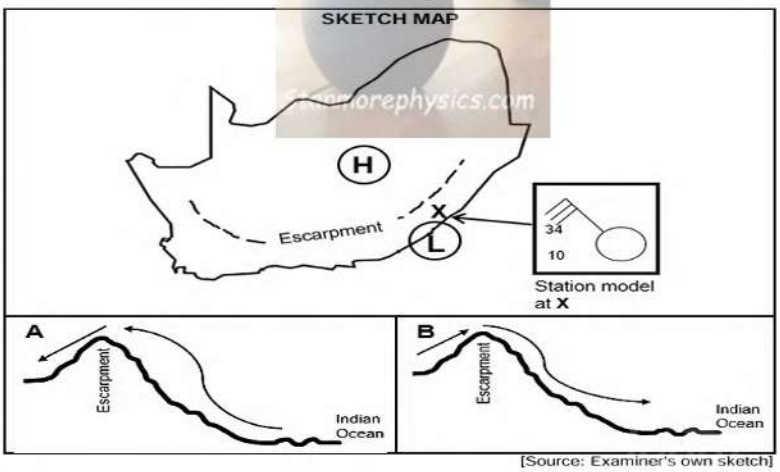
1.7 Study the diagram below and answer the following questions.



[Source: Examiner's own sketch]

1.7.1	Identify the front at **A**.	(1 x 1)	(1)
1.7.2	Give the wind direction at **B** and **C**.	(1 x 1)	(1)
1.7.3	State the moisture content of air masses **B** and **C**	(2 x 1)	(2)
1.7.4	Explain the formation of line thunderstorms over the interior of South Africa.	(3 x 2)	(6)
1.7.5	What is the positive impact of the heavy rainfall associated with line thunderstorms on agriculture?	(2 x 2)	(4)

1.8 Study the sketch below and answer the questions that follow.



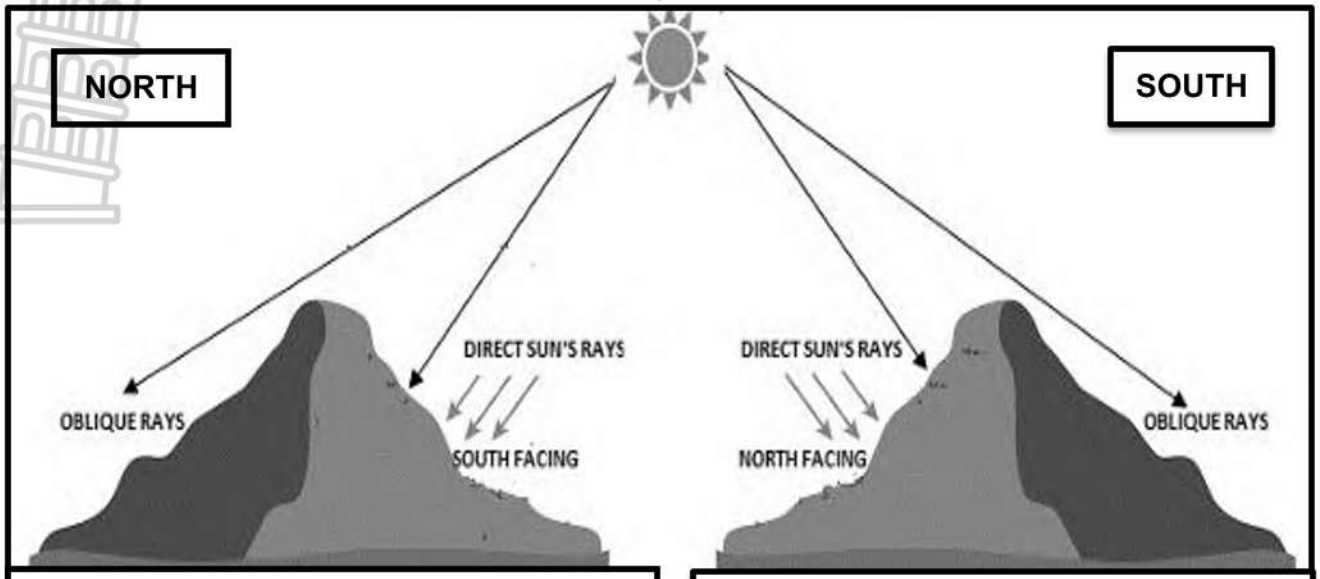
[Source: Examiner's own sketch]

1.8.1	Name the high-pressure cell and low-pressure cell indicated on the sketch map that leads to the development of berg winds.	(2 x 1)	(2)
1.8.2	Which sketch (**A** or **B**) represents the formation of berg winds?	(1 x 1)	(1)
1.8.3	Give a reason for your answer to QUESTION 1.7.2.	(1 x 2)	(2)
1.8.4	How does the high-pressure cell and low-pressure cell mention in QUESTION 1.7.1 interact to form berg winds?	(2 x 2)	(4)
1.8.5	Why cloudless conditions are indicated by the station model at **X** on the sketch map.	(1 x 2)	(4)
1.8.6	Discuss any TWO reasons why it important to have emergency services on standby along area **X** where berg winds are experienced.	(2 x 2)	(2)

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VALLEY CLIMATE

SLOPE ASPECT: The direction in which a slope faces in relation to the sun



South-Facing slope

- Warmer due to direct sun's rays
- Suitable for farming of crops and deciduous fruits
- Suitable for settlement, warmer in winter

North-facing slope

- Cooler due to indirect sun's rays
- Shadow zone
- More damp due to low evaporation
- Densely vegetated
- Suitable for thick-skinned fruits such as citrus
- Results in high building maintenance costs

South-Facing slope

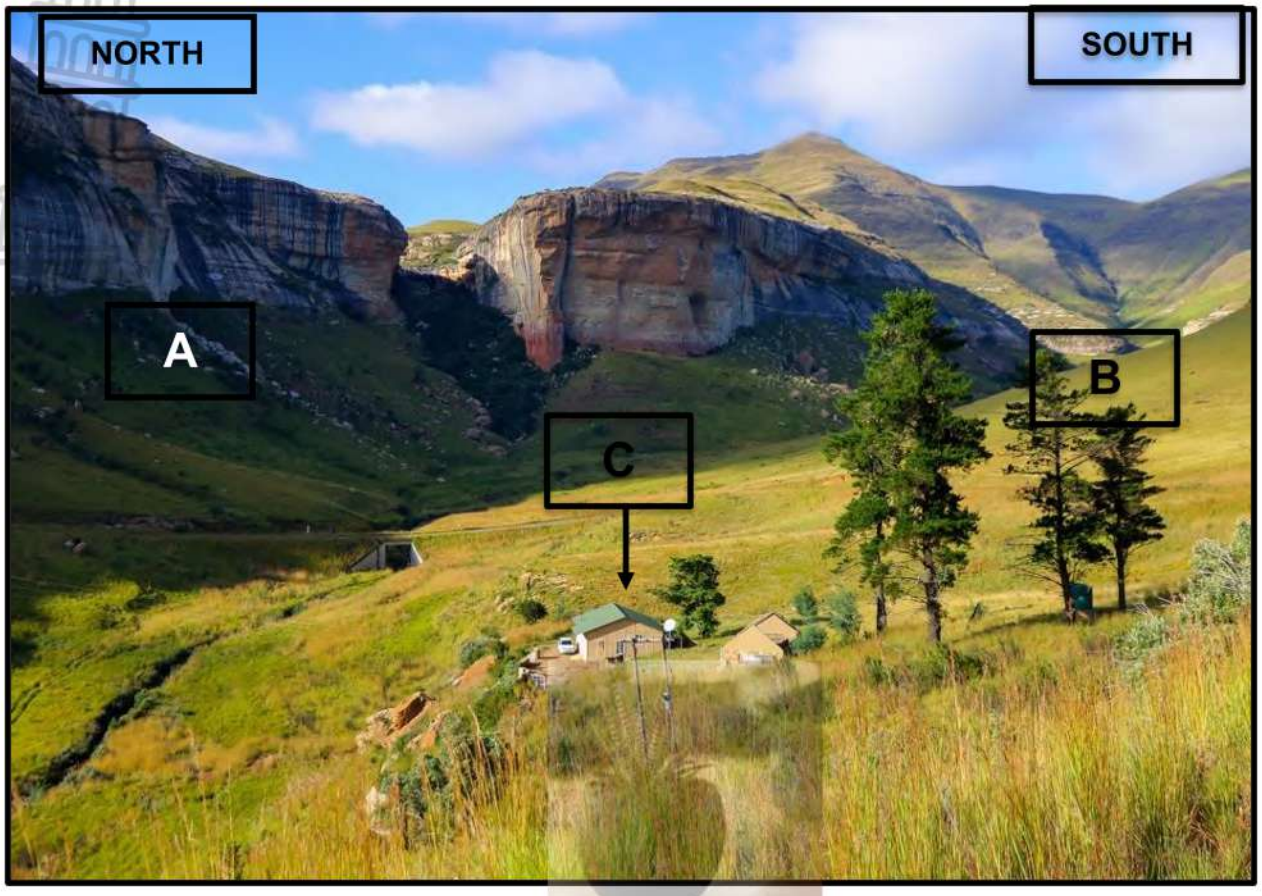
- Cooler due to indirect sun's rays
- Shadow zone
- More damp due to low evaporation
- Densely vegetation
- Suitable for thick-skinned fruits such as citrus
- Results in high building maintenance costs

North-facing slope

- Warmer due to direct sun's rays
- Suitable for farming of crops and deciduous fruits
- Suitable for settlement, warmer in winter

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1.9 Study the diagram below and answer questions that follow.



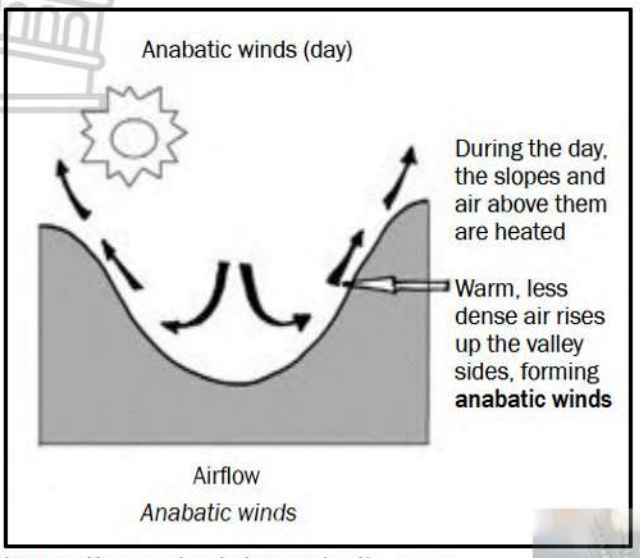
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1.9.1	Identify slope **A** and **B**.	(2 x 1)	(2)
1.9.2	What evidence from the image indicates that slope **A** receives indirect insolation?	(1 x 1)	(1)
1.9.3	Discuss the possible effects of indirect sun's rays on slope **A**.	(2 x 2)	(4)
1.9.4	Give a reason for settlement **C** locating along slope slope **B.**	(1 x 2)	(2)
1.9.5	As a pepper and deciduous fruit farmer discuss any THREE reasons why you would choose slope **B** for farming.	(3 x 2)	(6)

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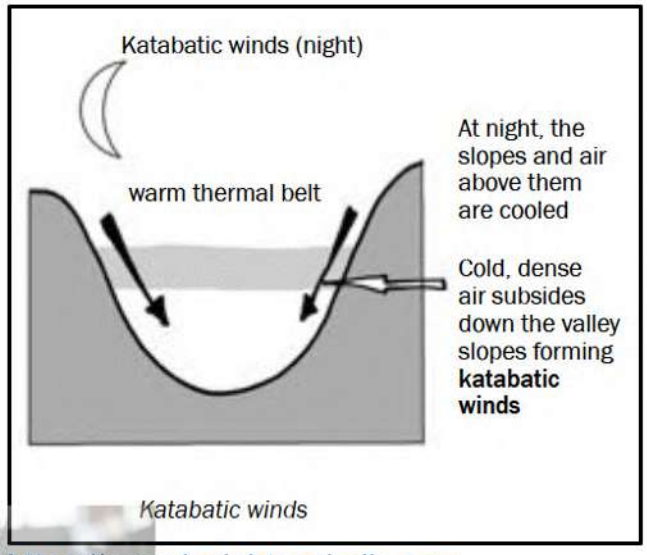
VALLEY WINDS

Anabatic Winds: Warm winds that blow up the slope in a valley during the day.
Katabatic Winds: Cold winds that blow down the slope in a valley at night.
Frost pocket: An area at the bottom of a valley where cold air collects and condenses below freezing point



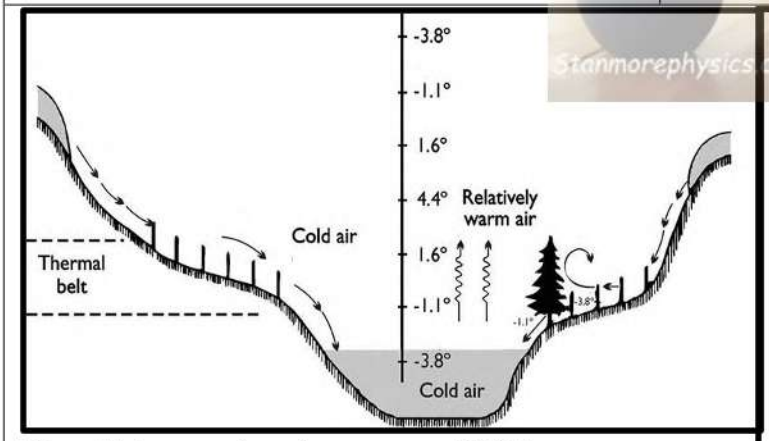
https://www.insightsonindia.com

- Anabatic winds take pollution out of the valley.



https://www.insightsonindia.com

- Katabatic winds trap pollution in the valley.
- Katabatic winds bring cold temperatures to the valley.



https://blogs.unb.ca/newsroom/2025.

FROST POCKET (FORMATION)

1. Terrestrial radiation cools the slope
2. Cold dense air descends the valley at night
3. Cold dense air accumulates at the valley floor and becomes more colder
4. Condenses below freezing point on the valley floor resulting to frost

IMPACTS: THERMAL BELT AND FROST POCKET

- Cold temperatures in valley
- Less frost-resistant crops destroyed
- Farms become colder
- Increase cost of productions
- Increases electricity and fuel use
- People will build their houses mid-slope of a valley to be in the warmer thermal belt
- Pollution is trapped in the cold air below the temperature inversion at night.

MANAGEMENT STRATEGIES

- Planting thick-skinned fruits and frost-resistant crops
- Build along the thermal belt
- Use of heaters to manage temperatures
- Crop rotation
- More water for irrigation in the thermal belt

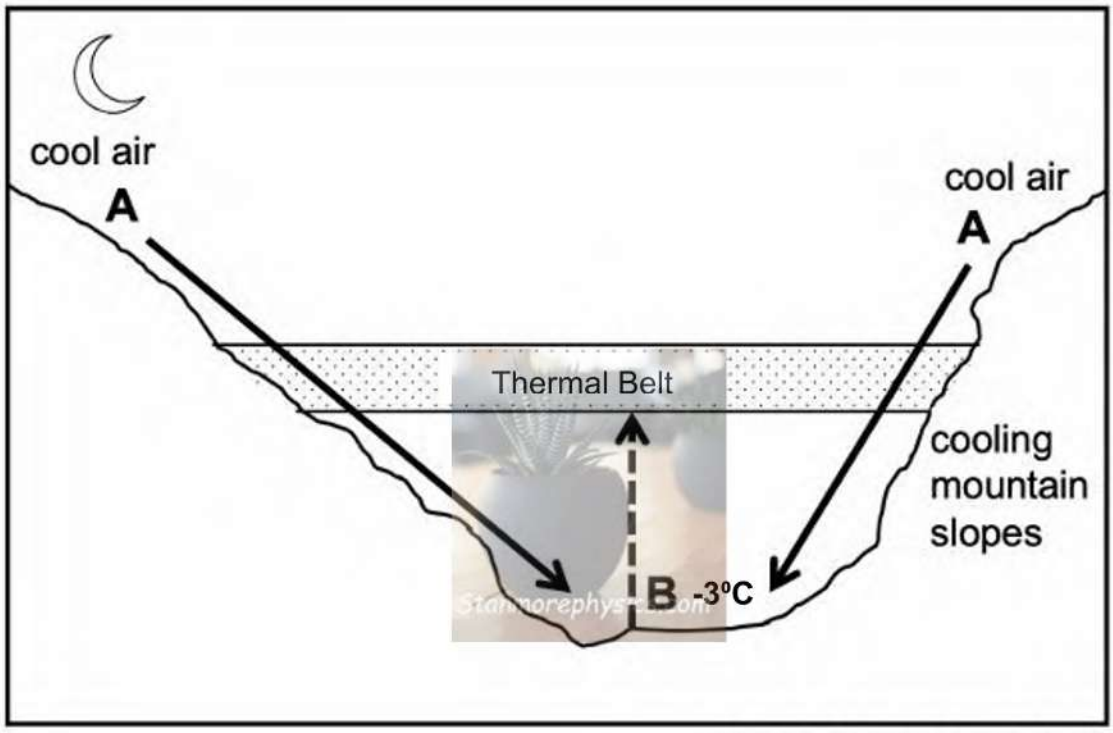
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Radiation Fog: A cloud that forms on a valley during cloudless and calm nights disappearing when the sun rises.

Formation process

1. The atmosphere above the valley is without clouds and there are no winds
2. Rapid terrestrial radiation cools down the surface
3. Air above the surface cools down and condenses rapidly
4. Small droplets suspended in air

1.10 Study the diagram below and answer questions that follow.



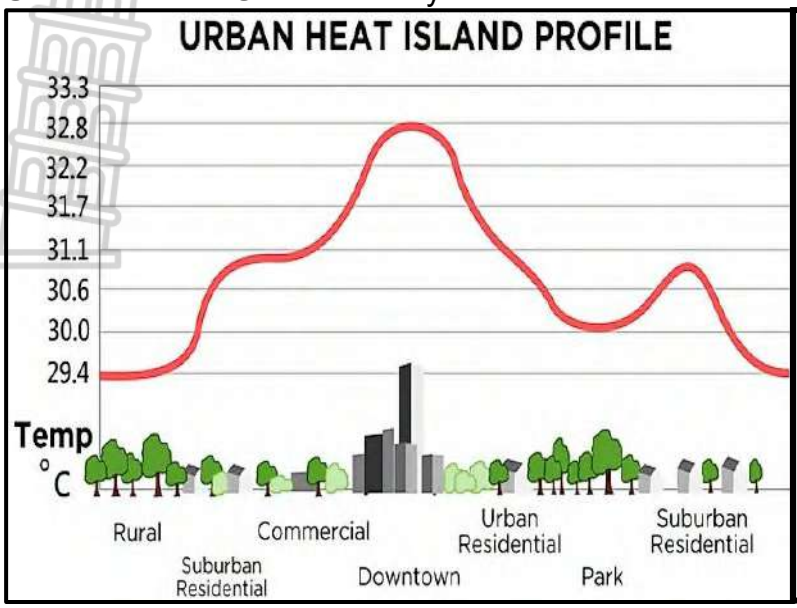
[Source: Examiner's own sketch]

1.10.1	Identify valley wind **A**.	(1 x 1)	(1)
1.10.2	Name the process responsible for the formation of Wind **A**?	(1 x 1)	(1)
1.10.3	Discuss how the thermal belt influences settlement and farming in a valley.	(2 x 2)	(4)
1.10.4	At **B** temperatures are -3ºC. What is the precipitation experienced in area **B**?	(1 x 1)	(1)
1.10.5	In a paragraph of EIGHT lines, outline the process leading to the formation of a precipitation identified in QUESTION 1.9.4.	(4 x 2)	(8)

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CITY CLIMATE

URBAN HEAT ISLAND: A city warmer than its surrounding rural areas.



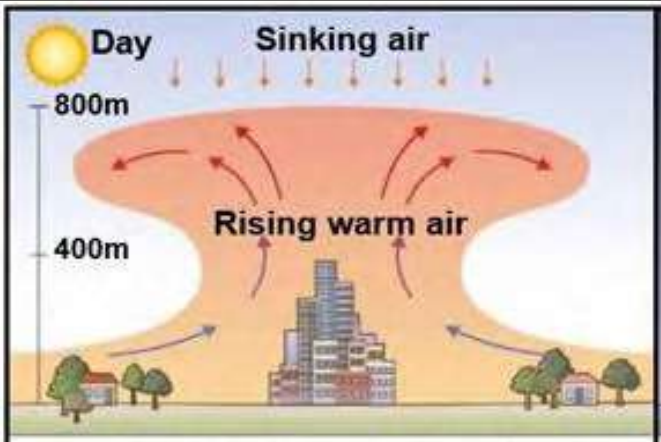
WHY URBAN AREAS ARE WARMER?

- Urban activities generate artificial heat.
- Pollution leads to greenhouse effect over a city
- Geometric shape of building- taller and larger.
- High building density.
- Building material absorbs more heat
- Artificial surfaces

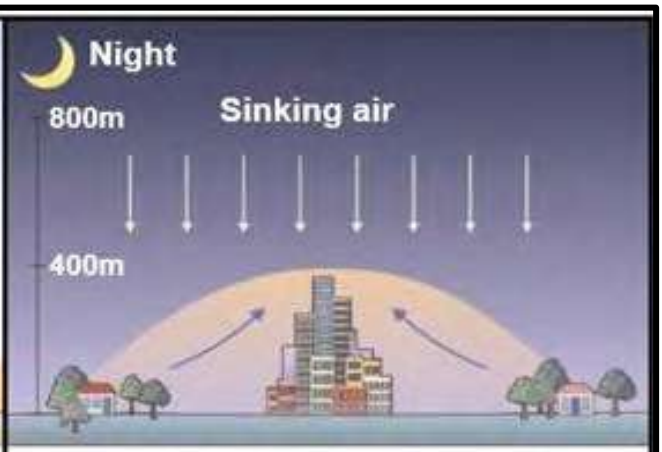
WHY RURAL AREAS ARE COOLER?

- More natural surfaces
- Less absorption of heat.
- Winds blow unhindered
- High evaporation

POLLUTION DOME: Mass concentration of pollutants above an urban



Higher vertical dimension during the day



Closer to the surface during the night

CAUSES

- Poor public transport systems increase private vehicles on the road
- Pollution from vehicles
- Pollution from industries
- Construction activities causing dust
- Fossil fuel combustion

EFFECTS

- Increased acid rain.
- People suffer allergies/irritations
- Respiratory diseases increase
- People suffer fatigue and/heat stroke

MANAGEMENT STRATEGIES

- Educating people about dangers of pollution
- Advocate for alternative/green energy
- Decentralise industries from the cities
- Pass laws that protect the environment
- Fines for polluters
- Put monitoring systems to ensure compliance
- Improve public transport system
- Develop green belts in cities to purify the air
- Introduce incentive to reduce air

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1.11 Read the extract below and answer the following questions.

Johannesburg Tackles Rising Heat with Innovative Urban Strategies

In a proactive response to the escalating heat island effect, the City of Johannesburg is implementing a range of strategies based on the latest research and collaborative efforts. Mzukisi Gwata, the principal specialist in the climate change adaptation unit for the Environment and Infrastructure Services Department (EISD), highlights the growing concern of increased temperatures in Johannesburg, especially their impact on vulnerable populations including the poor, the elderly, and those with pre-existing health conditions.

Gwata explains, "A detailed modelling study assessed this, revealing that the excess night-time temperature in urban areas is higher by up to 6°C compared to nearby rural areas." This study has led to several key recommendations, which the City is actively implementing.

https://www.joburgetc.com

1.11.1	Define the concept *Urban Heat Island.*	(1 x 2)	(2)
1.11.2	According to the extract, why is the increasing of temperatures in Johannesburg a concern?	(1 x 1)	(1)
1.11.3	Suggest reasons for the 6ºC increase in urban temperatures.	(2 x 2)	(4)
1.11.4	In a paragraph of EIGHT line, provide strategies that the city of Johannesburg can implement, as referred to in the extract, that can reduce urban heat island.	(4 x 2)	(8)

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1.12 Read the extract below and answer questions that follow.

Durban South Basin a hotspot for high air pollution



Image credit: Air Polluti_R

KwaZulu-Natal's 2018 Environmental Outlook Report has named the Durban South Basin as one of the hotspots for high air pollution levels. The heavily industrialised Durban South Basin is home to the largest concentration of petrochemical industries in the country.

Local government's answer lies with their "Air Quality Management Plan". But the plan has not even got off the ground yet. KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs official, Zama Mathenjwa says, "We had planned to start developing it from last year, but unfortunately a few administrative challenges occurred."

55-year-old Vanitha Perumal, who lives in Merebank, says she and her family have never smoked but they have constantly battled rashes, itchy noses and throats and a strong sulphur smell. Perumal says four generations of her family have battled poor health.

https://www.sabcnews.com/sabcnews/durban-south-basin-a-hotspot-for-high-air-pollution/

1.12.1	Define the concept *Pollution Dome.*	(1 x 2)	(2)
1.12.2	Identify factors in the infographic that has led to Durban being a hotspot for high air pollution levels.	(2 x 1)	(2)
1.12.3	Quote TWO health effects of pollution dome mentioned in the extract.	(2 x 1)	(2)
1.12.4	In a paragraph of EIGHT lines, discuss sustainable strategies that the Durban Municipality must implement to reduce the impact of pollution dome.	(4 x 2)	(8)

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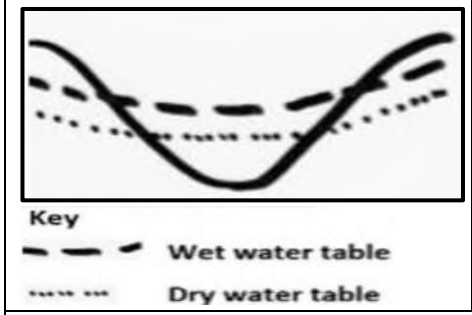
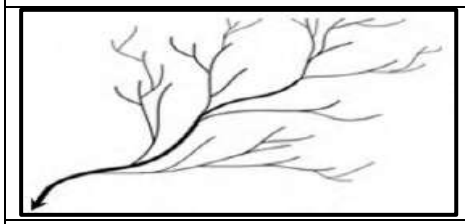
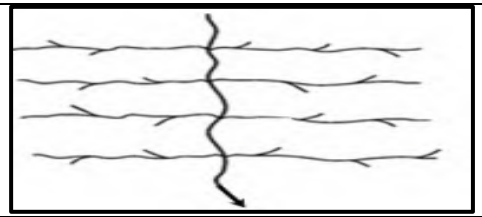
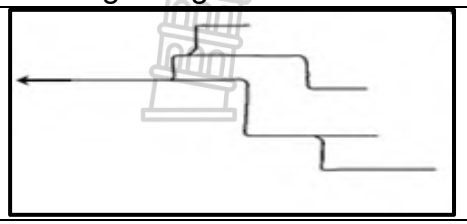
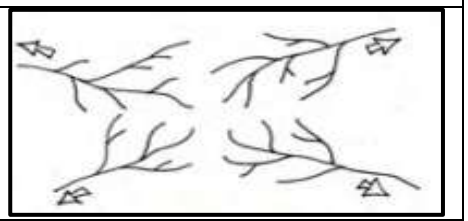
GEOMORPHOLOGY

KEY CONCEPTS

- **Drainage basin**: refers to an area drained by a river and its tributaries.
- **Source**: refers to the starting point of a river.
- **Catchment areas**: the upper reaches of a drainage basin which supplies river with water.
- **Watershed**: a highlying area that separate two drainage basin.
- **Tributary**: refers to a smaller stream that joins the main river.
- **Interfluve**: refers to a land that separate two tributaries in a same drainage basin.
- **Confluence**: a point where two or more river joins.
- **Mouth**: a point where the river enters the ocean.
- **Surface run-off**: refers to the water that flows over the surface after it rains.
- **Infiltration**: a process whereby water seeps into the ground.
- **Ground water**: refers to water found underground.
- **Water table**: refers to the upper level of saturated zone.
- **Base flow**: water which joins stream channel from ground water.
- **Drainage pattern**: refers to a surface pattern form by a river and its tributaries.

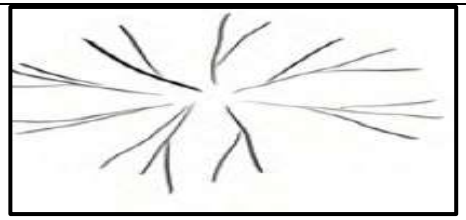
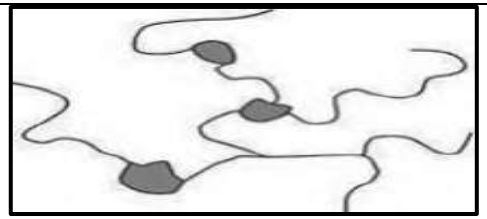
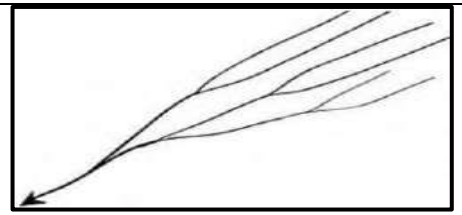
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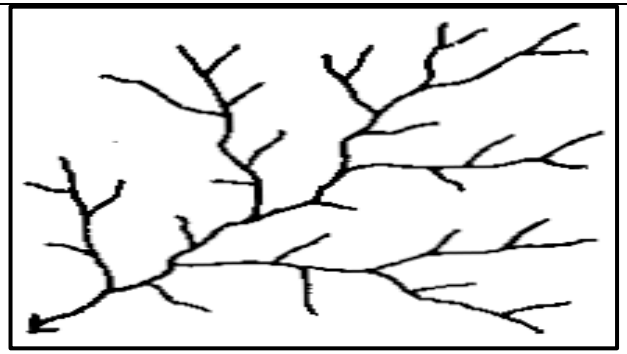
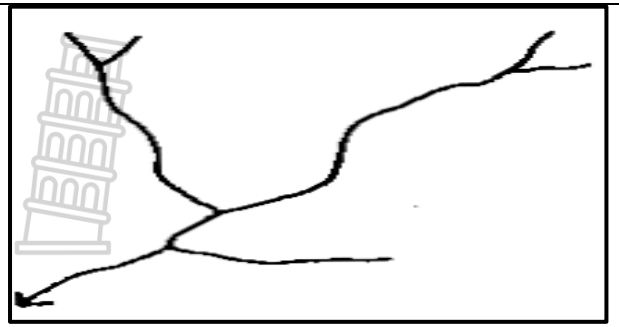
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TYPES OF RIVERS			
Permanent/ perennial river	Periodic/ seasonal river	Episodic river	Exotic river
• Flows throughout the year.  	• Only flows on rainy seasons. 	• Flows after heavy rains associated with floods. 	• Originate in areas on high rainfall and flow through dry regions. 
[source: https//youtu.be/dr9cz5bcele?si=fevwzwq9rk5kj07u.com]			
DRAINAGE PATTERNS			
Dendritic pattern	Trellis pattern	Rectangular pattern	Radial pattern
Description: • Resembles the branch of a tree.	**Description**: • Mainstreams are parallel to each other, has short tributaries joining the main stream.	**Description**: • The main stream has right angle bends along the river course	**Description**: • Streams radiate from one central highland.
Rock type: • Rocks which are uniform/ equal resistance to erosion.	**Rock type**: • Develop in folded rock strata's of alternating layers of hard and soft rock.	**Rock type**: • Develop in igneous rock that have many joints and cracks at right angles.	**Rock type**: • Associated with dome like features.
			
[Source: https://compass.rauias.com]			

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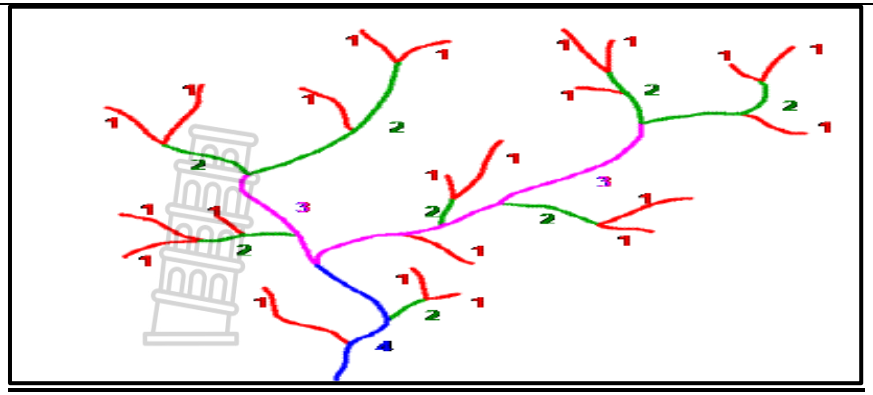
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DRAINAGE PATTERNS		
Centripetal pattern	Deranged pattern	Parallel pattern
Description: • Rivers flow towards one central point or depression.	**Description**: • It has a haphazard pattern, the main river meander across a wide, flat floodplain.	**Description**: • Tributaries flows almost parallel to each other.
Rock type: • Associated with massive igneous, usually with a depression or swamp.	**Rock type**: • Develop from melting of glaciers.	**Rock type**: • Found in steeply folded bedrock.
		
[Source: https://compass.rauias.com]		

DRAINAGE DENSITIES	
• The average length of a stream per unit area. • Drainage density of a river can be classified as **low or high.** • The soil texture is closely linked to the density of the basin.	
LOWER DRAINAGE DENSITY	**HIGHER DRAINAGE DENSITY**
	
[Adapted from: https://gis4geomorphology/com/wp-ontent/uploaded/201403threshold.jpg]	

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FACTORS THAT INFLUENCE DRAINAGE DENSITIES	
LOWER DRAINAGE DENSITY	**HIGHER DRAINAGE DENSITY**
• **Dry soil** promotes more infiltration thus lower density. • **Denser vegetation** promotes more infiltration thus, lower density. • **Gentle gradient** promotes more infiltration therefore, lower density. • **Porous rocks** promote more infiltration therefore, lower density. • **Permeable rocks** promote more infiltration thus, lower density. • **Light rains** promote more infiltration therefore, lower density. • **Higher evaporation** promotes more infiltration therefore, lower density.	• **Wet soil** promotes more surface run-off thus lower density. • **Sparse vegetation** promotes more surface run-off thus, lower density. • **Steep gradient** promotes more surface run-off therefore, lower density. • **Non- porous rocks** promote more surface run-off therefore, lower density. • **Impermeable rocks** promote more surface run-off thus, lower density. • **Heavy rains** promote more surface run-off therefore, lower density. • **Lower evaporation** promotes more surface run-off therefore, lower density.
STREAM ORDER	
• Refers to a method of classifying streams so that the size of drainage basin can be compered. • All the source tributaries are called first order stream. • When two first orders (1st order) meet they form a second order (2nd order). • For an order to change two streams of a same order must meet. • The stream remains unchanged if the lower order stream meets with a higher order stream.	
[Adapted from: https://wrt.tas.gov.au/cfev/docs/ref/stream+order+position+in+drainage.xhtml]	

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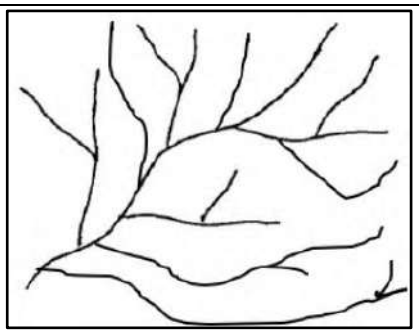
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2.1. Match the statements in COLUMN A with the options in COLUMN B on drainage basins. Write only Y or Z next to the question numbers (2.1.1 to 2.1.7) in the ANSWER BOOK, e.g. 2.1.8 Y.

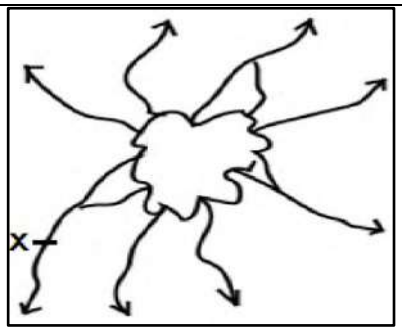
	COLUMN A		COLUMN B
2.1.1	Refers to the upper limit of saturated zone.	**Y** **Z**	Ground water Water table
2.1.2	The river… is the point where river enters the ocean.	**Y** **Z**	Mouth Source
2.1.3	The … consist of all tributaries and the main river.	**Y** **Z**	Drainage basin Main river
2.1.4	Water that joins the river channel from ground water are known as …	**Y** **Z**	Sheet flow Base flow
2.1.5	A segment of a river that flows into the main river.	**Y** **Z**	Confluence Tributary
2.1.6	A high laying area that separates two river systems	**Y** **Z**	Interfluve Watershed
2.1.7	Water that runs over the surface after it rains.	**Y** **Z**	Surface run-off Infiltration
			(7 x 1) (7)

2.2. Refer to drainage patterns A and B below.

A



B



[Source: https://courses.lumenlearning.com]

2.2.1	Define the concept *drainage basin*.	(1 x 2)	(2)
2.2.2	Identify drainage pattern **B**.	(1 x 1)	(1)
2.2.3	Compare the drainage density between **A** and **B**.	(2 x 1)	(2)
2.2.4	Describe the underlying rock structure of drainage pattern **A**	(1 x 2)	(2)
2.2.5	Determine the stream order at **X** in drainage pattern **B**.	(2 x 1)	(2)
2.2.6	Why are human activities limited in areas where drainage pattern **B** is found?	(1 x 2)	(2)
2.2.7	Discuss how slope/ gradient and rainfall influence drainage density of **A**.	(2 x 2)	(4)

[15]

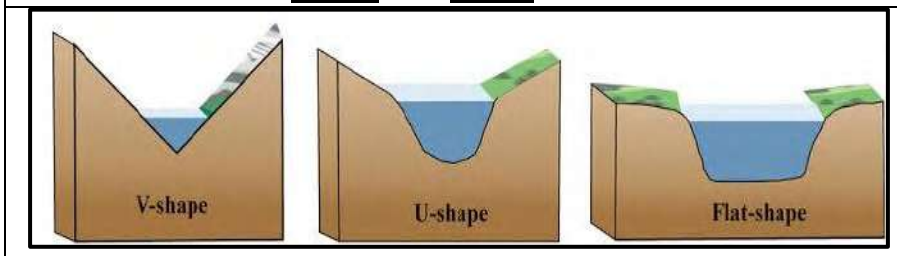
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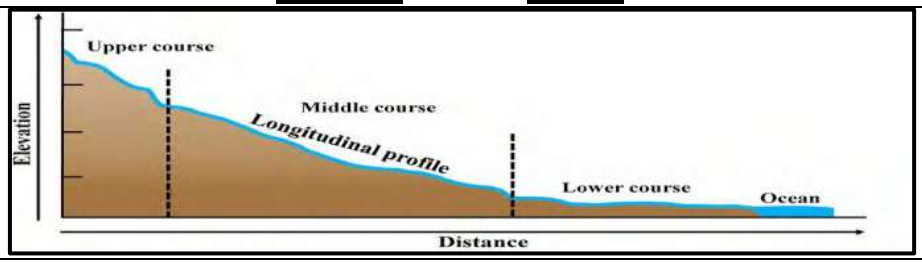
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FLUVIAL PROCESSES

RIVER PROFILES

CROSS/ TRANSVERSE PROFILE	LONGITUDINAL PROFILE
• It shows a view of a river from bank to bank. • It indicates: the **depth** and **width** of a river	• It shows the view of a river from source to mouth. • It indicates: the **gradient** and the **length** of a river.





[Source: https://geography-revision.co.uk/a-level/physical/]

STAGES OF A RIVER

UPPER COURSE	MIDDLE COURSE	LOWER COURSE
• Steeper gradient. • Erosion and transportation dominate. • Mainly, vertical/ downward erosion takes place, creating a steep, narrow V –shaped channels. • Stream flow is turbulent. • There is less volume of water. • Associated landforms are waterfalls and rapids.	• Gradual drop in gradient. • Vertical erosion is reduced. • Lateral/ sideways erosion set-in creating U-shaped channels. • Volume of water start to increase as more tributaries join the main river.	• **Gentle gradient.** • More deposition occurs. • Stream flow is laminar. • Large water volume • Associated landforms are meanders, ox-bow lakes, floodplains, braided streams, levees

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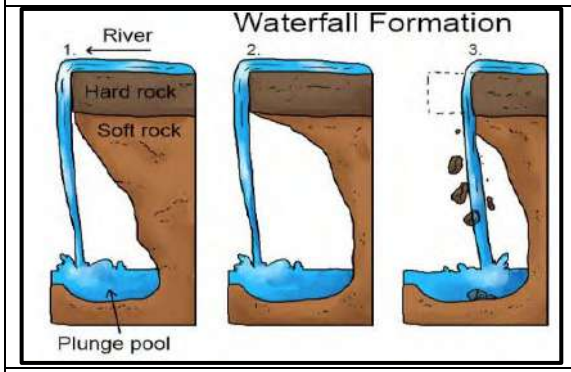
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FLUVIAL LANDFORMS

UPPER COURSE

WATERFALL

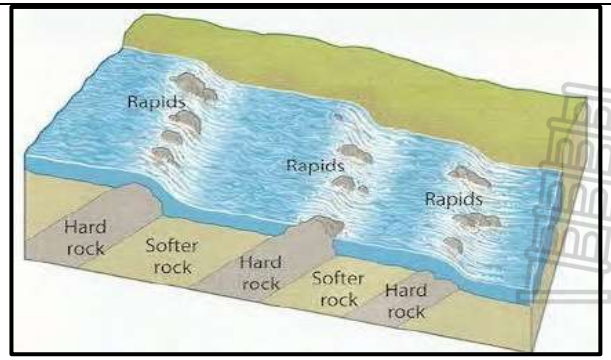
- Commonly occurs where hard rock overlies softer rock.
- The softer underlying rock is worn away quicker.
- The hard rock become undercut, unsupported and unstable and will eventually collapse.
- Some collapsed material may swirl around the foot of the waterfall forming a deep plunge pool.
- This process is repeated and the waterfall retreats upstream leaving a deep gorge (valley) downstream.



[source: https://mammothmemory.net]

RAPIDS

- These are sections of rough turbulent (white water).
- Forms where there are alternating layers of hard and soft rock.
- The layer of soft rock erodes quicker than the layer of hard rock.
- The hard rock form an outcrop (exposed).
- This makes the bed of the river uneven creating a rough turbulent water.



[source:https://laulima.hawaii.edu/access/content/group/dbd544e4-dcdd-4631-b8ad3304985e1be2/book/chapter11/erode.html]

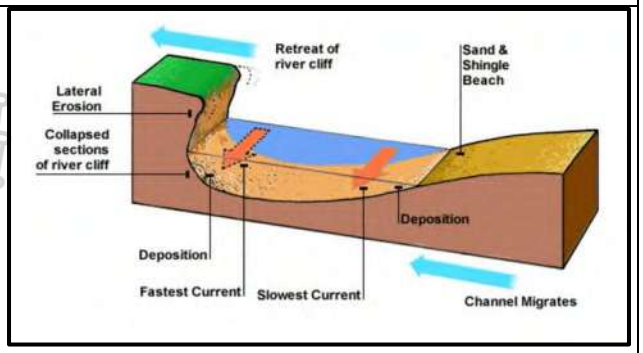
LOWER COURSE

MEANDER

- It is a curve or bend found along the river.
- It generally occurs in the lower course as the river flows slowly and the river begins to wanders
- The outer bank of a meander is called the under-cut slope and the inner bank is called the slip off slope

Undercut slope: higher velocity, more erosion, deeper and concave.

Slip-off slope: lower velocity, more deposition, shallower and convex.



[source: https://www.geocaching.com]

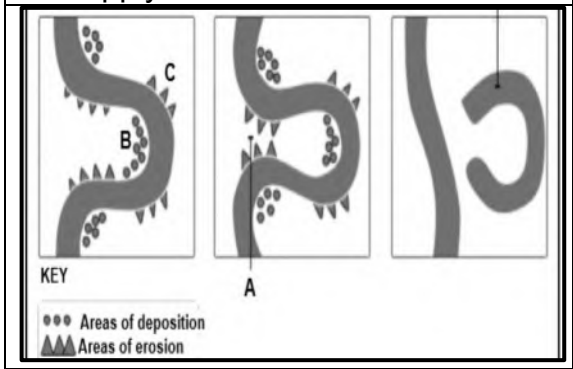
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LOWER COURSE

OX-BOW LAKE

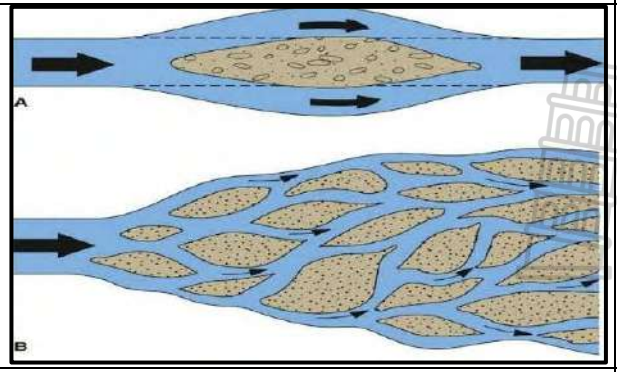
- Ox-bow Lake form from a meander loop that is cut off from the main stream.
- Erosion on the outer bank and deposition on the inner bank of the meander resulting in the meander neck becoming narrower
- During times of flood the water cannot negotiate the meander loop and flow straight.
- This results in the meander loop being cut off from the main stream to form an ox-bow lake
- The ox-bow lake will eventually dry up to form a meander scar because it does not have a water supply.



[source: https://quizlet.com]

BRAIDED STREAM

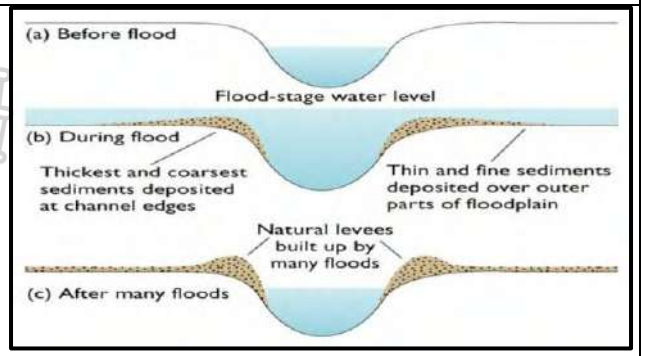
- Forms when a river deposits its load and blocking its own path and is forced to split into smaller channels.
- When a river losses energy, so does its capacity to transport the river load, resulting in deposition.
- This occurs after times of flooding and the river will deposit its load in the channel and by doing so chokes itself.
- The river is forced to flow around deposited sediments.
- These islands of deposited sediments cause the river to braid resulting in series of convergence and divergence segments.



[source: https://www.ibaguette.com]

NATURAL LEVEE

- It occurs when the river is subjected to repeated flooding.
- Flood water overflow and spread out over floodplains.
- Velocity decreases as water spread out of the channel.
- The river first deposit it heaviest sediments (coarse sediments) closer to the river channel. (these sediments are too heavy to be carried by slow moving water)
- Finer sediments are carried further away from the river channel.
- Overtime layers of deposited sediments accumulate along river banks, forming a raised bank called natural levee.



[source: https://www.tutorchase.com]

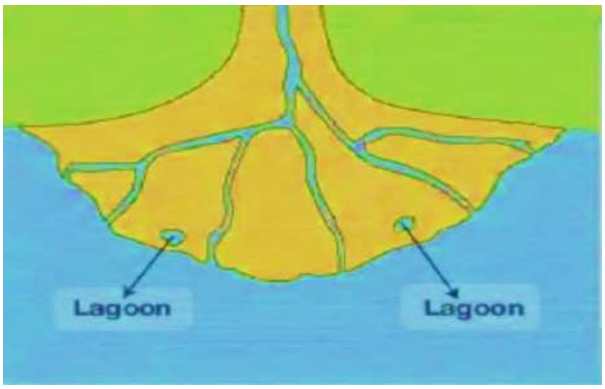
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LOWER COURSE

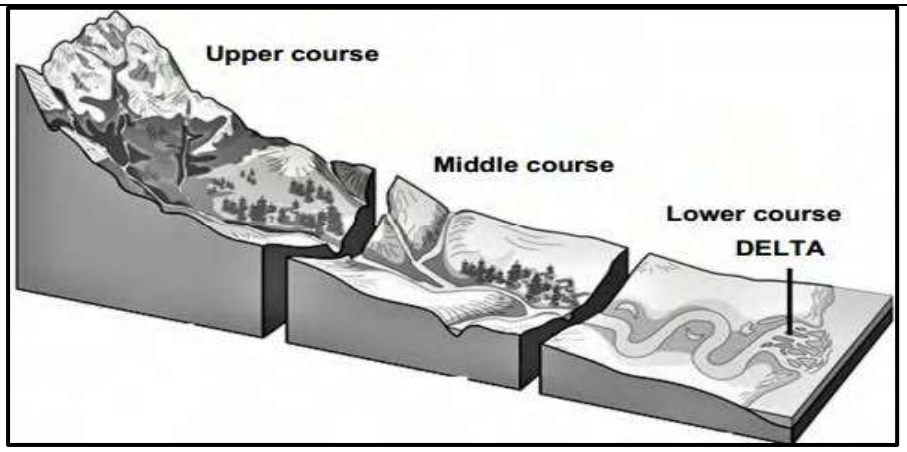
DELTA

- Forms when a river flows into a sea or lake.
- The gradient is very gentle and the river loses energy which result in deposition of its load.
- The coarser sediments are deposited first and the fine sediments are deposited further away from the river mouth.
- Overtime sediments build up and build out.
- The classic shape is triangular. The shape resembles a Greek Letter D which gave delta its name.



[Source: https://www.savemyexams.com]

2.3.1 **Study the diagram below that shows the fluvial courses of a river.**



[source: https://pressbooks.senecapolytechnic.ca]

2.3.1	Would the flow in the upper course of the river be characterised as turbulent or laminar?	(1 x 1)	(1)
2.3.2	Give a reason for your answer in QUESTION 2.3.1.	(1 x 2)	(2)
2.3.3	Define the concept *cross profile*.	(1 x 2)	(2)

Refer to the lower course (DELTA) of the river.

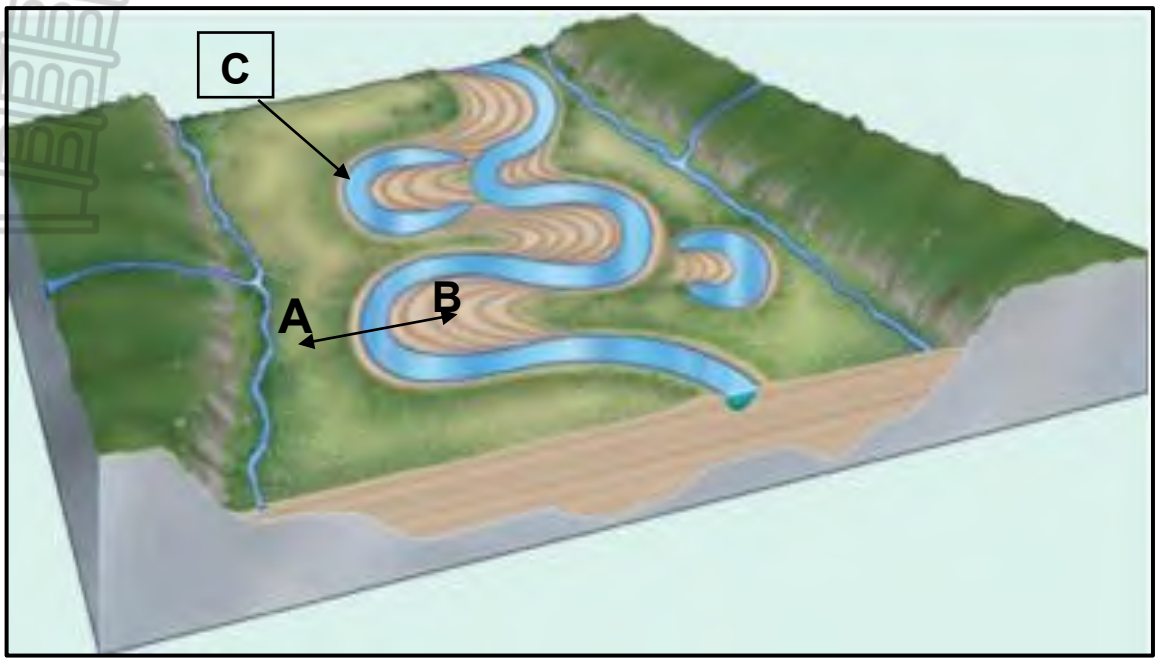
2.3.4	Name ONE condition necessary for the formation of a delta.	(1 x 2)	(2)
2.3.5	Why are some coastal areas not suitable for development of deltas?	(1 x 2)	(2)
2.3.6	What is the importance of distributaries in deltas?	(1 x 2)	(2)
2.3.7	Discuss TWO economic advantages of deltas why deltas are idea for farming.	(2 x 2)	(4)

[15]

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2.4. Refer to the sketch on fluvial landform below.



[source: https://www.geocaching.com]

2.4.1	The fluvial landform illustrated in the sketch is mainly found in the (middle/ lower) course?	(1 x 1)	(1)
2.4.2	Identify landform **C**.	(1 x 1)	(1)
2.4.3	(a). Name slope **A** and **B** respectively.	(2 x 1)	(2)
	(b). Draw a rough cross section from **A** to **B**.	(3 x 1)	(3)
2.4.4	In a paragraph of approximately EIGHT lines, describe the processes that resulted in the formation of landform **C**.	(4 x 2)	(8)
			[15]

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RIVER REJUVENATION

This is a process whereby a river that has reached the base level, regains energy and begins to erode vertically once again.

REASONS FOR REJUVENATION

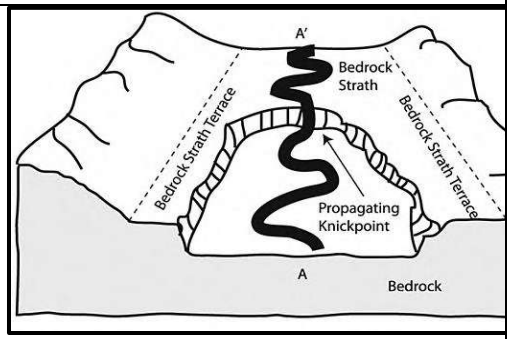
- Drop in sea level
- Tectonic upliftment
- River capture
- A significant increase in rainfall

WHY IS REJUVENATED LANDSCAPE NOT SUITABLE FOR HUMAN ACTIVITIES?

- Valleys within valleys would make the landscape steeper and more difficult for farmers to cultivate.
- Landscape promotes soil erosion and discourage the use of machineries.
- Terraces are too high, which hamper farmers access to water in the river.
- Narrow terrace would limit the amount of land to cultivate.
- Faster flowing water at the knick-point (waterfall) makes it inaccessible for irrigation.
- Entrenched/ incised meanders have steeper/ deeper valleys that limits farmers access to water.
- Steeper slopes make the construction of infrastructure difficult and expensive.

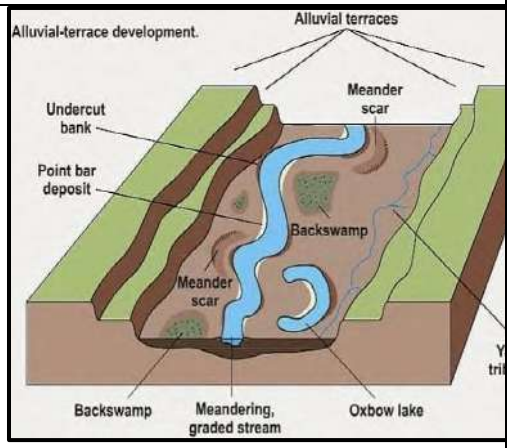
FEATURE ASSOCIATED WITH REJUVENATION

1. **KNICK-POINT**:
- The point where the old erosion level meet with the new often seen as a waterfall.
- They are often seen as waterfalls.
- Knick-points retreat back-ward or upstream.



[source: https://agupubs.onlinelibrary.net]

2. **TERRACES**:
- A terrace is the remains of previous floodplains.
- The river has cut downwards through this previous floodplain.
- The past floodplains are found at a higher level after the river has rejuvenated.
- The floor of the old channel forms a terrace on the either side.
- Paired terraces develop if the process is repeated several times.
- Lateral erosion by the river will cut the terrace back.



[source: https://thebritishgeographer.weebly.com]

3. **A VALLEY WITHIN-A-VALLEY**
- A new valley if curved within an old valley as a result of river rejuvenation.

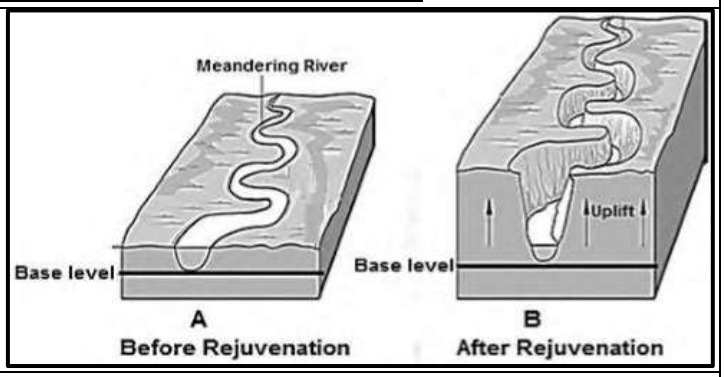
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FEATURE ASSOCIATED WITH REJUVENATION

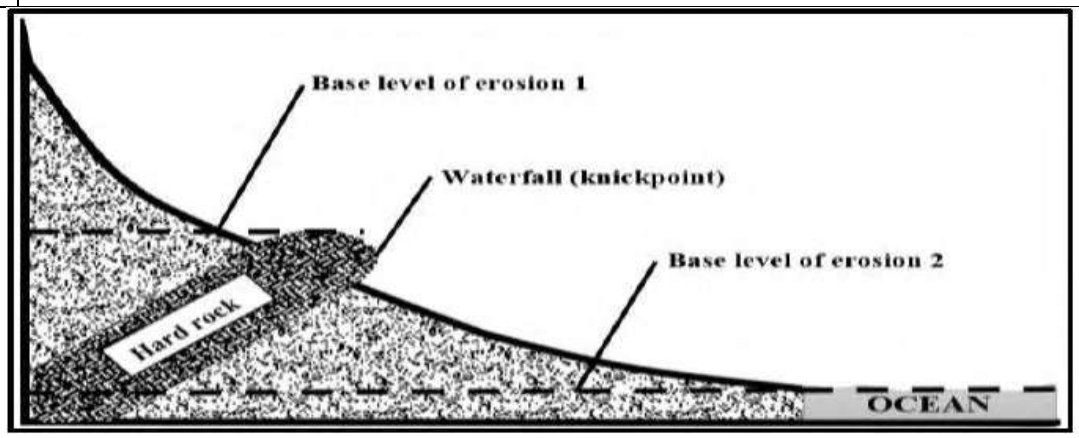
4. INCISED MEANDER (INGROWN/ ENTRENCHED)

- River meander across floodplains in the lower course
- After rejuvenation has occurred the river erodes vertically and the meander cut deeply into the landscape



[Adapted from https://www.google.com/search?q=rejuvenation+of+rivers]

2.5 Refer to the sketch illustrating a river profile.



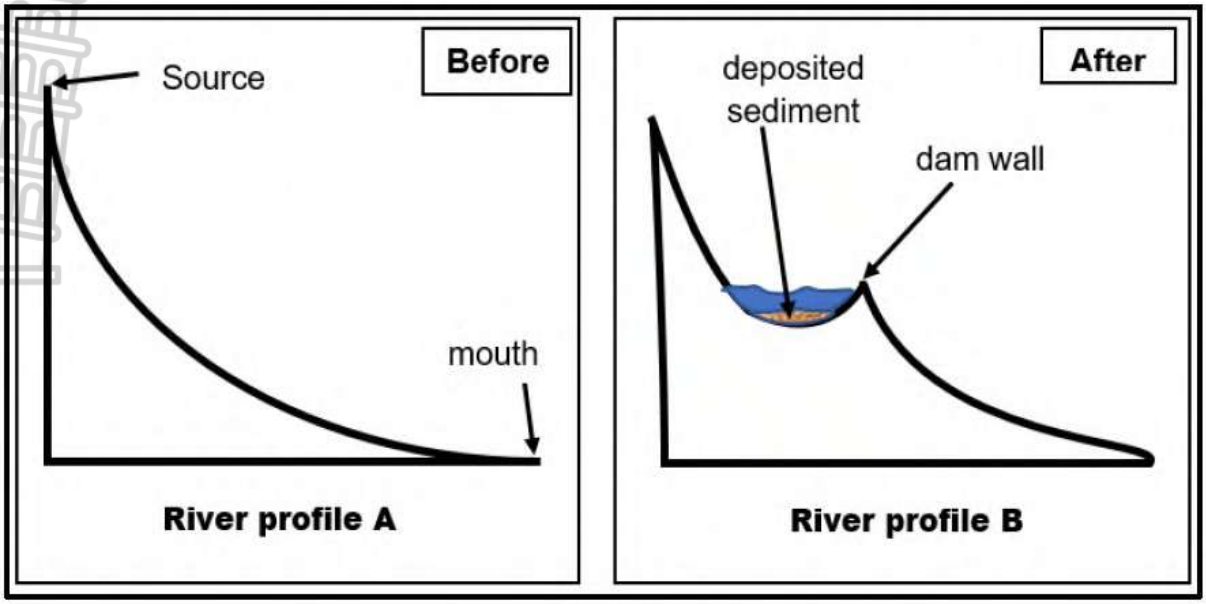
[Source: Examiner's own sketch]

	COLUMN A		COLUMN B
2.5.1	Which river profile is depicted by the diagram?	Y Z	cross profile longitudinal profile
2.5.2	The grading of the profile shown is...	Y Z	graded ungraded
2.5.3	The temporary/ local base level of erosion is represented by…	Y Z	base level of erosion 1 base level of erosion 2
2.5.4	In which course of river is the waterfall normally found?	Y Z	upper course middle course
2.5.5	The feature normally found at the foot of the waterfall.	Y Z	deep plunge pool rapids
2.5.6	When the river plunges over the waterfall, the velocity of the stream…?	Y Z	decreases increases
2.5.7	The waterfall retreat…	Y Z	upstream downstream
2.5.8	The diagram shows a/ an … between erosion and deposition.	Y Z	balance imbalance
			(8 x 1) (8) **[8]**

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2.6. Study the illustration and answer the following questions.



[source: Examiner's own sketch]

2.6.1 Define the concept *longitudinal profile*. (1 x 2) (2)

2.6.2 Identify the temporary base level of erosion evident in the sketches above. (1 x 1) (1)

2.6.3 Give a reason for your answer in QUESTION 2.6.2 (1 x 2) (2)

Refer to the deposited sediments in river profile **B**

2.6.4 a) How does the deposition of sediments influence the dam carrying capacity? (1 x 2) (2)

b) Explain the negative impact of deposited sediments on a dam. (1 x 2) (2)

2.6.5 Explain the impact of the presence of dams on erosion and deposition processes. (1 x 2) (2)

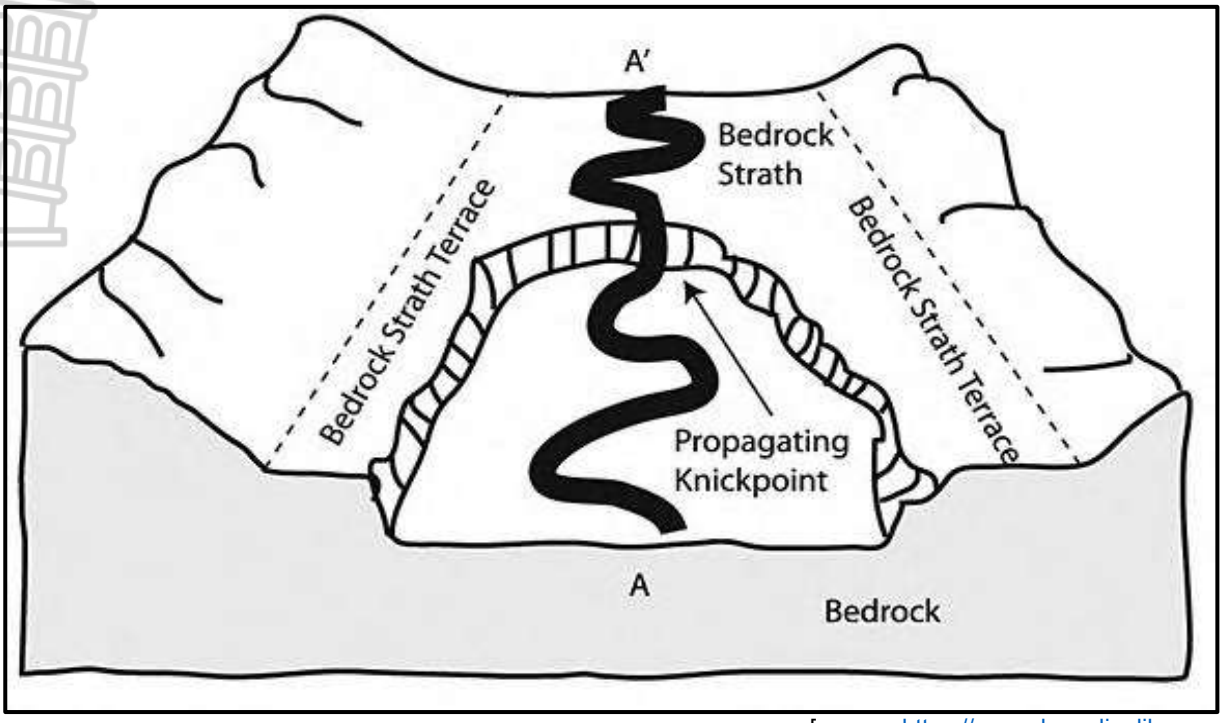
2.6.6 Describe the difference in grade between river profile **A** and river profile **B**. (2 x 2) (4)

[15]

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2.7. Study the illustration and answer the following questions.



[source: https://agupubs.onlinelibrary.net]

2.7.1 Define the concept *river rejuvenation*. (1 x 2) (2)

2.7.2 Identify TWO features of river rejuvenation on the sketch. (2 x 1) (2)

2.7.3 Name ONE condition that could have resulted in the river in the sketch above being rejuvenated. (1 x 1) (1)

2.7.4 Explain what will happen to a knickpoint overtime. (1 x 2) (2)

2.7.5 Draw a simplified longitudinal profile of a river shown in the above sketch. (4 x 1) (4)

2.7.6 Explain the negative impact that a rejuvenated landscape will have on farming activities. (2 x 2) (4)

[15]

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RIVER CAPTURE OR STREAM PIRACY

- It is when a more energetic stream robs/ intercept headwaters of a less energetic stream.

CONDITIONS NECESSARY FOR RIVER CAPTURE

- Steeper gradient
- Greater rainfall
- Softer rock

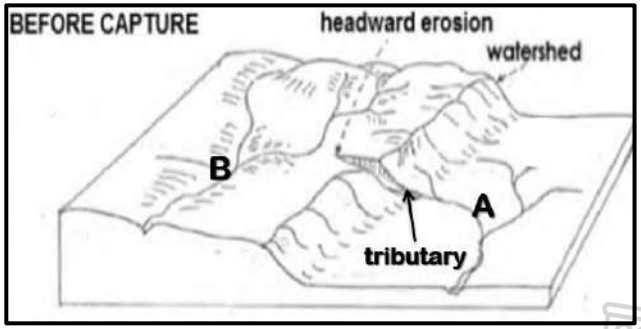
FEATURES ASSOCIATED WITH RIVER CAPTURE

- Misfit stream/ beheaded stream: it refers to a river that has too little water for the valley which it flows.
- Elbow of capture: it is generally a right-angle bend which indicate the point where one river captures another.
- Wind gap/ dry gab: it refers to a dry river valley that is found immediately below the elbow of capture.
- River gravels: in the wind gab, boulders, stones and pebbles are left behind due to decreased volume of water in the river.

PROCESS OF RIVER CAPTURE

BEFORE RIVER CAPTURE

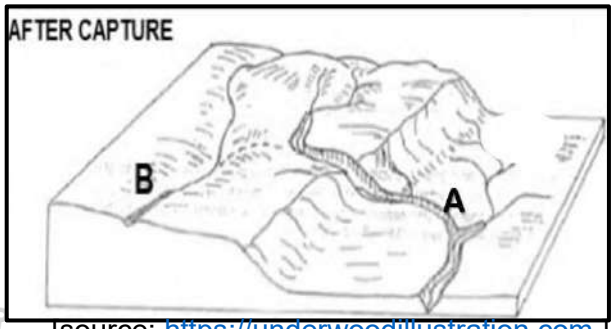
- River **A** has more energy because it flows over a steeper gradient and a softer rock.
- Head-ward erosion takes place in the direction of the watershed between river **A** and **B**
- The watershed moves to the direction of river **B**
- Overtime abstraction take place



[source: https://underwoodillustration.com]

AFTER RIVER CAPTURE

- River **A** continue to erode head-ward and eventually meet the upper stream of river **B**
- The water in the upper stream of river **B** will be diverted and will flow into river **A**
- The upper stream of river **B** has been captured by river **A**
- River **A** is a capture stream and river **B** is a captured stream



[source: https://underwoodillustration.com]

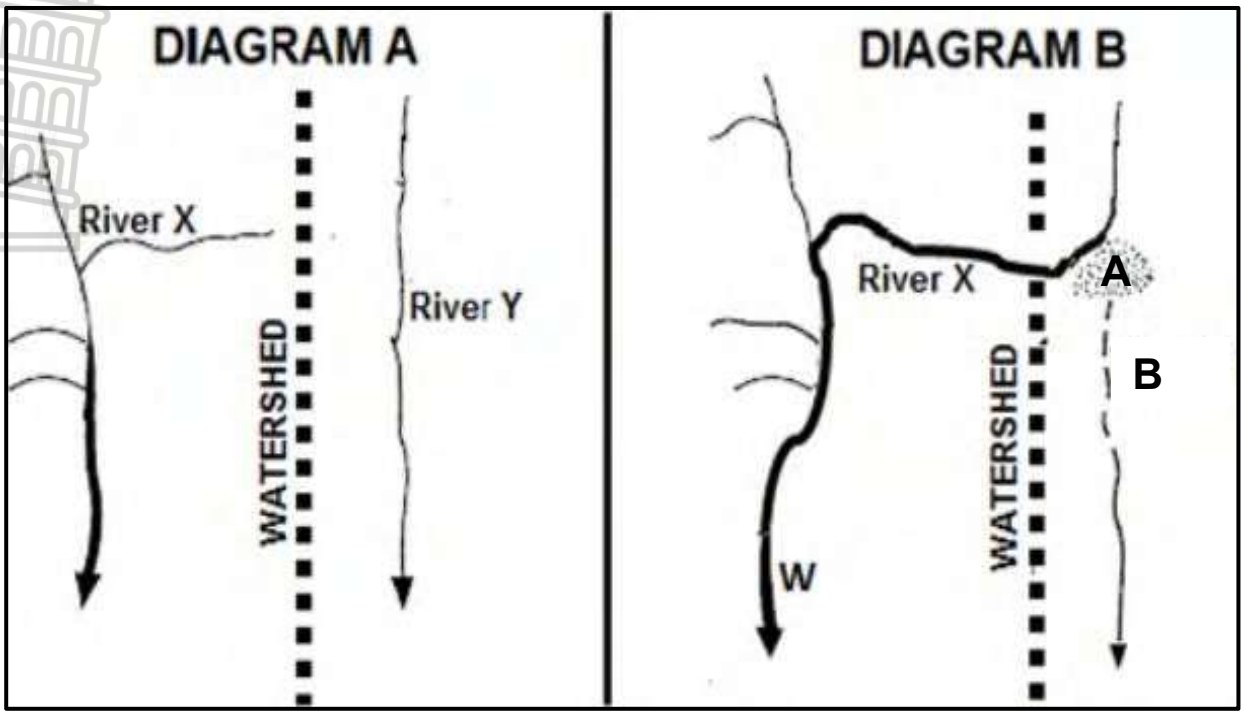
THE EFFECT OF RIVER CAPTURE ON CAPTOR STREAM AND CAPTURED STREAM

CAPTOR STREAM	CAPTURED STREAM
• The size increase, Volume increase, increase velocity, Erosive ability increase, River could rejuvenate, Associated with turbulent flow, Possibility of flooding, Rate of deposition is lowered, knickpoints, terraces, incised meanders and valley-within-a-valley may develop along the profile of a river.	• The size of a stream decreases, Volume decrease, Laminar flow, Erosive ability decreases, Deposition increases, River load decrease.

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2.8 Study the illustration and answer the following questions.



[source: https://askilo.com]

2.8.1	Define the concept *river capture.*	(1 x 2)	(2)
2.8.2	Give TWO pieces of evidence in the diagram that shows that river capture has taken place.	(2 x 1)	(2)
2.8.3	Identify feature **A** and **B**.	(2 x 1)	(2)
2.8.4	Name the type of erosion taking place at river **X**	(1 x 1)	(1)
2.8.5	Give a reason for the type of erosion mentioned in QUESTION 2.8.4	(1 x 2)	(2)
2.8.6	Describe changes that river **X** will experience after river capture has taken place.	(3 x 2)	(6)

[15]

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CATCHMENT AND RIVER MANAGEMENT		
The use of water resources in a sustainable way so that they are available for future generation.		
IMPORTANCE OF MANAGING DRAINAGE BASIN AND CATCHMENT AREAS	**IMPACT OF PEOPLE ON DRAINAGE BASINS AND CATCHMENT AREAS**	**STRATEGIES TO MANAGE DRAINAGE BASIN/ CATCHMENT AREAS**
• They are life supporting system, providing water for agriculture, industrial, domestic and recreational use. • Rivers are used to generate hydro-electric power. • They ensure that ecosystem remains healthy and in balance. • Leisure activities such as fishing, canoeing and white-water rafting. • To control flooding especially in low-lying areas.	• Removal of vegetation which increases surface run-off leading to flooding and siltation of rivers. • Over-cultivation and over-grazing have caused large tracts of protective vegetation cover within drainage basins to be destroyed. • Growth of informal settlements on floodplains leading to pollution. • Construction of dams, which decreases volume of water further downstream.	• Implementation of legislation such as fines. • Create a buffer zones close to rivers to prevent industrial development. • Afforestation, to prevent excessive surface run-off. • Encourage the recycling of waste rather than dumping in rivers • Educate farmers about correct method of farming.

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2.9. Study the infographic below and answer the following questions.

Local women clean up polluted Isipingo river in Durban, South Africa



[Source: http://www.ecr.co.za]



[Source:http//:ejatlas.org]

Isipingo river is a small tributary of Izimbokodo river, which runs from Engonyamani Township down several sections of uMlazi towards Orient hills where it merges with Izimbokodo river.

Recent studies highlights that the areas have been treated by pollution from various companies throughout the eThekwini municipality, which has been dumping chemical waste, raw sewages, and other effluents into Isipingo river from as early as the 1970's. The beginning of Prospecton industrial area throughout the 70's despite grievances from the Isipingo Community, which has been subjected to heavy industrial air and water pollution. Moreover, the municipality itself also dump sewage and allows burst sewer pipes to drain into the river for many years. The pollution has cause mass fish kills and force surrounding beaches to close. The smell is also often unbearable.

To improve the river's health a group of women took initiatives and organize over 100 women across Durban to form a task force cleaning the river without pay.

[Source: http//:ejatlas.org/conflict/local/women-clean-up-polluted-isipingo-river-in-durban-south-africa]

2.9.1	Define the concept *river management*.	(1 x 2)	(2)
2.9.2	What is the main source pollution in Isipingo river?	(1 x 1)	(1)
2.9.3	Name TWO main industrial effluents mentioned in the extract responsible for river pollution.	(2 x 1)	(2)
2.9.4	According to the extract state TWO negative impact that the municipality sewers have had in the surrounding area.	(2 x 1)	(2)
2.9.5	Why government is reluctant to shut down Prospection industrial area despite many grievances submitted by the local community.	(1 x 2)	(2)
2.9.6	How residents of Isipingo could benefit from a well- managed catchment area.	(1 x 2)	(2)
2.9.7	Apart from the strategy used in the extract, discuss other alternative strategies that could be put in place to eradicate pollution level in Isipingo river.	(2 x 2)	(4)

[15]

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RURAL AND URBAN SETTLEMENT

CONCEPTS

Site	Actual piece of land on which a settlement is built.
Situation	Location of a settlement in relation to the surrounding environment.
Complexity	Classification of a settlement according to services and functions it offers.
Pattern	Refers to the closeness of buildings in a settlement.
Nucleated Pattern	Refers buildings being closer together in a settlement.
Dispersed Pattern	Refers to buildings being far apart from each other in settlement.
Wet-point settlement	A settlement built closer to a source of water.
Dry-point settlement	Settlement built away from water source.
Shape	The arrangement of buildings in a settlement.
Linear shape	Develops along a natural or artificial linear feature e.g. rivers, mountain pass, roads, railway lines etc.
Round shape	Develops around a specific feature e.g. well, church, kraal etc.
Crossroad	Develops at a major intersection.
T-shaped	Develops at along a T-junction.
Injustice	Something unfair which violates a person's human right.
Environmental injustice	When the environment is treated in a manner that threatens
Rural-urban migration	Movement of people from rural areas to urban areas. **Push factors**: Negative reasons for people moving away from rural areas. **Pull factors**: Positive reasons for people moving into urban areas.
Rural depopulation	Decrease in the number of people living in rural areas.
Land Reform	Policy of government that is aimed at redressing the imbalances of the past in relation to land access and ownership.
Land Restitution	Compensating people whose land was forcefully taken from them.
Land Redistribution	Redressing the imbalances of the past in relation to land ownership
Land tenure reform	Securing rights for people living on land they do not own.
Expropriation without compensation	The government's ability to take private property for public use without providing financial compensation to the owner, primarily seen in South Africa's recent legislative changes.

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Urbanisation	Increase in percentage of urban population.
Rate of urbanisation	The speed/pace at which urbanisation occurs.
Level of urbanisation	The number of people living in urban areas.
Urban Growth	The increase in number of people living in urban areas.
Urban Expansion	The physical growth of an urban areas.
Urban Sprawl	Unchecked an unplanned physical growth of an urban area.
Central place town	Town/City providing services to the surround villages.
Trade and transport town	Town or City where goods change mode of transport
Gap Town	Town or city located where there are physical barriers.
Junction town	Town or city located at an important transport intersection.
Specialised town	Town or city with one main function.
Urban hierarchy	Arrangement of urban settlement from the smallest to the largest.
Range	Maximum distance that people are prepared to travel to buy goods or services.
Threshold population	The minimum number of customers needed to make a business profitable.
Sphere of influence	Area from which a business draws its customers.
High order goods	Goods and services not needed daily or used infrequently.
Low order goods	Goods and services needed daily.
Land-use	A specific activity for which the land has been set aside.
Land-use zone	An area set aside for a specific function.
Compatibility	The degree to which functions attract or repel each other. High-income residential zone and Heavy industrial zone are not compatible. Low-income residential area and Heavy industrial zone are compatible.
Commercial decentralisation	Movement of businesses out of the CBD and into the suburbs/outlying business centres
Land use model	Generalised version of the layout of urban areas.
Multiple nuclei model	A layout of a city that has many focal points.
Sector model	A layout of a city that has land-use zones developing along routes with the CBD at the centre.

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Traffic congestion	Overconcentration of vehicles on the road.
Urban Blight	Deterioration of urban areas/buildings.
Informal settlement	Illegally built buildings using cheap and weak material.
Urban renewal	Improvement of a dilapidated parts of the urban areas
Gentrification	Upgrading of low-income residential building in the city.
Facadism	Retaining the front of the building while demolishing and building a new structure behind.

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RURAL SETTLEMENT GEOGRAPHY

GRADE 12

1. DEFINITION



Human settlements with low population density and where people are engaged mainly in primary economic activities

2. CHARACTERISTICS

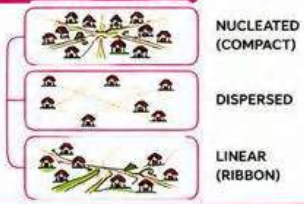
- Low population density
- Scattered or nucleated
- Dominated by primary economic activities – **unifunctional**
- Limited services and infrastructure

3. FACTORS INFLUENCING RURAL SETTLEMENTS

- **Natural factors** – relief, climate, water supply, soil type, natural vegetation
- **Economic factors** – Farming, mining, fishing, tourism and industries
- **Social factors** – Culture, tradition, family structure, community ties and lifestyle
- **Political Factors** – Government policies, land reform, decentralization, access to services
- **Historical factors** – Past settlement patterns, historical events and colonial influence

4. SPATIAL PATTERNS OF RURAL SETTLEMENTS

NUCLEATED – houses are clustered together.
DISPERSED – houses are widely scattered.



5. FUNCTIONS OF RURAL SETTLEMENTS

Mainly unifunctional e.g.

- Produce food
- Support animal husbandry
- Provide natural resources

6. LOCATION AND SITE FACTORS

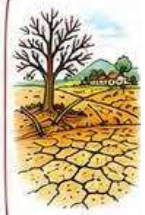
SITUATION – location of a settlement in relation to the surrounding.
SITE – The actual location of a settlement

SITE FACTORS INCLUDE

- Relief
- Soil type and soil fertility
- Water supply
- Vegetation
- Availability of building material
- Accessibility – transport network
- Risk due to natural hazard

Site and Situation factors influence where people settle and how settlements develop over time.

7. ISSUES AND SOLUTIONS



- Poverty
- Limited access to services
- Inadequate infrastructure
- Unemployment
- Migration
- Land degradation
- Land tenure problems
- Vulnerability to natural hazards

- Invest in infrastructure
- Improve education and health services
- Promote local economic development
- Support sustainable farming practices
- Strengthen community participation and leadership

8. RURAL–URBAN INTERACTIONS

Environmental, social, and economic factors may force people to migrate from rural to urban areas or from urban to rural areas.

9. PLANNING AND SUSTAINABLE DEVELOPMENT

- Improve and maintain infrastructure
- Ensure access to basic services
- Support sustainable farming
- Promote sustainable rural development
- Ensure community participation
- Manage risk of natural hazards



10. CHALLENGES AND OPPORTUNITIES (IN DETAIL)

- **Economic** – low income, limited job opportunities, and debt
- **Education** – lack of schools, poor quality education.
- **Healthcare** – inadequate facilities.
- **Infrastructure** – poor roads, unreliable electricity, unsafe water and sanitation.
- **Social** – rural-urban migration, population decline.
- **Environmental** – soil erosion, water scarcity, pollution, deforestation.
- **Natural hazards** – droughts, floods, landslides, cyclones
- **Lack of awareness** – traditional methods and low adoption to technology.

SUSTAINABLE RURAL SETTLEMENTS CONTRIBUTE TO FOOD SECURITY, SOCIAL WELL-BEING, ECONOMIC GROWTH AND ENVIRONMENTAL STEWARDSHIP.

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URBAN SETTLEMENT SUMMARY

GEOGRAPHY GRADE 12

1. WHAT IS AN URBAN SETTLEMENT?



People live and work in a built-up area with a high population density. Provides a variety of services (multifunctional)

2. MAIN CHARACTERISTICS

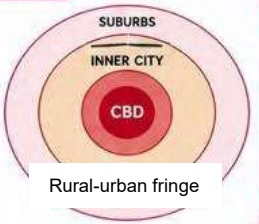
- High population density
- Wide variety of economic activities
- Well-developed infrastructure
- Complex transport networks
- Social and cultural diversity
- High levels of education, skills and innovation.

3. FACTORS INFLUENCING URBAN SETTLEMENTS

- **Physical Factors** – relief, climate, water supply, soil stability, accessibility, natural resources
- **Economic Factors** – industrialization, trade, finance, technology, services, markets, employment opportunities.
- **Social and cultural factors** – population growth, migration, education, culture, lifestyle and social values
- **Historical factors** – colonial influence, industrial revolutions and past settlement patterns
- **Political Factors** – government policies, urban planning, decentralisation, service delivery

4. SPATIAL STRUCTURE AND PATTERNS

- **CENTRAL BUSINESS DISTRICT (CBD):** Core area with offices, retail, services and administration.
- **INNER CITY:** Transition zone with mixed land uses, older housing and light industry.
- **SUBURBS:** Residential areas on the outskirts (high, middle or low income).
- **PERI-URBAN ZONE:** Area between the city and rural areas with mixed land use.
- **URBAN PATTERNS:** Radial, concentric, sectoral and grid/rectangular patterns.



5. FUNCTIONS OF URBAN SETTLEMENTS

- **Economic:** Trade, industry, finance, tourism and other services.
- **Administrative:** Government, management and decision-making.
- **Social:** Education, healthcare, recreation, culture and entertainment.
- Transport and communication hub.
- Innovation and information centre.
- Provides employment and improves quality of life.

6. LOCATION AND SITE FACTORS

LOCATION FACTORS

- Near water sources (rivers, harbours, lakes).
- Crossroads of transport routes.
- Access to markets and raw materials.
- Economically strategic positions.

SITE FACTORS

- Flat or gently sloping land.
- Good drainage and safe from natural hazards.
- Availability of land for development.
- Access to infrastructure and services.

Urban settlements are dynamic and continuously change and expand as a result of population growth, economic development, technology and government decisions.

7. CHALLENGES FACING URBAN SETTLEMENTS



- Rapid population growth and high density.
- Overcrowding and traffic congestion.
- Housing shortages and informal settlements.
- High cost of living.
- Pollution and waste management problems.
- Pressure on water, electricity and sanitation.
- Crime, violence and social problems.
- Urban sprawl and loss of agricultural land.
- Climate change impacts (heat islands, flooding).

8. URBAN–RURAL LINKAGES



Urban areas depend on rural areas for:

- Food and agricultural products
- Raw materials
- Water and energy
- Labour
- Recreation and tourism

Urban areas provide rural areas with:

- Manufactured goods
- Services (education, health, finance, transport)
- Markets for products
- Technology and information

9. PLANNING FOR SUSTAINABLE CITIES

- Plan for compact, well-structured and inclusive cities.
- Provide efficient public transport and non-motorised options.
- Ensure adequate housing and basic services for all.
- Promote mixed land use and sustainable buildings.
- Protect the environment and reduce pollution.
- Create green spaces and recreational areas.
- Use resources efficiently and promote renewable energy.
- Encourage community participation in planning and decision-making.
- Build resilient cities that can adapt to future challenges.



10. CHALLENGES AND SOLUTIONS

CHALLENGES

- Overpopulation and congestion.
- Urban sprawl and informal settlements.
- Unemployment and poverty.
- Pollution (air, water, noise).
- Crime and social inequality.
- Pressure on infrastructure and services.

SOLUTIONS

- Good urban planning and zoning.
- Investment in infrastructure and public transport.
- Create more jobs and support small businesses.
- Provide affordable housing.
- Environmental management and green spaces.
- Encourage inclusive and sustainable urban development.

WELL-PLANNED, INCLUSIVE AND SUSTAINABLE URBAN SETTLEMENTS CREATE OPPORTUNITIES, IMPROVE QUALITY OF LIFE AND DRIVE NATIONAL DEVELOPMENT.

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3.1 Give a concept or term for each of the following statements. Write only the concept/term next to the question number. E.g. 3.1.11 Decentralization.

3.1.1	A settlement where buildings are grouped closely together.	
3.1.2	A single house on a farm, far from other buildings.	
3.1.3	Settling away from a water source to avoid flooding risk.	
3.1.4	The movement of people out of rural areas into urban areas.	
3.1.5	A settlement shape that develops along major transport routes.	
3.1.6	A settlement shape usually found at crossroads.	
3.1.7	A settlement located near water in a dry or arid region.	
3.1.8	The decrease in the economic value or productivity of rural areas.	
3.1.9	A land reform process that returns land to original owners.	
3.1.10	A factor attracting rural migrants towards major economic hubs.	
	(10 x 1)	(10)

3.2. Define the following concepts

3.2.1 Urban hierarchy

3.2.2 Central place

3.2.3 Threshold population

3.2.3 Sphere of influence

3.2.4 Range of goods

3.2.5 Urban profile

3.2.6 Street pattern

3.2.7 Morphological structure

(7 x 2) (14)

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3.3 Give ONE word or term for each of the following statements. Write only the term next to the question number. E.g. 3.1.6 Hierarchy.

3.3.1	The process by which an increasing percentage of a country's population that lives in urban areas.		
3.3.2	The physical expansion of an urban area.		
3.3.3	The commercial heart of the city characterized by high land values and high-rise buildings.		
3.3.4	The land use zone surrounding the CBD characterized by mixed land-use and dilapidated buildings.		
3.3.5	A ranking of settlements from smallest (isolated farmstead) to largest (conurbation) based on population size and functions.		
3.3.6	The minimum number of customers required to make a business profitable.		
3.3.7	The maximum distance a consumer is willing to travel to purchase a specific good or service		
3.3.8	Goods that are expensive, bought infrequently, and require a large threshold population.		
3.3.9	Goods that are cheap, bought daily, and have a small range.		
3.3.10	A continuous urban area formed by the growth and merging of several cities and towns.		
3.3.11	An unplanned settlement consisting of makeshift shelters, often built on the periphery of cities.		
3.3.12	The dynamic zone where rural activities and urban land-use overlap.		
3.3.13	The targeted upgrading and redevelopment of deteriorating urban areas, often displacing low-income residents.		
3.3.14	The geometric pattern formed by the streets of an urban settlement (e.g., gridiron, radial).		
		(14 x 1)	(14)

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3.4 Refer to the images below showing two different rural settlement patterns.

SETTLEMENT A



- Very few houses
- Far from other settlements
- Surrounded by large areas of land used for farming or livestock

SETTLEMENT B



- Many houses clustered closely together
- Located in a central place
- Surrounded by farmland
- Often near services such as schools, shops or churches

[Source: AI generated images]

3.4.1	Identify the settlement pattern represented by Settlement **A**.	(1 x 1)	(1)
3.4.2	Identify the settlement pattern represented by Settlement **B**.	(1 x 1)	(1)
3.4.3	State ONE economic advantage for a farmer living in Settlement **A**.	(1 x 2)	(2)
3.4.4	State ONE social disadvantage experienced by inhabitants of Settlement **A**.	(1 x 2)	(2)
3.4.5	Explain how the concept of a wet-point settlement applies to Settlement **B.**	(2 x 2)	(4)

[10]

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3.5 Read the extract below regarding rural-urban migration trends in South Africa.

THE CRISIS OF EMPTY RURAL VILLAGES

Many small towns across the Eastern Cape and Limpopo provinces are facing severe economic decline. Young, economically active individuals migrate to metropolitan areas like Johannesburg and Cape Town in search of jobs, leaving behind the elderly and children. Agricultural production drops, schools close, and infrastructure crumbles. The government's land reform policies aim to redress historical imbalances, but sustainable development remains a challenge.

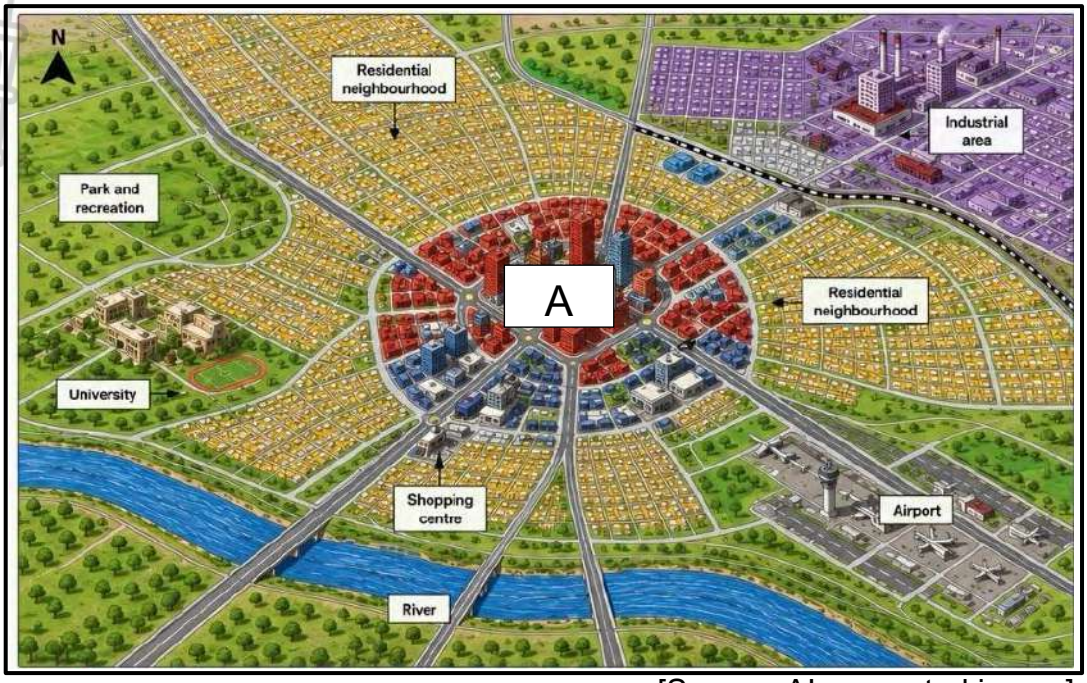
3.5.1	Define the concept *rural depopulation.*	(2 x 1)	(2)
3.5.2	According to the extract, which TWO demographic groups are primarily left behind in rural areas?	(2 x 1)	(2)
3.5.3	State TWO 'push factors' that cause this migration (movement).	(2 x 1)	(2)
3.5.4	Distinguish between *Land Restitution* and *Land Redistribution* as pillars of South African land reform.	(2 x 2)	(4)
3.5.5	How does the migration of young adults create a "vicious cycle of poverty" for rural economies?	(3 x 2)	(6)
3.5.6	Give TWO reasons why many land reform projects fail to achieve commercial agricultural success.	(2 x 2)	(4)
3.5.7	How can the provision of Agri-villages improve the livelihoods of rural farm workers?	(2 x 2)	(4)
3.5.8	Suggest THREE sustainable strategies the South African government can implement to keep youth in rural areas.	(3 x 2)	(6)
3.5.9	How does rural depopulation negatively impact the infrastructure of expanding urban centres?	(2 x 2)	(4)

[34]

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3.6 Refer to the infographic below illustrating simplified urban land use zones.



[Source: AI generated image]

3.6.1	Define the concept *urban settlement*.	(2 x 1)	(2)
3.6.2	State TWO characteristics of urban settlements.	(2 x 1)	(2)
3.6.3	Differentiate between *land use* and *land-use zone*.	(2 x 2)	(4)
3.6.4	Name THREE common land-use zones found in cities.	(3 x 1)	(3)
3.6.5	Identify land use zone labelled **A**.	(1 x 1)	(1)
3.6.6	Explain TWO characteristics of the land use zone labelled **A**.	(2 x 2)	(4)
3.6.7	Why is accessibility important in the land use zone labelled **A**?	(1 x 2)	(2)
3.6.8	Explain TWO problems experienced in the land use zone labelled **A**.	(2 x 2)	(4)

[22]

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3.7 Refer to the infographic below illustrating simplified urban land use zones.



[Source: AI generated image]

3.7.1	What does CBD stand for?	(1 x 1)	(1)
3.7.2	Define the concept *commercial decentralisation*.	(2 x 1)	(2)
3.7.3	State TWO reasons why businesses move from the CBD to the outskirts of cities.	(2 x 2)	(4)
3.7.4	Explain TWO advantages of commercial decentralisation.	(2 x 2)	(4)
3.7.5	Identify THREE types of residential areas found in South African cities.	(3 x 1)	(3)
3.7.6	Explain THREE factors influencing the location of residential areas.	(3 x 2)	(6)

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3.8 Read the extract below on different land use zones in urban areas.

Urban areas are divided into different land use zones, each serving a specific function. The Central Business District (CBD) is the commercial heart of the city and is surrounded by other zones with different activities.

The transition zone, also known as the zone of decay, is located around the CBD. It is characterised by old buildings, mixed land use, overcrowding, and poor housing conditions. Many low-income residents and recent migrants live in this area because accommodation is relatively cheap. Social problems such as crime, unemployment, and urban decay are common.

Further away from the CBD is the rural-urban fringe, which forms the boundary between the built-up urban area and the surrounding countryside. Land use in this zone is mixed and constantly changing. Activities commonly found here include industries, transport depots, warehouses, market gardening, small-scale farming, airports, and landfill sites.

Many industries choose to locate on the edge of cities and within the rural-urban fringe because land is cheaper, there is more space for expansion, and heavy traffic can be kept away from residential areas. Industries also benefit from being close to major roads and highways, which allow the efficient transport of raw materials to factories and finished products to markets. Good road access also reduces transport costs and improves connectivity with suppliers and customers.

[Source: Examiner's own notes]

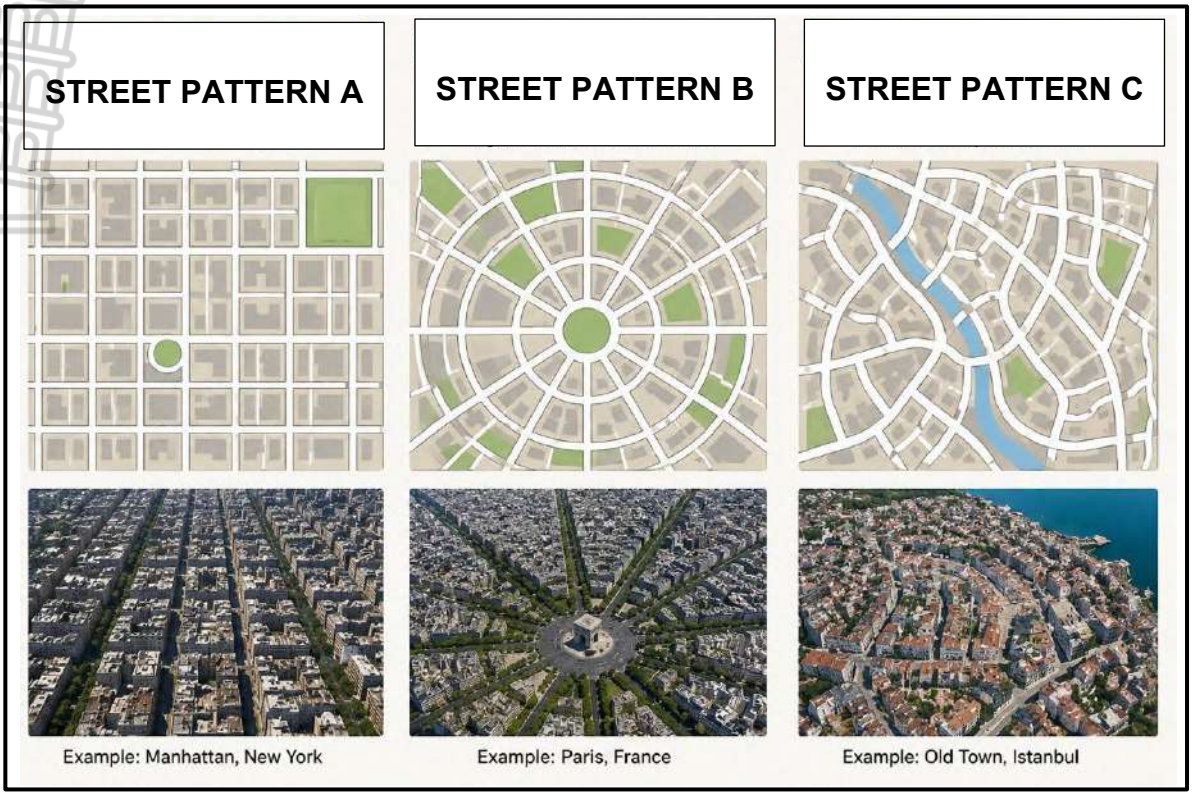
3.8.1	Define the concept *rural-urban fringe.*	(2 x 1)	(2)
3.8.2	Name THREE activities commonly found in the rural-urban fringe.	(3 x 1)	(3)
3.8.3	State TWO reasons why industries are often located on the edge of cities.	(2 x 2)	(4)
3.8.4	Give TWO advantages of locating industries near major roads.	(2 x 2)	(4)
3.8.5	Define the concept *transition zone*.	(2 x 1)	(2)
3.8.6	State THREE characteristics of the transition zone.	(3 x 1)	(3)
3.8.7	Explain TWO social problems commonly found in the zone of decay.	(2 x 2)	(2)

[20]

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3.9 Refer to the street patterns below.



[Source: AI generated image]

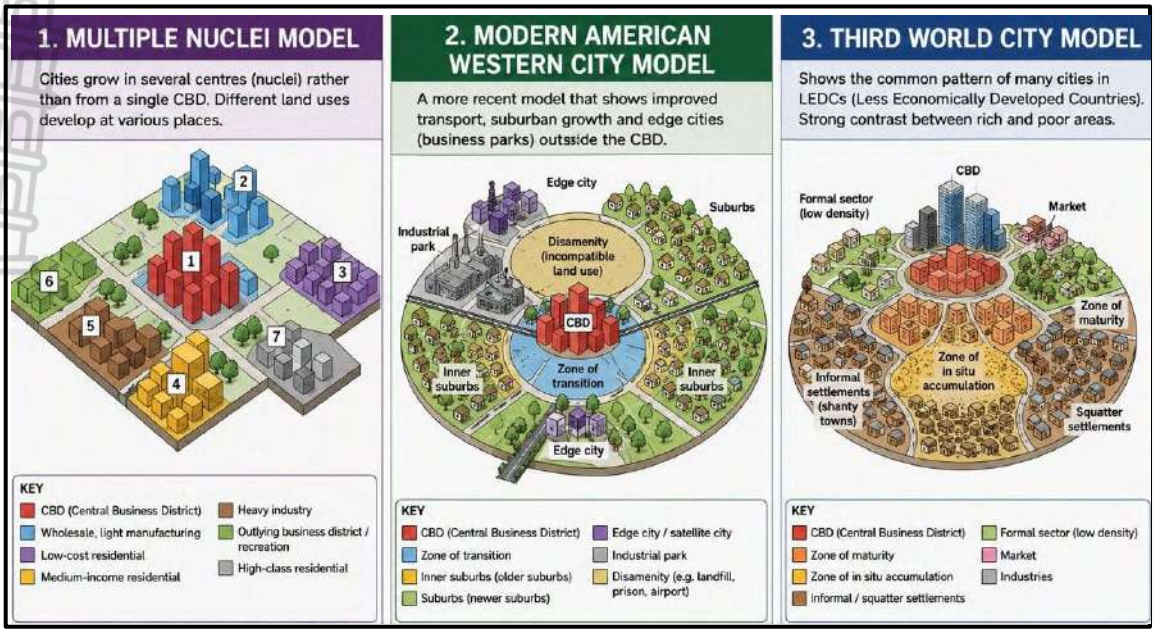
3.9.1	Define the concept *urban morphology*.	(2 x 1)	(2)
3.9.2	Identify the street patterns labelled **A**, **B** and **C** above.	(3 x 1)	(3)
3.9.3	Explain TWO advantages of each street pattern identified above.	(3 x 2)	(6)
3.9.4	Explain TWO disadvantages of each street pattern identified above.	(3 x 2)	(6)

[17]

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3.10 Refer to the infographic below showing different urban models.



[Source: AI generated image]

3.10.1	Define the concept *urban model.*	(2 x 1)	(2)
3.10.2	State THREE characteristics of the Multiple-Nuclei Model.	(3 x 1)	(3)
3.10.3	Explain why cities develop more than one nucleus.	(2 x 2)	(4)
3.10.4	Give TWO advantages of the Multiple-Nuclei Model.	(2 x 2)	(4)
3.10.5	Explain TWO characteristics of the Modern American-Western City Model.	(2 x 2)	(4)
3.10.6	Explain TWO characteristics of the Third World City Model.	(2 x 2)	(4)
3.10.7	Why do urban models differ between countries?	(2 x 2)	(4)

[25]

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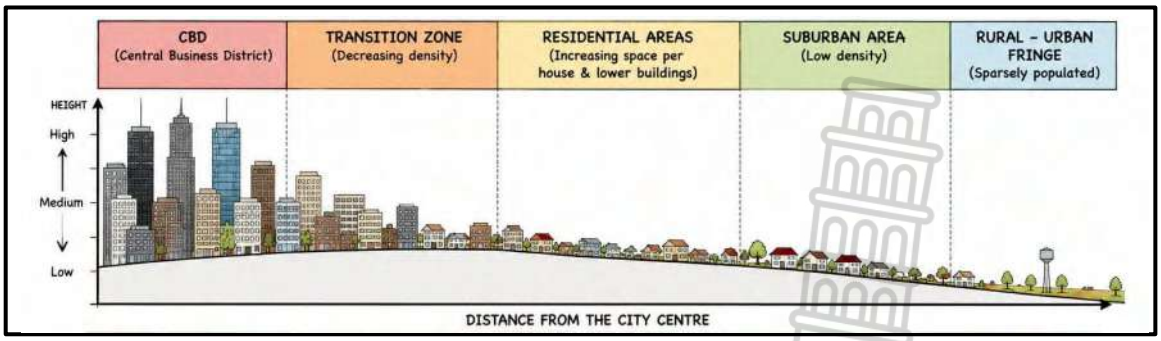
3.11 Refer to the images below showing the South African City Model.



3.11.1	Explain the *apartheid city structure*.	(2 x 1)	(2)
3.11.2	Name THREE residential areas commonly found in South African cities.	(3 x 1)	(3)
3.11.3	Explain how apartheid influenced South African cities.	(2 x 2)	(4)
3.11.4	State THREE characteristics of the South African City Model.	(3 x 2)	(6)
3.11.5	Explain TWO reasons for the development of townships.	(2 x 2)	(4)
3.11.6	Explain TWO examples of urban renewal projects in South Africa.	(2 x 2)	(4)

[23]

3.12 Refer to the urban profile below.



[Source: AI generated image]

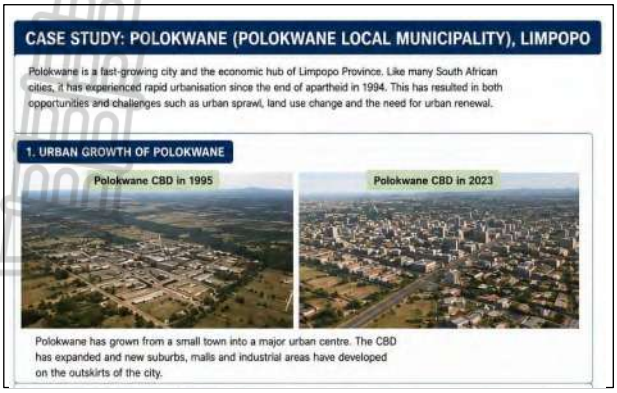
3.12.1	Define the concept *urban profile*.	(2 x 1)	(2)
3.12.2	Why are tall buildings usually found in the CBD?	(1 x 2)	(2)
3.12.3	State THREE factors influencing urban morphology.	(3 x 1)	(3)
3.12.4	Explain TWO effects of accessibility on urban development.	(2 x 2)	(4)
3.12.5	Explain THREE factors affecting the shape of an urban profile	(3 x 2)	(6)

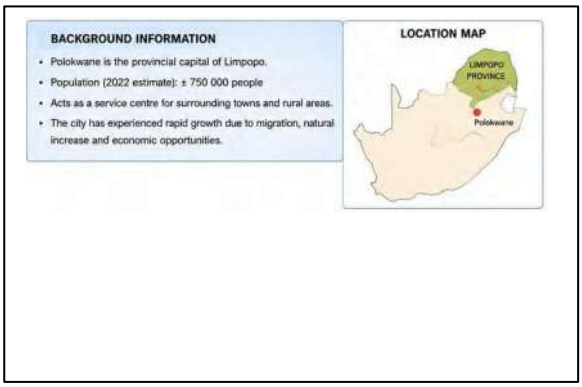
[17]

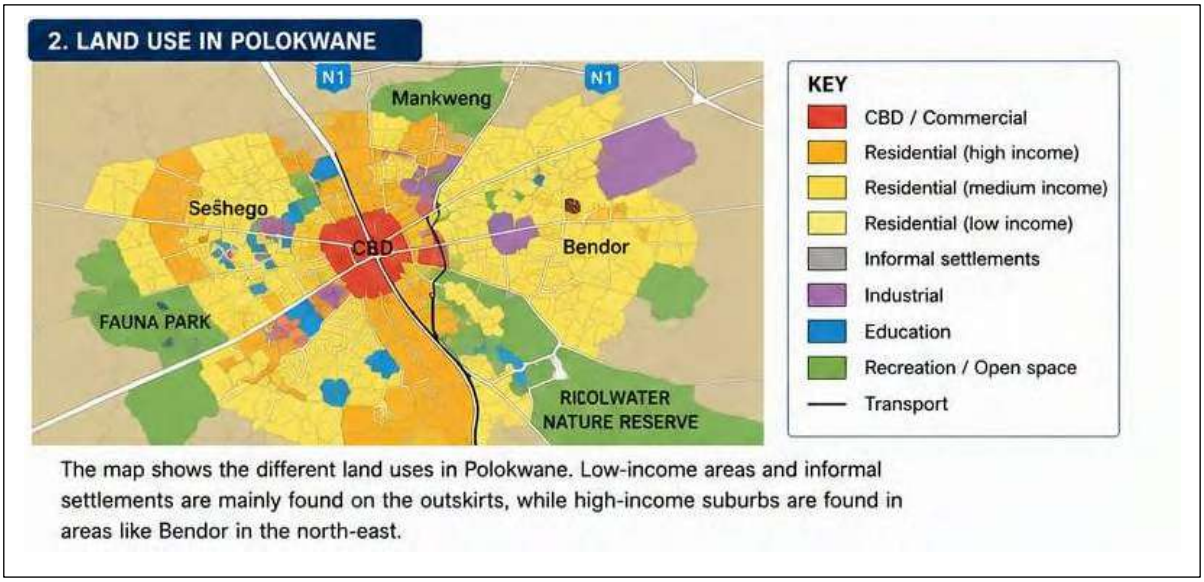
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3.13 Refer to the infographic on Polokwane local municipality below.







3.13.1	Define the concept *urbanisation.*	(2 x 1)	(2)
3.13.2	State THREE causes of urbanisation in South Africa.	(3 x 1)	(3)
3.13.3	Explain TWO impacts of rapid urbanisation in urban areas.	(2 x 2)	(4)
3.13.4	Define the concept *urban sprawl.*	(2 x 1)	(2)
3.13.5	Give THREE characteristics of urban sprawl.	(3 x 1)	(3)
3.13.6	Explain TWO effects of urban sprawl on the environment.	(2 x 2)	(4)
3.13.7	What is *urban renewal*?	(2 x 1)	(2)
3.13.8	Explain TWO benefits of urban renewal projects.	(2 x 2)	(4)
3.13.9	State THREE examples of changing land use in South African cities.	(3 x 1)	(3)
3.13.10	Explain THREE reasons why urban land use changes over time.	(3 x 2)	(6)

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3.14 Refer to the infographic on traffic congestion below.

A recent survey in Johannesburg found that commuters spend an average of 45 minutes per day in traffic.

The number of private vehicles on the roads has increased significantly over the past decade. Public transport systems are unable to meet the growing demand during peak hours.



[Source: AI generated image]

3.14.1	Define the concept *traffic congestion.*	(2 x 1)	(2)
3.14.2	Identify TWO causes of traffic congestion mentioned in the infographic.	(2 x 2)	(4)
3.14.3	Explain how rapid urbanisation contributes to traffic congestion in South African cities.	(3 x 2)	(6)
3.14.4	Discuss TWO social impacts of traffic congestion on commuters.	(2 x 2)	(4)
3.14.5	Explain how traffic congestion affects economic activities in urban areas.	(2 x 2)	(4)
3.14.6	Assess FOUR strategies that municipalities can implement to reduce traffic congestion.	(2 x 2)	(4)

[24]

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3.15 Refer to the extract on traffic congestion below.

> Traffic congestion has become a major challenge in many South African cities. Long queues of vehicles result in increased fuel consumption and higher levels of air pollution. Businesses often experience delays in the transportation of goods and services.

3.15.1	What is meant by the concept *traffic congestion*?	(2 x 1)	(2)
3.15.2	Identify TWO environmental impacts of traffic congestion.	(2 x 2)	(4)
3.15.3	Explain why businesses are negatively affected by traffic congestion.	(3 x 2)	(6)
3.15.4	Discuss the relationship between traffic congestion and air pollution.	(1 x 2)	(2)
3.15.5	Explain how efficient public transport systems can reduce traffic congestion in cities.	(2 x 2)	(4)
3.15.6	Evaluate FOUR sustainable urban planning strategies that can help reduce traffic congestion.	(4 x 2)	(8)

[26]

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3.16 Refer to the extract below on informal settlements.

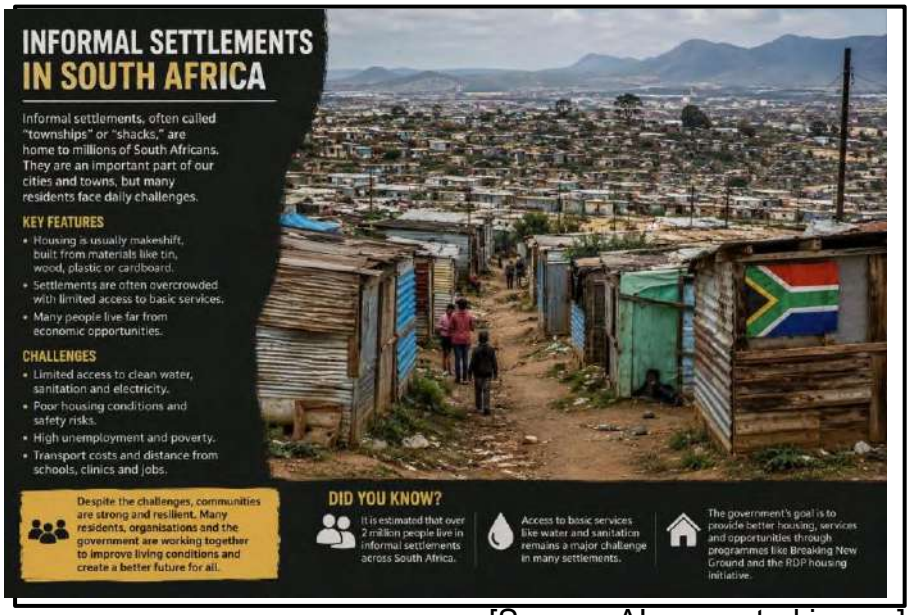
> An informal settlement has developed on the outskirts of a large South African city. The settlement consists mainly of shacks built from corrugated iron, wood and recycled materials. Many residents migrated from rural areas in search of employment opportunities. The settlement experiences challenges such as inadequate sanitation, limited access to clean water, overcrowding and high unemployment. Despite these challenges, residents have established informal businesses and community organisations.

3.16.1	Define the concept *informal settlement.*	(2 x 1)	(2)
3.16.2	Name TWO materials commonly used to construct dwellings in the settlement.	(2 x 1)	(2)
3.16.3	Identify TWO reasons why people develop informal settlements.	(2 x 2)	(4)
3.16.4	Explain how rural-to-urban migration contributes to the growth of informal settlements.	(2 x 2)	(4)
3.16.5	Discuss TWO social challenges experienced by residents living in informal settlements.	(2 x 2)	(4)
3.16.6	How can overcrowding negatively affect the quality of life in informal settlements?	(2 x 2)	(4)
3.16.7	Suggest THREE measures that local municipalities can implement to improve living conditions in informal settlements.	(3 x 2)	(6)

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3.17 Refer to the infographic below on informal settlements.



[Source: AI generated image]

3.17.1	Define the concept *informal settlement.*	(2 x 1)	(2)
3.17.2	Explain TWO reasons for the rapid growth of informal settlements in South Africa.	(2 x 2)	(4)
3.17.3	Describe THREE characteristics that can be used to identify informal settlements.	(3 x 2)	(6)
3.17.4	Discuss the social and environmental challenges associated with informal settlements.	(4 x 2)	(8)
3.17.5	Explain how inadequate service provision affect the quality of life of residents in informal settlements.	(2 x 2)	(4)
3.17.6	Assess FOUR strategies that government can implement to improve conditions in informal settlements.	(4 x 2)	(8)

[32]

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3.18 Refer to the extract below on informal settlements.

FIRE DESTROYS HUNDREDS OF SHACKS

A fire recently swept through an informal settlement near Cape Town, destroying more than 300 dwellings. Emergency services reported that narrow pathways between shacks made it difficult to access the area. Many residents lost their possessions and were temporarily housed in community halls. Authorities highlighted the need for improved housing and better urban planning.

3.18.1	What is meant by the concept *urban planning*?	(2 x 1)
3.18.2	How many dwellings were destroyed by the fire?	(1 x 1)
3.18.3	State TWO factors that made the fire disaster worse.	(2 x 1)
3.18.4	Explain why informal settlements are vulnerable to fires.	(2 x 2)
3.18.5	Suggest TWO strategies that could reduce the risk of fires in informal settlements	(2 x 2)

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3.	Rural and Urban Settlements	16 - 30

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1.1

1.1.1 Y (1)
1.1.2 X (1)
1.1.3 X (1)
1.1.4 Y (1)
1.1.5 X (1)
1.1.6 X (1)
1.1.7 X (1)

(7 x 1) (7)

1.2

1.2.1	Winter (1)	(1 x 1)	(1)
1.2.2	Date (7 May 2026) (1) Disruptive rainfall (1) Cold front affecting Western Cape (1) (Any TWO)	(2 x 1)	(2)
1.2.3	Shifting of the ITCZ to the north (2) South Atlantic High has migrated northwards (2) Mid-latitude cyclones migrate further north (2) Pressure belts follow the perpendicular sunrays northwards (2). (Any ONE)	(1 x 2)	(2)
1.2.4	Cumulonimbus cloud along the cold front brings heavy rainfall (2) Cold fronts bring high amount of rainfall (2) Dry vegetation in winter increases surface runoff (2) Low-lying areas become waterlogged (2) (Any TWO)	(2 x 2)	(4)
1.2.5	**Positive:** Brings much needed moisture to the soil (2) Revival of biodiversity/ecosystem/habitat (2) Water available for wildlife (2) Water available for growth of natural vegetation (2) Water allows for more grazing land/veld (2) Fill up (by infiltration) natural aquifers/springs/groundwater (2) Fill up (via surface runoff) rivers (2) **Negative:** (Low-lying) areas are flooded (2) Soil erosion will increase (2) Destruction of biodiversity/ecosystem/habitat (2) Damage to natural vegetation (2) Loss of wildlife (2) Increase salination of rivers (2) Saturation of soil (waterlogged conditions) (2) Rock falls/mass movements on steeper slopes (2) (Any THREE)	(3 x 2)	(6)

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[15]

1.3.1	Eye (1)	(1 x 1)	(1)
1.3.2	Low (1)	(1 x 1)	(1)
1.3.3	Heavy (1)	(1 x 2)	(1)
1.3.4	Updraughts (1)	(1 x 1)	(1)
1.3.5	Diverging (1)	(1 x 1)	(1)
1.3.6.	High (1)	(1 x 1)	(1)
1.3.7	Wind speed (1)		

1.4.1	A (1)	(1 x 1)	(1)
1.4.2	B (1)	(1 x 1)	(1)
1.4.3	A (1)	(1 x 2)	(1)
1.4.4	C (1)	(1 x 1)	(1)
1.4.5	B (1)	(1 x 1)	(1)
1.4.6.	C (1)	(1 x 1)	(1)
1.4.7	A (1)		

1.5

1.5.1	Wind speed of 230 km/h (1) Severe damage (accept examples from impacts) (1) Any ONE	(1 x 1)	(1)
1.5.2	6/Six (1)	(1 x 1)	(1)
1.5.3	Cyclones are name alphabetically and G is the 7th alphabet. (2)	(1 x 2)	(1)
1.5.4	Circulation is clockwise in the image (1) Mozambique and Madagascar are in the southern hemisphere. (1) Date is 09/02/26 Summer in early autumn in the SH (1) Latitude are in S (south of the equator) (1) Any ONE	(1 x 1)	(1)
1.5.5	It was over the warmer (26,5º C and above) waters (Mozambique channel) (2) Increased evaporation/latent heat over warm waters (2) Calm conditions (2)	(2 x 2)	(2)
1.5.6.	Gale force winds will result in storm surges (2) Storm surges will result in coastal erosion would take place (2) Soil erosion would occur on the land (2) Destruction of coastal infrastructure by gale force winds (2) Mass movements (accept examples) change the landscape (2) Reshaping of the coastline (2) Habitats would be destroyed (accept examples) (2) Food chains/Food webs are destroyed (accept examples) (2) Biodiversity would be diminished (accept examples) (2) Destruction of property (2) Any THREE	(3 x 2)	(6)

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1.6

1.6.1 Y (1)
1.6.2 Y (1)
1.6.3 X (1)
1.6.4 X (1)
1.6.5 Y (1)
1.6.6 X (1)
1.6.7 X (1)
1.6.8 Y (1)

(8 x 1) (8)

1.7

1.7.1	Moisture front (1)	(1 x 1)	(1)
1.7.2	**B**: North-easterly (1) **C**: South-westerly (1)	(1 x 1)	(1)
1.7.3	**B:** Moist (1) **C**: Dry (1)	(2 x 1)	(2)
1.7.4	Convergence of warm moist air and cold dry air (2) Moisture front develops (2) Cold dry air undercuts warm moist air (2) Warm moist air rises (2) Condensation occurs in the eastern side of the moisture front (2) Cumulonimbus clouds develop (2) (Any THREE)	(3 x 2)	(6)
1.7.5	Rains will break drought (2) More water for irrigation (2) Reduced cost of production (2) Increase in production (2) Variety of crops are produced (2) Livestock thrives (2) More profit for farmers (2) (Any TWO)	(2 x 2)	(4)

1.8

1.8.1	Kalahari High Pressure Cell (1) Coastal Low-Pressure Cell (1)	(2 x 1)	(2)
1.8.2	**B** (1)	(1 x 1)	(1)
1.8.3	Air is descending the escarpment towards the coast (2)	(1 x 2)	(2)
1.8.4	Coastal LP cell along the coast increases pressure gradient (2) The two systems dragging cold air towards the coast (2) Air moves from the (Kalahari) high pressure to the low pressure (2)	(2 x 2)	(4)
1.8.5	Moisture is evaporated as air descends (from the interior to the coast) (2) The air is heated adiabatically, it loses moisture (2) (Any ONE)	(1 x 2)	(2)

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1.8.6	Police officers must be on standby to assist traffic in case of a fire near travel routes (2) Fire fighters must be activated in case there are fires spreading (2) Ambulance services must be on standby to respond to heat and fire related health emergencies (2) Disaster management services must be on standby to plan and evacuate people in fire engulfed areas (2) (Any TWO)	(2 x 2)	(4)
1.9.1	**A**: South-facing slope (1) **B**: North-facing slope (1)	(2 x 1)	(2)
1.9.2	Shadow zone (1) Patches of thick vegetation/forest (1) (Any ONE)	(1 x 1)	(1)
1.9.3	Results in shadow zone (2) Less evaporation (2) Slope becomes damp (2) Dense plantation grow because of limited evaporation (2) (Any TWO)	(2 x 2)	(4)
1.9.4	Slope **B** is warmer (2)	(1 x 2)	(2)
1.9.5	Slope B is warmer suitable for a variety of crops (2) Deciduous fruits need higher temperature to grow (2) Slope is warmer even in winter due to thermal belt (2) Less expensive to produce food in winter (2) (Any THREE)	(3 x 2)	(6)
1.10			
1.10.1	**A**: Katabatic winds (1)	(1 x 1)	(1)
1.10.2	Terrestrial radiation (1)	(1 x 1)	(1)
1.10.3	SETTLEMENT Mid-slope is warmest part in the valley (2) The mid-slope is suitable for settlement (2) Warmer in winter (2) FARMING More crop farmers in the mid-slope (2) Livestock farmers prefer mid-slope for grass (2) Crops thrive well in the warmest part of the slope (2) (Any TWO)	(2 x 2)	(4)
1.10.4	Frost (2)	(1 x 1)	(1)
1.10.5	Terrestrial radiation cools the slope (2) Air in the valley becomes colder (2) Cold dense air descends the valley at night (2) Cold dense air accumulates at the valley floor and becomes more colder (2)		

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	Condenses below freezing point on the valley floor resulting to frost (2) (Any FOUR)	(4 x 2)	(8)
1.11			
1.11.1	A city warmer than its surrounding rural areas (2) CONCEPT	(1 x 2)	(2)
1.11.2	"their impact on vulnerable population" (1)	(1 x 1)	(1)
1.11.3	High building density (2) Tall buildings provide more space for heat absorption (2) Concrete surfaces retain more heat (2) Air conditioning system produces artificial heat (2) Industrial activities increase greenhouse effect (2) Vehicles produce artificial heat and increase greenhouse effect over the city (2) Windows result in multireflection of heat within the city (2) (Any TWO)	(2 x 2)	(4)
1.11.4	Paint roofs or buildings with light colours (2) Develop rooftop gardens (2) Replace tar and concrete with cobble stones (2) Minimise large glass windows/ structures (2) Using green energy in buildings (2) Use low energy light bulbs (2) Decrease building density (2) Improve insolation in buildings (2) Use eco-friendly/natural building materials (2) Restrict the height of buildings (2) Use mirrored glass which is more reflective (2) Planned areas for parks/planting trees/water features (2) Improve public transport (2) (Any FOUR)	(4 x 2)	(8)
1.12			
1.12.1	Mass concentration of pollutants above a city. (2)	(1 x 2)	(2)
1.12.2	Industrial activities/smoke from industries (1) Largest concentration of petrochemical industries (1)	(2 x 1)	(2)
1.12.3	Rashes (1) Itchy noses (1) Itchy throats (1) Poor health (1) (Any TWO)	(2 x 1)	(2)
1.12.4	Plant more trees to absorb more carbon dioxide (2) Establish roof gardens/vertical gardens on high rise buildings (2) Create parks/greenbelts in the urban area (2) Reduce carbon emissions in urban areas by making use of solar energy (2)		

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	Reduce carbon emissions in urban areas by making use of wind energy (2) Replace concrete/tar surfaces with cobble stones which allow infiltration of water and cooling through evaporation (2) Promote urban farming that will result in more evapotranspiration and cooling of temperatures (2) Use of public transport/cycling to reduce the number of vehicles on the roads (2) Reduce the number or vehicles on the road (accept examples) (2) Use of reflective paint on buildings and roofs (2) Reducing our carbon footprint through recycling and re-using of products (2) Modernisation of buildings with greener materials (2) Implementing energy saving strategies (2) Encourage the use of hybrid cars which produce no pollution (2) Green policy to be included in all legislation/by-laws (2) Awareness/education campaigns on green policies (2) Incentives for going green/eco-friendly products (2) (Any FOUR)	(4 x 2)	(8)

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GEOMORPHOLOGY

2.1	**DRAINAGE BASIN**		
2.1.1	Z		
2.1.2	Y		
2.1.3	Y		
2.1.4	Z		
2.1.5	Z		
2.1.6	Z		
2.1.7	Y	(7 x 1)	(7)
			[7]

ACTIVITY 2.2.

2.2.	**DRAINAGE DENSITIES**		
2.2.1	It refers to an average length of a stream per unit area. (2) [CONCEPT]	(1 x 2)	(2)
2.2.2	Centrifugal pattern	(1 x 1)	(1)
2.2.3	**A** – Higher density **B** – Lower density	(2 x 1)	(2)
2.2.4	It is uniformly resistant to erosion. (2) Massive igneous rock/ Horizontal sedimentary (2) **[ANY ONE]**	(1 x 2)	(2)
2.2.5	2nd (1) Order stream (1)	(2 x 1)	(2)
2.2.6	Land is steep (2) Prone to soil erosion/ thin soil (2) Infertile soil (2) Risk of mass movements (2) High cost of developing land (2) **[ANY ONE]**	(1 x 2)	(2)

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2.2.7	Steeper gradient promotes more surface run-off therefore, higher drainage density. (2) Higher rainfall promotes more surface run-off therefore, higher drainage density. (2) Heavy rains promote more surface run-off therefore, higher drainage density. (2) **[ANY TWO]**	(2 x 2)	(4)
			[15]

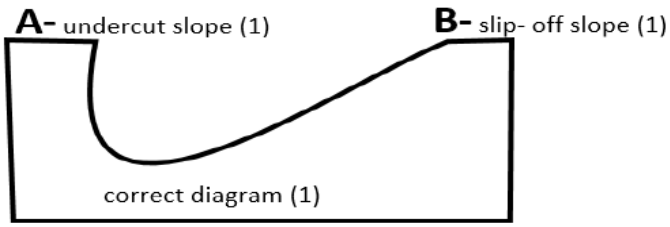
ACTIVITY 2.3.

2.3	**LONGITUDINAL PROFILE**		
2.3.1	Turbulent flow	(1 x 1)	(1)
2.3.2	Steeper gradient result in turbulent flow (2) River valley is narrow and steep (2) River channel in the upper course is uneven (2) **[ANY ONE]**	(1 x 2)	(2)
2.3.3	The view of a river from bank to bank. (2) [CONCEPT]	(1 x 2)	(2)
2.3.4	The river must have a large amount of sediments (2) The sea must have a weak currents and small tidal range (2) The sea must be shallow at the river's mouth (2) **[ANY ONE]**	(1 x 2)	(2)
2.3.5	They have a strong current and a large tidal range. (2) The sea is deep at the river mouth (2) some rivers carry low sediments due to resistant rocks (2) Some river mouth form estuaries (2) **[ANY TWO]**	(2 x 2)	(4)
2.3.6	Consist of fertile land for farming (2) More water for fishing and aquaculture (2) Land is flat (2) More water for irrigation and livestock drinking (2) **[ANY TWO]**	(2 x 2)	(4)
			[15]

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ACTIVITY 4

2.4	**FLUVIAL FEATURES**		
2.4.1	Lower	(1 x 1)	(1)
2.4.2	Ox- bow lake	(1 x 1)	(1)
2.4.3	(a) **A –** Undercut slope **B**- Slip- off slope (b) 	(2 x 1) (3 x 1)	(2) (3)
2.4.4	Ox-bow lake form from a meander loop that is cut off from the main stream (2) Erosion on the outer bank and deposition on the inner bank of the meander resulting in the meander neck becoming narrower (2) During times of flood the water cannot negotiate the meander loop and flow straight (2) This results in the meander loop being cut off from the main stream to form an ox-bow lake (2) The ox-bow lake will eventually dry up to form a meander scar because it does not have a water supply (2) **[ANY FOUR]**	(4 x 2)	(8)
			[15]

ACTIVITY 2.5

2.5	**RIVER GRADING**		
2.5.1	Z		
2.5.2	Z		
2.5.3	Y		
2.5.4	Y		
2.5.5	Y		
2.5.6	Z		
2.5.7	Y		
2.5.8	Z	(8 x 1)	(8)

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ACTIVITY 2.6

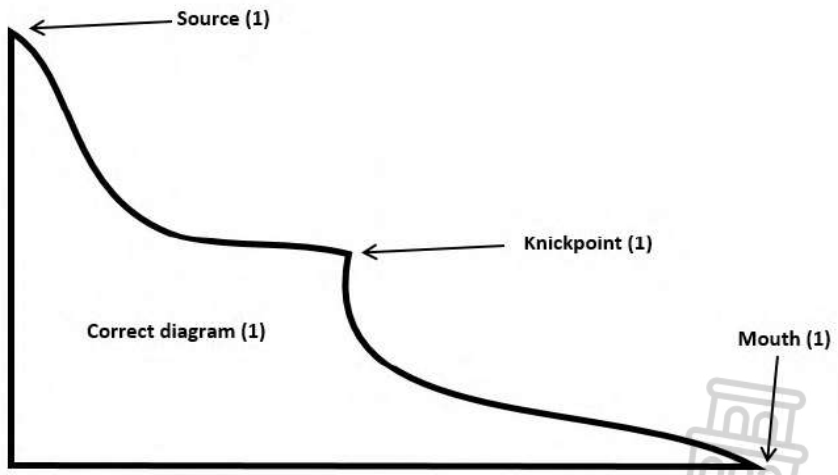
2.6	**RIVER GRADING**		
2.6.1	The view of a river from source to mouth. (2) [CONCEPT]	(1 x 2)	(2)
2.6.2	Dam/ damwall	(1 x 1)	(1)
2.6.3	This features temporary prevent river from further vertical erosion.	(1 x 2)	(2)
2.6.4	(a) It will decrease the capacity/ reduce the volume of water. (b) sediments cause decrease water quality (water pollution) which disrupt aquatic ecosystem (2) May cause dam wall to collapse (2) Loss of biodiversity (2) Disrupt food chains and food webs (2) **[ANY ONE]**	(1 x 2) (1 x 2)	(2) (2)
2.6.5	**<u>Erosion</u>** More erosion upstream of dam due to greater water volume (2) Erosion temporarily stops at the dam (2) Rate of erosion decreases downstream of the dam due to less water (2) **[ANY ONE]** **<u>Deposition</u>** Deposition of silt in the results in less deposition downstream (2) The rate of deposition increases as the velocity of the water is reduced downstream (2) **[MUST REFER TO BOTH EROSION AND DEPOSITION]** **[ANY ONE]**	 (1 x 2)	 (2)
2.6.6	**RIVER PROFILE A** It is a graded river profile River has a smooth concave profile (2) The profile shows a gradual decrease in gradient from source to mouth **RIVER PROFILE B** It is an ungraded river profile (2)		

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	It has an uneven river bed (2) The profile is therefore multi-concave (2) **[MUST REFER TO BOTH EROSION AND DEPOSITION]** [**ANY ONE**]	(2 x 2)	(4)
			[15]

ACTIVITY 2.7

2.7	**RIVER REJUVENATION**		
2.7.1	This is a process whereby a river that has reached the base level, regains energy and begins to erode vertically once again. (2) [CONCEPT]	(1 x 2)	(2)
2.7.2	Knickpoint (1) Terrace (1)	(2 x 1)	(2)
2.7.3	Drop in sea level	(1 x 1)	(1)
2.7.4	Knickpoints retreat back-ward or upstream towards the source (2)	(1 x 2)	(2)
2.7.5		(4 x 1)	(4)

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2.7.6	Valleys within valleys would make the landscape steeper and more difficult for farmers to cultivate (2) This would promote soil erosion and discourage the use of machineries (2) Terraces are too high, would hamper farmers access to water in the river (2) Narrow terrace would limit the amount of land to cultivate (2) Faster flowing water at the knickpoint (waterfall) makes it inaccessible for irrigation (2) Entrenched/ incised meanders have steeper/ deeper valleys that limits farmers access to water (2) Steeper slopes make the construction of infrastructure difficult and expensive (2) **[ANY TWO]**	(2 x 2)	(4)
			[15]

ACTIVITY 2.8

2.8	**RIVER CAPTURE**		
2.8.1	X	(1 x 1)	(1)
2.8.2	Wind gap (1) Elbow of capture (1) Captor/ pirate stream (1) Captured/ beheaded stream (1) Watershed has been removed (1) Headwaters of river Y has been diverted (1) River x is cutting backwards through the watershed (1) Line indicating the river is thicker indicating greater volume (1) **[ANY TWO]**	(2 x 1)	(2)
2.8.3	**A –** captor stream **B** – Misfit stream	(2 x 1)	(2)
2.8.4	Headward erosion	(1 x 2)	(2)
2.8.5	The river is flowing over a steeper gradient (2) It receives a greater amount of rainfall (2)		

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	It flows over a softer rock (2) **[ANY ONE]**	(1 x 2)	(2)
2.8.6	The size increase due to river capture (2) Volume increase due to additional water being diverted into its channel (2) Increase velocity due to increase in water volume (2) Erosive ability increase due to increase flow (2) River could rejuvenate due to more water being added into a stream (2) Aquatic ecosystem flourish (2) Associated with turbulent flow (2) Possibility of flooding due to greater volume of water (2) Rate of deposition is lowered (2) Knickpoints, terraces, incised meanders and valley-within-a-valley may develop along the profile of a river (2) **[ANY THREE]**	(3 x 2)	(6)
			[15]

ACTIVITY 2.9

2.9	**CATCHMENT AND RIVER MANAGEMENT**		
2.9.1	Refers to the use of water resources in a sustainable way so that they are available for future generation. (2) [CONCEPT]	(1 x 2)	(2)
2.9.2	Industrial waste	(1 x 1)	(1)
2.9.3	Chemical waste (1) Raw sewages (1)	(2 x 1)	(2)
2.9.4	Heavy industrial air (1) Water pollution (1)	(2 x 1)	(2)
2.9.5	Industries provide job opportunities (2) Industries contribute to taxes and income to the government (2) They attract foreign exchange and investments (2) Industries stimulate trade (2) It is costly to relocate industries (2)		

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	[ANY ONE]	(1 x 2)	(2)
2.9.6	Reduce risk of flooding (2) Access to clean water for domestic use (2) More water for agricultural use thus better agricultural production (2) Maintenance of a balanced ecosystem (2) (accept examples) Water resources are protected for future generations (2) Less flooding of fertile soil (2) Increase tourism which increases job opportunities (2) **[ANY ONE]**	(1 x 2)	(2)
2.9.7	Implementation of legislation such as, fines to be imposed for dumping into rivers (2) Create a buffer zones close to rivers to prevent industrial development being too close (2) Afforestation, to prevent excessive surface run-off and decrease soil erosion, to cover floodplains (2) Closing of industries operating closer to the river (2) Create awareness campaigns to educate people on sustainable use of rivers and catchment areas (2) Regular testing of water to avoid pollution/ contamination (2) Maintain water purification plants to reduce pollution in rivers (2) Regular environmental impact assessment studies to reduce pollution in catchment areas (2) **[ANY TWO]**	(2 x 2)	(4)
			[15]

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RURAL AND URBAN SETTLEMENTS		
3.1.1	Nucleated settlement.	
3.1.2	Isolated settlement.	
3.1.3	Dry-point settlement.	
3.1.4	Rural-urban migration.	
3.1.5	Linear settlement.	
3.1.6	T-shaped settlement.	
3.1.7	Wet-point settlement.	
3.1.8	Rural decline.	
3.1.9	Land restitution.	
3.1.10	Pull factor.	
	(10 x 1)	(10)

3.2.1	Urban hierarchy – ranking of settlements according to their size, population and number of functions.		
3.2.2	Central place – an urban settlement that provides goods and services to the surrounding rural settlement.		
3.2.3	Threshold population – minimum number of customers required to make a business or service profitable.		
3.2.3	Sphere of influence – the surrounding area served by a central place or a settlement.		
3.2.4	Range of goods – maximum distance a consumer is willing to travel to purchase a specific good or service.		
3.2.5	Urban profile – a side view of a city showing how the building height changes from the outskirts to the centre.		
3.2.6	Street pattern – the layout or arrangement of roads and streets within a city.		
3.2.7	Morphological structure – the internal layout or physical structure of an urban area.		
		(7 x 2)	(14)

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3.3.1	Urbanisation.		
3.3.2	Urban growth.		
3.3.3	Central Business District (CBD)		
3.3.4	Transitional Zone.		
3.3.5	Settlement hierarchy.		
3.3.6	Threshold population.		
3.3.7	Range of a good.		
3.3.8	High- order goods.		
3.3.9	Low-order goods.		
3.3.10	Conurbation.		
3.3.11	Informal settlement.		
3.3.12	Rural-urban fringe.		
3.3.13	Urban renewal.		
3.3.14	Urban street pattern.		
		(14 x 1)	(14)

3.4.1	Isolated rural settlement.	(1 x 1)	(1)
3.4.2	Nucleated settlement.	(1 x 1)	(1)
3.4.3	Large land size. No local competition.	(1 x 2)	(2)
3.4.4	Isolation. Poor access to services. Increased risk to crime.	(1 x 2)	(2)
3.4.5	Wet-point settlement formed because people chose to cluster around the water source, due to the scarcity of water in the area. Houses are clustered to maintain shared access to the water source.	(2 x 2)	(4)
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3.5.1	Decrease in the number of people living in rural areas.	(2 x 1)	(2)
3.5.2	The elderly. The children.	(2 x 1)	(2)
3.5.3	Severe economic decline. Crumbling local infrastructure.	(2 x 1)	(2)
3.5.4	Land restitution – restores land ownership or compensate people who were forcefully dispossessed of their property due to the past laws. Land redistribution - provide the disadvantaged landless or poor people with access to land for residential and agricultural purposes.	(2 x 2)	(4)
3.5.5	Result in brain drain. Decline in agricultural production. Businesses and schools close down.	(3 x 2)	(6)
3.5.6	Lack of skills and training to run or maintain large commercial farms. Lack of capital, funding, machinery and resources to maintain operations.	(2 x 2)	(4)
3.5.7	They offer secure land tenure and better housing conditions for farm workers and their families. They improve access to essential basic services like clean water, electricity and medical clinics.	(2 x 2)	(4)
3.5.8	Skills development – rural vocational training. Funding and grants – provide access to funding and start-up grants. Infrastructure investment – improve rural infrastructure.	(3 x 2)	(6)
3.5.9	Overburden on the existing public services result in traffic congestion. Strains housing availability resulting in the expansion of informal settlement	(2 x 2)	(4)
			[34]

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3.6.1	Built-up, densely populated area where majority of residents engage in secondary and tertiary economic activities.	(2 x 1)	(2)
3.6.2	High population density. Dominated by secondary, tertiary or quaternary economic activities.	(2 x 1)	(2)
3.6.3	Land use – specific activity happening on a piece of land. Land use zone – designated functional zone (region) within a town or city dominated by a particular type of legally mandated function or activity.	(2 x 2)	(4)
3.6.4	Residential. Industrial. Commercial.	(3 x 1)	(3)
3.6.5	Central Business District (CBD)	(1 x 1)	(1)
3.6.6	High building density – buildings are close together and vertical extended to maximize limited space. High land values – property and rental prices are most expensive in the city due to intense competition for central location.	(2 x 2)	(4)
3.6.7	Accessibility workers and customers and goods can easily reach the central hub from the surrounding residential areas.	(1 x 2)	(2)
3.6.8	Traffic congestion – high volume of vehicles entering the city leads to severe gridlock and delayed traffic times. Air and noise pollution – heavy traffic and concentrated commercial activities degrade the environmental quality and increase noise levels.	(2 x 2)	(4)
			[22]

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3.7.1	Central Business District.	(1 x 1)	(1)
3.7.2	Movement of shops, offices, and businesses away from the central city towards the outer periphery areas.	(2 x 1)	(2)
3.7.3	High rental and land costs in the CBD. Traffic congestion and lack of accessible parking space for customers.	(2 x 2)	(4)
3.7.4	Reduced congestion – reduced traffic pressure and overcrowding in the central city. Better accessibility - suburban location offer easier parking and closer proximity to residential consumers.	(2 x 2)	(4)
3.7.5	Low-income residential areas. Middle-income residential areas. High-income residential areas.	(3 x 1)	(3)
3.7.6	Transport links – people prefer living near major transport routes for easier commuting. Land values – high income housing is built on expensive, desirable land while low income residential is relegated to cheaper, peripheral land. Topography – residential zones prefer flat of gentle terrain, avoiding steep slopes, floodplains and marshy ground.	(3 x 2)	(6)
			[20]
3.8.1	The boundary where the built-up urban area meets the surrounding rural area.	(2 x 1)	(2)
3.8.2	Industries, Transport depots, Warehouses, Market gardening, Small-scale farming, Airports, Landfill sites.	(3 x 1)	(3)
3.8.3	Land is cheaper. More space is available for expansion. Heavy traffic can be kept away by residential areas.	(2 x 2)	(4)
3.8.4	Efficient transport of raw materials to factories. Efficient transport of finished products to markets. Good road access reduces transport costs. Improved connectivity with suppliers and customers.	(2 x 2)	(4)
3.8.5	An urban area located around the CBD characterized by mixed land use, old buildings and constant change.	(2 x 1)	(2)
3.8.6	Located around the CBD. Old buildings. Mixed land use. Overcrowded conditions. Poor housing conditions. High concentration of low-income residents and recent migrants. Relatively cheap accommodation.	(3 x 1)	(3)
3.8.7	Crime – high rates of illegal activities due to poverty and overcrowding. Unemployment - lack of job opportunities for the low-income population living there.	(2 x 2)	(2)
			[20]

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3.9.1	The physical form, structure, layout and arrangement of an urban area.	(2 x 1)	(2)
3.9.2	A – Gridiron B – Radial C – Irregular	(3 x 1)	(3)
3.9.3	**Street Pattern A** Easy navigation – straight streets meeting at right angles. Efficient land use – plots are rectangular, which minimises wasted space. **Street Pattern B** Central accessibility – all roads lead directly to the central point. Aesthetic appeal – creates striking focal points and organised layout. **Street Pattern C** Traffic calming – the winding, non-linear roads naturally slow down vehicles Topographical adaptation – follows the natural contours reducing construction costs.	(3 x 2)	(6)
3.9.4	**Street Pattern A** Traffic congestion – frequent intersections lead to many stopping points. Monotony – the repetitive rectangular layout can lack visual interest. **Street Pattern B** Central bottlenecks – directing all major traffic towards the single centre can lead to severe congestion. Awkward plot shapes – the pie-shaped or triangular land segments created by angling roads make building construction inefficient. **Street Pattern C** Difficult navigation – winding and inconsistent roads make it very easy for drivers and emergency services to get lost. Inefficient expansion – lack of structured layout makes it highly complex to plan infrastructure extension like water, electricity or sewage lines.	(3 x 2)	(6)
			[17]

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3.10.1	Simplified theoretical framework or diagram that explains how land-use zones are arranged across a city.	(2 x 1)	(2)
3.10.2	It features multiple focal points (nuclei) rather than one central downtown. Incompatible land uses (like heavy industry and high-class housing) are kept far apart. Similar activities cluster together to benefit from shared infrastructure and customers.	(3 x 1)	(3)
3.10.3	Specialised facility requirements – certain industries need transport links like ports or railway lines. Congestion avoidance – high land value and traffic jams push newer businesses out of the central core. Agglomeration of economies – similar businesses cluster in new hubs to share specialized labour and services.	(2 x 2)	(4)
3.10.4	It provides a highly flexible layout that realistically mirrors the chaotic growth of modern, expanding cities. It reduces central traffic by decentralizing commercial activities into suburban nodes and edge cities.	(2 x 2)	(4)
3.10.5	Prominent edge cities – suburban commercial and business parks develop independently outside the primary CBD. High speed transport rings – outer ring roads and highways connect peripheral suburbs directly to one another.	(2 x 2)	(4)
3.10.6	Socio-economic polarization – wealthy resident sectors sit directly alongside massive, informal squatter settlements. Commercial spine – a dominant commercial strip extends outwards from the historic CBD toward high -income zones.	(2 x 2)	(4)
3.10.7	Urban models differ due to distinct historical backgrounds, economic development levels, and government planning policies	(2 x 2)	(4)
			[25]

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3.11.1	Segregated by race, had buffer zones, centralised wealth, and peripheral townships	(2 x 1)	(2)
3.11.2	High-income residential areas. Middle-income residential area. Low-income residential area.	(3 x 1)	(3)
3.11.3	Urban sprawl – cities expanded massively outward due to the forced relocation of black communities to distant peripheral townships. Infrastructural inequality – wealthier, historically white suburbs received excellent infrastructure, while townships lacked basic services, proper roads and electricity. Long commute times – workers from peripheral townships had to travel extreme distances daily, spending significant time and income on public transport. Fragmented spatial planning – cities grew as disconnected, racially divided pockets rather than integrated, functional urban spaces.	(2 x 2)	(4)
3.11.4	Integration efforts – modern planning aim to bridge the gaps between historically segregated zones through mixed-use developments. Proximity of informal settlements – informal housing often springs up near affluent suburbs or industrial hubs to access jobs Growth of edge cities – new economic nodes and decentralized commercial centres develop away from the traditional CBD. Transport corridors – major transport routes are used to link peripheral residential areas to economic hubs.	(3 x 2)	(6)
3.11.5	Forced segregation laws – legislation like Group Areas Act of 1950 forced non-white populations out of inner cities into designated urban edges. Supply of cheaper labour – townships were built to house the large black workforce near cities to serve industrial and domestic labour needs without allowing them permanent urban integration.	(2 x 2)	(4)
3.11.6	Inner-city gentrification – upgrading old, dilapidated industrial buildings into trendy apartments, arts studios, and retail spaces to attract investment. Social housing developments – building affordable, high quality residential units near the city centre to bring lower-income workers close to economic opportunities.	(2 x 2)	(4)
			[23]

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3.12.1	Side view of a city that illustrates the various building heights.	(2 x 1)	(2)
3.12.2	High land values. High demand for space.	(1 x 2)	(2)
3.12.3	Topography Historical factors Transport networks	(3 x 1)	(3)
3.12.4	Commercial clustering due to high foot traffic. Increased land values – areas are easily accessibly by both public and private transport, which increase property rates and rental values.	(2 x 2)	(4)
3.12.5	Land values – land cost drop as distance from CBD increases, causing building heights to taper off significantly towards the suburbs. Zoning laws and height restrictions – municipal laws often limit how high buildings can be constructed in specific zones. Geological structures – the strength of the bedrock determines whether the land can physically support the weight of heavy skyscrapers.	(3 x 2)	(6)
			[17]

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3.13.1	The percentage increase of people living in urban areas.	(2 x 1)	(2)
3.13.2	Rural-urban migration Natural population growth Industrial development	(3 x 1)	(3)
3.13.3	Informal settlements – overcrowding leads to the growth of shacks and slums. Infrastructure strain – overuse causes failures in electricity, water and sewage systems.	(2 x 2)	(4)
3.13.4	Uncontrolled, outward expansion of urban areas into surrounding rural land.	(2 x 1)	(2)
3.13.5	Low-density housing - spread-out residential areas dominating the landscape. Car-dependency – heavy reliance on private vehicles due to long distances. Loss of farmland – agricultural land converted into shopping malls and suburbs.	(3 x 1)	(3)
3.13.6	Habitat destruction – clearing natural vegetation destroys local ecosystems and wildlife habitats. Increase air pollution – longer daily commutes lead to higher vehicle exhaust emissions.	(2 x 2)	(4)
3.13.7	The upgrading, modernising, and rehabilitation of decaying or run-down urban zones.	(2 x 1)	(2)
3.13.8	Reduces crime rates – improving physical spaces and lighting enhances public safety. Economic growth – attracts new businesses, investors, tourists, and consumers.	(2 x 2)	(4)
3.13.9	Invasion and succession Gentrification De-industrialization	(3 x 1)	(3)
3.13.10	Economic growth – expanding businesses require more space in central areas. Population pressure – rising populations increase the demand for residential housing. Government planning policies – zoning laws dictate how different spaces must develop.	(3 x 2)	(6)
			[33]

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3.14.1	A condition on transport networks that occurs as use increases, characterised by slower speeds, longer trip times, and increased vehicular queueing.	(2 x 1)	(2)
3.14.2	Increase in private vehicles on the roads. Inadequate public transport systems unable to meet the growing demand during peak hours.	(2 x 2)	(4)
3.14.3	Population influx – rapid urban migration floods cities with more people, increasing the number of daily commuters. Lagging infrastructure – city road networks cannot expand fast enough to cope with the sudden population growth.	(3 x 2)	(6)
3.14.4	Increased stress – spending long hours trapped in gridlock deteriorates mental health, leading to road rage and anxiety. Loss of personal time.	(2 x 2)	(4)
3.14.5	Productivity loss due to delays by workers who arrive late. High transit costs due to idle vehicle burning more fuel and suffer quicker wear and tear which inflates delivery and operational costs.	(2 x 2)	(4)
3.14.6	Expand public transit – develop and upgrade efficient, reliable networks. Encourage lift clubs. Stagger working hours. Improve road infrastructure.	(2 x 2)	(4)
			[24]

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3.15.1	A condition on transport networks that occurs as use increases, characterised by slower speeds, longer trip times, and increased vehicular queueing.	(2 x 1)	(2)
3.15.2	Increased air pollution. Elevated noise pollution.	(2 x 2)	(4)
3.15.3	Delayed delivery of goods. Reduced worker productivity. Increased logistical costs.	(3 x 2)	(6)
3.15.4	Traffic congestion intensifies local air pollution through prolonged vehicle idling.	(1 x 2)	(2)
3.15.5	High passenger capacity on a single bus or train can displace dozens of private single-occupancy vehicles reducing congestion. Dedicated transit lanes isolate public transport from general traffic, ensuring faster commute times	(2 x 2)	(4)
3.15.6	Implement transit-oriented development – high density, mixed-use commercial and residential zones directly around major transit hubs. Expanding active transportation infrastructure – building protected bike and pedestrian lanes. Developing decentralized urban nodes Developing congestion charging zones – charging vehicles a fee for entering high density zones during peak times.	(4 x 2)	(8)
			[26]

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3.16.1	Unplanned illegal settlement built from makeshift building material.	(2 x 1)	(2)
3.16.2	Corrugated iron. Plastic sheeting. Wood scraps.	(2 x 1)	(2)
3.16.3	Rapid urbanisation. Poverty or unemployment – residents cannot afford formal rent or home ownership.	(2 x 2)	(4)
3.16.4	People move to cities in search for better jobs and services. Due to shortage of housing in the city, these new arrivals are forced to build temporary shelters on any vacant land.	(2 x 2)	(4)
3.16.5	High crime rates – poor lighting and lack of police presence can lead to safety concerns. Health risks – poor sanitation and lack of clean water lead to the rapid spread of diseases like cholera and diarrhoea.	(2 x 2)	(4)
3.16.6	Overcrowding leads to lack of privacy and increased social tension. It puts more pressure on limited resources, increasing the risk of fires spreading quickly, and accelerates the spread of contagious illness.	(2 x 2)	(4)
3.16.7	Provision of basic services. Formalization – provide residents with legal tenure and upgrading shacks into permanent brick houses. Refuse removal – implementing regular waste collection to improve hygiene and prevent environmental pollution.	(3 x 2)	(6)
			[26]

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3.17.1	Unplanned illegal settlement built from makeshift building material.	(2 x 1)	(2)
3.17.2	Rapid rural-urban migration. Shortage of affordable houses.	(2 x 2)	(4)
3.17.3	Built form makeshift building material. High population densities. Lack of basic infrastructure.	(3 x 2)	(6)
3.17.4	**Social** High crime rates Rapid spread of diseases. **Environmental** Water and soil pollution. High risk of devastating fires.	(4 x 2)	(8)
3.17.5	Compromised health and dignity due to unhygienic communal pit toilets and increase exposure to toxic bacteria. Reduced educational and economic productivity due to lack of reliable electricity which forces residents to use dangerous alternative electricity supply.	(2 x 2)	(4)
3.17.6	In-situ upgrading programs – install services to existing settlements. Accelerated RDP housing delivery Sites and services schemes – provide legal plots to citizens. Rural development initiatives – investing in rural infrastructure, farming, and job creation.	(4 x 2)	(8)
			[32]

3.18.1	Designing and organising the layout of the cities.	(2 x 1)	(2)
3.18.2	More than 300 dwellings.	(1 x 1)	(1)
3.18.3	Narrow pathways. Density or proximity of buildings.	(2 x 1)	(2)
3.18.4	Informal settlements are built with highly flammable material. Have congested layouts. Lack of formal electricity.	(2 x 2)	(4)
3.18.5	Re-blocking – re-organising the layout of shacks to create wider roads for fire trucks and emergency access. Provision of basic services – install formal electricity to reduce the reliance on dangerous open flames. Provide accessible water hydrants within the settlement.	(2 x 2)	(4)
			[13]

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