education

Department of
Education
FREE STATE PROVINCE

GEOGRAPHY

2024

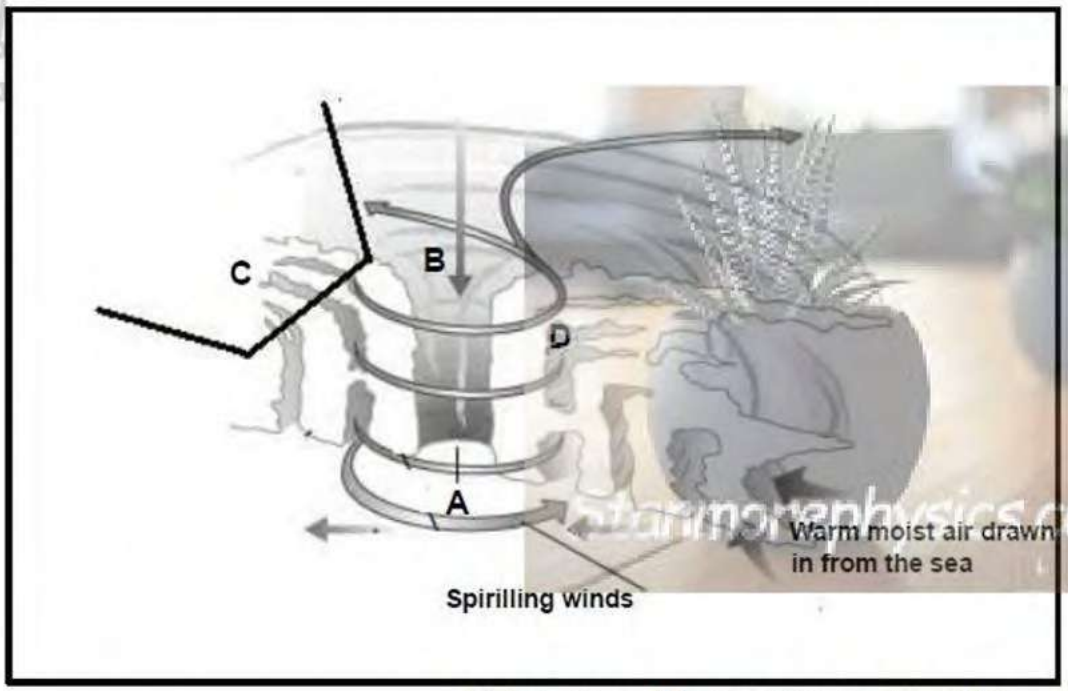
LAST PUSH ACTIVITIES

PAPER 1

CLIMATE AND WEATHER

QUESTION 1 CLIMATE AND WEATHER

Refer to the sketch below. Choose the term/concept from COLUMN B that completes the statement in COLUMN A. Write down only **Y** or **Z** next to the question numbers (1.1.1 to 1.1.7) in the ANSWER BOOK, e.g. 1.1.8 Y.



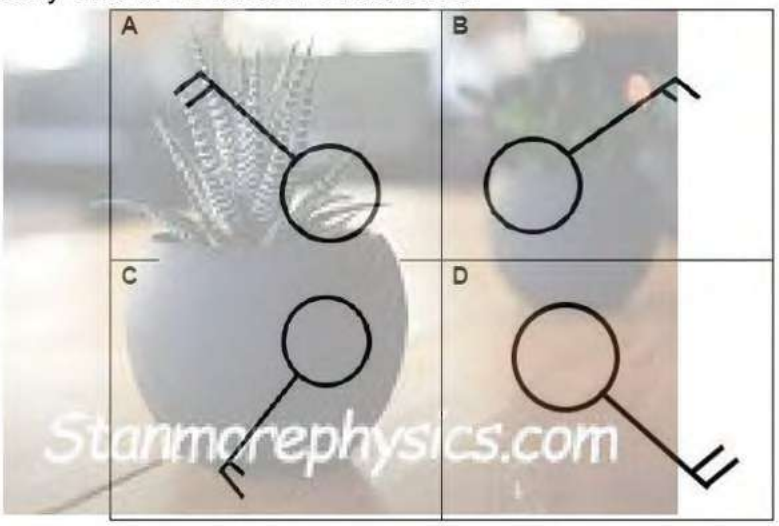
[Adapted from *Merriam Webster, Inc*, 2006]

	COLUMN A	COLUMN B
1.1.1	The weather system shown in the sketch is a …cyclone.	**Y.** tropical **Z.** mid-latitude
1.1.2	The sketch above represents a cyclone in the …hemisphere	**Y.** southern **Z.** northern
1.1.3	**A** in the sketch is referred to as the … of the cyclone.	**Y.** apex **Z.** eye
1.1.4	The air descending at **B** is …	**Y.** moist **Z.** dry
1.1.5	Area **C** in the sketch represents the … of the cyclone.	**Y.** dangerous semi-circle **Z.** cold sector
1.1.6	The cloud type found at **D** is …	**Y.** cumulonimbus **Z.** stratus
1.1.7	The general movement of this weather system is …	**Y.** east to west **Z.** west to east

(1X7) **7**

1.2 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (1.2.1 to 1.2.8) in the ANSWER BOOK, example 1.2.9 D.

1.2.1 A south westerly wind of 15 knots is evident in …



1.2.2 Cyclones are associated with … weather conditions and … of air.

(i) unstable
(ii) stable
(iii) divergence
(iv) convergence

A (i) and (iii)
B (i) and (iv)
C (ii) and (iii)
D (ii) and (iv)

1.2.3 Berg winds are … and … gusty local winds that blow from the interior of the country to the coast.

(i) hot
(ii) warm
(iii) dry
(iv) moist

A (i) and (iii)
B (i) and (iv)
C (ii) and (iii)
D (ii) and (iv)

1.2.4 Berg winds occur as a result of the interaction between the … and …pressure systems.

(i) Kalahari high
(ii) Cut-off low
(iii) South Indian high
(iv) Coastal low

A (i) and (iii)
B (i) and (iv)
C (ii) and (iii)
D (ii) and (iv)

1.2.5 The two winds responsible for the development of line thunderstorms are the … winds.

A south westerly and north westerly
B north westerly and south easterly
C north easterly and south westerly
D south westerly and north westerly

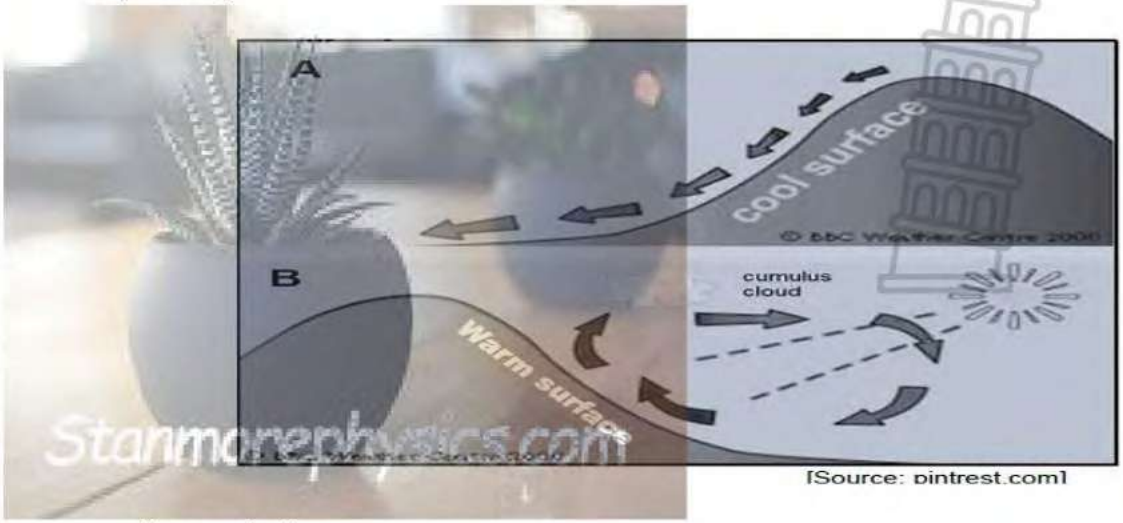
1.2.6 A zone between two air masses with different water vapour content, resulting in the occurrence of line thunderstorms known as a …

A cold front.
B moisture front.
C warm front.
D polar front.

1.2.7 Line thunderstorms are associated with the following weather conditions:

A torrential rain; snow
B hurricane winds; hail
C light rain; thunder
D torrential rain; gusty winds

1.2.8 The micro-climate illustrated in the sketches below, shows … **(A)** and … **(B)** winds respectively.



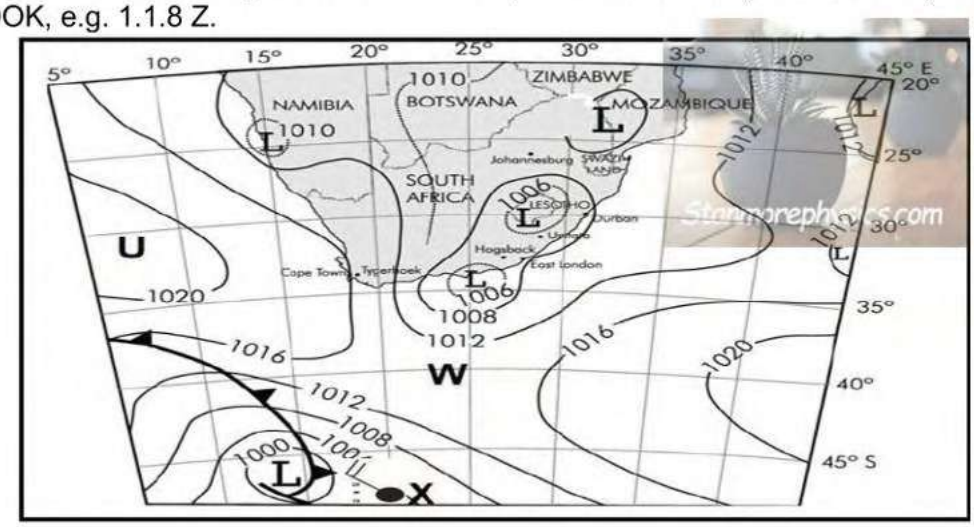
[Source: pintrest.com]

i) anabatic
(ii) westerlies

(iii) katabatic
(iv) easterlies

A (i) and (iiii)
B (i) and (iv)
C (ii) and (iii)
D (iii) and (i)

1.3 Refer to the weather map below. Complete the statements in COLUMN A with the options in COLUMN B. Write only Y or Z next to the question numbers (1.1.1 to 1.1.7) in the ANSWER BOOK, e.g. 1.1.8 Z.



1.3.1 The synoptic map above represents the … season.
Y winter
Z summer

1.3.2 The weather station model at **X** is in the …
Y cold sector
Z warm sector

1.3.3 The temperature in Lesotho will most probably be …
Y high
Z low

1.3.4 The area of constant pressure between two highs and two lows at **W** is called …
Y saddle
Z ridge

1.3.5 The pressure cell found at **U** is the south … high pressure cell.
Y Indian
Z Atlantic

1.3.6 The wind direction from U to **X** will most likely be in a … direction.
Y south easterly
Z north westerly

1.3.7 The pressure reading at the Cut-off low in Mozambique is … hPa.
Y 1010
Z 1008

(7x1) 7

1.4 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A – D) next to the question numbers (1.1.1 to 1.1.7) in the ANSWER BOOK, e.g. 1.1.8 A.

1.4.1 An urban heat island can be described as …

A urban areas being colder than rural areas.
B urban areas receiving more insolation than rural areas.
C urban areas being warmer than rural areas.
D an increase in temperature as you move from rural to urban areas.

1.4.2 Urban heat islands can develop because of …

A the reduced number of vehicles.
B reduced industrial activity.
C larger open water sources.
D larger artificial surfaces.

1.4.3 The following photograph shows … due to a large glass surface in an urban area.

[Source: *https://www.mornglass.com/light-pollution-of-glass-curtain-wall.html*]

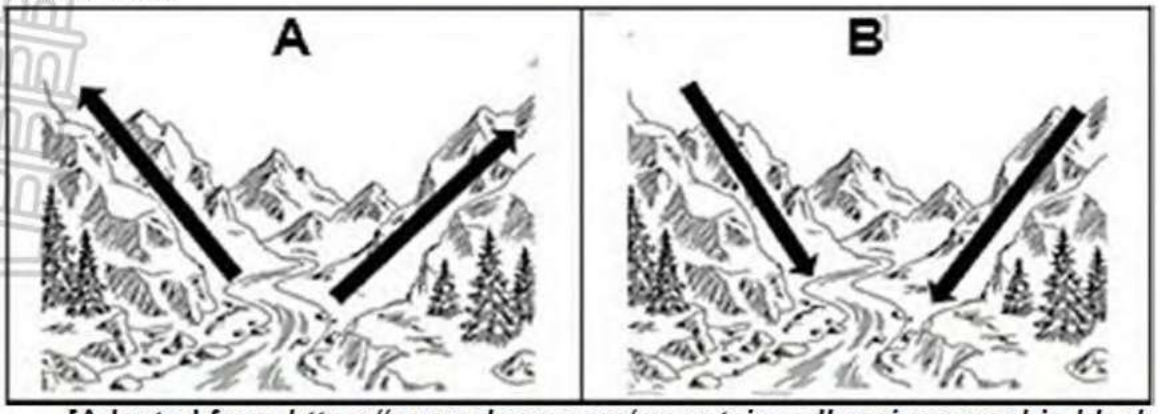
A Albedo
B evapotranspiration
C insolation
D absorption

1.4.4 A pollution dome located over an urban area would be … and …

(i) higher during the day
(ii) lower during the day
(iii) lower during the night
(iv) higher during the night

A (i) and (iii)
B (i) and (iv)
C (ii) and (iii)
D (ii) and (iv)

1.4.5 Refer to sketches A and B below, showing wind direction in valleys, to answer QUESTIONS 1.1.5 to 1.1.7.



[Adapted from *https://www.alamy.com/mountain-valley-river-graphic-black-white-landscape-sketch-illustration-vector-image416759737.html*]

1.4.6 The wind illustrated in sketch **A** is a/an … wind.

A katabatic
B Föhn
C anabatic
D Berg

1.4.7 The wind illustrated in diagram **B** is most prevalent …

A in the afternoon.
B at night.
C before midday.
D at any time of the day.

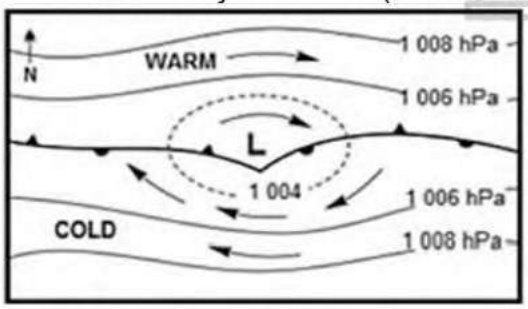
1.4.8 Frost pockets will likely form in diagram B because of the …

A accumulation of cold air.
B dispersion of warm air.
C mountain slopes.
D location of the river.

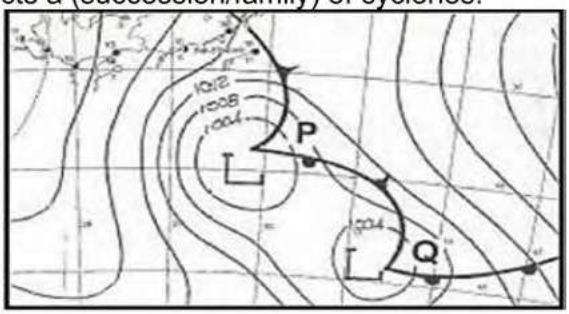
1.5 Read the statements below and choose the appropriate word(s) in brackets that will make the statement TRUE. Write down only the question numbers (1.2.1 to 1.2.8) and the answer in the ANSWER BOOK, e.g. 1.2.9 Decreased

1.5.1 The global wind belt responsible for the general movement of mid-latitude cyclones is the (polar easterlies/tropical easterlies).

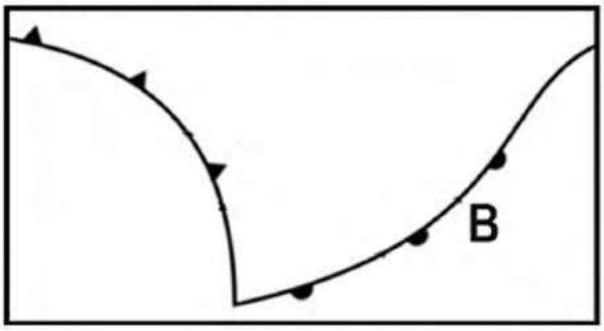
1.5.2 The diagram below shows a mid-latitude cyclone in the(initial/development) stage.



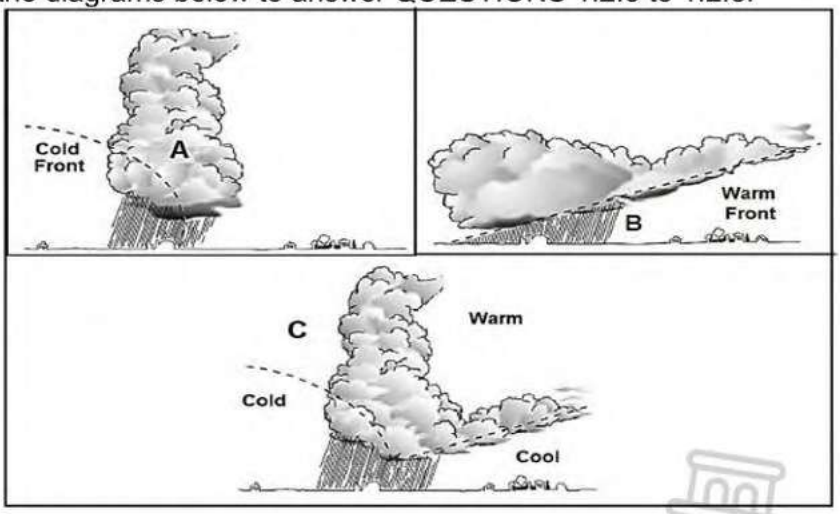
1.5.3 The diagram below depicts a (succession/family) of cyclones.



1.5.4 The front at B below is the (warm/cold) front.



Refer to the diagrams below to answer QUESTIONS 1.2.5 to 1.2.8.



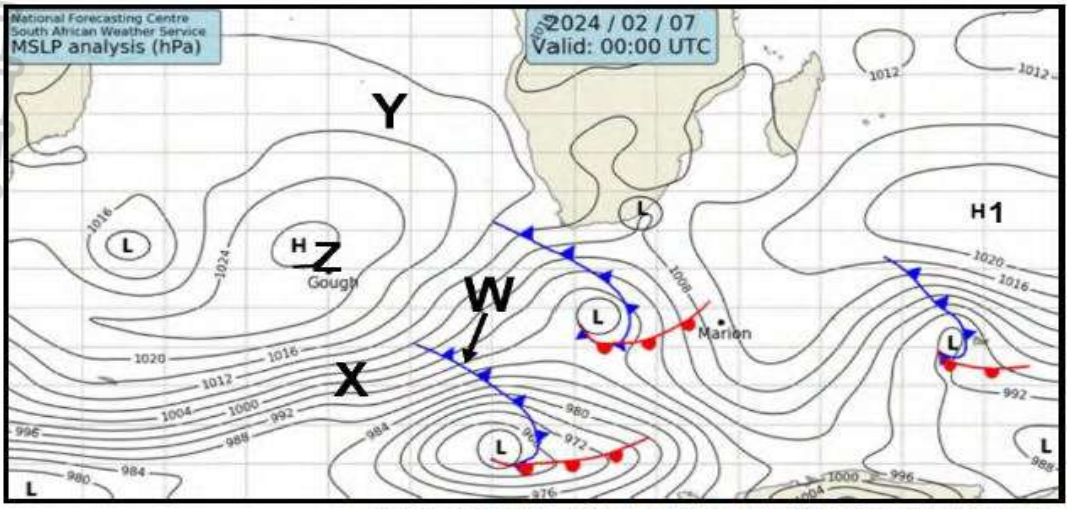
1.5.5 (Nimbostratus/Cumulonimbus) clouds are most likely to develop at **A**.

1.5.6 Gentle rain can be expected at **B** because (warm/cold) air rises steadily above the cooler air masses.

1.5.7 The occluded front depicted in diagram **C** is a (warm/cold) occlusion.

1.5.8 The occlusion in diagram **C**, is the result of cold air that moves (faster/slower) than warm air.

1.6 Refer to the synoptic weather map and answer the following questions.



[Source: https://www.weathersa.co.za/home/synopticcharts]

1.6.1 Identify the season of this synoptic weather map.

1.6.2 Name the low pressure system located on the east coast of South Africa.

1.6.3 The wind will be stronger at (**X/Y**).

1.6.4 Identify the front labelled **W**.

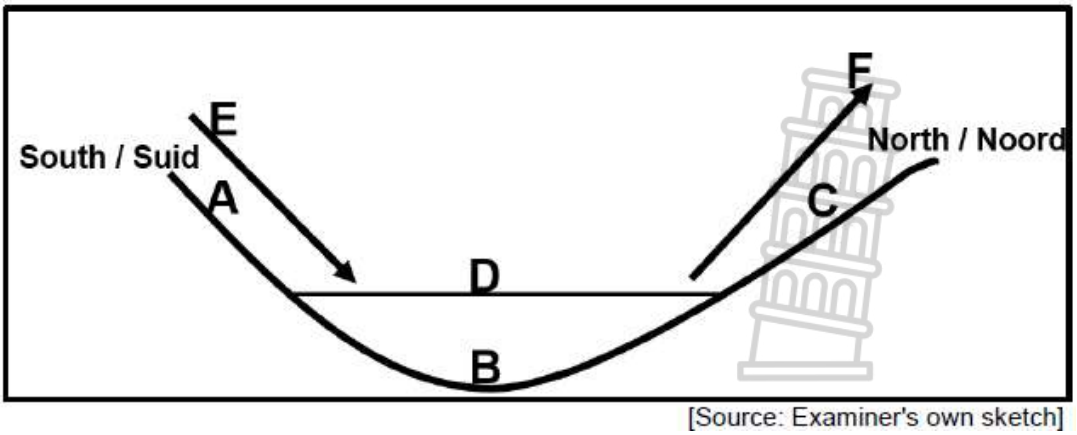
1.6.5 Name the line connecting areas with the same atmospheric pressure.

1.6.6 Determine the atmospheric pressure at Z.

1.6.7 What is the isobaric interval on the map?

1.6.8 Name the pressure cell labelled H1 on the map. (8x1) 8

1.7 Refer to the diagram below, indicating valley climate in the Southern Hemisphere. Choose the corresponding letter that matches the statement. e.g., 1.2.8 B



[Source: Examiner's own sketch]

1.7.1 The warmest slope in the southern hemisphere.

1.7.2 Smoke and pollution becomes trapped in the valley due to its formation.

1.7.3 Cold air accumulates, forming a frost pocket.

1.7.4 It is relatively cool as it is called a shadow zone.

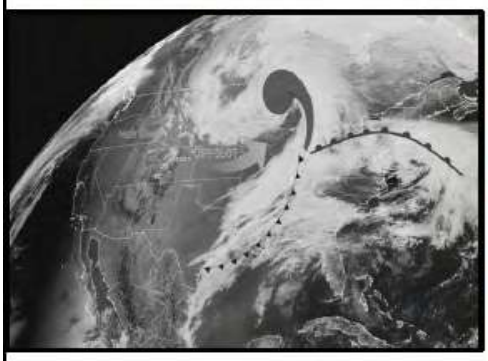
1.7.5 Represents a katabatic wind.

1.7.6 Less evaporation occurs in this area.

1.7.7 The most ideal slope for pastures. (7x1) 7

2.1 Study the extract and satellite image below showing a mid-latitude cyclone.

Mid-latitude cyclone causing three days of wind and fire danger



The structure of the storm was very impressive seen from satellite. It had well defined comma cloud named for its distinct shape. A long tail which was the cold front, and a warm front extending out east of the storm.

There was also a clear dry slot, which has been responsible for the very low humidity in Colorado leading to three straight days of elevated fire weather.

[Source: https://www.9news.com/article/weather/weather-colorado]

2.1.1 In which hemisphere is the satellite image depicted? (1x1) 1

2.1.2 **Substantiate** your answer to QUESTION 2.1.1 (1x2) 2

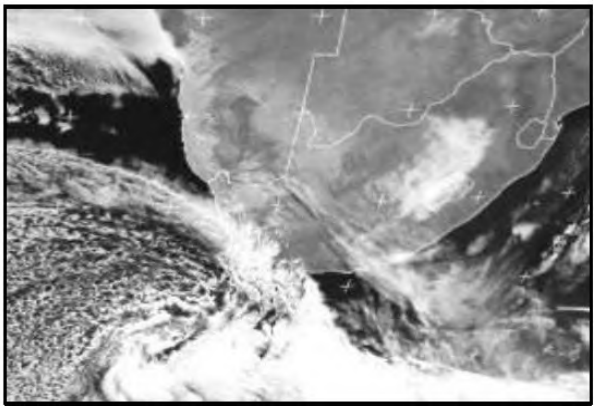
2.1.3 **Quote** the cause for the fire danger as stated in the text. (1x2) 2

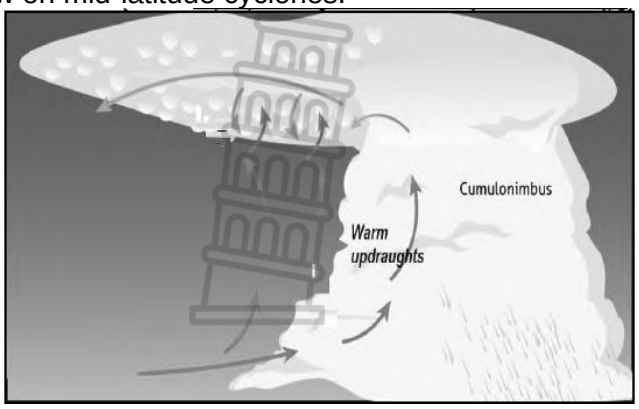
2.1.4 **Account** for the direction of movement of the mid-latitude cyclone. (1x2) 2

2.1.5 **How** are cold fronts associated with the formation of the cumulonimbus clouds. (2x2) 4

2.1.6 **Explain why** the cold front moves faster than the warm front. (2x2) 4

2.2 Refer to the satellite image and the photo below on mid-latitude cyclones.





2.2.1 **Identify** the front in the Mid-latitude cyclone that will lead to the development of cumulonimbus clouds.

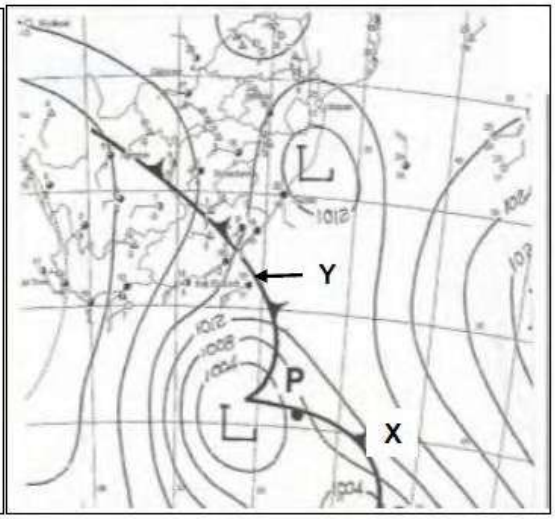
2.2.2 **Briefly explain** how cumulonimbus clouds are formed. (1x2) 2

2.2.3 **Draw** a sketch map to illustrate the satellite image. (2x1) 2

2.2.4 **How** will the Cumulonimbus clouds change the weather of Cape Town? (2x2) 4

2.2.5 **Explain how** the cumulonimbus clouds can be expected to increase the water levels in the Western Cape. (3x2) 6

2.3 Refer to the infographic showing a mid-latitude cyclone.



As the cold front moves over the central and south-eastern parts of South Africa today, it has left a trail of heavy falls, very cold conditions, very rough seas and gale force winds over the interior and along the coast. At present the cold front is positioned over the Eastern Cape, bringing heavy rain and very cold temperatures to the province. Snowfalls are expected on the mountains of the Eastern Cape today, as well as in Lesotho, the Drakensberg and the eastern Free State overnight and tomorrow. Sea conditions remain very hazardous, with gale force winds and very rough seas persisting along the southern Cape coast today, spreading towards the Wild Coast and KwaZulu-Natal

Source: Adapted from South African Weather Services]

2.3.1 **Provide evidence** from the synoptic chart indicating that X is a mid-latitude cyclone. (1x1) 1

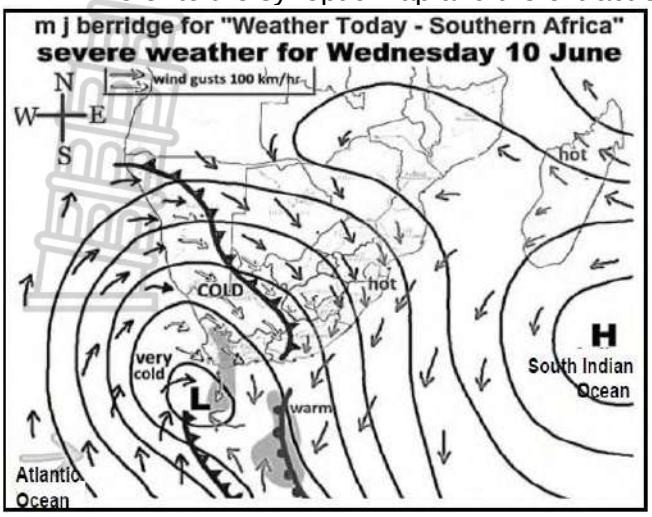
2.3.2 **Give evidence** from the satellite image and synoptic weather chart indicating that typical winter conditions are shown. (1x2) 2

2.3.3 **With reference** to the satellite image and synoptic weather chart, explain why the Eastern Cape is experiencing rain and very cold conditions. (1x2) 2

2.3.4 **Draw** a simple, free-hand cross section through the front labelled Clearly indicate the position of the cold and warm air masses, and the main rain-bearing cloud associated with front Y. (4x1) 4

2.3.5 With reference to the extract, **suggest** THREE ways how satellite tracking can assist farmers in the Eastern Cape, to prepare for the weather conditions associated with a mid-latitude cyclone. (3x2) 6

2.4 Refer to the synoptic map and the extract on a mid-latitude cyclone.



Storm Report SA

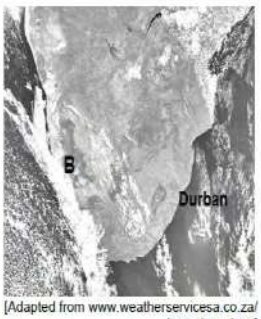
Overview of the mid-latitude cyclone on Wednesday, 10 June 2020.

By Mike Berridge

Weather models continue to indicate that the mid-latitude cyclone will move across the Western Cape on Wednesday with heavy rain. The cold front will move across the country, over the south-western Cape mountains, with lots of rain and snow from the low pressure system. The areas across the south-western Cape are likely to receive about 50 mm of rain from the low pressure system.

The upper atmospheric winds in this system will be extremely strong north-westerly and may reach 100 km/h. This naturally poses a severe risk of runaway fires. Winds striking the Cape west and south-west coasts should reach a sustained speed approaching gale force (60 km/h).

[Adapted from https://www.accu weather.com]



[Adapted from www.weatherservicesa.co.za/home/warnings]

2.4.1 **Provide** another name for a mid-latitude cyclone. (1x1) 1

2.4.2 **State** TWO severe weather conditions from the extract associated with the mid-latitude cyclone which occurred on 10 June. (2x1) 2

2.4.3 **Explain why** the severe weather is likely to 'move' towards Durban in the next few days. (2x1) 2

2.4.4 **Describe how** the low pressure at the apex of the mid-latitude develops. (1x2) 2

2.4.5 In a paragraph of approximately EIGHT lines, **discuss** strategies which the Western Cape government can implement to prepare the inhabitants of the Cape Flats to cope with the severe impact of the approaching mid-latitude cyclones. (4x2) 8

2.3 Study the map showing the forecast track of a hurricane.

2.3.1 **What** is the difference between a tropical cyclone and a hurricane? (1x2) 2

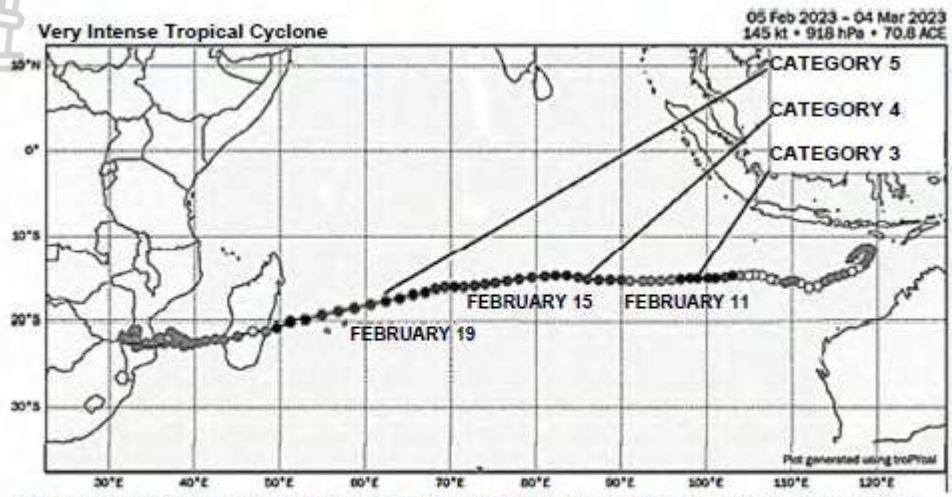
2.3.2 **Why** tropical cyclones ONLY affect the eastern side of the continent? (1x1) 1

2.3.3 **Describe** how hurricane Lee formed. (2x2) 4

2.3.4 In a paragraph of approximately EIGHT lines **discuss** the pre-cautionary and management strategies the government can prepare to manage the effects of tropical cyclones. (4x2) 8

2.4 Refer to the infographic on Tropical Cyclone Freddy.

MOVEMENT OF TROPICAL CYCLONE FREDDY



[Adapted from *https://watchers.news/2023/03/06/tropical-cyclone-freddy-the-longest-lived-and-one-of-a-kind-tropical-cyclone-in-history/*]

CYCLONE FREDDY

Tropical Cyclone Freddy was an exceptionally long-lived, powerful, and deadly storm that traversed the southern Indian Ocean for more than five weeks in February and March of 2023.

Freddy made its first landfall near Mananjary, Madagascar. The storm rapidly weakened overland but restrengthened in the Mozambique Channel.

The cyclone struck south-eastern Madagascar, damaging many homes. The impact in Mozambique was more severe than in Madagascar and included heavy rainfall in the southern half of the country.

Hardest-hit was Malawi where incessant rains caused catastrophic flash floods, with Blantyre suffering the brunt of it. The nation's power grid was crippled, with its hydroelectric dam rendered inoperable. Food security was of particular concern, with millions of people left at risk.

[Source: *https://en.wikipedia.org/wiki/Cyclone_Freddy*]

SATELLITE IMAGE OF TROPICAL CYCLONE FREDDY

[Source: *https://en.wikipedia.org/wiki/Cyclone_Freddy*]

2.4.1 **According to the infographic**, what was the lifespan of Tropical Cyclone Freddy? (1x1) 1

2.4.2 **Quote** an example of infrastructural damage caused by Tropical Cyclone Freddy, as mentioned in the article. (1x1) 1

2.4.3 **Describe** the rotation of winds as depicted (shown) in the satellite image. (1x1) 1

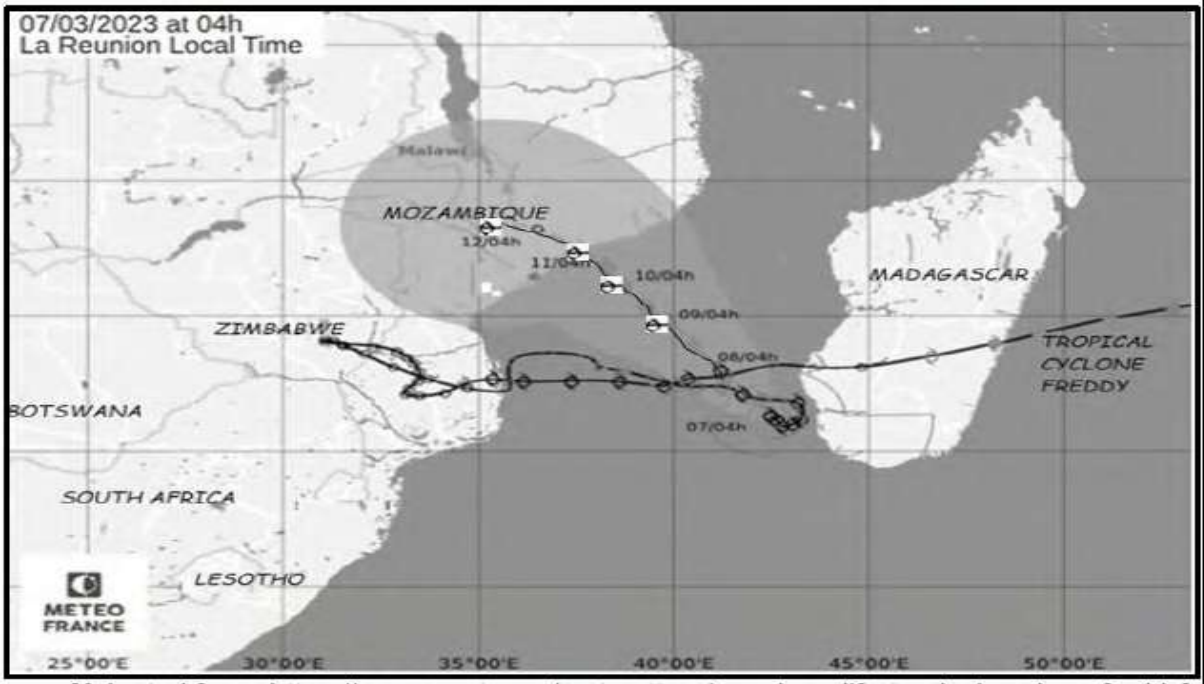
2.4.4 **Suggest** TWO possible reasons why Tropical Cyclone Freddy intensified from a category 3 to a category 5 cyclone between 11 February 2023 and 19 February 2023. (2x2) 4

2.4.5 **What** could have caused the rapid weakening of Tropical Cyclone Freddy when it made landfall near Mananjary? (2x1) 2

2.4.6 **Suggest** THREE strategies that the local authorities in Mozambique could have implemented to prepare for the destruction caused by Tropical Cyclone Freddy. (3x2) 6

2.5 Refer to the infographic below on Tropical cyclone Freddy.

TRACK OF TROPICAL CYCLONE FREDDY



[Adapted from: https://www.rmets.org/metmatters/very-long-life-tropical-cyclone-freddy]

Record-breaking Tropical Cyclone Freddy

According to the National Oceanic and Atmospheric Administration, no tropical cyclones had taken such a path across the Indian Ocean in the past two decades. On March 7, Freddy became the longest-lived tropical cyclone ever recorded and was at that time officially Earth's most energetic storm ever observed.

Cyclone Freddy made landfall on Madagascar's eastern coast, near Mananjary, on February 21. Freddy then moved across the Mozambique Channel and made landfall in Mozambique's Inhambane province on February 24. Cyclone Freddy made its third landfall in total and its second landfall in Mozambique on March 11 in Zambézia province, with maximum winds of almost 92 miles per hour (148 kilometers per hour). Freddy moved over land as a tropical depression, with a localized center close to the border between Mozambique and the southern tip of Malawi, a landlocked country. Although the system dissipated, it still generated intense rainfall in the interior of Mozambique and southern Malawi.

[Adapted from: https://disasterphilanthropy.org/disasters/tropical-cyclonefreddy/]

2.5.1 **State** the direction of tropical cyclone Freddy across the Mozambique channel towards Mozambique as shown on the map. (1x1) 1

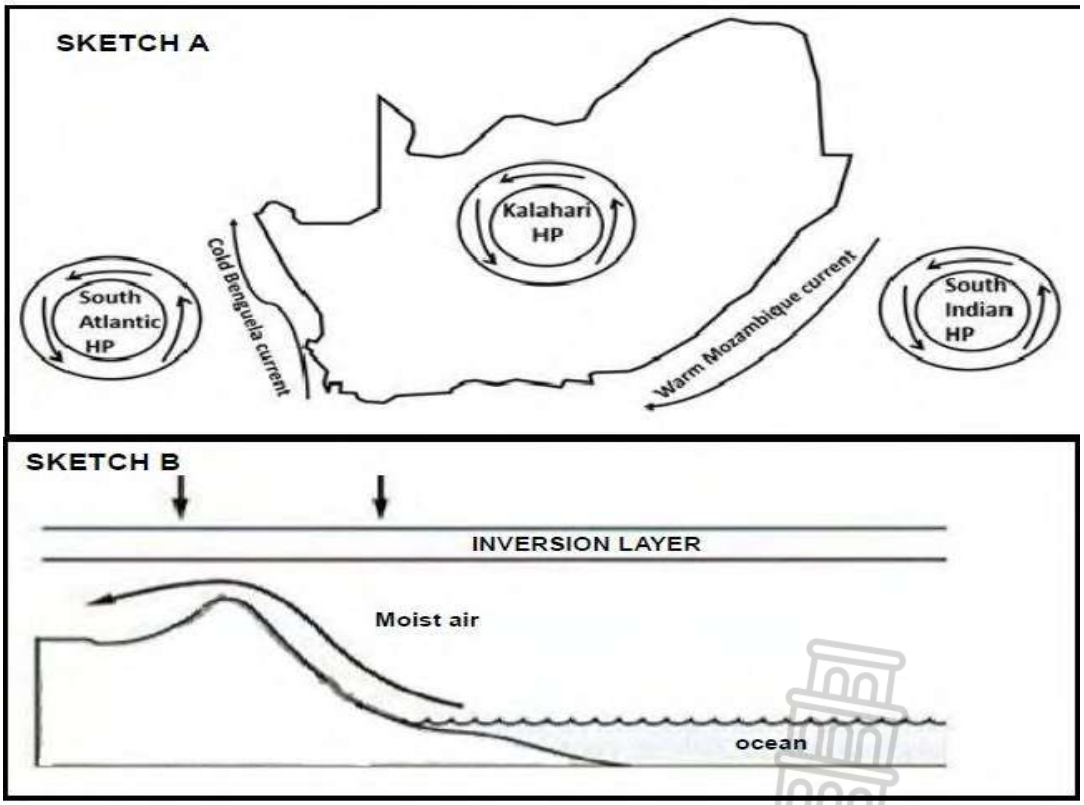
2.5.2 In the text, (third paragraph), tropical cyclone Freddy is regarded as a tropical depression.

a **On what basis** has it been classified as a tropical depression? (1x2) 2

b. **What impact** will wind traveling at 148km/h velocity (speed) have on the natural vegetation in Mozambique? (2x2) 4

2.5.3 The map depicts an erratic (unpredictable) path of a tropical cyclone, Freddy. In a paragraph of approximately EIGHT lines**, give possible reasons** for the erratic path it followed and why this creates problems for disaster management teams to effectively manage the impact of tropical cyclones. (4x2) 8

2.6 Refer to sketch A and sketch B showing factors that influence the weather over South Africa in summer.



2.6.1 **Identify** ONE factor in sketch A that influences the weather of South Africa. (1x1) 1

2.6.2 **How** would the position of the South Indian HP influence the moisture content of the air reaching the east coast of South Africa in summer? (1x2) 2

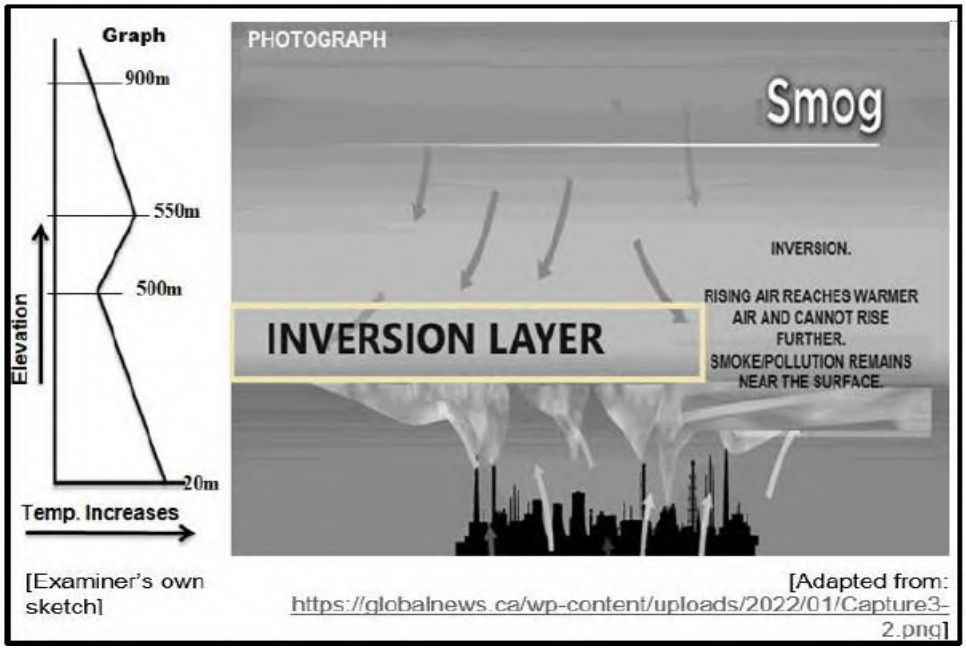
2.6.3 **Why** is the Kalahari HP weakly developed over the land in summer? (1x2) 2

2.6.4 **How** does the weakly developed Kalahari high pressure cell influence the presence of the inversion layer in sketch **B**? (1x2) 2

2.6.5 In a paragraph of approximately EIGHT lines, **explain how** the position of the inversion layer will bring overcast and unstable weather conditions over the interior of the country

in summer

2.7 Refer to the diagram below showing the Inversion layer.



2.7.1 **Define** the concept inversion layer. (1x2) 2

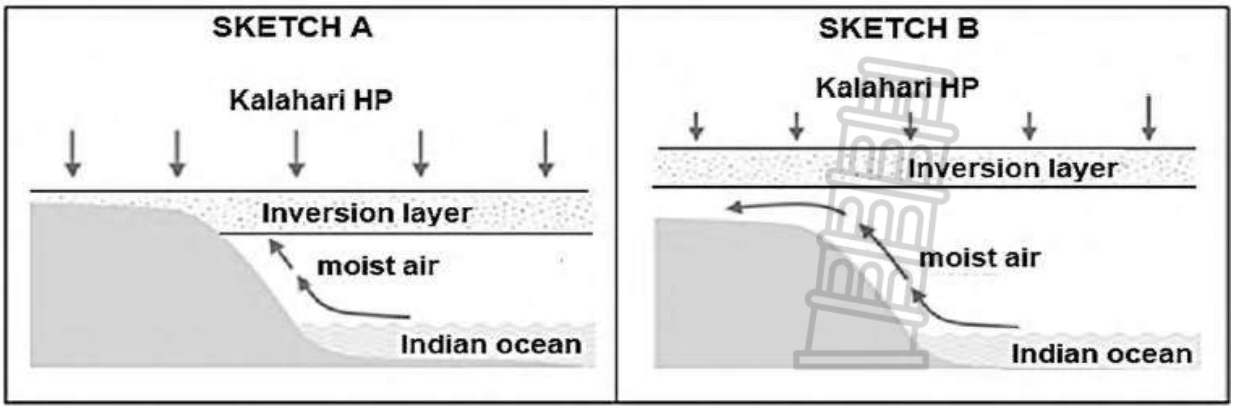
2.7.2 **State** THREE conditions favourable for the formation of the inversion layer. (3x1) 3

2.7.3 **Give a reason** for the trapped smoke/pollution near the surface. (1x2) 2

2.7.4 **Study the graph** above and describe the sequence of changes of temperature with altitude. (2x2) 4

2.7.5 **Explain how** trapped smoke/pollution will negatively impact on the health of the people. (2x2) 4

2.8 Refer to sketches A and B below, showing the inversion layer.



2.8.1 **Define** the term temperature inversion. (1x2) 2

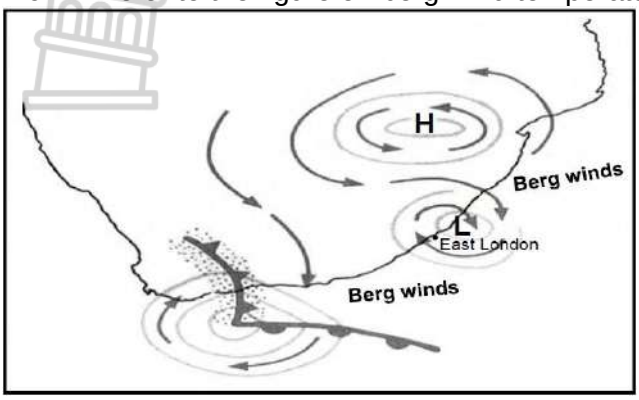
2.8.2 **Which** of the sketches, **A** or **B**, represents the winter season? (1x2) 2

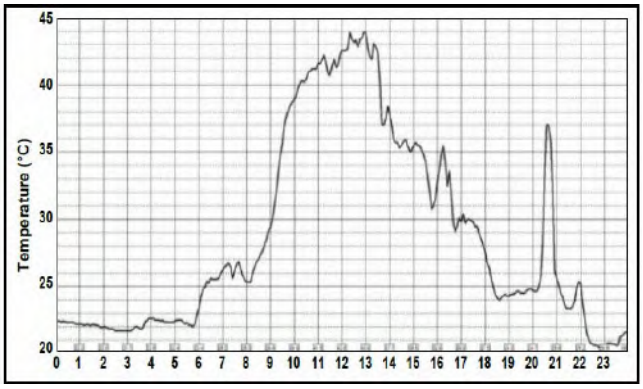
2.8.3 **Provide evidence from the sketch** to support your answer to QUESTION 2.8.2. (2x2) 4

2.8.4 **Explain** the likely stable conditions experienced in the interior of South Africa in sketch **A**. (3x2) 6

2.8.5 A farmer in the Free State wants to plant crops that require large amounts of water. **Explain why** the climatological conditions depicted in sketch **B** would suit this type of farming. (3x2) 6

2.9 Refer to the figure on berg wind temperatures at East London.





2.9.1 Berg winds are more likely to occur in (summer/winter). (1x1) 1

2.9.2 On which day did East London record the highest temperature? (1x2) 1

2.9.3 **State** the temperature recorded. (Answer to QUESTION 2.9.2.) (1x2) 2

2.9.4 **Explain why** the air from the interior gets warmer and drier as it approaches the coast of East London. (2x2) 4

2.9.5 **Discuss** the effect of the cold front on the berg winds at East London and describe how the weather of East London will change. (2x2) 4

2.9.6 **Suggest** TWO strategies that farmers can implement to reduce the impacts of berg winds in East London. (2x2) 4

2.10 Refer to the extract on line thunderstorm.

SEVERE THUNDERSTORMS AND HEAT WAVES CONTINUE TO WREAK HAVOC IN SOUTH AFRICA

Severe thunderstorms are leaving a trail of destruction in the north-eastern areas of the country. This includes a tornado in the Lekwa local municipality in Mpumalanga, as well as hailstorms in parts of the City of Joburg. Severe damage to property, including housing and other structures, as well as motor vehicles, has been reported. Meanwhile, in the rest of the country, temperatures soar up to 40°C. There is a weather situation where a low-pressure system is located over the central parts of the country, and there is a high-pressure system to the east. This specific arrangement is causing moisture at lower levels of the atmosphere to move into the north-eastern parts of the country. As a result, conditions are favourable for the formation of thunderstorms. The weather service reported that the isolated thunderstorm in Gauteng caused extensive damage to property and infrastructure because of the large hail.

[Source: Adapted from 05 February 2024-12:18 by TIMELIVES]

2.10.1 From the extract **name** the main weather systems responsible for the development of line thunderstorms over South Africa. (1x1) 1

2.10.2 **Describe** the type of cloud you would encounter with line thunderstorms. (1x1) 1

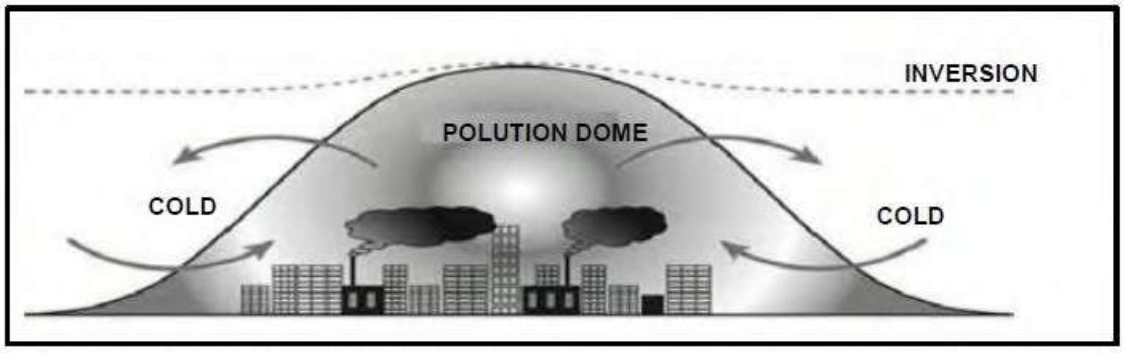
2.10.3 **What** hazard is associated with the clouds mentioned in QUESTION 2.10.2. (1x1) 1

2.10.4 **Use a diagram** to explain how line thunderstorms develop over the interior of South Africa. (2x2) 4

2.10.5 **Explain why** there is a thicker band of clouds to the east of the moisture front (line thunderstorms). (2x2) 4

2.10.6 **Explain why** the weather conditions associated with line thunderstorms are more severe than isolated (normal) thunderstorms. (2x2) 4

2.11 Refer to the sketch showing a pollution dome.



[Source: [http://www.ibgeographypods.org/uploads/7/6/2/2/7622863/ib_dp_geography_microclimates_urban_heat island_worksheet.pdf

2.11.1 **Give** TWO reasons why pollution domes are common in most cities. (2x1) 2

2.11.2 **Give evidence from the sketch** that suggests that this pollution dome is occurring at night (1x1) 1

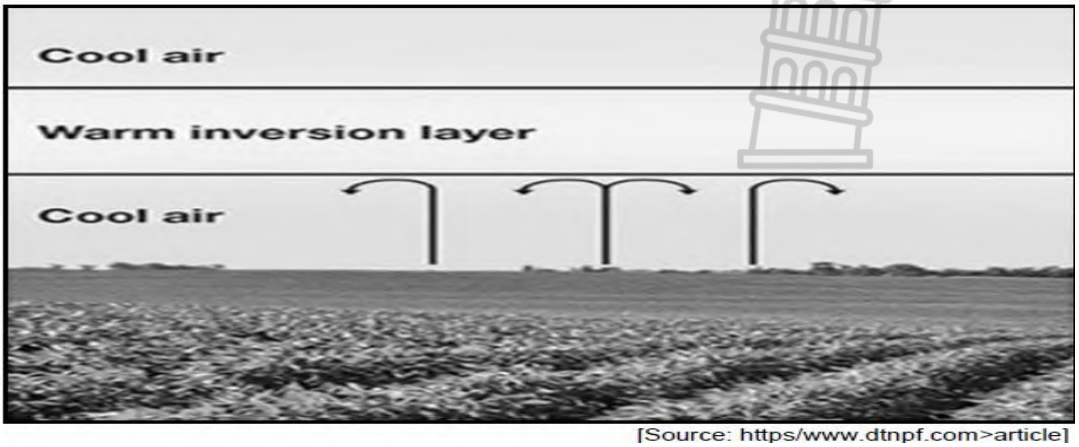
2.11.3 **Suggest** a reason why pollution domes are more concentrated at night. (1x2) 2

2.11.4 **How** do pollution domes increase temperature in a city? (1x2) 2

2.11.5 **Explain why** the negative impact of pollution domes on people are greater in winter. (2x2) 4

2.11.6 **Provide** sustainable strategies that can reduce the occurrence of pollution domes in our cities. (2x2) 4

2.12 Refer to an inversion above a cultivated land.



[Source: https/www.dtnpf.com>article]

2.12.1 **Define** the concept temperature inversion. (2x2) 2

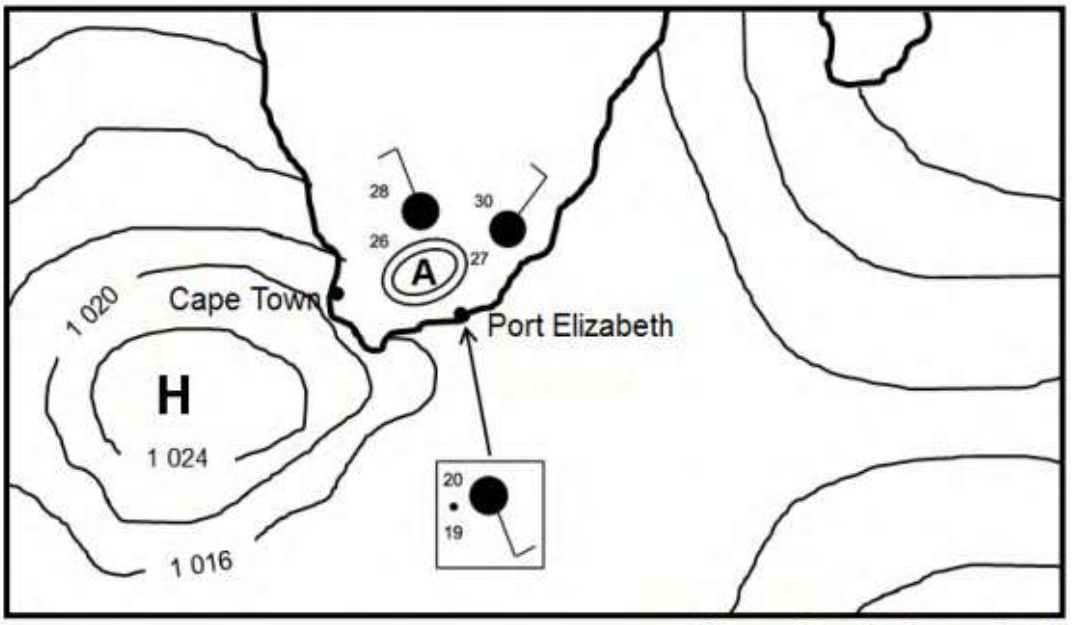
2.12.2 **Name** ONE condition that contributes to the formation of temperature inversion in the sketch above. (1x1) 1

2.12.3 **Suggest** the reason why fire activities for cultivated lands are not suitable during inversion conditions. (1x2) 2

2.12.4 **Explain how** the inversion layer developed. (2x2) 4

2.12.5 **Suggest** any THREE measures that farmers can implement to reduce the effects of the temperature inversion layer in the above-mentioned region. (3x2) 6

2.13.1 Refer to the South African synoptic weather map.



[Source: Examiner's own sketch]

2.13.1 **Identify** low-pressure system A on the synoptic weather map. (1x1) 1

2.13.2 **Give a reason** for the formation of this low-pressure system over the interior (1x2) 2

2.13.3 **Give evidence** from the synoptic weather map that the South Atlantic high is ridging. (1x2) 2

2.13.4 **Why** does the ridging of the South Atlantic high result in onshore winds? (2x2) 4

2.13.5 **Describe** the weather conditions at Port Elizabeth as a result of the onshore winds. (3x2) 6

GEOMORPHOLOGY

1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A – D) next to the question numbers (1.1.1 to 1.1.8) in the ANSWER BOOK e.g. 2.1.9 A

1.1.1 The raised banks of a river subjected to repeated flooding and deposition is a/an

A birdsfoot delta.
B alluvial fan.
C meander scar.
D natural levee.

1.1.2 Flat land on either side of the banks of a river made up of layers of silt is a …

A sand delta.
B natural levee.
C flood plain.
D sand island.

1.1.3 When a river enters the sea and deposit its load it forms a …

A delta.
B braided stream.
C sand island.
D flood plain.

1.1.4 This fluvial landform is popular with tourists who want to do river rafting.

A waterfalls
B valleys
C gorge
D rapids

1.1.5 The outer bank of a meander is called the … slope and has a … shape.

(i) slip-off
(ii) under cut
(iii) convex
(iv) concave

A (i) and (iv)
B (ii) and (iv)
C (i) and (iii)
D (ii) and (iii)

1.1.6 When a meander loop becomes separated from the river, it forms a/an …and when it dry up it is referred to as a/an …

(i) Yazoo stream
(ii) Ox-bow lake
(iii) Meander scar
(iv) Flood plain

A (i) and (ii)
B (ii) and (iv)

C (i) and (iii)
D (ii) and (iii)

1.1.7 A braided stream forms in the … course of the river when it deposits its load within its channel forming … islands.

(i) Lower
(ii) Upper
(iii) Sand
(iv) Rock

A (ii) and (iv)
B (i) and (iv)
C (i) and (iii)
D (ii) and (iii)

1.1.8 Where water plunges over a … cliff, it forms a …

(i) horizontal
(ii) rapid
(iii) vertical
(iv) Waterfall

A (iii) and (iv)
B (i) and (iv)
C (i) and (ii)
D (ii) and (iii)

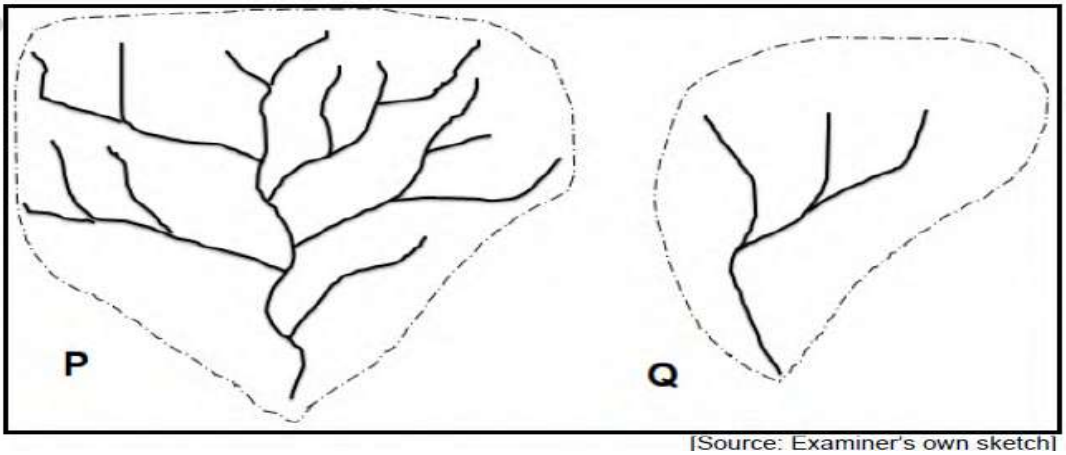
(8x1) 8

1.2 Complete the statements in COLUMN A with the options in COLUMN B.
Write down only Y or Z next to the question numbers (1.2.1 to 1.2.7) in the ANSWER BOOK, e.g. 2.2.8 Y

	COLUMN A	**COLUMN B**
1.2.1	High-lying areas that separates two drainage basins is known as …	**Y** interfluve **Z** watershed
1.2.2	Point where two or more streams meet is known as…	**Y** confluence **Z** tributary
1.2.3	Point where the river enters the sea is known as …	**Y** mouth **Z** source
1.2.4	The upper limit of ground water is known as …	**Y** base flow **Z** water table
1.2.5	The process whereby water seeps underground is known as …	**Y** run off **Z** infiltration
1.2.6	Area drained by a river and its tributaries is known as …	**Y** drainage basin **Z** drainage pattern
1.2.7	A river that originates in areas of high rainfall but flows through dry area is known as …	**Y** exotic **Z** episodic

(7x1) 7

1.3 Refer to drainage basins P and Q below which have different drainage densities. Match the descriptions in QUESTIONS 2.1.1 to 2.1.5 with P and Q. Write only P or Q next to the question number (1.3.1 to 1.3.8) in the ANSWER BOOK, e.g. 2.1.9 Q



[Source: Examiner's own sketch]

1.3.1 Dense vegetation cover that prevents surface run-off

1.3.2 A drainage basin that experiences high rainfall

1.3.3 A drainage basin that has mainly clay soils

1.3.4 A drainage basin that has mainly permeable rock

1.3.5 Rivers in this drainage basin flow through hilly areas

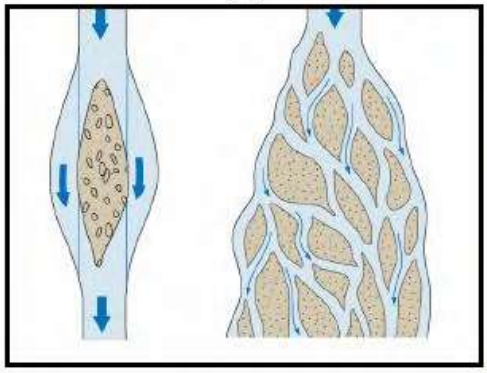
1.3.6 A drainage basin that has porous rock with sandy soils

1.3.7 A drainage basin found in gently sloping land

1.3.8 A drainage basin with the highest stream order (8x1) 8

1.4 Refer to the diagrams below and answer the following questions. Choose a word(s) from the brackets to make the statement TRUE. Write only the word e.g. 1.2.8 dam.
QUESTION 1.4.1 – 1.4.4 refer to diagram A and QUESTION 1.4.5 – 1.4.7 refer to diagram B.

A



B

[Source:stream channel pattern google images]

1.4.1 The stream channel pattern at sketch A is (braided/meandering).

1.4.2 The main reason for this pattern is (less gradient/flooding).

1.4.3 The main cause of this pattern is (erosion/deposition).

1.4.4 This pattern forms (distributaries/oxbow lakes).

1.4.5 A waterfall is known as a (temporary/permanent) base level of erosion.

1.4.6 A waterfall will result in (headward/lateral) erosion along the river channel.

1.4.7 The river at B has (turbulent/laminar) flow. (7x1) 7

1.5 Choose a term/concept from COLUMN B that matches the statement in COLUMN A. Write only the letter (Y or Z) next to the question numbers (1.5.1 – 1.5.8) in the ANSWER SHEET, e.g. 2.2.9 Y.

	COLUMN A	**COLUMN B**
1.5.1	Soft continuous rainfall will cause …	**Y** – Greater infiltration **Z** – More run-off
1.5.2	If an area has low evaporation rates … will occur.	**Y** – More infiltration **Z** – Less run-off
1.5.3	Steep gradients will cause …	**Y** – More run-off **Z** – Greater infiltration
1.5.4	An area with more vegetation will have …	**Y** – Less infiltration **Z** – Less run-off
1.5.5	Drier soil in an area is the cause of …	**Y** – Greater infiltration **Z** – More run-off
1.5.6	An area with impermeable (hard) rock will experience …	**Y** – Less run-off **Z** – Less infiltration
1.5.7	Artificial surfaces like tar and cement in cities will experience …	**Y** – Greater infiltration **Z** – More run-off
1.5.8	Overgrazing can cause …	**Y** – Greater infiltration **Z** – More run-off

(8x1) 8

1.6 Give ONE term/concept for each of the following descriptions by choosing a word/term from the list below. Write only the term/concept next to the question numbers (1.6.1 to 1.6.7).

surface runoff; river discharge; drainage basin; through flow; water table; confluence; ground water; watershed

1.6.1 The area drained by the main river and its tributaries

1.6.2 Water that flows on the surface

1.6.3 Accumulation of water underground due to infiltration

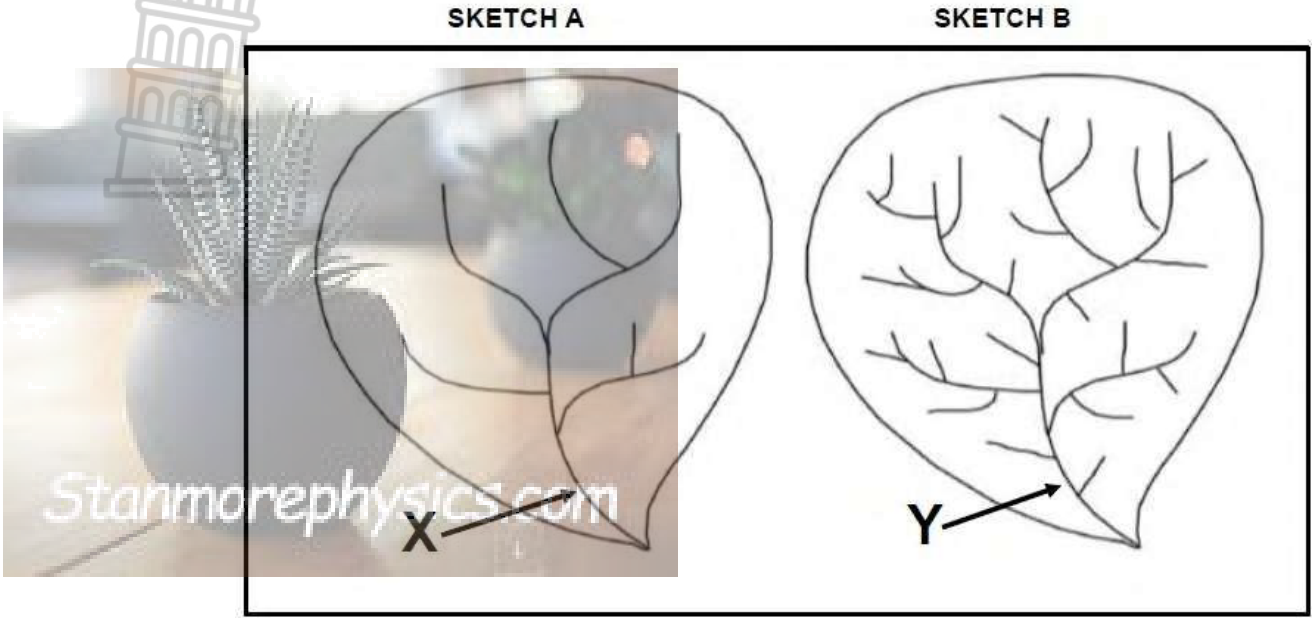
1.6.4 The point where a tributary meets the main stream

1.6.5 The horizontal movement of water underground

1.6.6 Refers to the upper limit of a water that collects underground

1.6.7 The volume of water flowing through a river channel at a given point at a specific time (7x1) 7

1.7 Refer to the drainage density illustrated in sketches A and B below.



1.7.1 **Explain** the concept drainage density. (1x2) 2

1.7.2 What evidence indicates that sketch **B** has a higher drainage density than sketch **A**? (1x2) 2

1.7.3 Determine the stream order at **X** in the sketch **A.** (1x2) 2

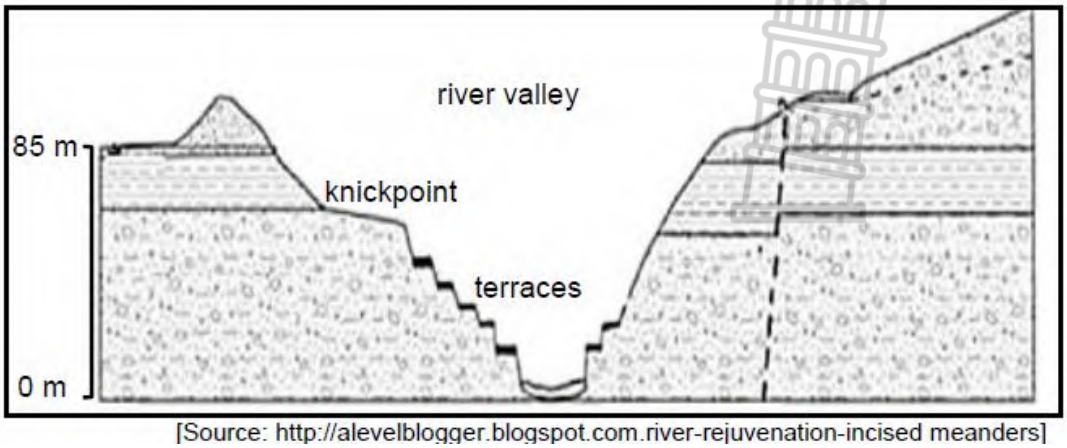
1.7.4 **Why** will the stream order be higher at point **Y** than point **X**? (1x2) 2

1.7.5 **Explain** the influence of gradient (slope) on drainage density. (2x2) 4

1.7.6 **Identify** the drainage pattern in sketch B? (1x1) 1

1.7.7 **Give a reason** for your answer to QUESTION 1.7.6. (1x2) 2

1.8 Refer to sketch below showing rejuvenation of a river.



[Source: http://alevelblogger.blogspot.com.river-rejuvenation-incised meanders]

1.8.1 **Define** the concept of river rejuvenation. (1x2) 2

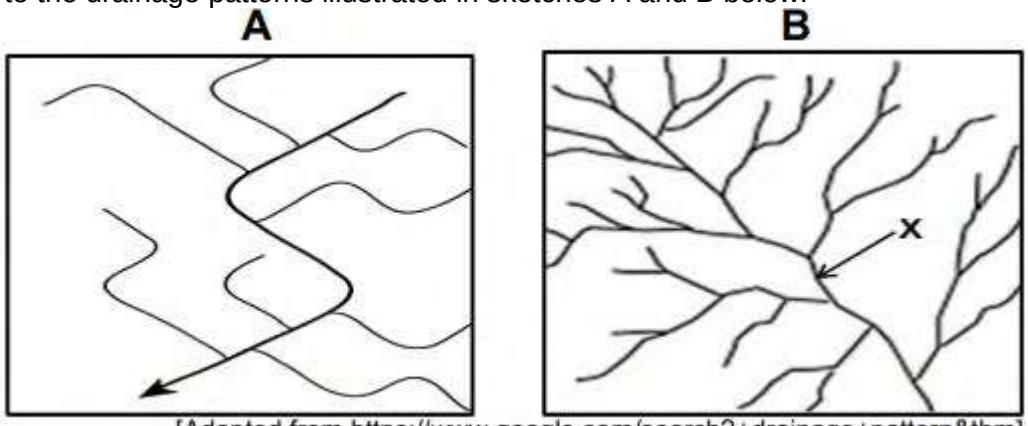
1.8.2 **Give** ONE piece of evidence from the sketch which indicates that river rejuvenation has taken place. (1x1) 1

1.8.3 **Provide** ONE reason why terraces are not suitable for agricultural activities. (1x2) 2

1.8.4 **Discuss** TWO physical changes to the river downstream (in the middle or lower course) from the point where river rejuvenation has occurred. (2x2) 4

1.8.5 **Explain** the economic importance of the landforms of river rejuvenation. (3x2) 6

1.9 Refer to the drainage patterns illustrated in sketches A and B below.



[Adapted from https://www.google.com/search?+drainage+pattern&tbm]

1.9.1 **Identify** drainage patterns in sketches A and B. (1x2) 2

1.9.2 **State** the underlying rock structure and rock type on which the drainage pattern in A developed. (1x2) 2

1.9.3 **Explain how** the underlying rock structure influenced the drainage pattern in A (1x2) 2

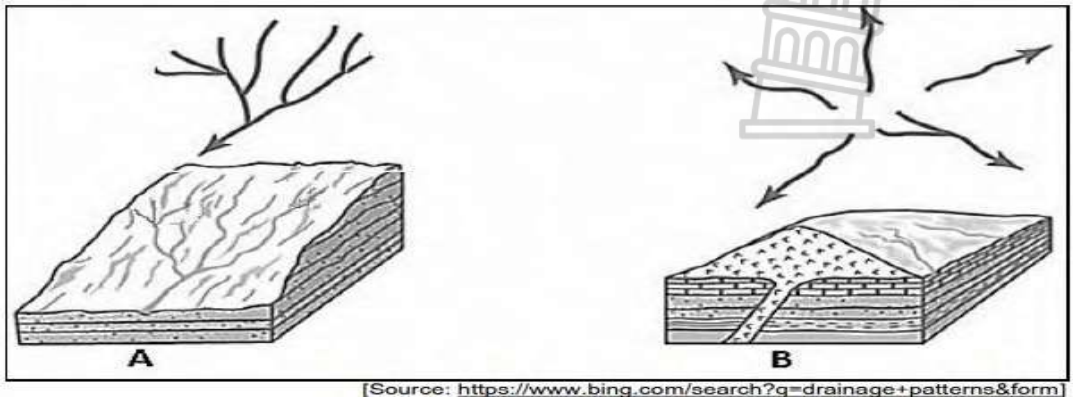
1.9.4 The drainage density in B is (high/low). (1x1) 1

1.9.5 **Determine** the stream order at X. (1x2) 2

1.9.6 **Explain** the relationship between stream order and drainage density in B. (1x2) 2

1.9.7 **Explain how** the slope (gradient) and permeability of underlying rock influence the drainage density in B. (2x2) 4

1.9 drainage patterns



[Source: https://www.bing.com/search?q=drainage+patterns&form]

1.9.1 **Define** the concept drainage pattern (1x1) 1

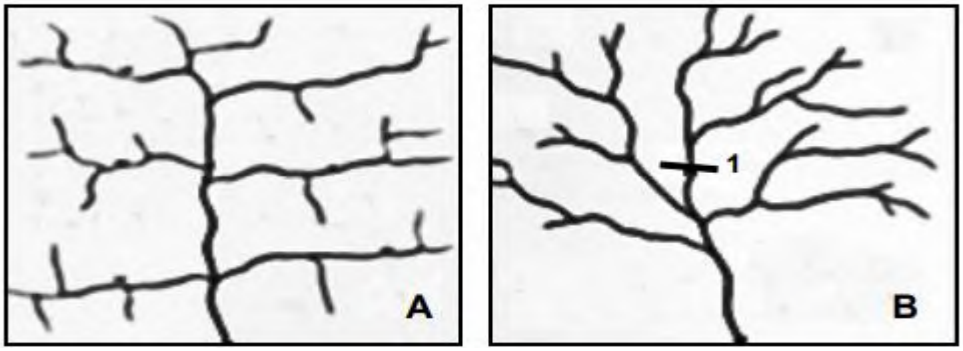
1.9.2 **Identify** drainage patterns **A** and **B**. (1x2) 2
1.9.3 **Give** TWO characteristics of drainage pattern **A** evident in the sketch above. (1x2) 2

1.9.4 **How** does the volcanic landscape in the sketch result in drainage pattern B? (1x2) 2

1.9.5 **Why** is drainage pattern A more suitable for settlements? (2x2) 4

1.9.6 **Explain how** the characteristics of the underlying rock structure result in the formation of drainage patterns A and B. (2x2) 4

1.10 Refer to the diagrams showing drainage patterns.



1.10.1 **Identify** drainage patterns **A** and **B** (1x2) 2

1.10.2 **Differentiate** between the underlying rock structure of drainage patterns **A** and **B** respectively. (2x2) 4

1.10.3 **Why** are the tributaries of the main stream parallel to each other in drainage pattern **A?** (1x2) 2

1.10.4 **Determine** the stream order at point 1 in drainage pattern **B**. (2x2) 2

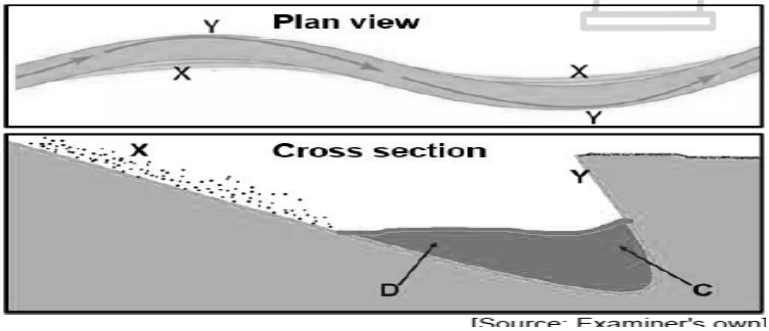
1.10.5 Choose the CORRECT word between brackets to make the statement TRUE

The higher the stream order, the (higher/lower) the drainage density. (2x2) 1

1.10.6 Refer to drainage pattern **B** and **describe** the relationship between;

a. Drainage density and low rainfall (1x2) 2
b. Drainage density and steep gradient (1x2) 2

1.11 Study the diagram below which illustrates the plan view and cross profile of a meander.



[Source: Examiner's own]

1.11.1 **Define** transverse profile of a river. (1x2) 2

1.11.2 Refer to the diagram of the cross section.
a **Name** the river banks at **X** and **Y** respectively. (1x2) 2

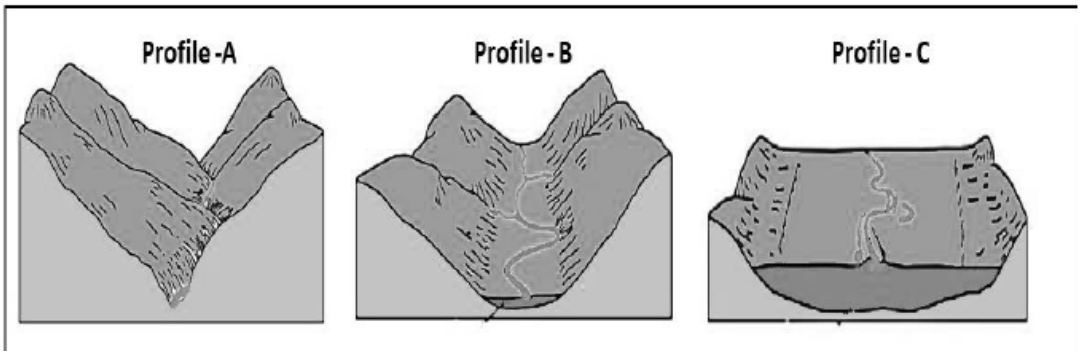
b **Describe** the shape of river bank Y. (1x2) 2

1.11.3 **Name** the dominant type of erosion of a meander in the middle course. (1x1) 1

1.11.4 **Name** TWO characteristics of a river channel visible in the cross-section between **X** and **Y.** (1x2) 2

1.11.5 **Describe** the formation of a meander. (1x2) 4

1.12 Study the diagram below showing the cross profiles of a river.



1.12.1 In which course of the river is profile **B**? (1x1) 1

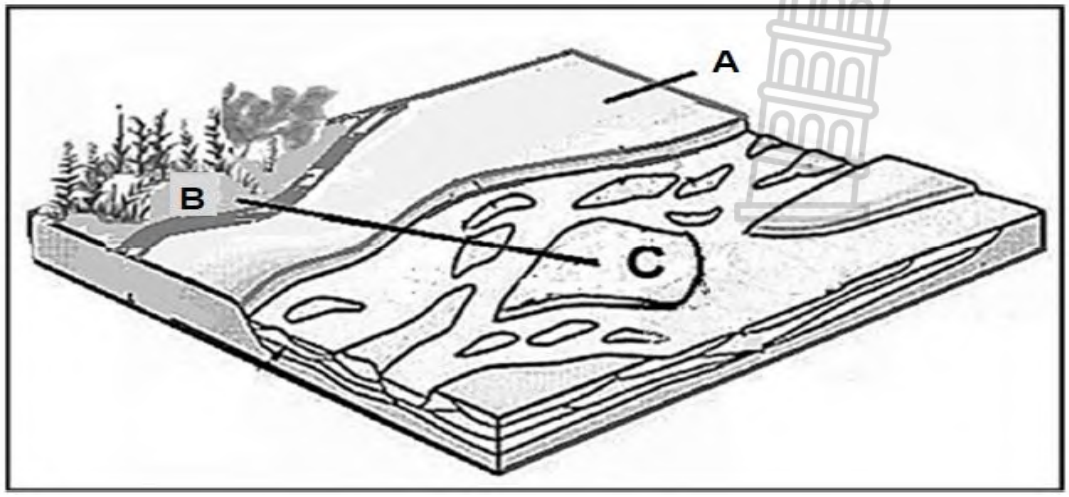
1.12.2 **Give** evidence that the river at profile **C** has been rejuvenated. (1x1) 1

1.12.3 **State** ONE cause of rejuvenation. (1x1) 1

1.12.4 **Explain** the formation of river terraces visible in profile **C**. (2x2) 4

1.12.5 In a paragraph of approximately EIGHT lines **describe** the characteristics and environmental impact of a river that has been rejuvenated. (4x2) 8

1.13 Study the sketch below showing a braided river channel.



1.13.1 **Define** the concept braided river channel. (1x2) 2

1.13.2 **Identify** the fluvial (river) features labelled A and C. (1x2) 2

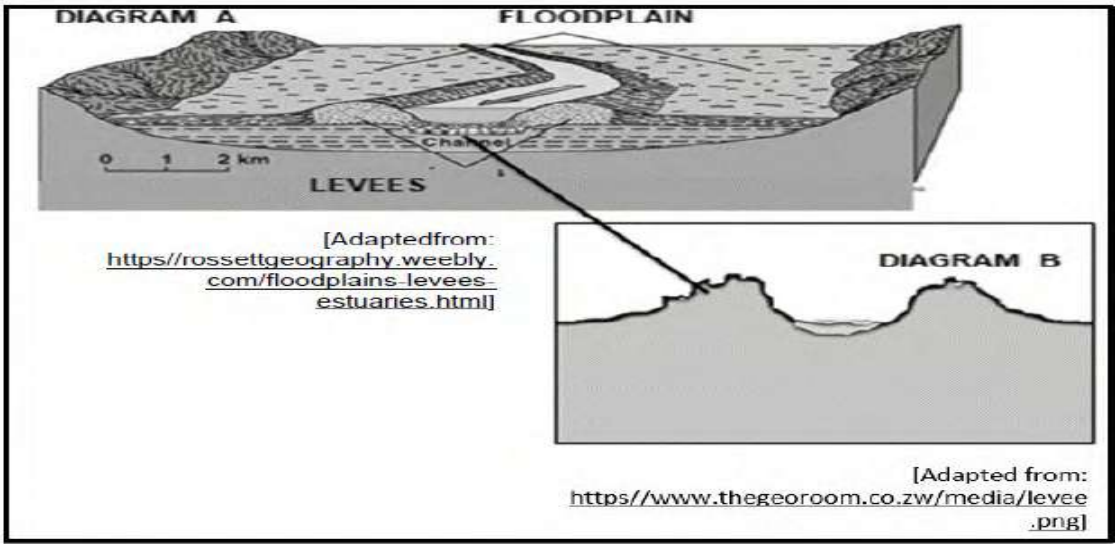
1.13.3 Choose the correct answer from the options within brackets..
The (upper/middle/lower) fluvial course is depicted in the sketch (1x1) 1

1.13.4 **Give** THREE pieces of evidence from the sketch to support your answer to QUESTION 1.13.3 (3x1) 3

1.13.5 **Draw** a freehand, labelled cross-section along line **B** – **C**. (3x1) 3

1.13.6 **Explain why** a tourist should not set up camp at point **C**. (2x2) 4

1.14 Refer to DIAGRAM A and DIAGRAM B on fluvial landforms below.



1.14.1 **Define** the geographical term floodplain. (1x2) 2

DIAGRAM B indicates the enlarged part of the levee in DIAGRAM A.
1.142 What type of profile is shown here? (1x1) 1

1.14.3 **Explain how** and why the dimensions (shapes) of the river valley, illustrated in DIAGRAM B (width and depth), will change once rejuvenation occurs. (2x2) 4

1.14.4 **Briefly describe** the process in the formation of the natural levee in DIAGRAM B. (4x2) 8
1.15

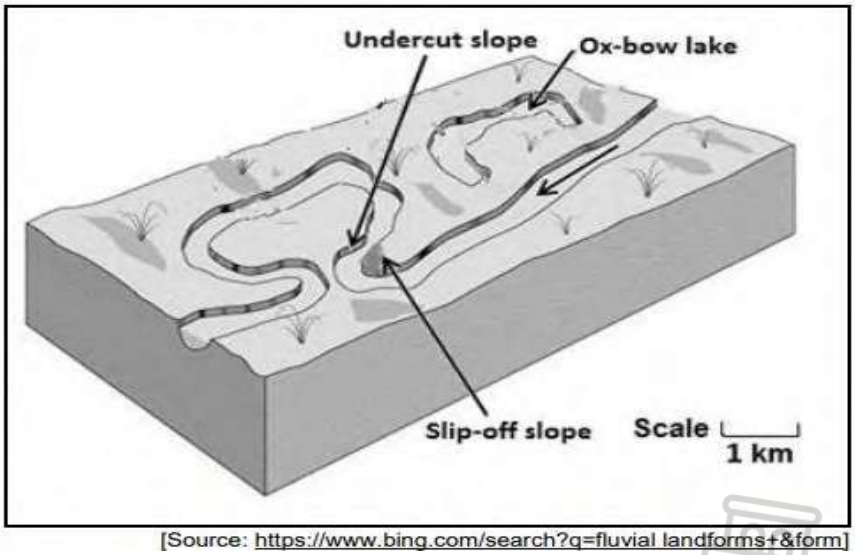
1.15.1 **State** the geomorphological process that gave rise to the formation of the flood plain (1x1) 1

1.15.2 **Describe** the gradient at X. (1x2) 2

1.15.3 **Suggest** TWO reasons for the wide flood plain at X. (2x2) 4

1.15.4 In a paragraph of approximately EIGHT lines, **explain** the physical (natural) impact of flooding on the flood plain. (4x2) 8

1.16. Fluvial landforms



[Source: https://www.bing.com/search?q=fluvial landforms+&form]

(2x2)

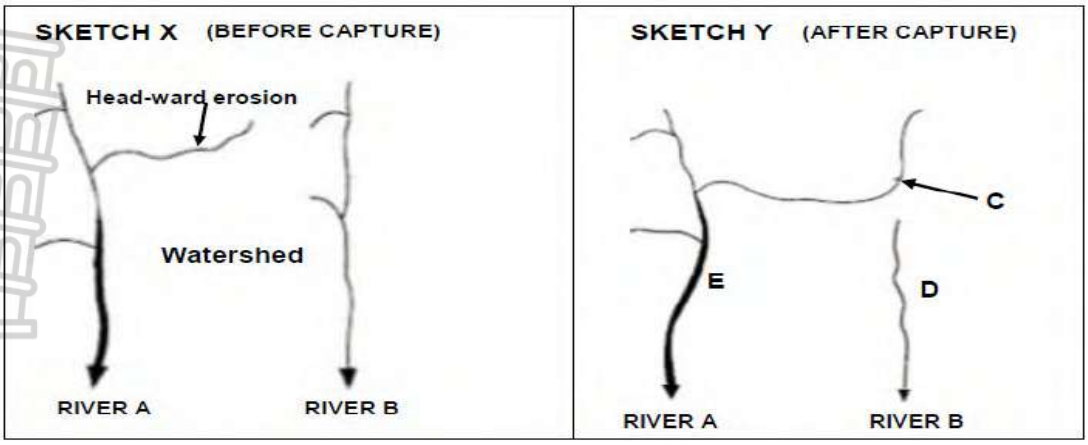
1.16.1 **Which** stage (course) of the river is illustrated

1.16.2 **What** role did the gradual gradient play in the formation of the meander evident in the sketch? (2x2)

1.16.3 **Explain** the formation of the undercut (outer bank) and slip-off slope (inner bank). (2x2)

1.16.3 In a paragraph of approximately EIGHT lines, **explain how** a meander develops into an oxbow lake. (2x2)

1.17 Refer to the sketches below on river capture (stream piracy).



1.17.1 **What evidence** in sketch X indicates that river capture is likely to take place? (2x2)

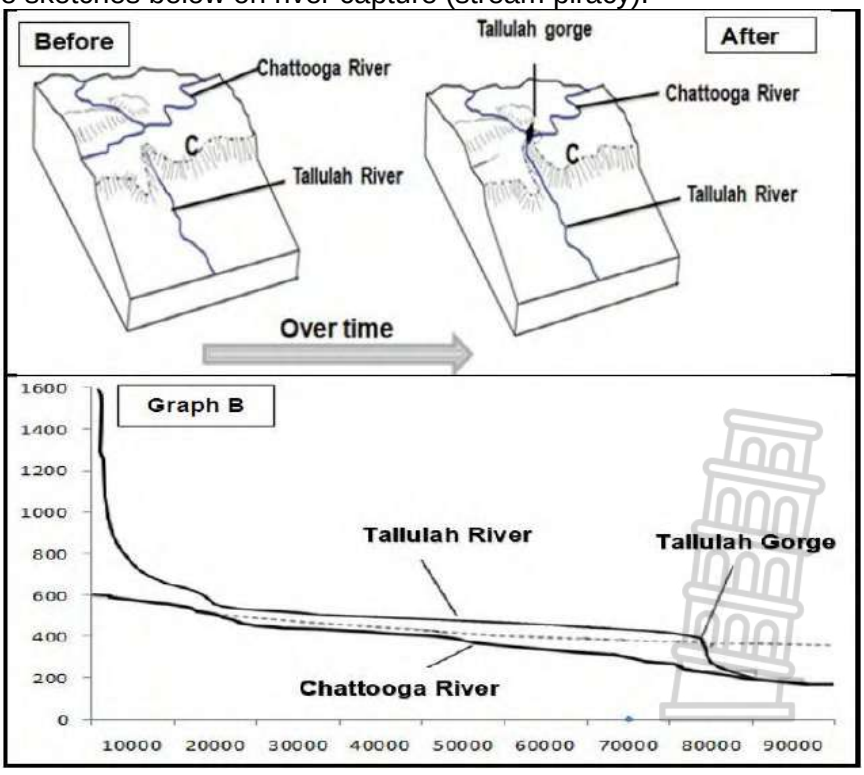
1.17.2 **What** could have caused the captor stream to erode through the watershed? (2x2)

1.17.3 **Identity** features **C** and **D** of river capture in sketch **Y**. (2x2)

1.17.4 **Explain** the process that resulted in the formation of feature **D**. (2x2)

1.17.5 In a paragraph of approximately EIGHT lines, **describe how** the increased volume of water will positively impact on the farming community at **E** in sketch Y. (2x2)

1.18 Refer to the sketches below on river capture (stream piracy).



1.18.1 **Which** river between Tallulah River and Chattooga River is a captured stream? (1x2) 2

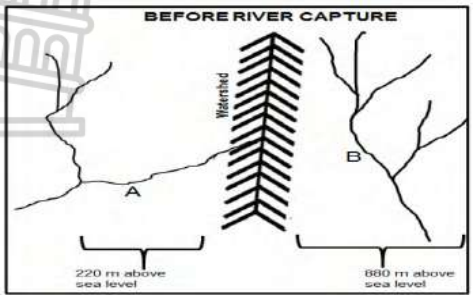
1.18.2 Refer to Graph B above and **determine** the height of the Tallulah gorge. (1x2) 2

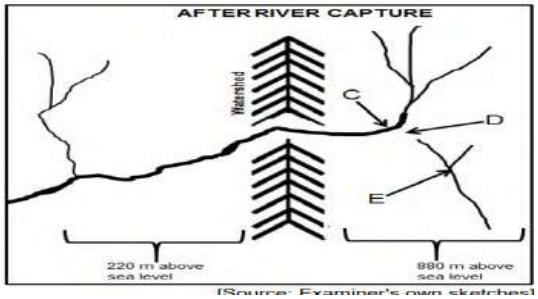
1.18.3 **Draw** a sketch to illustrate the area after river capture has taken place. Clearly indicate the following land forms: watershed; wind gap and the misfit stream. (4x1) 4

1.18.4 **Name** and explain the fluvial landform that will develop at Tallulah gorge. (2x2) 4

1.18.5 The divide at C is migrating upstream. **Explain how** this occurs. (2x2) 4

1.19 Refer to the sketches below on river capture (stream piracy).





[Source: Examiner's own sketches]

1.19.1 **Which** river (A or B) has more erosive power? (1x2) 2

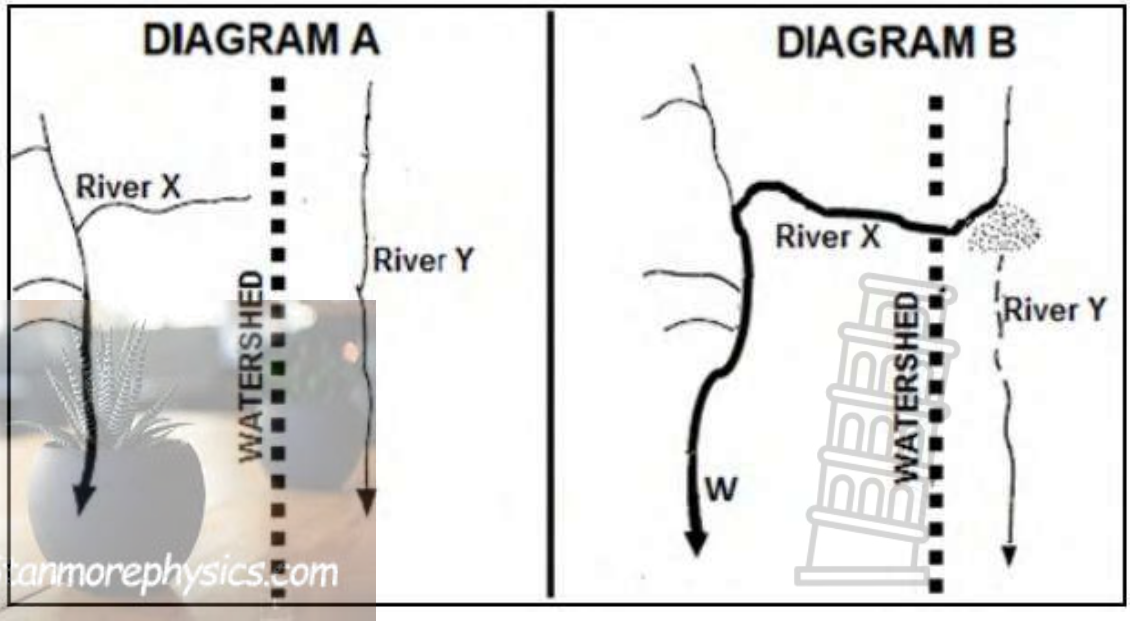
1.19.2 **Give** ONE reason evident in the sketches to support your answer to QUESTION 1.19.1 (1x2) 2

1.19.3 **Identify** features C and D. (2x1) 2

1.19.4 **Give** ONE characteristic of feature D. (1x2) 2

1.19.5 In a paragraph of approximately EIGHT lines, **describe** the changes that river E will experience after river capture has taken place (4x2) 8

1.20 Refer to the sketches below on river capture (stream piracy).



1.20.1 Is river **X** or **Y** the captured river? (1x2)

1.20.2 **Give** TWO pieces of evidence in diagram B that shows that river capture has taken place. (2x2) 4

1.20.3 **What** influence does the underlying rock have on river capture? (1x2) 2

1.20.4 **How** does river capture rejuvenate the captor stream? (2x2) 4

1.20.5 In a paragraph of approximately EIGHT lines, **discuss how** river capture will have a positive impact on farming at W. (4x2) 8