

CLIMATE, WEATHER AND GEOMORPHOLOGY

CLIMATE AND WEATHER

Nov 2017

1.1 Choose a term in COLUMN B that matches the climatological description in COLUMN A.

Write only the letter (A–I) next to the question number (1.1.1–1.1.8) in the ANSWER

BOOK, for example 1.1.9 J.

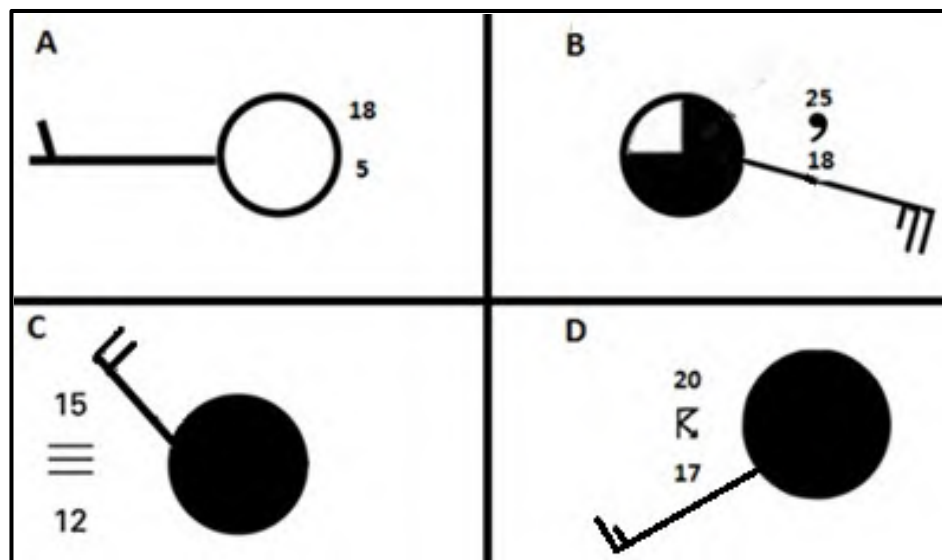
COLUMN A		COLUMN B	
1.1.1	The inversion layer is higher than the plateau in this season	A	ridging
1.1.2	The temperature at which water vapour condenses	B	saddle
1.1.3	Pressure cell that causes clear and stable conditions over the interior of the country in winter	C	line thunderstorms
1.1.4	Forms when the cold front of a mid-latitude cyclone is cut off from the rest of the cyclone	D	Kalahari high
1.1.5	A weak low pressure associated with drizzle and unstable weather conditions along the South African coastline	E	cut-off low
1.1.6	Forms when warm, moist air from the Indian Ocean is undercut by cold, dry air from the Atlantic Ocean	F	summer
1.1.7	Indicated by elongated isobars from a high-pressure cell	G	coastal low
1.1.8	Zone of constant pressure between two anticyclones	H	dew point
		I	winter

(8 x 1) (8)

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2.1 Refer to FIGURE 2.1 that displays four weather stations. Match the statements below with weather stations **A** to **D**. Write only the letter (A–D) next to the question number (2.1.1–2.1.7) in the ANSWER BOOK, for example 2.1.8 A.

FIGURE 2.1: WEATHER STATIONS



[Source: South African Weather Service]

2.1.1 Thunderstorms are likely to be experienced.

2.1.2 Wind speed is 25 knots.

2.1.3 Indicates clear skies.

2.1.4 Wind direction is south-westerly.

2.1.5 Associated with stable conditions over the interior in winter.

2.1.6 Conditions that prevail on the west coast of South Africa in winter.

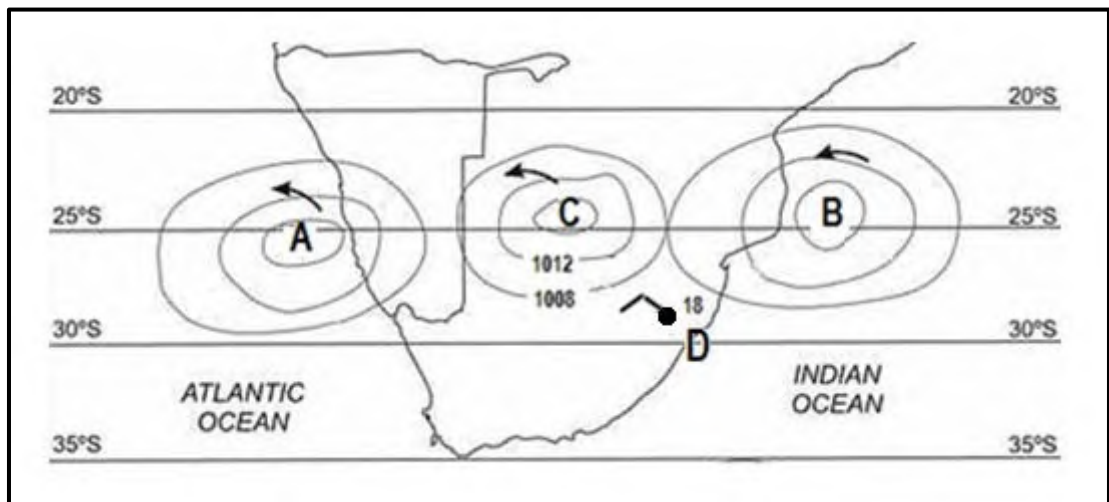
2.1.7 The expected precipitation is drizzle.

(7 x 1) (7)

Nov 2018

1.1 Refer to FIGURE 1.1 which shows anticyclones over South Africa. Choose the correct word(s) from those given in brackets. Write only the word(s) next to the question numbers (1.1.1 to 1.1.7) in the ANSWER BOOK.

FIGURE 1.1: ANTICYCLONES

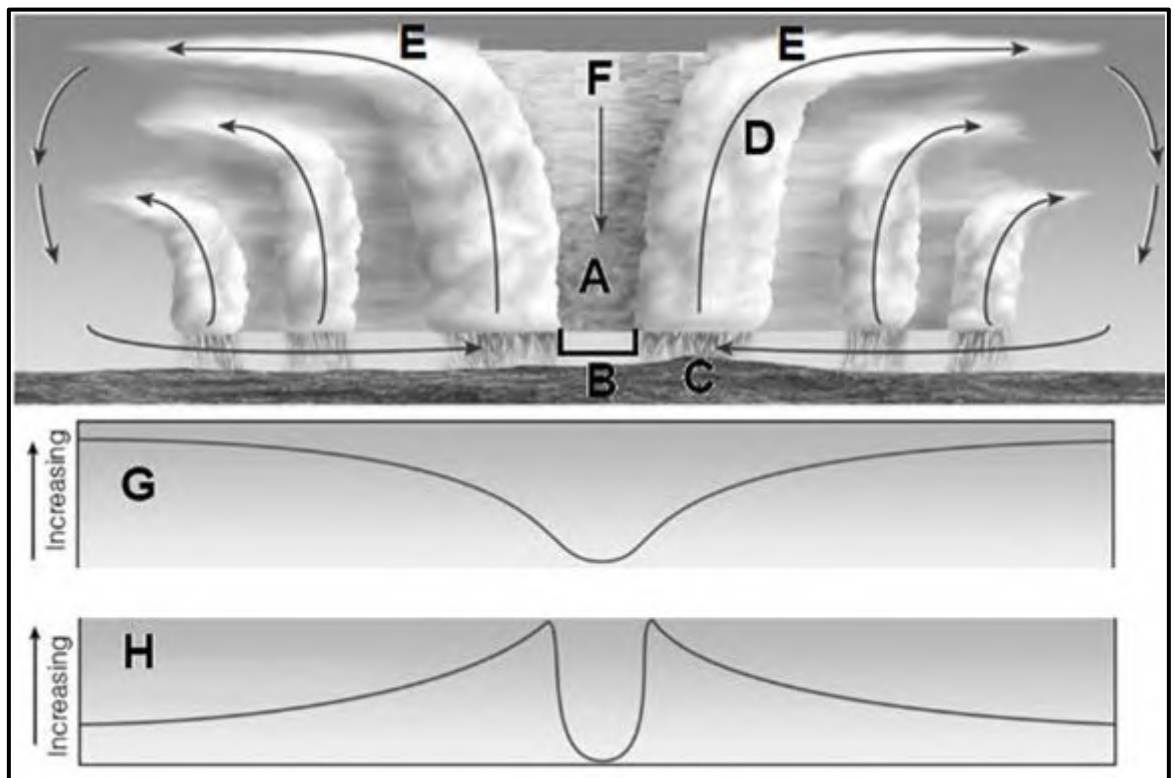


- 1.1.1 Pressure cell **A** is situated further (north/south) in winter.
- 1.1.2 Pressure cell **B** is named the (South Atlantic/South Indian) High-Pressure Cell.
- 1.1.3 When isobars are elongated away from pressure cell **B** they form a (ridge/trough).
- 1.1.4 The pressure reading at **C** is approximately (1 012 hPa/1 016 hPa).
- 1.1.5 The wind speed at weather station **D** is (20 knots/10 knots).
- 1.1.6 The wind direction at weather station **D** is (north-east/north-west).
- 1.1.7 Pressure cells **A**, **B** and **C** represent the (equatorial low/subtropical high) pressure belt. (7 x 1) (7)

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2.1 Study FIGURE 2.1, a cross-sectional view of a tropical cyclone. 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 (2.1.1 to 2.1.8) in the ANSWER BOOK.

FIGURE 2.1: TROPICAL CYCLONE CROSS-SECTION



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

- 2.1.1 The (eye/vortex) at **A** is characterised by descending air.
- 2.1.2 The area at **B** is an area of (high/low) air pressure.
- 2.1.3 (Light/Heavy) rainfall occurs at **C**.
- 2.1.4 The vertical movements of air at **D** are known as (updraughts/ down draughts).
- 2.1.5 The upper air at **E** is (converging/diverging).
- 2.1.6 **F** is associated with (low/high) air pressure.
- 2.1.7 The graph (**G**) shows air (pressure/temperature) with the passage of the tropical cyclone.
- 2.1.8 Surface (air temperature/wind speed) is depicted by graph **H**. (8 x 1) (8)

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1.1 Give ONE term for each of the following descriptions by choosing a term from the list below. Write only the term next to the question numbers (1.1.1 to 1.1.7) in the ANSWER BOOK, e.g. 1.1.7 climate.

radiation fog; katabatic; temperature inversion; anabatic; smog; thermal belt; frost; aspect

1.1.1 Zone where a warm air mass is trapped between colder air masses

1.1.2 A mixture of smoke and fog

1.1.3 The direction in which the slope faces in relation to the sun's rays

1.1.4 Forms when calm conditions and clear skies occur in a valley

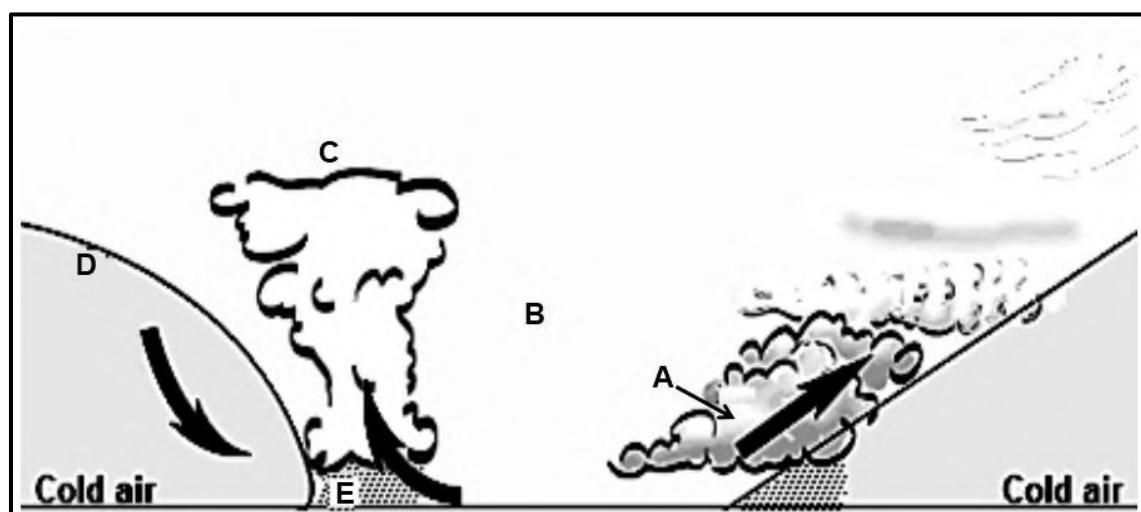
1.1.5 Forms on the valley floor when the air temperature is below freezing point

1.1.6 Type of wind that results from air sinking down the valley slope at night

1.1.7 Type of wind that results from air moving up the valley slope during the day
(7 x 1) (7)

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2.1 Various options are provided as possible answers to the following questions based on the cross-section of the mid-latitude cyclone in FIGURE 2.1. Choose the answer and write down only the letter (A–D) next to the question numbers (2.1.1 to 2.1.8), e.g. 2.1.7 D.



2.1.1 The general direction of movement of the mid-latitude cyclone in the Southern Hemisphere is ... -wards.

- A north
- B west
- C east
- D south

2.1.2 Identify cloud **A** that is associated with the warm front:

- A Stratus
- B Cumulus
- C Nimbostratus
- D Cumulonimbus

2.1.3 The area at **B** is referred to as the ...

- A warm sector.
- B cold sector.
- C polar front.
- D apex.

2.1.4 The type of cloud at **C** is ...

- A stratus.
- B cirrus.
- C cumulonimbus.
- D nimbostratus.

2.1.5 The gradient at **D** can be described as ...

- A steep.
- B gentle.
- C weak.
- D vertical.

2.1.6 The ... front is found at **D**.

- A polar
- B cold
- C occlusion
- D warm

2.1.7 The more active and faster moving front is the ...

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

2.1.8 The type of rainfall at **E** is/are ...

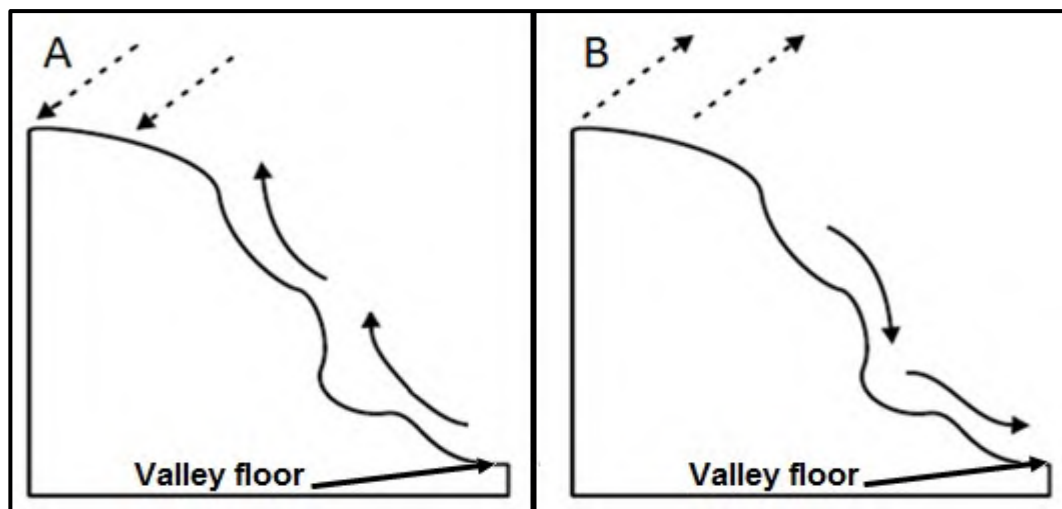
- A light showers.
- B frontal rain.
- C orographic rain.
- D convectional rain.

(8 x 1) (8)

Nov 2020

1.1 Refer to FIGURE 1.1 showing air movement associated with valley climates. Match the descriptions below with winds A and B. Write only the letter A or B next to the question numbers (1.1.1 to 1.1.7) in the ANSWER BOOK, e.g.
1.1.8 B.

FIGURE 1.1: VALLEY CLIMATES



[Examiner's own sketch]

1.1.1 The air movement associated with upslope flow

1.1.2 Air movement that occurs at the night

1.1.3 Air movement that originates due to the rate of insolation

1.1.4 Air movement that mostly reduces air pollution at the bottom of the valley

1.1.5 Air movement associated with dense, heavy air

1.1.6 Air movement associated with the formation of frost on the valley floor

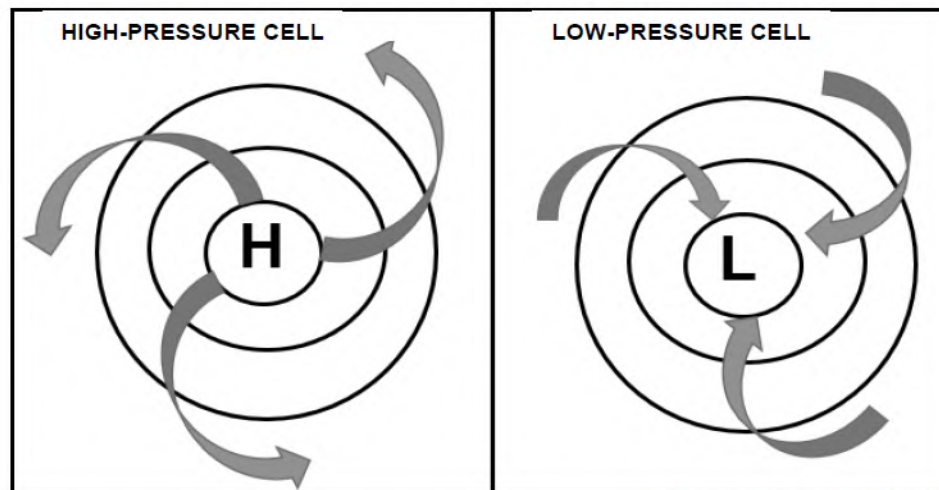
1.1.7 The direction of air movement determined by gravitational forces

(7 x 1) (7)

Nov 2020

2.1 Refer to FIGURE 2.1 showing a high pressure and low pressure cell in the Southern Hemisphere. Match the statements below with the **high pressure cell** or **low pressure cell**. Write down your answer next to the question numbers (2.1.1 to 2.1.8) in the ANSWER BOOK, e.g. 2.1.9 low-pressure cell.

FIGURE 2.1: HIGH- AND LOW-PRESSURE CELLS IN THE SOUTHERN HEMISPHERE



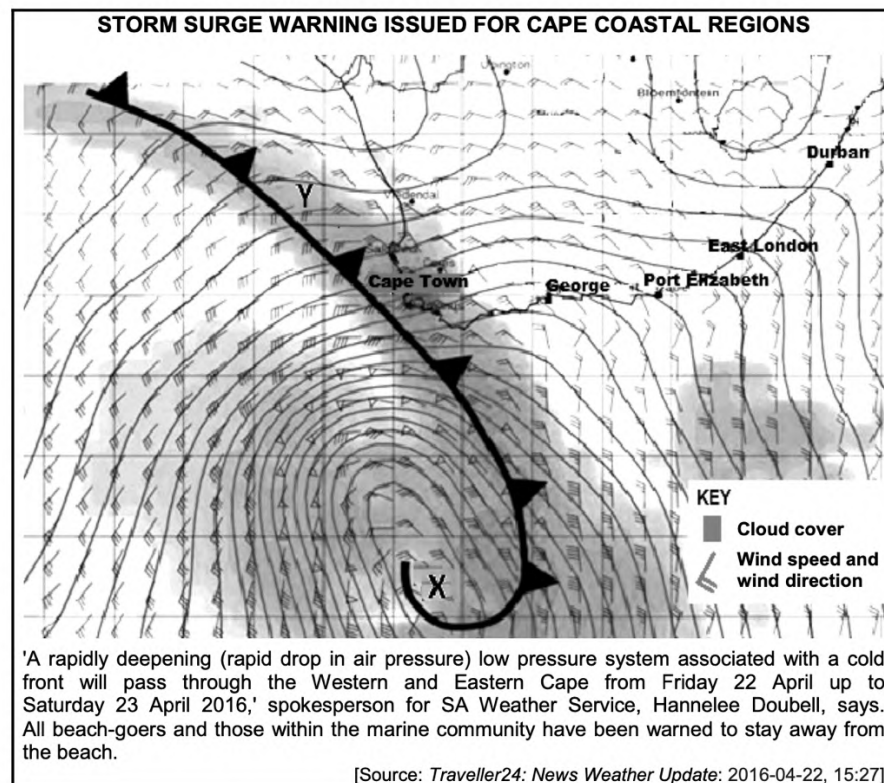
[Source: Examiner's own sketch]

- 2.1.1 Associated with rising air
- 2.1.2 Air diverges on the surface from this pressure cell
- 2.1.3 Associated with the clockwise movement of air
- 2.1.4 Unstable weather conditions over the interior
- 2.1.5 Associated with ridging
- 2.1.6 Associated with heavy rain and hail
- 2.1.7 Dominates the land in winter
- 2.1.8 Berg wind conditions develop when it interacts with a coastal low

(8 x 1) (8)

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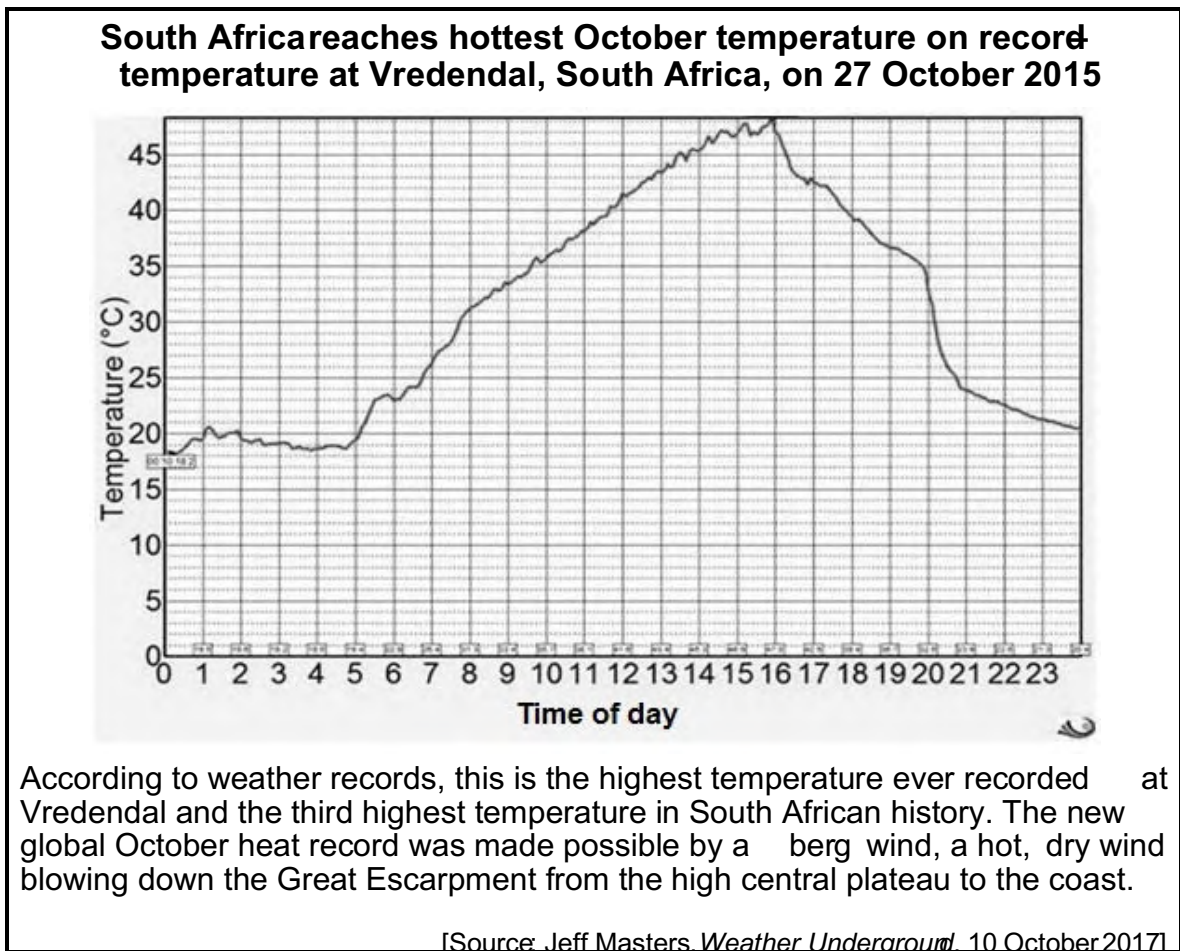
1.3 Refer to FIGURE 1.3 based on a cold front.



- 1.3.1 What evidence in the diagram indicates that **X** is a rapidly deepening low pressure?
(1 x 1) (1)
- 1.3.2 Describe the predicted change in temperature and air pressure that Cape Town will experience.
(2 x 1) (2)
- 1.3.3 Account for the cumulonimbus cloud that will form at **Y**.
(1 x 2) (2)
- 1.3.4 Why have beach-goers been warned to stay away from the beach? (2 x 2) (4)
- 1.3.5 How can residents of the Cape coastal regions reduce the negative impact of the cold front?
(2 x 2) (4)

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FIGURE 1.4: IMPACT OF BERG WINDS ON COASTAL TEMPERATURES

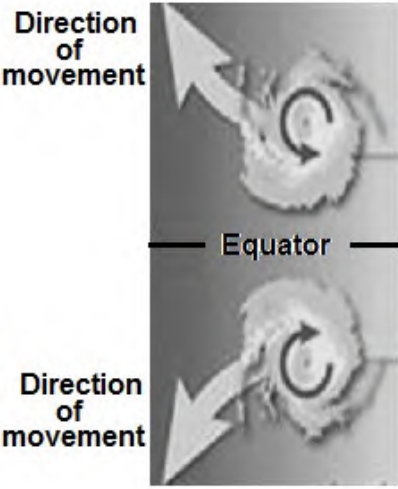


- 1.4.1 (a) Give the lowest temperature recorded at Vredendal on 27 October. (1 x 1) (1)
- (b) Give the exact time when this temperature was recorded. (1 x 1) (1)
- 1.4.2 Give the highest temperature recorded on the graph. (1 x 1) (1)
- 1.4.3 Determine the temperature range experienced at Vredendal on 27 October. (1 x 2) (2)
- 1.4.4 Explain how the abnormally large temperature range experienced at Vredendal on 27 October was caused by berg winds. (2 x 2) (4)
- 1.4.5 In a paragraph of approximately EIGHT lines, outline precautionary measures that the inhabitants of Vredendal should have in place in advance when a berg wind approaches. (4 x 2) (8)

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2.3 Study FIGURE 2.3 that contains information about a typhoon in Taiwan.

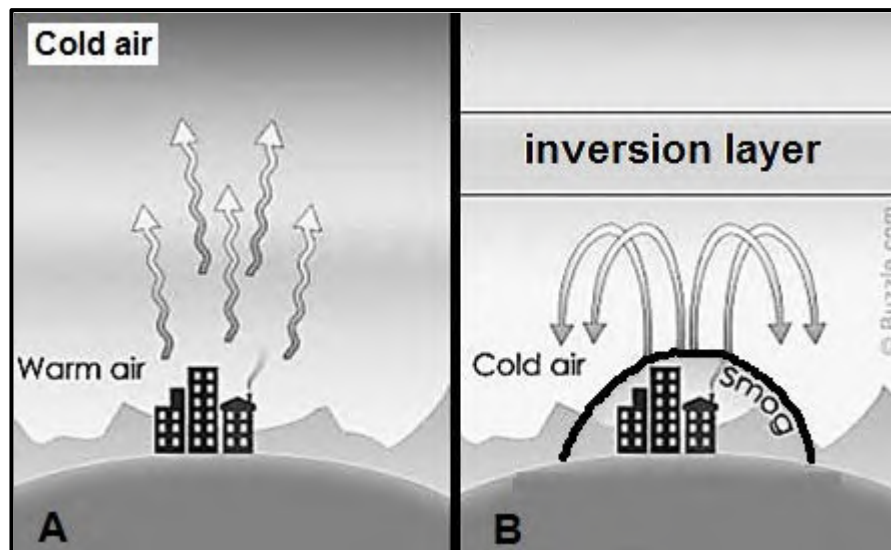
FIGURE 2.3: TYPHOON IN TAIWAN

 <p>Direction of movement</p> <p>A</p> <p>Equator</p> <p>B</p> <p>Direction of movement</p>	<p>STRONGEST TYPHOON IN 21 YEARS HITS TAIWAN</p> <p>Parts of Taiwan came to a standstill as super typhoon Meranti brought the strongest winds in 21 years.</p> <p>There were severe travel disruptions for the Mid-Autumn Festival long weekend, as over 300 domestic and international flights were cancelled and trains running along the east coast were halted.</p> <p>The storm was forecast to have dumped as much as 800 mm of rain in mountainous areas. Close to 1 500 people were evacuated from at-risk areas, with about half placed in temporary shelters.</p> <p>[Adapted from <i>AFP</i>, 15 September 2016]</p>
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- 2.3.1 Which sketch, **A** or **B**, shows the typhoon that struck Taiwan? (1 x 1) (1)
- 2.3.2 Give ONE reason for your answer to QUESTION 2.3.1. (1 x 2) (2)
- 2.3.3 What evidence suggests that Taiwan experiences typhoons regularly? (1 x 2) (2)
- 2.3.4 Why are people moved to safety at the approach of a typhoon? (1 x 2) (2)
- 2.3.5 Explain TWO factors that would have led to Meranti developing into a super (extremely strong) typhoon. (2 x 2)(4)
- 2.3.6 Evaluate the impact of 800 mm of rain being dumped (falling in large amounts) in the mountainous areas of Taiwan. (2 x 2) (4)

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FIGURE 2.4 is a representation of a city's climate.

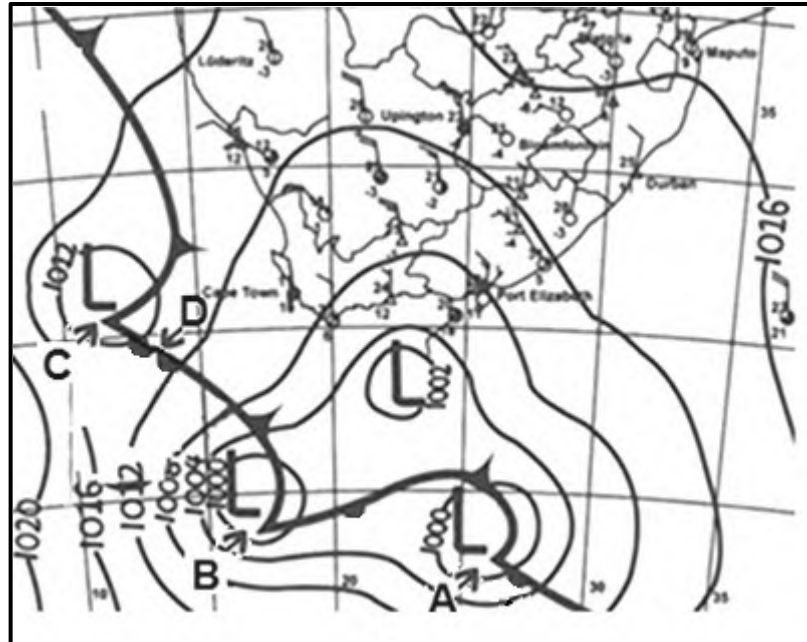


- 2.4.1 Which sketch, **A** or **B**, represents the daytime city climate? (1 x 1) (1)
- 2.4.2 Give ONE reason to support your answer to QUESTION 2.4.1. (1 x 2) (2)
- 2.4.3 Give ONE reason for the occurrence of smog in sketch **B**. (1 x 2) (2)
- 2.4.4 Suggest ONE reason for the absence of smog in sketch **A**. (1 x 2) (2)
- 2.4.5 In a paragraph of approximately EIGHT lines, discuss various sustainable solutions to limit the formation of smog in a city. (4 x 2) (8)

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1.3 Study FIGURE 1.3 showing mid latitude cyclones on a synoptic weather map of southern Africa

FIGURE 1.3: MID-LATITUDE CYCLONES



[Source: South African weather services]

- | | |
|--|-------------|
| 1.3.1 Identify the pressure system labelled B. | (1 x 1) (1) |
| 1.3.2 What evidence suggests that mid-latitude cyclone A is the oldest? | (1 x 2) (2) |
| 1.3.3 Why is front D NOT associated with heavy rains? | (1 x 2) (2) |
| 1.3.4 What causes the dissipation of mid-latitude cyclones? | (1 x 2) (2) |
| 1.3.5 Write a paragraph of approximately EIGHT lines explaining the weather conditions that will be experienced by a tourist visiting Cape Town with the approach of a cold front. | |

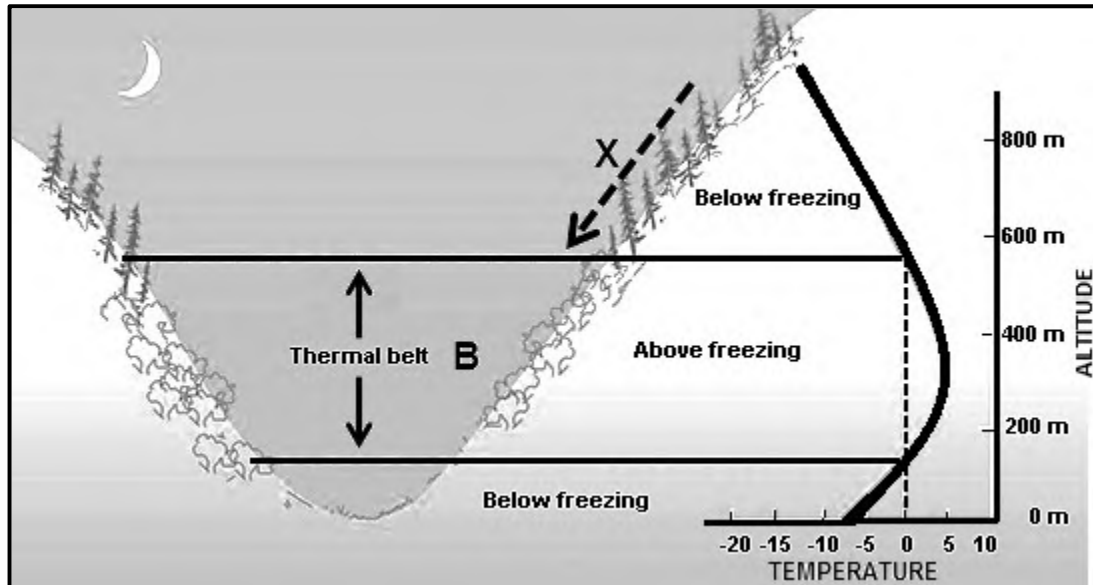
(4 x 2) (8)

[15]

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1.4 Study FIGURE 1.4 showing a diagram on valley climates.

FIGURE 1.4 VALLEY CLIMATES



[Adapted from <http://apollo.lsc.vsc.edu/classes/met130/notes/chapter3/drainage3.html>]

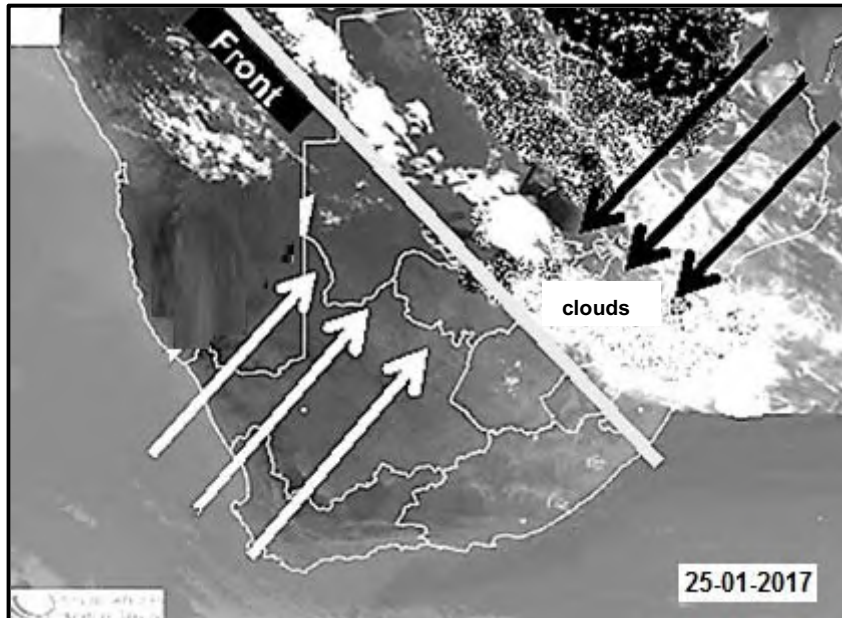
- 1.4.1 Is the slope wind X an anabatic or a katabatic wind? (1 x 1) (1)
- 1.4.2 Other than the label, what evidence indicates that B is the thermal belt? (1 x 1) (1)
- 1.4.3 What is the term used to describe an increase in temperature as the height increases in the valley floor? (1 x 1) (1)
- 1.4.4 Explain why the slope wind X will be more intense in winter. (2 x 2) (4)
- 1.4.5 Account for the low temperature that is likely to be experienced on the valley floor during winter. (2 x 2) (4)
- 1.4.6 How will farmers have to adapt their farming techniques (methods) due to the temperature on the valley floor. (2 x 2) (4)

[15]

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2.3 FIGURE 2.3 shows line thunderstorms over South Africa.

FIGURE 2.3: LINE THUNDERSTORMS OVER SOUTH AFRICA



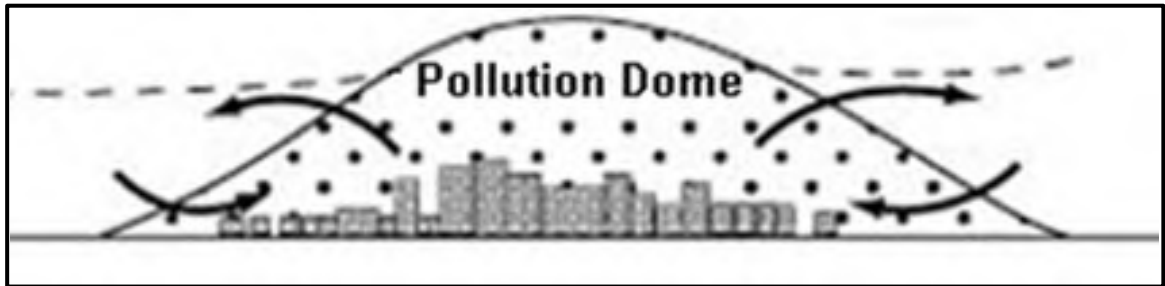
[Adapted from <https://www.bing.com/images/search?=&line+thunderstorms+in+south+africa&simid>]

- 2.3.1 Name the front over the interior of the country where line thunderstorms originate. (1 x 1) (1)
- 2.3.2 What evidence suggests that line thunderstorms are illustrated (shown). (1 x 2)(2)
- 2.3.3 Why are line thunderstorms generally associated with summer? (1 x 2) (2)
- 2.3.4 What is the source of moisture for the formation of line thunderstorms? (1 x 2) (2)
- 2.3.5 Why is there generally a thicker band of clouds to the east of the front? (2 x 2) (4)
- 2.3.6 Explain why the weather conditions associated with line thunderstorms are more severe than isolated (normal) thunderstorms. (2 x 2)(4)

[15]

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- 2.4 Refer to FIGURE 2.4 showing a pollution dome over a South African city.
FIGURE 2.4: POLLUTION DOME



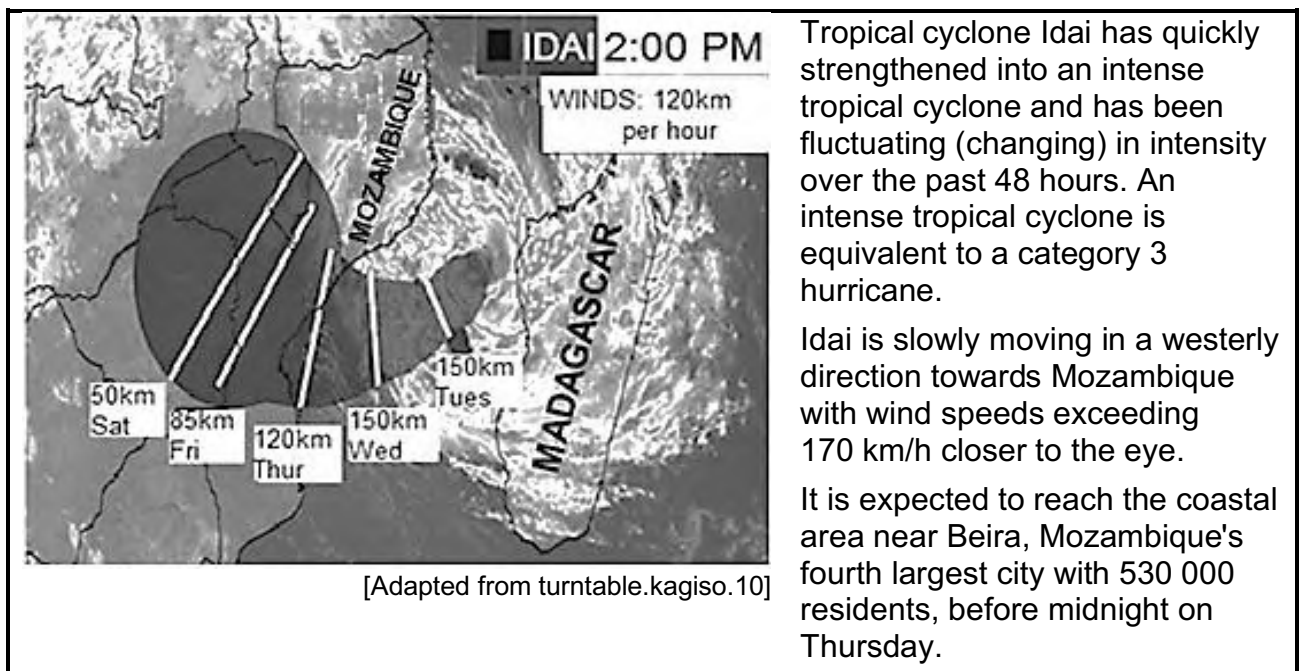
[Source: <http://www.metlink.org/secondary/key-stage->]

- 2.4.1 What is a *pollution dome*? (1 x 2) (2)
2.4.2 Why is a pollution dome associated with an urban area? (1 x 2) (2)
2.4.3 Explain why the pollution dome is more concentrated at night (2 x 2) (4)
2.4.4 Write a paragraph of approximately EIGHT lines explaining how pollution domes increase the maintenance costs of the built environment for people living in the city. (4 x 2) (8)

[15]

Nov 2019

- 1.3 FIGURE 1.3 is based on a case study of a tropical cyclone that recently affected Southern Africa.

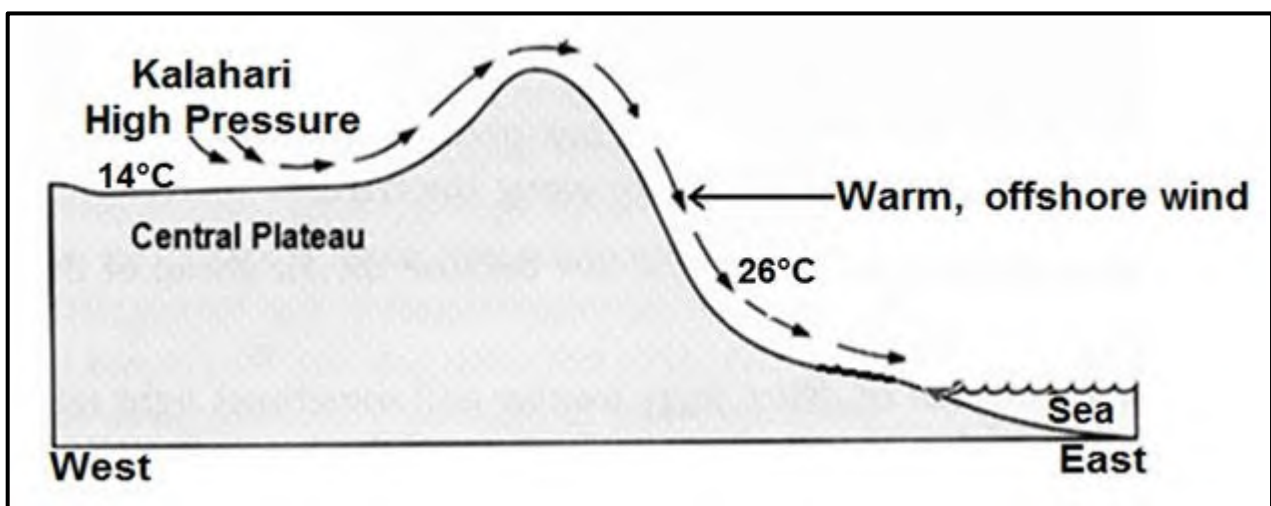


- 1.3.1 Refer to the article. With what can you compare this intense tropical cyclone? (1 x 1) (1)
- 1.3.2 Name ONE condition that was necessary for the formation of tropical cyclone Idai. (1 x 1) (1)
- 1.3.3 Refer to the image and determine the expected wind speed with which tropical cyclone Idai will reach the coast of Mozambique. (1 x 1) (1)
- 1.3.4 Why will the wind speed decrease as you move further from the eye? (1 x 2) (2)
- 1.3.5 Explain how the dangerous semi-circle of tropical cyclone Idai originated (developed). (1 x 2) (2)
- 1.3.6 In a paragraph of approximately EIGHT lines, suggest the negative impact that high wind speeds will have on the coastal areas of Mozambique. (4 x 2) (8)

[15]

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1.4 Study FIGURE 1.4 based on South African berg winds.



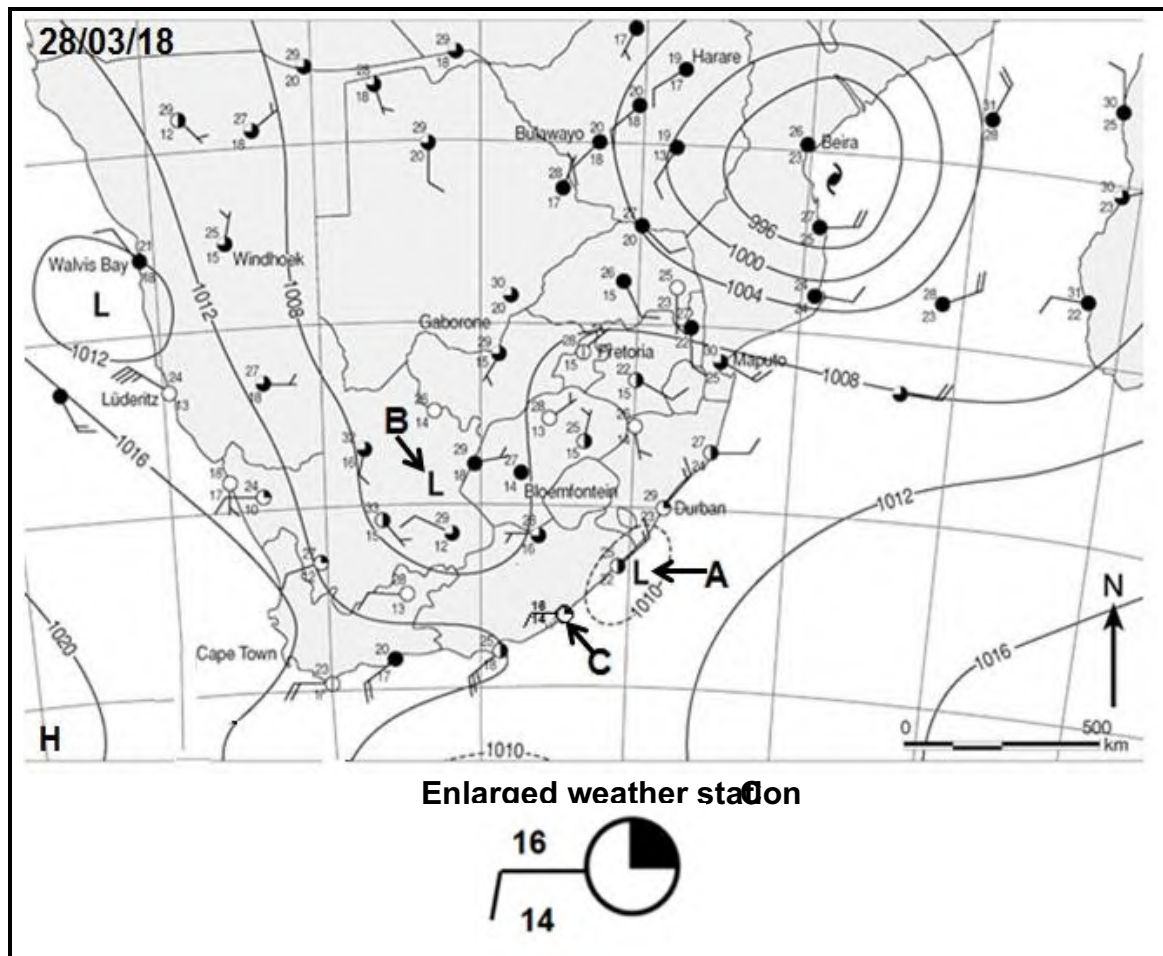
[Source: Examiners own sketch]

- 1.4.1 Name the season in which South African berg winds develop. (1 x 1) (1)
- 1.4.2 Give TWO pieces of evidence in FIGURE 1.4 to support your answer to QUESTION 1.4.1. (2 x 1) (2)
- 1.4.3 (a) Why are berg winds described as being dry? (1 x 2) (2)
- (b) What causes the South African berg wind to be a warm offshore wind? (1 x 2) (2)
- (c) How does a steep pressure gradient influence South African berg winds? (2 x 2) (4)
- 1.4.4 Why are emergency services (fire brigades, ambulances and traffic police) placed on high alert (standby) when berg wind conditions occur. (2 x 2) (4)

[15]

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2.3 Study FIGURE 2.3 showing a synoptic weather map.



2.3.1 What are the lines representing air pressure on the map called? (1 x 1) (1)

2.3.2 Give TWO pieces of evidence that the season depicted is summer. (2 x 1) (2)

2.3.3 State the general movement of air pressure cell **A**. (1 x 1) (1)

2.3.4 Refer to air pressure cell **B**.

(a) Name this pressure cell. (1 x 1) (1)

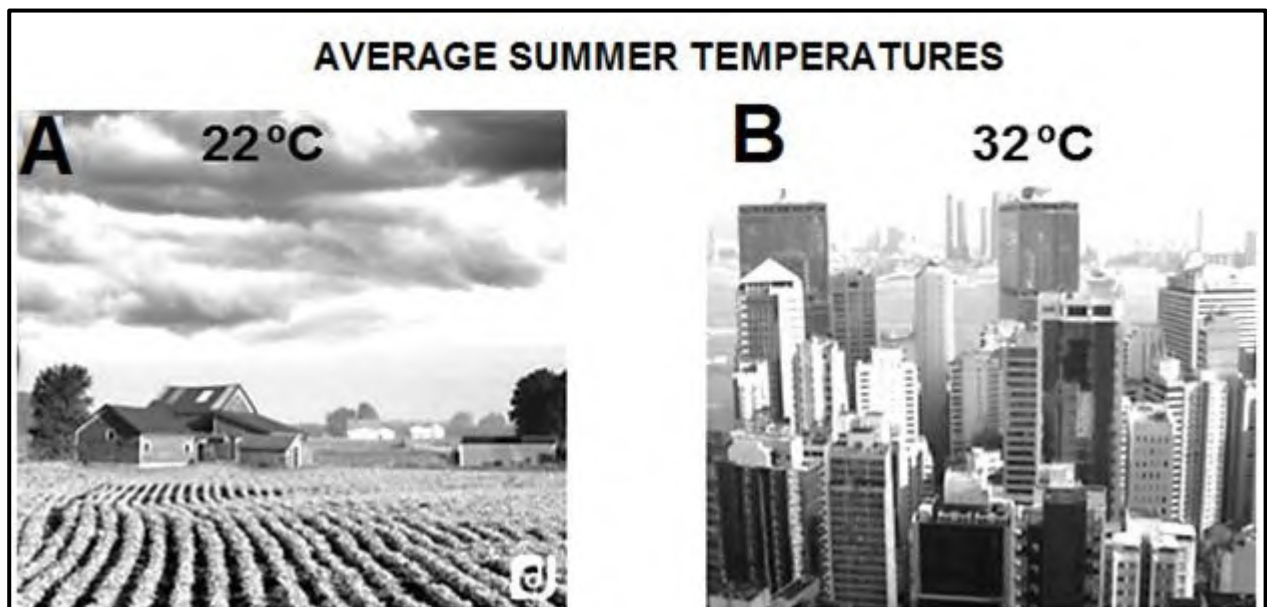
(b) Explain how air pressure cell **B** influences the summer rainfall pattern in the interior of South Africa. (2 x 2) (4)

2.3.5 Refer to the weather station model at **C**.

- (a) Give evidence from weather station model **C** that suggests that there is little possibility of rain. (1 x 2) (2)
 - (b) Account for the air temperature and wind direction recorded at weather station **C**. (2 x 2) (4)
- [15]**

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2.4 Refer to FIGURE 2.4 based on the differences between rural and urban climates.



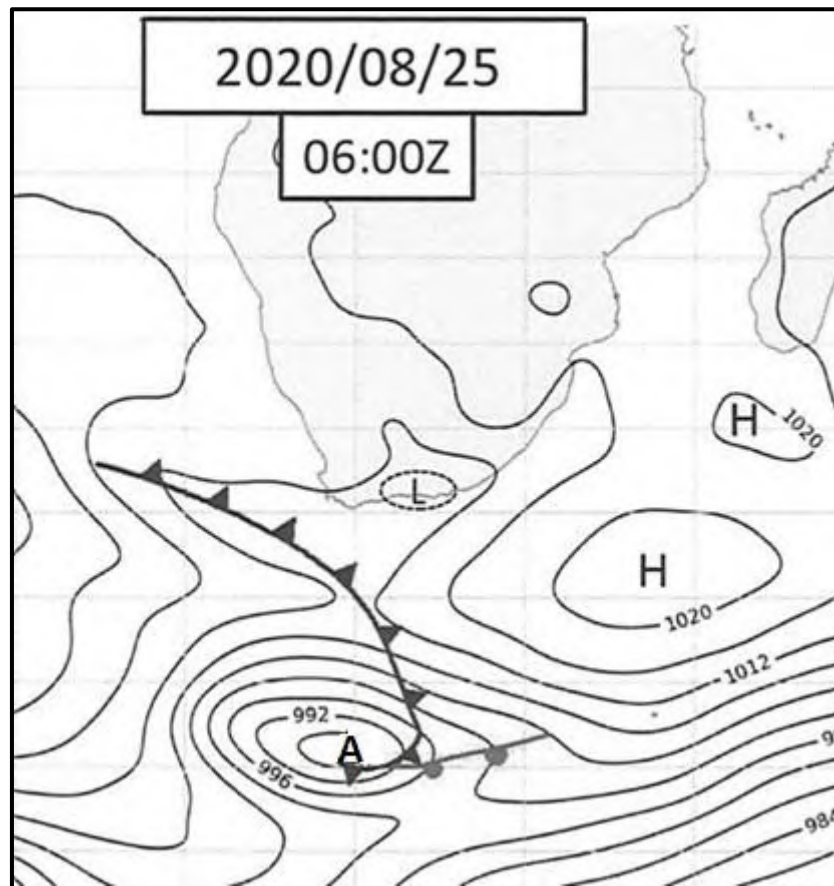
- 2.4.1 Will **A** or **B** generally experience lower wind speeds? (1 x 1) (1)
- 2.4.2 What evidence in the photograph indicates that **A** experiences higher evaporation rates than **B**? (1 x 2) (2)
- 2.4.3 Why does **B** experience more frequent rainfall than **A**? (1 x 2) (2)
- 2.4.4 Explain how the geometric shape of the buildings in the city causes a greater absorption of heat. (1 x 2) (2)
- 2.4.5 In a paragraph of approximately EIGHT lines, discuss how artificial surfaces and urban activities contribute to higher temperature recordings in **B**. (4 x 2) (8)

[15]

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1.3 FIGURE 1.3 shows a mid-latitude cyclone on a synoptic weather map of Southern Africa.

FIGURE 1.3: MID-LATITUDE CYCLONE



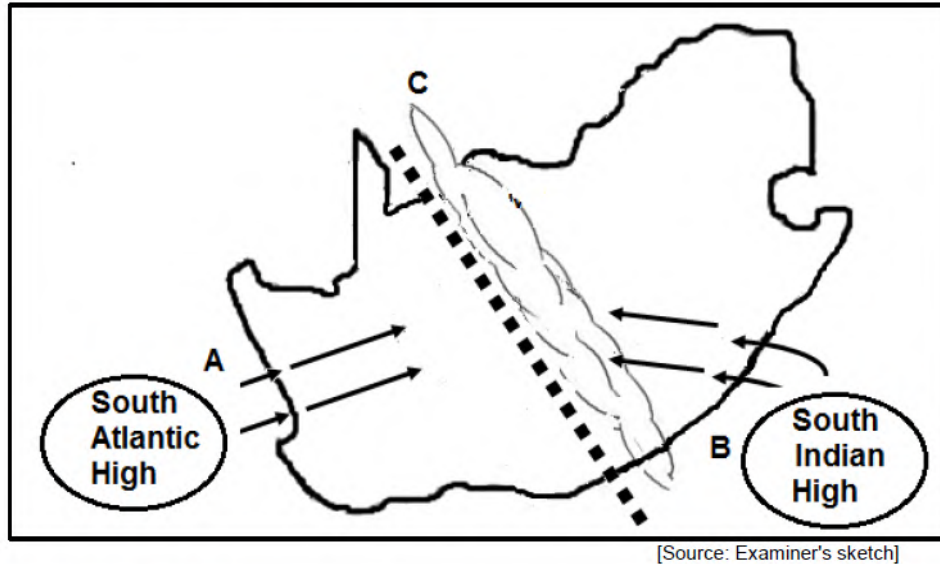
[Source: South African Weather Bureau]

- 1.3.1 Give evidence from the diagram that suggests that weather system **A** is a mid-latitude cyclone. (1 x 1) (1)
- 1.3.2 Why does this weather system originate at the polar front? (1 x 2) (2)
- 1.3.3 Give a reason for the direction of movement of this weather system. (1 x 2) (2)
- 1.3.4 Why is the cold front associated with severe weather conditions? (1 x 2) (2)
- 1.3.5 Explain the formation of the stage of development shown in FIGURE 1.3 of the mid-latitude cyclone. (2 x 2) (4)
- 1.3.6 Why does the cold front of the mid-latitude cyclone have a positive impact on agricultural activities in the Western Cape? (2 x 2) (4)

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1.4 FIGURE 1.4 shows the presence of a line thunderstorm across South Africa.

FIGURE 1.4: LINE THUNDERSTORM



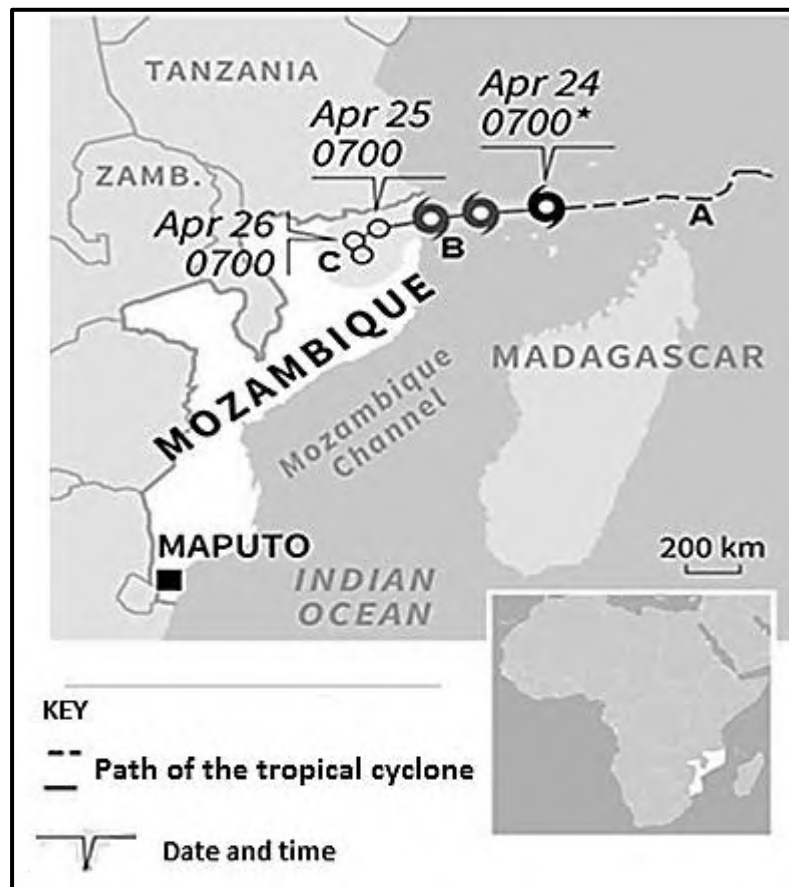
[Source: Examiner's sketch]

- 1.4.1 Does the line thunderstorm obtain its source of moisture from ocean **A** or **B**? (1 x 1) (1)
- 1.4.2 Why is cold, dry air fed in from the South Atlantic High-Pressure Cell? (1 x 2) (2)
- 1.4.3 Explain how the formation of the moisture front at **C** results in line thunderstorms. (2 x 2) (4)
- 1.4.4 In a paragraph of approximately EIGHT lines, explain the destructive (harmful) nature of line thunderstorms. (4 x 2) (8)

[15]

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2.3 Refer to FIGURE 2.3, which shows the path of a tropical cyclone.



[Source: Meteo France]

- 2.3.1 Give evidence that this tropical cyclone is in the Southern Hemisphere. (1x1) (1)
- 2.3.2 Why is the Mozambique Channel usually ideal for the increase in temperature within the tropical cyclone? (1 x 2) (2)
- 2.3.3 Explain how the intensity of the tropical cyclone increased as it moved from area **A** to area **B**. (2 x 2) (4)
- 2.3.4 Discuss the conditions that could have caused the cyclone to weaken as it reached area C (2 x 2) (4)
- 2.3.5 Evaluate the physical (natural) negative impact of tropical cyclones along the coastline of Mozambique. (2 x 2) (4)

[15]

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2.4 Refer to FIGURE 2.4, an extract based on urban heat islands.

FIGURE 2.4: URBAN HEAT ISLANDS

CITY DWELLERS ARE BEARING THE BRUNT OF EXTREME TEMPERATURES

Thanks to a phenomenon that makes urban areas hotter than their surroundings, cities such as Pretoria are as much as 6 °C hotter than they could be.

The heat comes from decades of poor planning. Since the 1950s, the global focus of city infrastructure planning has been on cars and on getting as many people as possible into tall buildings (skyscrapers).

In South Africa's six big cities, this means tarred roads crisscrossing what used to be fields, big cement slabs providing parking for the cars, high-rise apartments and office blocks overcrowding their occupants. This both creates and traps heat, which leads to an urban heat island. This effect is worse at night, with cities storing heat.

The World Health Organisation (WHO) says urban heat islands, which both raise temperatures and trap pollutants, will have to disappear in this century if future generations are to live healthy lives in cities. A possible way of addressing the issue of heat islands is introducing 'green' strategies. Green strategies are sustainable and do not harm the environment.

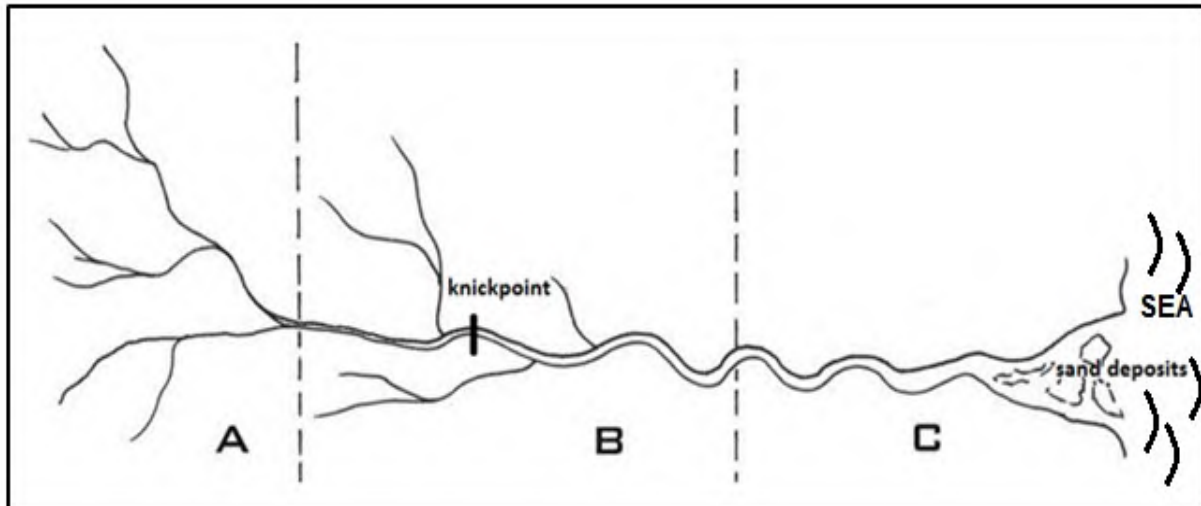
[Adapted from <https://mg.co.za/article/2016-01-16-beyond-the-inferno-how-sa-cities-must-green>]

- 2.4.1 Define the concept *urban heat island*. (1 x 2) (2)
- 2.4.2 Give TWO quotations from the extract that suggests that poor planning is responsible for increasing temperatures in cities. (2 x 1) (2)
- 2.4.3 Why is the urban heat island effect more concentrated at night? (2 x 2) (4)
- 2.4.4 In a paragraph of approximately EIGHT lines, provide sustainable green strategies, as referred to in the extract, that can reduce the heat island effect. (4 x 2) (8)

Question 2 : GEOMORPHOLOGY

Nov 2017

Study FIGURE 1.2 based on a river system.



- | | | | |
|-----|-------|---|----------|
| 1.2 | 1.2.1 | Name the drainage pattern in the upper course of the river in area A . | |
| | 1.2.2 | Name the underlying rock structure likely to be found in area A . | |
| | 1.2.3 | Is area A the catchment area or the mouth of the river? | |
| | 1.2.4 | State the type of erosion that causes deep valleys in area A . | |
| | 1.2.5 | Name a natural feature that forms at a knickpoint (in area B). | |
| | 1.2.6 | In which course of the river does deposition dominate? | |
| | 1.2.7 | Name the landform that is likely to form from the sand deposits at the river mouth. | (7x1)(7) |

Nov 2017

2.2 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 number (2.2.1–2.2.8) in the ANSWER BOOK, for example 2.2.9 A.

- | | |
|-------|---|
| 2.2.1 | Refers to the main river and its tributaries: |
| | A Drainage basin |
| | B Confluence |
| | C Catchment area |
| | D River system |

- 2.2.2 The flow of water in a mountainous stream is likely to be ...
A laminar.
B smooth.
C turbulent.
D layered.
- 2.2.3 The main geomorphological process in the lower course of a river is...
A erosion
B deposition
C saltation
D abstraction
- 2.2.4 The lowest point at which the river can erode is called the...
A permanent base level
B source
C temporal base level
D knick-point
- 2.2.5 The term used to describe the changing position of a watershed:
A river capture
B rejuvenation
C deposition
D abstraction
- 2.2.6 The stream that is now too small to have eroded the valley in which it flows:
A antecedent stream
B captured stream
C superimposed
D misfit stream
- 2.2.7 Forms when a stream deposits its load and blocks its own path:
A braided stream
B levee
C flood plain

D marsh

2.2.8 Rivers that only flow in the rainy season are called..... rivers

A exotic

B periodic

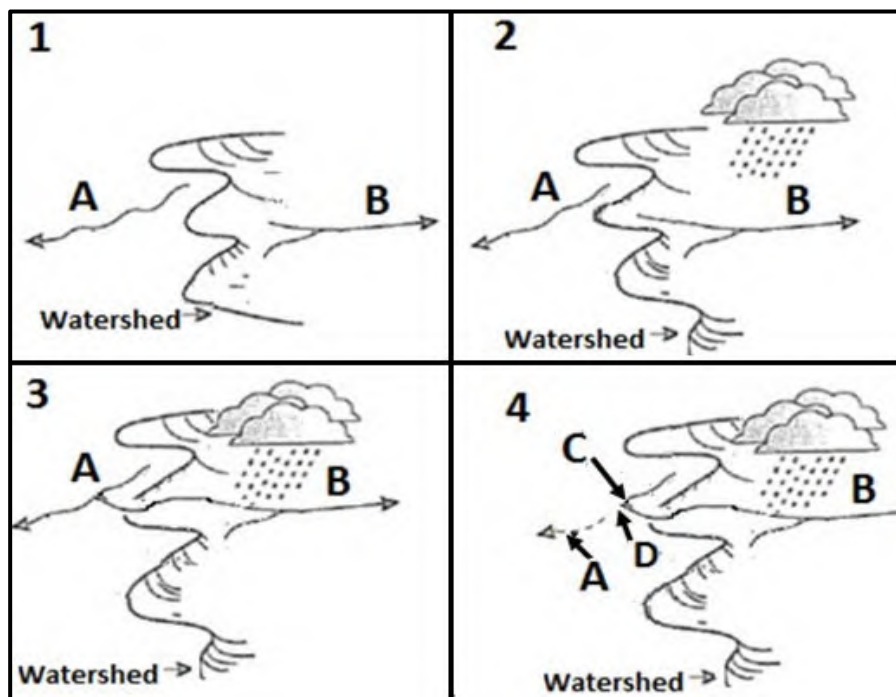
C episodic

D perennial

(8 x 1) (8)

1.2 Nov 2018

FIGURE 1.2 shows sketches (1 to 4) based on river capture.



1.2.1 Refer to sketch 1. Which one, river **A** or river **B**, is likely to be the captor stream?

1.2.2 Name the climatic factor causing river **B** in sketch 2 to erode at a faster rate

1.2.3 What type of erosion caused the water shed to move towards river **A** in sketch 2?

1.2.4 Refer to sketch 3. Which one, River **A** or River **B**, is captured stream?

1.2.5 Refer to sketch 4. Name the feature of river at **C**.

- 1.2.6 Refer to sketch 4. Name the feature of river capture at D.
- 1.2.7 What is the term used to describe river A which has been reduced in volume in sketch 4?
- 1.2.8 Does river A or river B flow at lower altitude in sketch 2? (8 x 1)(8)

2.2 Nov 2018

Choose a term from COLUMN B that matches the fluvial landform description in COLUMN A. Write only the letter (A–H) next to the question numbers (2.2.1 to 2.2.7) in the ANSWER BOOK, e.g. 2.2.8 I.

COLUMN A		COLUMN B	
2.2.1	Flat, natural feature next to a river	A	rapid
2.2.2	An embankment along the river where coarse material is deposited first	B	delta
		C	meander
2.2.3	Curves or bends found along the course of a river	D	braided stream
		E	floodplain
2.2.4	When a meander loop becomes separated from the river	F	oxbow lake
2.2.5	Streams with multiple channels and islands of sediment between the channels	G	levee
		H	waterfall
2.2.6	A vertical drop in the course of a river as a result of softer rock eroding faster than hard rock		
2.2.7	A depositional landform that occurs when a river flows into the ocean		

(1 x 7) (7)

1.2 Nov 2019

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, e.g. 1.2.9 D.

- 1.2.1 The cross-profile of the river shows the shape the shape of the river valley from
A source to mouth
B concave to convex
C bank to bank
D width to depth
- 1.2.2 The shape of the valley in the upper course of the river is
A V-shaped
B wide
C gentle
D U-shaped
- 1.2.3 Deposition is the dominant process in the ... of the river
A upper course
B middle course
C lower course
D young course
- 1.2.4 The volume of water in the middle course of the river is likely to increase because of ...
A lateral erosion
B tributaries joining the river
C downward erosion
D no tributaries joining the river
- 1.2.5 Rapids are most likely to develop in the
A lower course
B middle course and lower course
C upper course
D upper course and lower

- 1.2.6 The stream flow (discharge) of a river in the upper course is generally a. ... flow
A layered
B laminar
C smooth
D turbulent
- 1.2.7 An ox bow lake can be formed from a ... in the lower course of the river.
A slip-off slope
B cut-off slope
C meander loop
D meander scar
- 1.2.8 The processes that a river undergoes from the upper course to the lower course are
A erosion, transportation and deposition.
B transportation, erosion and deposition
C erosion, deposition and transportation
D deposition, erosion and transportation

2.2 Nov 2019

Give ONE term for each of the following descriptions by choosing a term from the list below. Write only the term next to the question numbers (2.2.1 to 2.2.7) in the ANSWER BOOK, e.g. 2.6.8 turbulent flow.

water table; confluence; river mouth; drainage basin; river source; interfluvium; surface run-off; ground water

- 2.2.1 Point where the river enters the sea
- 2.2.2 Water that has infiltrated the soil
- 2.2.3 Area drained by a main river and its tributaries
- 2.2.4 Point where a river originates
- 2.2.5 The upper level of the saturated zone
- 2.2.6 Water flowing overland after it has rained
- 2.2.7 Point where a tributary meets the main river

(1 x 7) (7)

1.2 Nov 2020

Choose a term from COLUMN B that matches the characteristic/description in COLUMN A. Write only the letter (A–I) next to the question numbers (1.2.1 to 1.2.8) in the ANSWER BOOK, e.g. 2.7.9 J.

COLUMN A		COLUMN B	
1.2.1	Drainage pattern that is common along steep slopes of ridge or hills	A	trellis
1.2.2	Drainage pattern found in areas where glaciers have occurred	B	dendritic
1.2.3	The main stream has right angle bends in this drainage pattern	C	radial
1.2.4	Drainage pattern associated with streams that flow towards a central low-lying area	D	rectangular
1.2.5	Drainage pattern associated with a dome feature	E	deranged
1.2.6	Drainage pattern that originates in areas with alternative layers of hard and soft rock	F	antecedent
1.2.7	Drainage pattern that is usually uniform and tributaries join at acute angles	G	centripetal
1.2.8	The river is younger than the underlying rock structure over which it flows	H	superimposed
		I	parallel

(8 x 1) (8)

2.2 Nov 2020

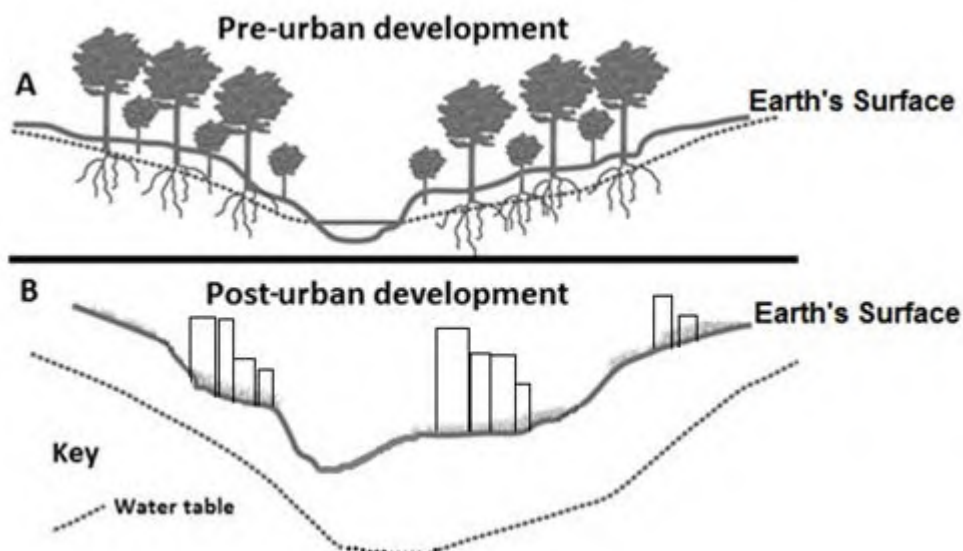
Choose a concept/term from COLUMN B that matches the description in COLUMN A.
Write only the letter (A–H) next to the question numbers (2.2.1 to 2.2.7) in the ANSWER BOOK, e.g. 2.2.8 I.

COLUMN A		COLUMN B	
2.2.1	Area drained by a river and its tributaries	A	catchment area
2.2.2	High-lying area that separates two different drainage basins	B	interfluve
2.2.3	Starting point of a river	C	confluence
2.2.4	Term that describes the main river and its tributaries	D	drainage basin
2.2.5	Point where the river enters the sea	E	river system
2.2.6	Point where the river enters the sea	F	watershed
2.2.7	Elevated land that separates streams in the same drainage basin	G	river source
2.2.7	Point along the river where two or more streams meet	H	river mouth

(7 x 1) (7)

1.5 Nov 2017

Refer to FIGURE 1.5 based on the water table.

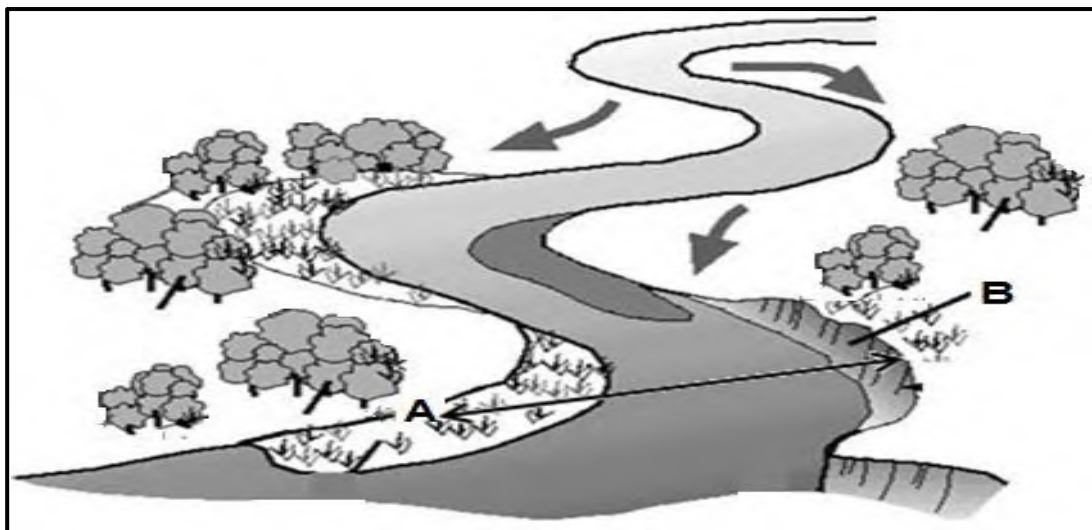


- 1.5.1 Define the term water table. (1 x 2) (2)
- 1.5.2 (a) Describe the position the water table in FIGURE 1.5 A in relation to the earth's surface. (1 x 1) (1)
- (b) Account for the position of the water table in FIGURE 1.5 A that was mentioned in QUESTION 1.5.2 A (1 x 2) (2)
- 1.5.3 (a) How has urban development changed the position of the water table in relation to the earth's surface in FIGURE 1.5 B (1 x 2) (2)
- (b) Explain why urban development changed the position of the water table in FIGURE 1.5 B that was mentioned in QUESTION 1.5.3 A 2x2(4)
- 1.5.4 Suggest measures that can be introduced after urban development to maintain the water table as illustrated in FIGURE 1.5A 2x2(4)

[15]

1.6 Nov 2017

Refer to FIGURE 1.6 showing a stream channel.



[Source: <http://adlib.eversite.co.uk/adlib/defra/content.aspx?id=000IL3890W.17UT30ZOH8G447>]

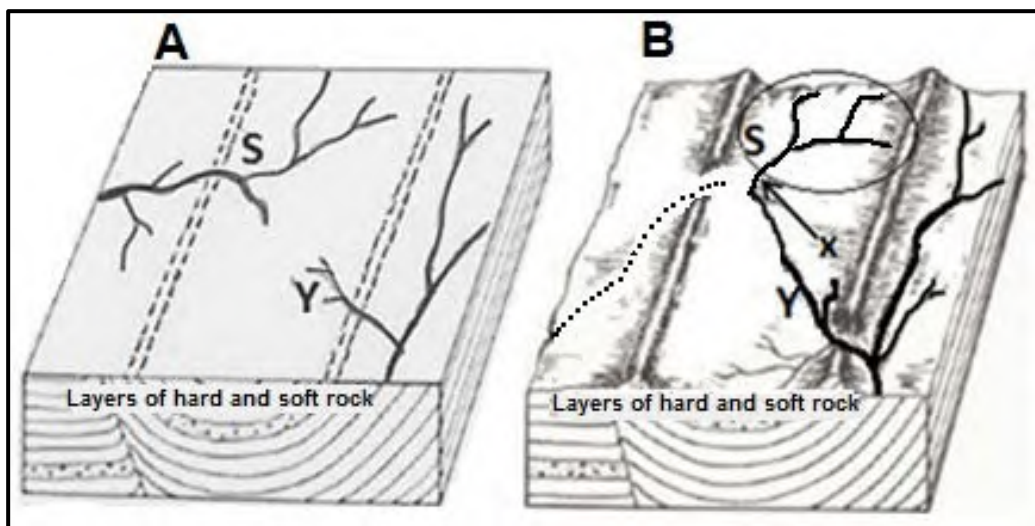
- 1.6.1. Identify the stream channel pattern shown in FIGURE 1.6 (1 x 1) (1)
- 1.6.2. In which course of the river is the illustrated stream channel pattern most likely to be found? (1 x 1) (1)
- 1.6.3. Give one reason why the illustrated stream channel pattern will develop in the course of the river named in QUESTION 1.6.2. (1 x 2) (2)

- 1.6.4. Draw a simple, labelled cross-section of a meander between points (2 x 2) (4)
A and B.
- 1.6.5. You would like to develop a campsite along the banks of the
illustrated river. After careful consideration, you choose a site along (4 x 2) (8)
slope/bank A rather than along slope/bank B. In a paragraph of
approximately 8 lines, explain why the site along slope/bank A is
the better choice.

[16]

2.5 Nov 2017

Refer to FIGURE 2.5 that shows river capture on a superimposed landscape.



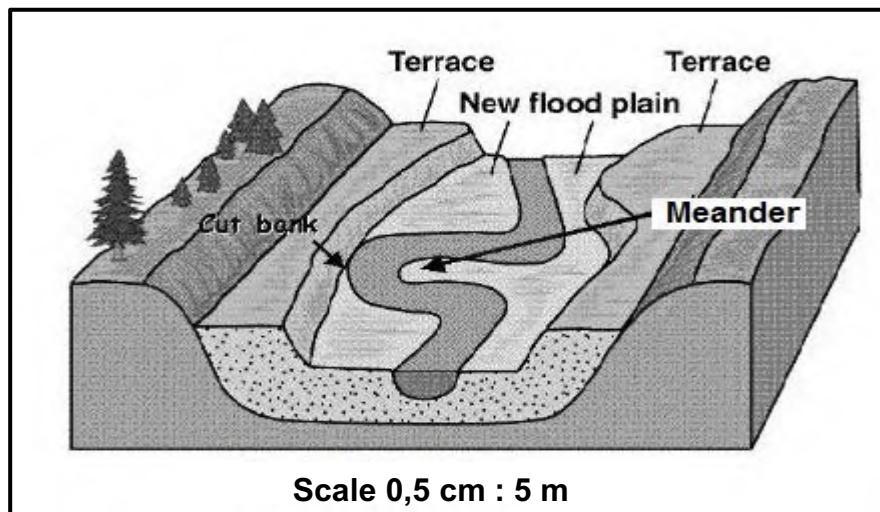
[Adapted from www.uky.edu]

- 2.5.1 What is a superimposed stream? (1 x 2) (2)
- 2.5.2. What evidence suggests that river S and river Y are superimposed (1 x 2) (2)
streams?
- 2.5.3. Draw a labelled cross-section to show how the abstraction process (2 x 2) (4)
resulted in river capture in FIGURE 2.5B
- 2.5.4. In a paragraph of approximately EIGHT lines, explain the changes (4 x 2) (8)
that the captured stream will undergo downstream of the elbow of
capture .

[16]

2.6. Nov 2017

Study FIGURE 2.6 based on river rejuvenation in the lower course of a river.

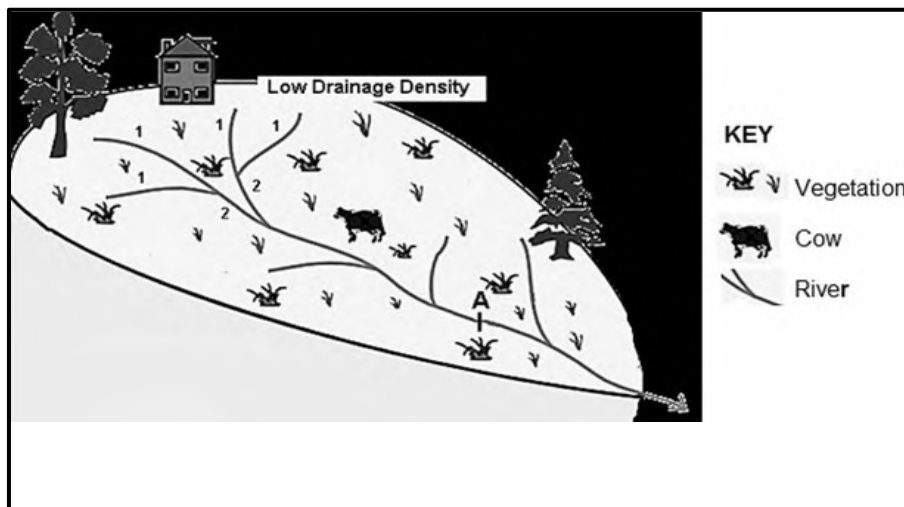


[Adapted from www.studyblue.com]

- 2.6.1. State one characteristic of a rejuvenated river. (1 x 1) (1)
- 2.6.2. What evidence in the sketch indicates that the river has been rejuvenated? (2 x 1) (2)
- 2.6.3. Give TWO possible causes of river rejuvenation. (2 x 2) (4)
- 2.6.4. Describe the impact that rejuvenation will have on the meander in FIGURE 2.6. (1 x 2) (2)
- 2.6.5. Suggest one negative impact of rejuvenation on the future development of infrastructure. (1 x 2) (2)
- 2.6.6. Give evidence in FIGURE 2.6. to support the statement that terraces, even though they are flat, are not always suitable for farming. (2 x 2) (4)

1.5 Nov 2018

FIGURE 1.5 shows a river system with a low drainage density.



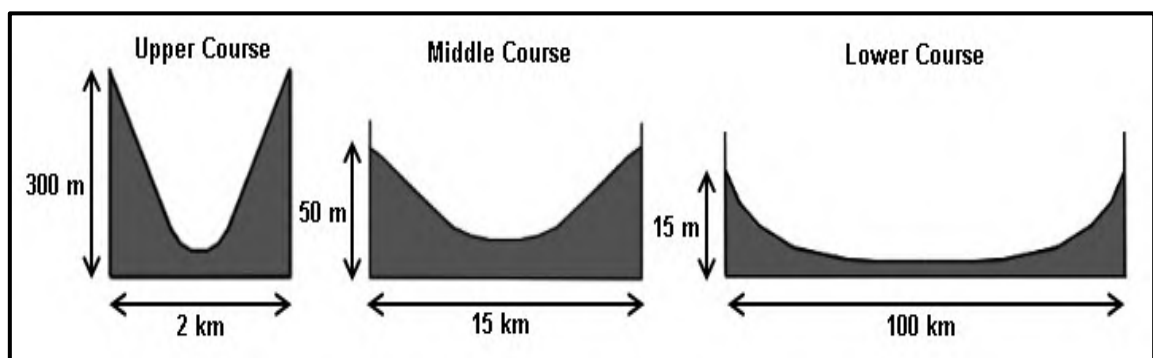
[Adapted from Google Images]

- 1.5.1. Give evidence to suggest that the river system has a low drainage density. (1 x 1) (1)
- 1.5.2. Describe TWO factors that may have resulted in a low drainage density. (2 x 2) (4)
- 1.5.3. How will an increased drainage density impact on the existing stream order at A? (1 x 2) (2)
- 1.5.4. Write a paragraph of approximately EIGHT lines discussing how human activities along the river's course could increase the drainage density of the drainage basin. (4 x 2) (8)

[15]

Nov 2018

FIGURE 1.6 shows the changing cross-profile of the valley along the river's course.



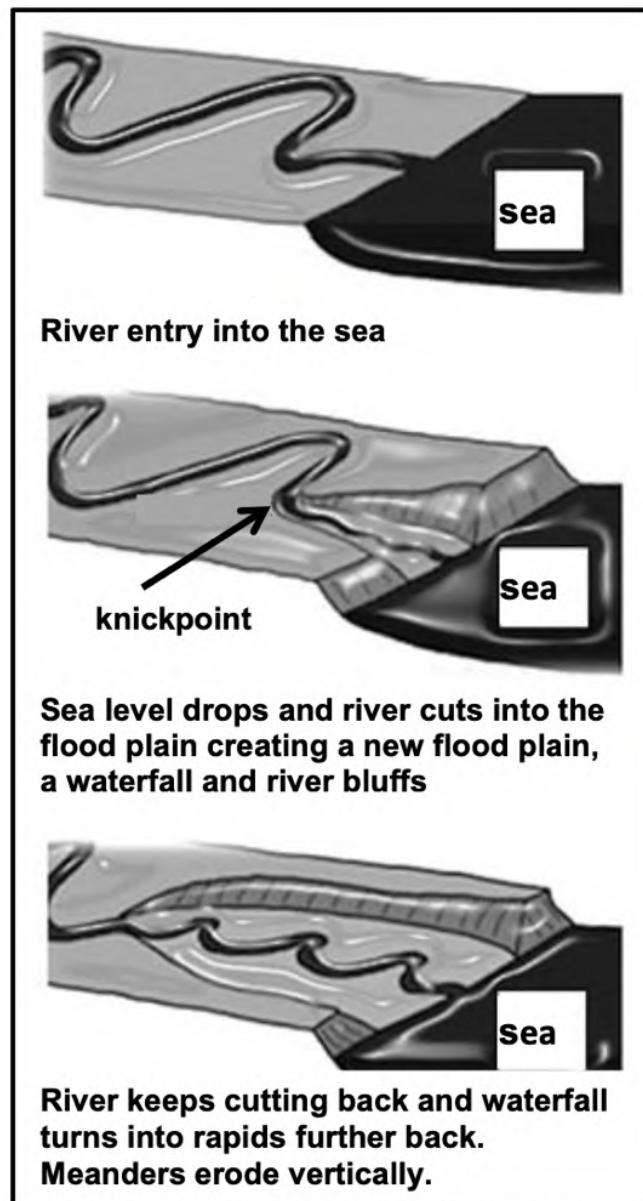
[Adapted from <http://www.geography.learnontheinternet.co.uk/topics/longprofile.html>]

- 1.6.1 In which course is the source of the river? (1 x 1) (1)
- 1.6.2 Name TWO elements of the cross-profile that changed from the upper to the lower course in FIGURE 1.6. (2 x 1)(2)
- 1.6.3 Differentiate between the fluvial processes that shaped the cross-profiles of the upper course and the lower course of the river. (2 x 2) (4)
- 1.6.4 Describe the reasons for the change in the shape of the cross-profile of the middle course. (2 x 2) (4)
- 1.6.5 Explain why the shape of the cross-profile in the upper course of the river will make the most suitable place to build a dam. (2 x 2) (4)

[15]

2.5 Nov 2018

Study FIGURE 2.5 which illustrates river rejuvenation



[Source: <https://alevelrivers.weebly.com/rejuvenation.html>]

- 2.5.1 Define the term river rejuvenation. (1 x 2) (2)
- 2.5.2 Identify the condition that resulted in river rejuvenation. (1 x 1) (1)
- 2.5.3 Name ONE likely fluvial feature that can form at the knick-point along the river profile. (1 x 1) (1)
- 2.5.4 Explain the impact of river rejuvenation on the grading of a river. (2 x 2) (4)
- 2.5.5 Write a paragraph of approximately EIGHT lines elaborating on the changes that will occur in the fluvial features found in the illustrated course of the river as a result of river rejuvenation (4 x 2) (8)

2.6 Nov 2018

Refer to FIGURE 2.6, an extract based on the impact of deforestation on river management

<p style="text-align: center;">GOING, GOING, GONE!</p> <p>The current rate of deforestation worldwide is of great concern. Currently 12 million hectares of forests are cleared annually – an area 1,3 times the size of KwaZulu-Natal! Almost all of the deforestation occurs in the moist forests and open woodlands of the tropics. At this rate all moist tropical forests could be lost by the year 2050, except for isolated areas in Amazonia, the Zaire basin, as well as a few protected areas within reserves and parks. Some countries, such as Ivory Coast, Nigeria, Costa Rica and Sri Lanka are likely to lose all their tropical forests by the year 2030 if no conservation steps are taken.</p> <p>DID YOU KNOW?</p> <ul style="list-style-type: none">• The World Resources Institute regards deforestation as one of the world's most pressing land-use problems.• An area of forest equal to 20 football or rugby fields is lost every minute.• South Africa's climate is such that less than 0,5% of its surface area is covered with indigenous forest – great care should be taken to conserve the few forests we have. <p>[Adapted from https://www.environment.co.za/environmental-issues/deforestation.html]</p>
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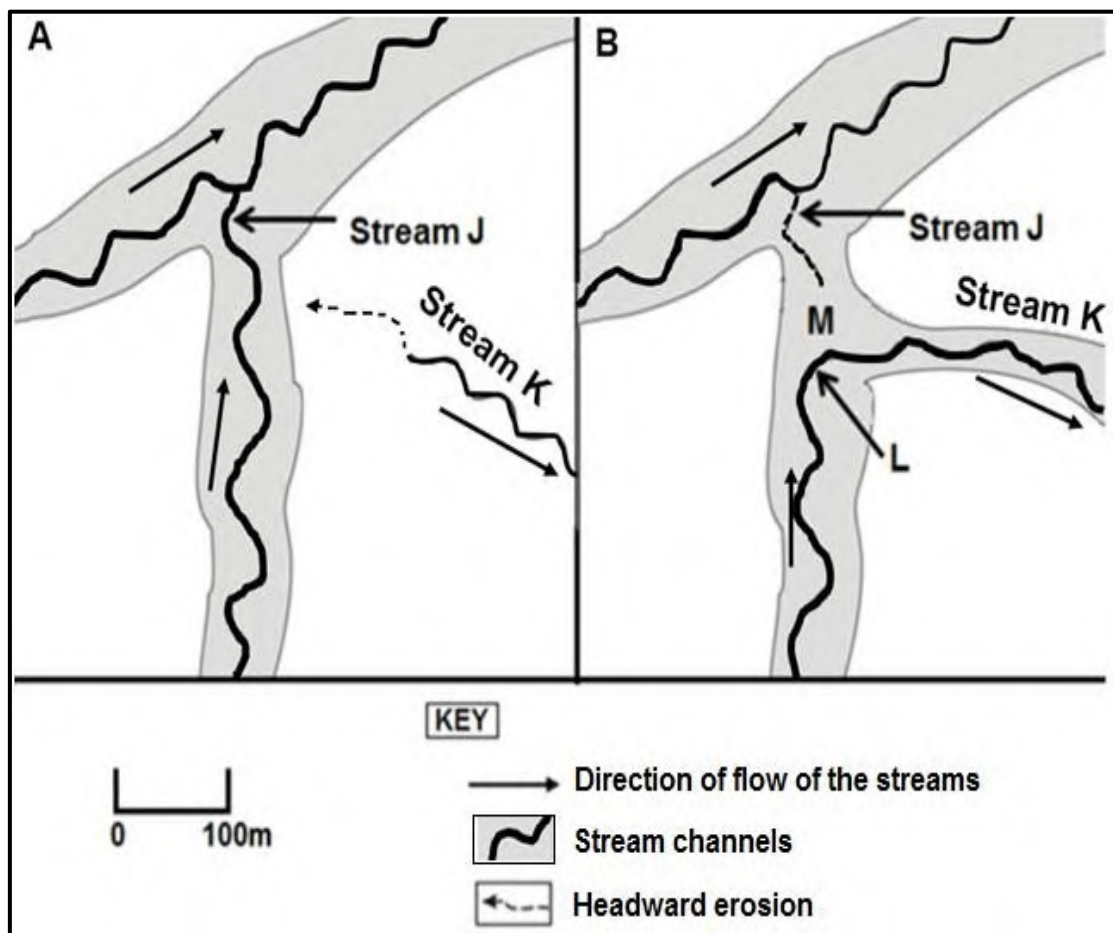
- 2.6.1 What is deforestation? (1 x 2) (2)
- 2.6.2 (a) By which year is it expected that almost all tropical forests will be lost? (1 x 1) (1)
- (b) The size of which province can be compared to the total area of the forest being lost annually? (1 x 1) (1)
- 2.6.3 Name TWO negative consequences of deforestation on river systems. (2 x 2) (4)

- 2.6.4 Suggest TWO measure that can be put in place by the government and non-governmental organisations (NGOs) to manage river systems at risk due to deforestations. (2 x 2) (4)
- 2.6.5 Discuss the negative impact of poor river management practices on South Africa's future water supply. (2 x 2) (4)

[16]

1.5 Nov 2019

Study FIGURE 1.5 based on river capture (stream piracy).



[Adapted from <http://www.researchgate.net>]

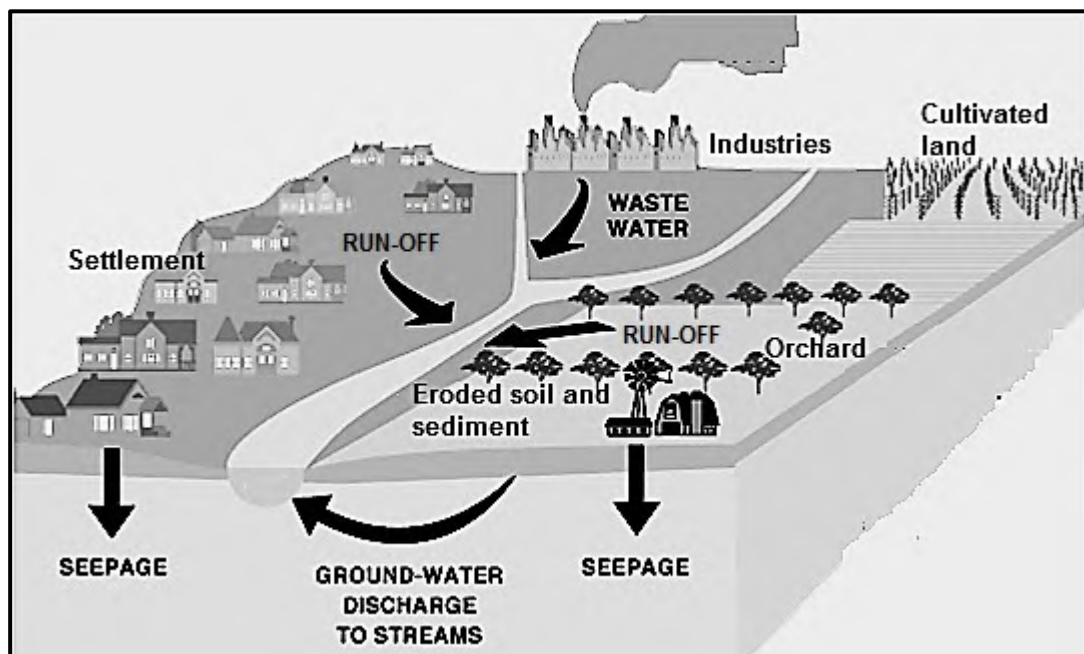
- 1.5.1 Define the term river capture. (1 x 2) (2)
- 1.5.2 Describe the erosion associated with the process of river capture in sketch A. (1 x 1) (1)
- 1.5.3 Identify the features L and M that results from river capture. (2 x 1) (2)
- 1.5.4 Match the terms captor stream and misfit stream to the streams J and K in diagram B. (2 x 1) (2)

- 1.5.5 (a) What is a watershed? (1 x 1) (1)
- (b) How can the process of river capture cause the watershed to change its position? (1 x 2) (2)
- (c) What effect will river capture have on the volume of water in stream K? (1 x 2) (2)
- 1.5.6 What can the local farming community around stream J do to continue with their daily activities after river capture has taken place? (2 x 2) (4)

[16]

1.6 Nov 2019

Refer to FIGURE 1.6 showing catchment and river management.



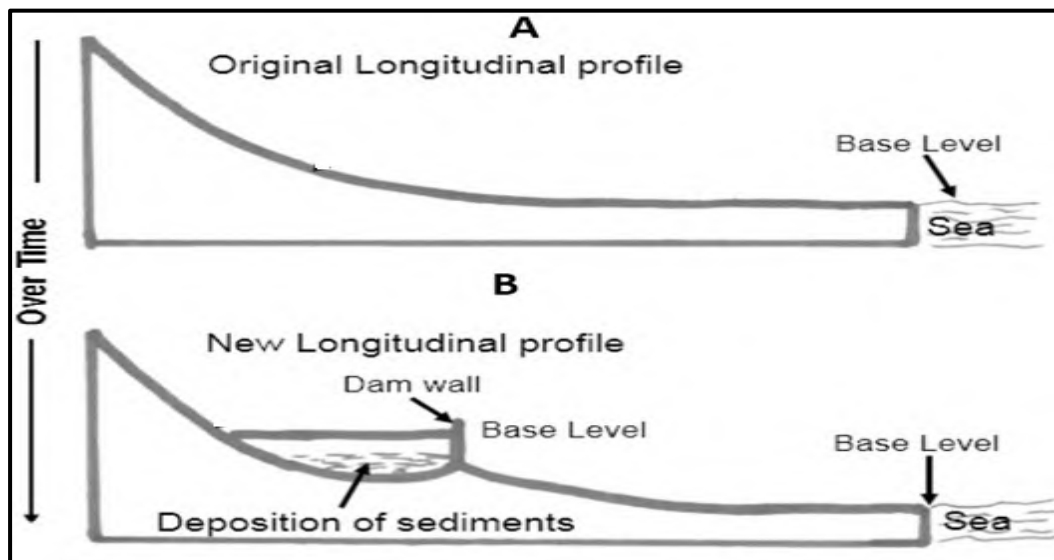
[Source: <https://openoregon.pressbooks.pub/envirobiology/chapter/7-3-water-pollution/>]

- 1.6.1 What is the main source of waste water? (1 x 1) (1)
- 1.6.2 Discuss how the removal of natural vegetation for human activities increased the eroded soil and sediments in the river. (1 x 2) (2)
- 1.6.3 Explain how run off from both settlements and cultivated land decreases the quality of water of a river. (2 x 2) (4)
- 1.6.4 In a paragraph of approximately EIGHT lines, discuss why sustainable river management is important for all sectors of the economy. (4 x 2) (8)

[15]

2.5 Nov 2019

Refer to FIGURE 2.5 showing river profiles.



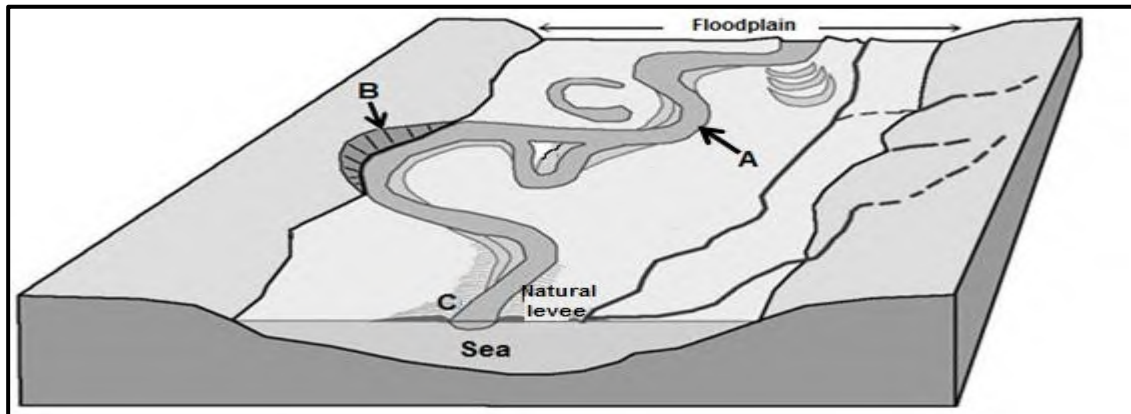
[Source: Examiner's own sketches]

- 2.5.1 Define the term longitudinal profile. (1 x 1) (1)
- 2.5.2 Describe the shape of longitudinal profile A. (1 x 2) (2)
- 2.5.3 Identify an ultimate (permanent) and temporal base level of erosion in the diagram. (2 x 1) (2)
- 2.5.4 How will the deposition of sediments influence the capacity of the dam? (1 x 2) (2)
- 2.5.5 Describe the difference in grade between the new longitudinal profile and the original longitudinal profile. (2 x 2) (4)
- 2.5.6 Explain the impact of the presence of the dam on erosion and deposition processes. (2 x 2) (4)

[15]

2.6 Nov 2019

Study FIGURE 2.6 based on fluvial landforms in the lower course of the river.



[Adapted from <https://www.google.com/search?q=cartoons+on+fluvial+landforms&tbnm>]

- 2.6.1. Name fluvial feature **A**. (1 x 1) (1)
- 2.6.2. Give a reason for the formation of feature **A**. (1 x 2) (2)
- 2.6.3. Explain why the undercut slope at B is steep. (1 x 2) (2)
- 2.6.4. Feature **C** is a natural Levee'. Why is this fluvial landform commonly found in the lower course of the river? (1 x 2) (2)
- 2.6.5. In the paragraph of approximately Eight lines, explain the positive and the negative impact of levees on farming on the flood plain. (4 x 2) (8)

1.5. **Nov 2020**

FIGURE 1.5 is an extract on deltas.

<p style="text-align: center;">DELTA ARE SINKING</p> <p>The world's river deltas take up less than 0,5% of the Earth's land area, but they are home to hundreds of millions of people. With fertile soils and easy access to the coast, deltas are important areas for food production. They also have unique ecosystems. Now many of the world's deltas are facing a crisis. Sea levels are rising as a result of climate change, while deltas are sinking.</p> <p>As sediments in deltas compact under their own weight, deltas naturally sink. If left undisturbed, new river sediment can accumulate and help to maintain the delta surface above sea level.</p> <p>But deltas are now subsiding much faster than they would do naturally. That's due to groundwater being pumped from aquifers (permeable rock) underneath them and used to irrigate crops and provide water for rapidly growing cities. Under these conditions, only the continued deposition of sediment on deltas can keep them from 'drowning'.</p> <p>Difficult decisions need to be made about development priorities between countries upstream of deltas and those including the deltas themselves. There will be trade-offs to be made between hydropower, agricultural practices and delta sustainability.</p> <p style="text-align: right;"><small>[Source: https://www.asiatimes.com/2019/11/article/river-delta-changes-threaten-hundreds-of-millions/]</small></p>

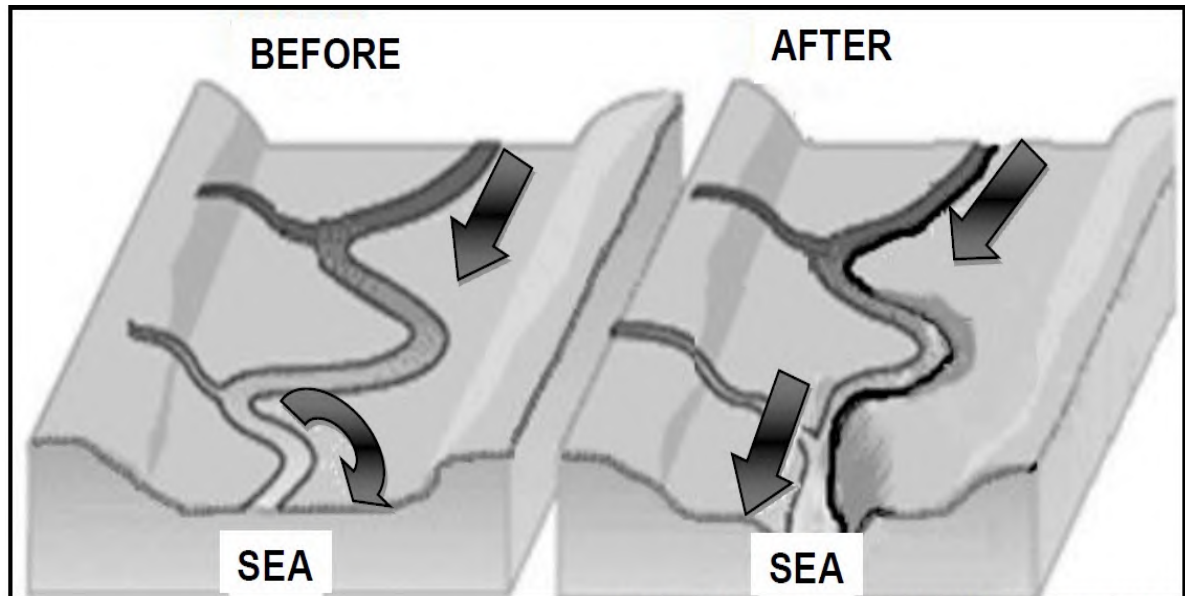
- | | | |
|--------|--|-------------|
| 1.5.1. | Where do deltas form? | (1 x 1) (1) |
| 1.5.2. | What evidence in the extract indicates that deltas are densely populated? | (1 x 1) (1) |
| 1.5.3. | According to the extract, how are cities disturbing the natural formation of deltas? | (1 x 1) (1) |
| 1.5.4. | Discuss the importance of protecting deltas. | (2 x 2) (4) |
| 1.5.5. | A recent environmental impact assessment has highlighted concerns about the future sustainability of deltas. In a paragraph of | (4 x 2) (8) |

approximately EIGHT lines, suggest strategies to protect areas like deltas from the negative of human activities.

[15]

1.6. Nov 2020

Refer to FIGURE 1.6 showing river rejuvenation.



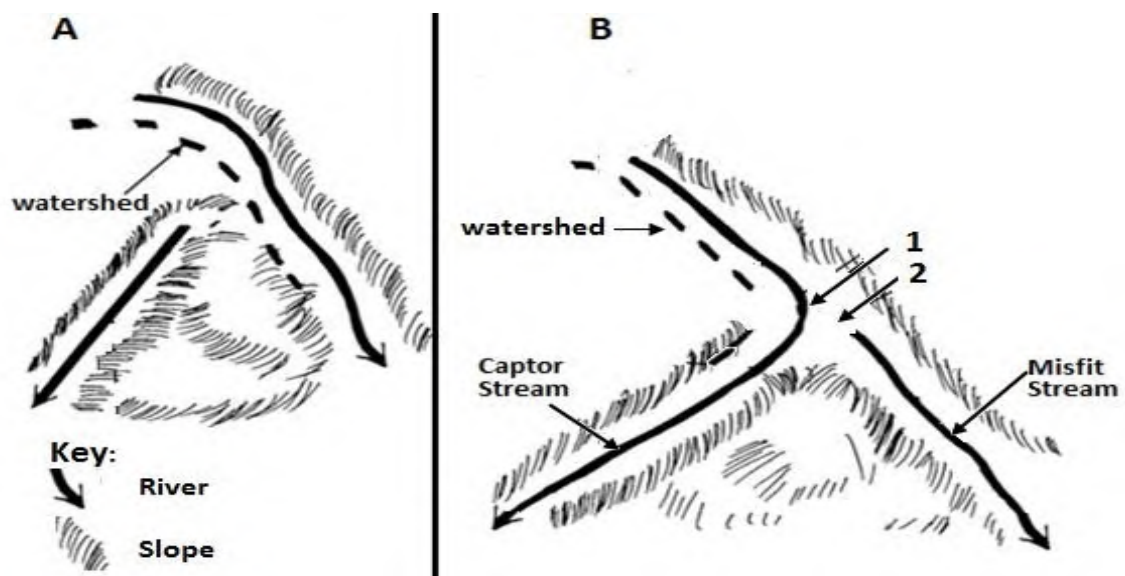
[Adapted from <http://navneetsingh00215.blogspot.in>]

- 1.6.1. What is river rejuvenation? (1 x 2) (2)
- 1.6.2. Which stage (course) of the river is illustrated in FIGURE 1.6? (1 x 1) (1)
- 1.6.3. Give evidence from FIGURE 1.6. to support your answer to QUESTION 1.6.2. (1 x 1) (1)
- 1.6.4. Why is there an increase in the rate of erosion in the river after rejuvenation? (2 x 2) (4)
- 1.6.5. Identify the changes to the following features after river rejuvenation took place:
- (a) River channel (1 x 2) (2)
 - (b) Meander (1 x 2) (2)
- 1.6.6. Discuss the possible negative impact of river rejuvenation on storage dams in the lower course after the point of rejuvenation(knickpoint). (2 x 2) (4)

[16]

2.5. Nov 2020

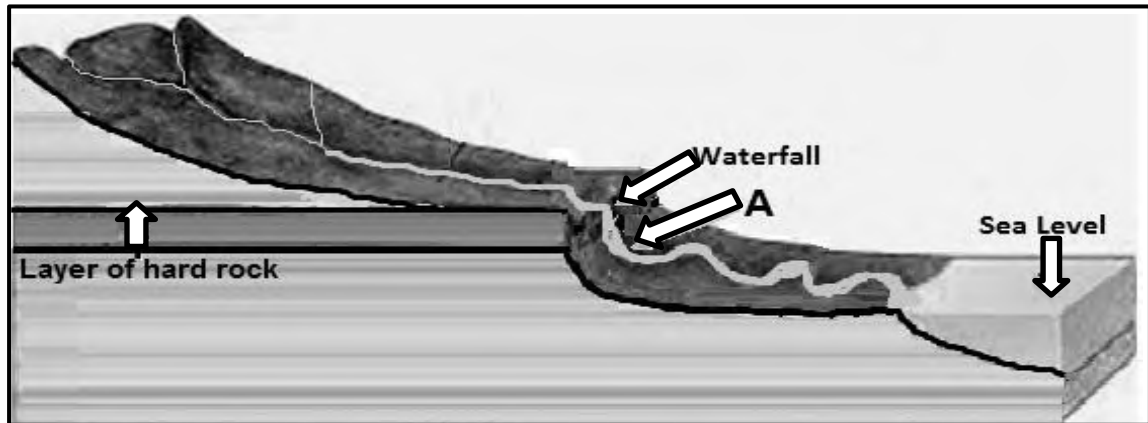
Refer to FIGURE 2.5, which shows river capture (stream piracy)



- 2.5.1. Define the concept river capture as shown in sketch B. (1 x 2) (2)
- 2.5.2. Identify features 1 and 2 of river capture in sketch B. (2 x 1) (2)
- 2.5.3. What could have caused the captor stream to erode through the watershed? (2 x 1) (2)
- 2.5.4. Explain the process that resulted in the formation of the misfit stream. (2 x 2) (4)
- 2.5.5. Describe the change in the flow characteristics of the captor stream. (3 x 2) (6)

2.6. Nov 2020

FIGURE 2.6 shows a river profile.



- 2.6.1. Is the river profile in FIGURE 2.6 graded or ungraded (1 x 1) (1)
- 2.6.2. Give evidence for your answer to QUESTION 2.6.1 (1 x 2) (2)
- 2.6.3. Why will there be more erosion than deposition at A? (2 x 2) (4)
- 2.6.4. In a paragraph of approximately EIGHT lines, explain the fluvial (4 x 2) (8)
process that the river undergoes to reach a graded profile.

[15]