basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

GEOGRAPHY P1

NOVEMBER 2022

MARKS: 150

TIME: 3 hours

This question paper consists of 20 pages.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of TWO SECTIONS.

   SECTION A
   QUESTION 1: CLIMATE AND WEATHER (60)
   QUESTION 2: GEOMORPHOLOGY (60)

   SECTION B
   QUESTION 3: GEOGRAPHICAL SKILLS AND TECHNIQUES (30)

2. Answer ALL THREE questions.
3. All diagrams are included in the QUESTION PAPER.
4. Leave a line between the subsections of questions answered.
5. Start EACH question at the top of a NEW page.
6. Number the answers correctly according to the numbering system used in this question paper.
7. Do NOT write in the margins of the ANSWER BOOK.
8. Draw fully labelled diagrams when instructed to do so.
9. Answer in FULL SENTENCES, except when you have to state, name, identify or list.
10. Units of measurement MUST be indicated in your final answer, e.g. 1 020 hPa, 14 °C and 45 m.
11. You may use a non-programmable calculator.
12. You may use a magnifying glass.
13. Write neatly and legibly.

SPECIFIC INSTRUCTIONS AND INFORMATION FOR SECTION B

14. A 1 : 50 000 topographic map 2930CA MERRIVALE and a 1 : 10 000 orthophoto map 2930 CA 5 MERRIVALE are provided.
15. The area demarcated in RED/BLACK on the topographic map represents the area covered by the orthophoto map.
16. Marks will be allocated for steps in calculations.
17. You must hand in the topographic and orthophoto map to the invigilator at the end of this examination session.

SECTION A: CLIMATE AND WEATHER AND GEOMORPHOLOGY

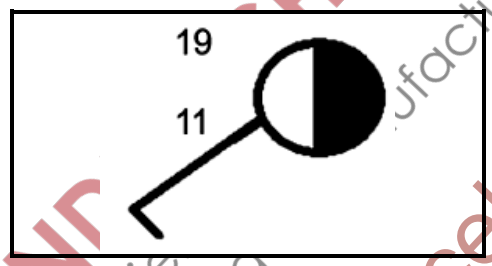
QUESTION 1: CLIMATE AND WEATHER

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. 1.1.9 D.

1.1.1 Lines that join places of equal atmospheric pressure on a synoptic weather map are known as …

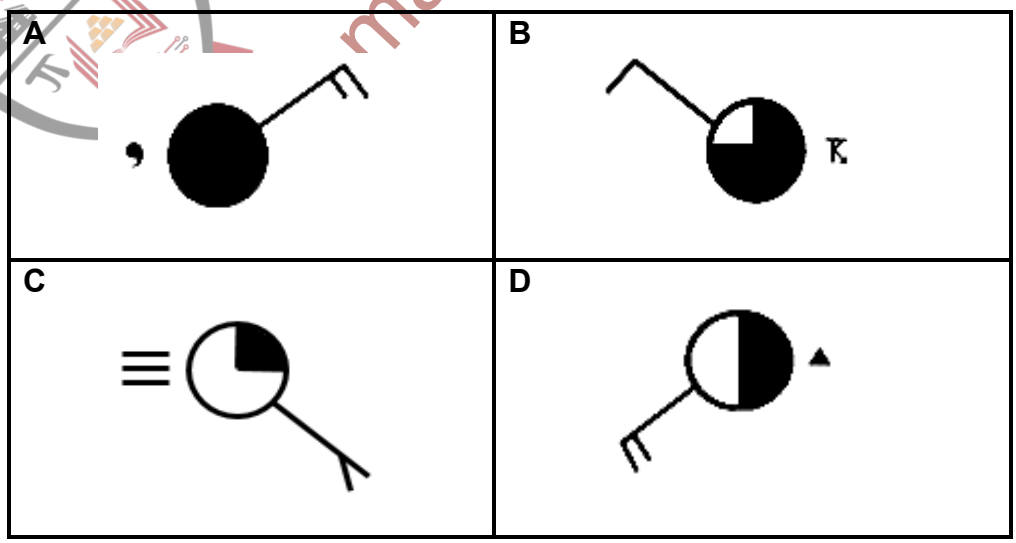
A isolines.
B isotherms.
C isohyets.
D isobars.

1.1.2 The wind direction represented by the station model below is …

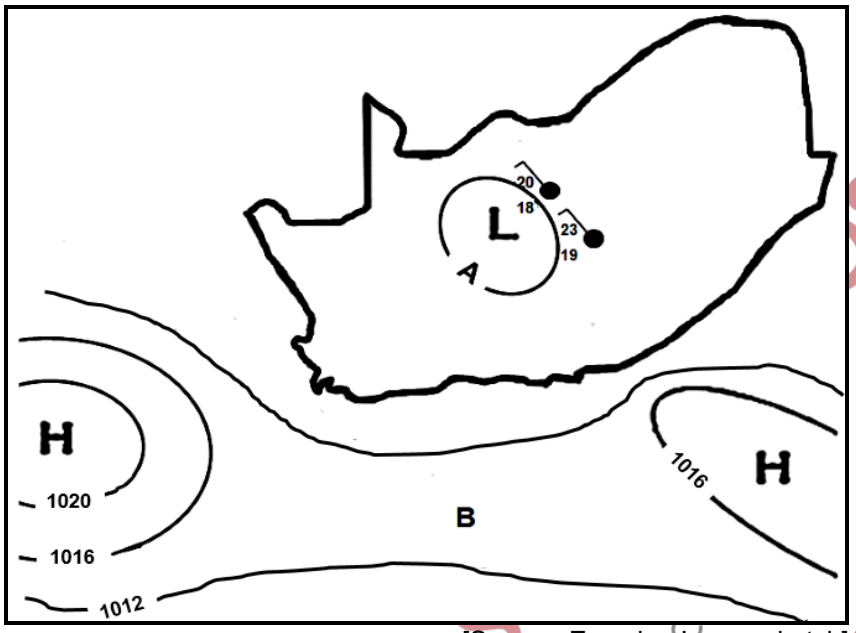


A north-west.
B south-west.
C south-east.
D north-east.

1.1.3 Which ONE of the station models below shows drizzle as a form of precipitation?



Refer to the sketch below to answer QUESTIONS 1.1.4 to 1.1.6.



[Source: Examiner's own sketch]

1.1.4 The atmospheric pressure reading at **A** is … hPa.

A 1004
B 1008
C 1012
D 1016

1.1.5 Feature **B** is known as a …

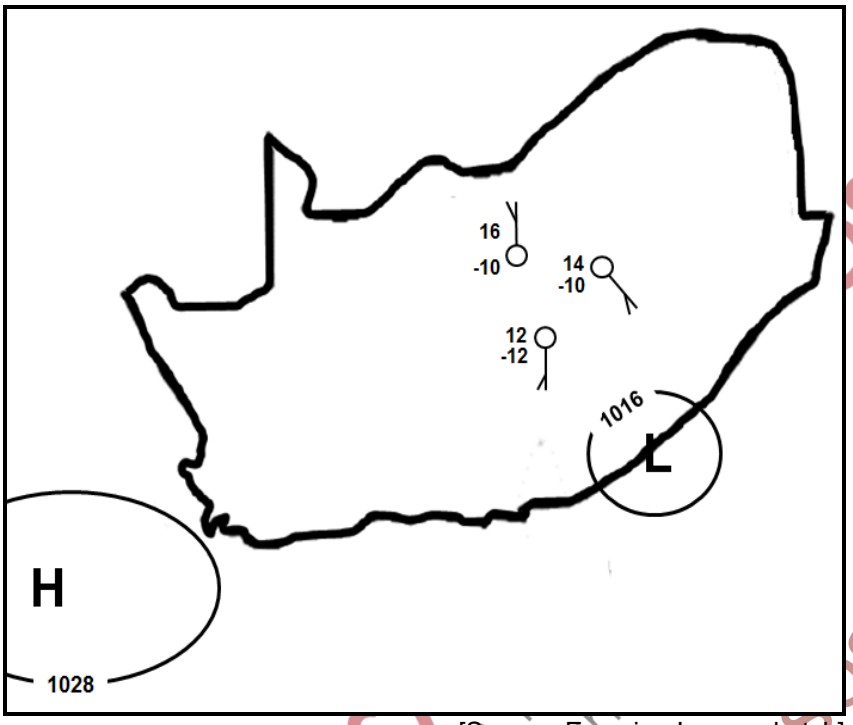
A ridge.
B trough.
C wedge.
D saddle.

1.1.6 The low-pressure cell over the interior has caused north-westerly winds because of … circulation and overcast conditions due to … of air.

(i) clockwise
(ii) anticlockwise
(iii) descending
(iv) ascending

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

Refer to the sketch below to answer QUESTIONS 1.1.7 and 1.1.8.



[Source: Examiner's own sketch]

1.1.7 The low-pressure cell in the sketch is a …

A mid-latitude cyclone.
B tropical depression.
C coastal low.
D thermal low.

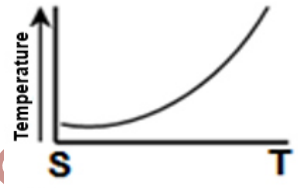
1.1.8 The interior of South Africa experiences … conditions with a greater temperature variation due to … climatic conditions.

(i) unstable
(ii) stable
(iii) continental
(iv) maritime

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

(8 x 1) (8)

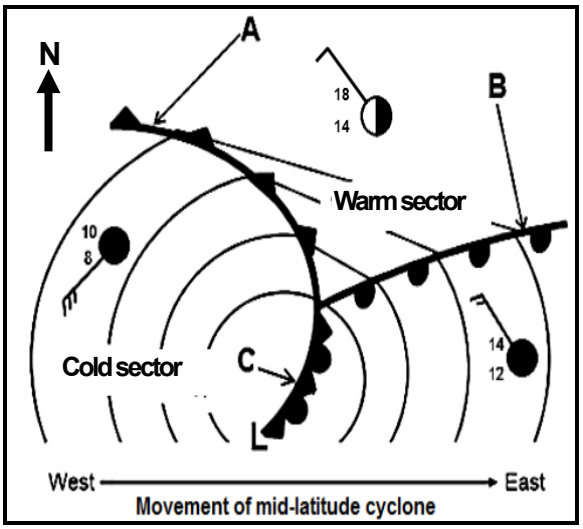
1.2 Complete the statements in COLUMN A with the options in COLUMN B. Write down only **Y** or **Z** next to the question numbers (1.2.1 to 1.2.7) in the ANSWER BOOK, e.g. 1.2.8 Y.

COLUMN A		COLUMN B
1.2.1	Increased absorption of heat in urban areas is due to … surfaces.	**Y** natural **Z** artificial
1.2.2	The intensity of multiple reflections of heat is increased due to the … dimension of buildings.	**Y** vertical **Z** horizontal
1.2.3	The air pressure will generally be … in urban areas than in rural areas.	**Y** lower **Z** higher
1.2.4	The wind speed in urban areas is … than in rural areas.	**Y** faster **Z** slower
1.2.5	The relative humidity over urban areas is lower than over rural areas due to … evaporation.	**Y** more **Z** less
1.2.6	Urban areas have a higher frequency of precipitation than rural areas due to …	**Y** hygroscopic particles **Z** building structures
1.2.7	Temperature graph … represents the change in temperature from the urban areas (**S**) to the rural areas (**T**).	**Y**  **Z** 

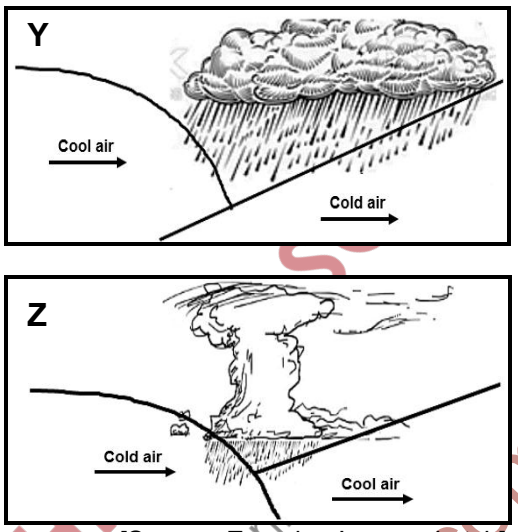
(7 x 1) (7)

1.3 Refer to the sketches below on a mid-latitude cyclone.

PLAN VIEW



CROSS-SECTIONS



[Source: Examiner's own sketch]

1.3.1 Name the wind belt that causes the easterly movement of the mid-latitude cyclone. (1 x 1) (1)

Refer to the plan view.

1.3.2 Identify front **A**. (1 x 1) (1)

1.3.3 Which ONE of fronts **A** or **B** is moving faster? (1 x 1) (1)

1.3.4 Give a reason for your answer to QUESTION 1.3.3. (1 x 2) (2)

1.3.5 Give evidence from the sketch that the mid-latitude cyclone is found in the Southern Hemisphere. (1 x 2) (2)

Refer to the cold front occlusion **C** and the cross-sections.

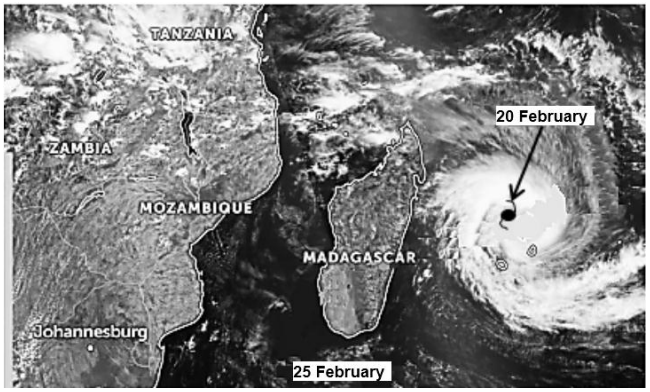
1.3.6 (a) Which ONE of the cross-sections **Y** or **Z** represents the cold front occlusion at **C**? (1 x 2) (2)

(b) Give evidence that **C** is a cold front occlusion. (1 x 2) (2)

(c) Explain how the cold front occlusion developed. (2 x 2) (4)

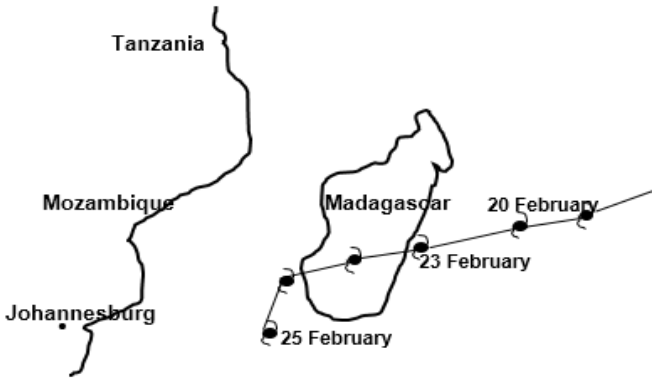
1.4 Refer to the infographic below on Tropical Cyclone Batsirai.

Satellite image of Tropical Cyclone Batsiria



[Adapted from https://twitter.com/kwang/poon/status]

Path of Tropical Cyclone Batsiria



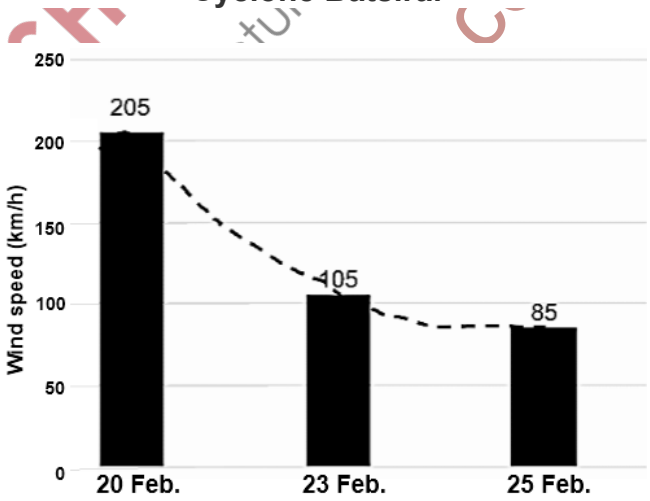
[Source: Examiner's own sketch]

Tropical Cyclone Batsirai – February 2022

Tropical Cyclone Batsirai intensified and moved westward across the South Indian Ocean. The forward movement was approximately 19 kilometres per hour (km/h). Batsirai made landfall on Saturday night. Tropical Cyclone Batsirai's wind and rains caused considerable damage to roads and transport links, leaving some of the hardest-hit areas inaccessible. In addition, Tropical Cyclone Batsirai caused storm surges.

[Adapted from https://reliefweb.int/disaster/tc-2022-000160-mdg]

Wind speed associated with Tropical Cyclone Batsirai



[Source: Examiner's own sketch]

1.4.1 Give the date on which Tropical Cyclone Batsirai reached the mature stage. (1 x 1) (1)

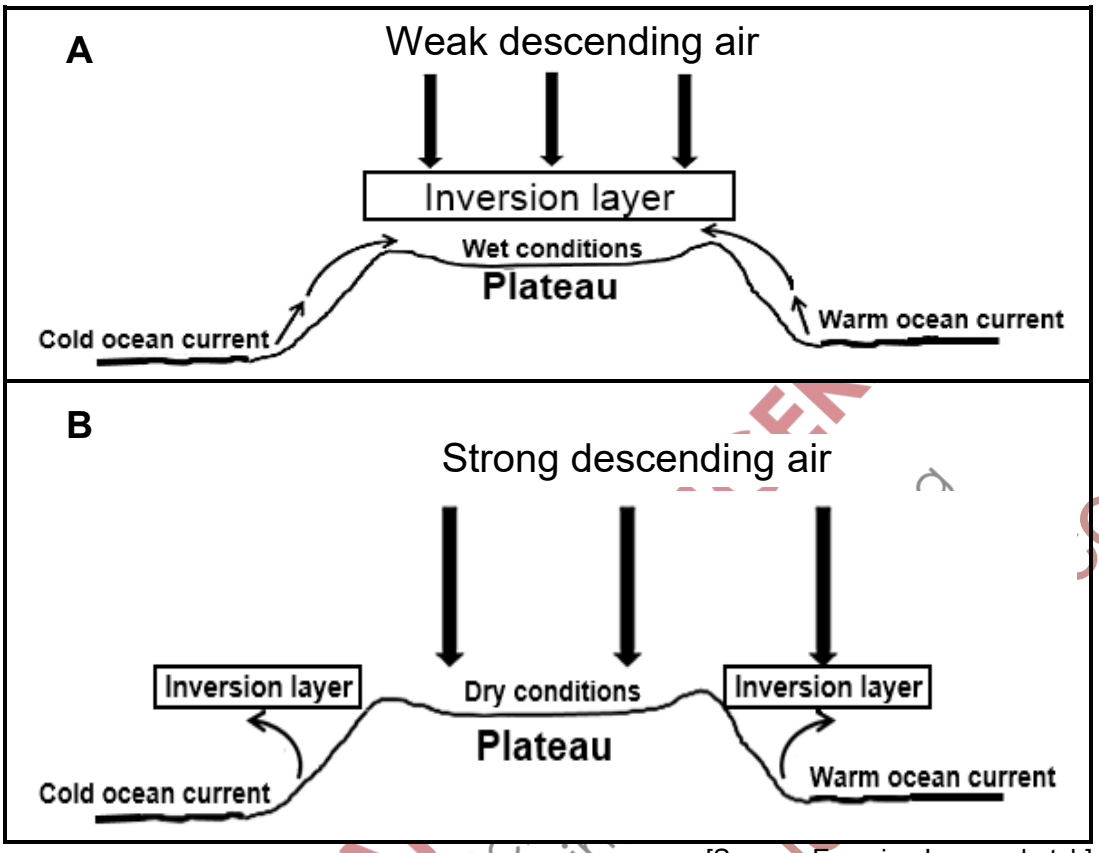
1.4.2 According to the infographic, Tropical Cyclone Batsirai moved westward across the South Indian Ocean. Give ONE reason for this movement. (1 x 2) (2)

1.4.3 Suggest TWO reasons for the large decrease in wind speed between 20 and 25 February 2022. (2 x 2) (4)

1.4.4 How could storm surges negatively impact the physical environment on the east coast of Madagascar? (4)

1.4.5 Explain the importance of monitoring tropical cyclones like Batsirai for Madagascar. (2 x 2) (4)

1.5 Refer to the sketches below showing the changes in the position of the inversion layer over South Africa.



[Source: Examiner's own sketch]

Refer to sketch **A**.

1.5.1 Identify the season illustrated in sketch **A**. (1 x 1) (1)

1.5.2 Give a reason for your answer to QUESTION 1.5.1. (1 x 2) (2)

Refer to sketch **B**.

1.5.3 Identify TWO factors, visible in the sketch, which influence the climate of South Africa. (2 x 1) (2)

1.5.4 Explain the role played by descending air in the development of the inversion layer. (1 x 2) (2)

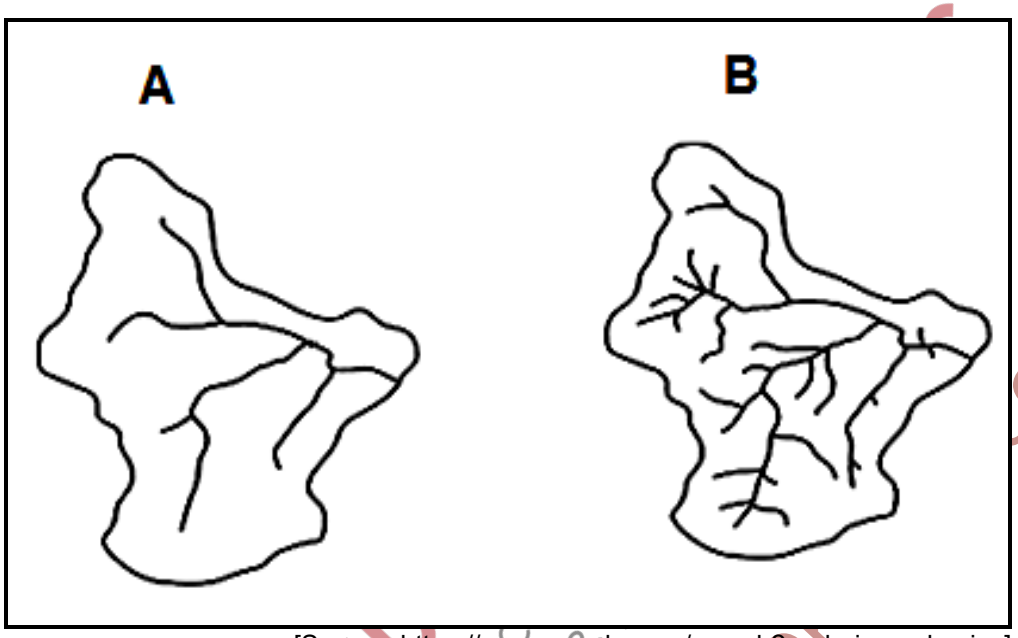
Refer to sketches **A** and **B**.

1.5.5 In a paragraph of approximately EIGHT lines, describe how the position of the inversion layer in sketches **A** and **B** influences the amount of rainfall in the interior of South Africa. (4 x 2) (8)

[60]

QUESTION 2: GEOMORPHOLOGY

2.1 Refer to drainage basins **A** and **B** below which have different drainage densities. Match the descriptions in QUESTIONS 2.1.1 to 2.1.8 with **A** and **B**. Write down only **A** or **B** next to the question numbers (2.1.1 to 2.1.8) in the ANSWER BOOK, e.g. 2.1.9 **A**.



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

2.1.1 Higher drainage density

2.1.2 Lower infiltration rate

2.1.3 Denser vegetation

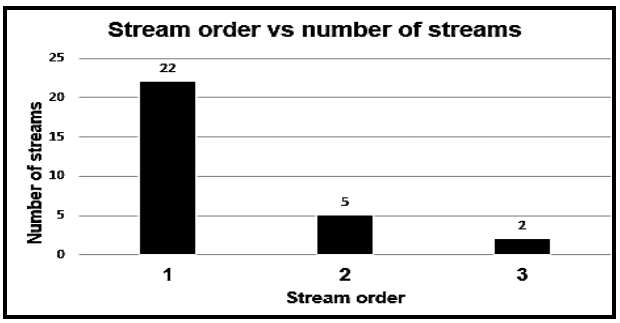
2.1.4 Higher soil moisture content

2.1.5 Developed on the least resistant (soft) rock

2.1.6 Lower degree of permeability

2.1.7 Higher stream order

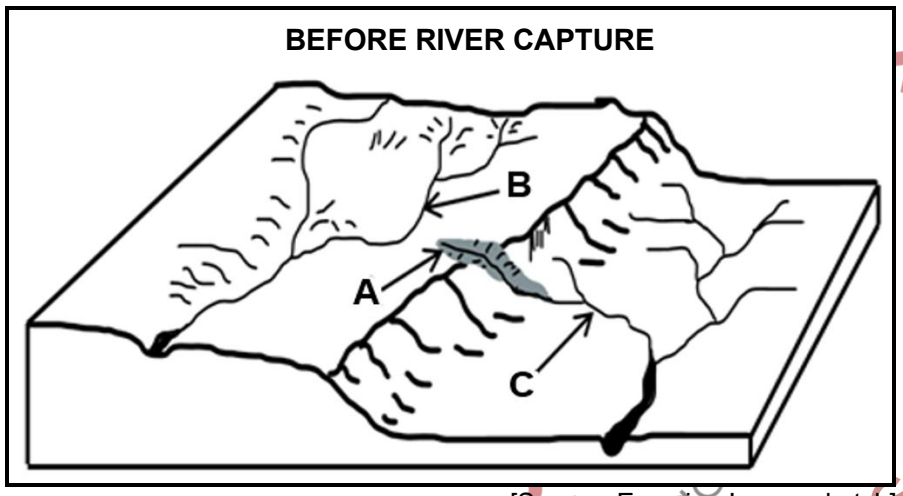
2.1.8 The graph below represents this drainage basin.



(8 x 1) (8)

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 numbers (2.2.1 to 2.2.7) in the ANSWER BOOK, e.g. 2.2.8. D.

Refer to the sketch below to answer QUESTIONS 2.2.1 to 2.2.3.



[Source: Examiner's own sketch]

2.2.1 … erosion at **A** is responsible for the lengthening of the river.

A Vertical
B Lateral
C Sheet
D Headward

2.2.2 The landform caused by the type of erosion in QUESTION 2.2.1 is a …

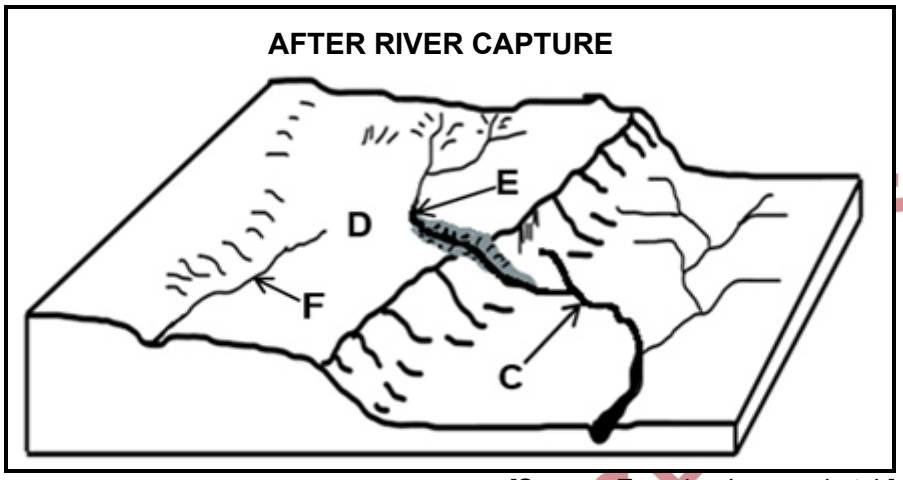
A spur.
B rapid.
C gorge.
D meander.

2.2.3 River **C** will eventually capture river **B** because it flows on a … gradient and over … rock.

(i) gentler
(ii) steeper
(iii) softer
(iv) harder

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

Refer to the sketch below to answer QUESTIONS 2.2.4 to 2.2.7.



[Source: Examiner's own sketch]

2.2.4 River **C** is known as the … stream.

A captive
B captor
C captured
D misfit

2.2.5 Feature **D** is referred to as …

A a waterfall.
B river gravel.
C a wind gap.
D an elbow of capture.

2.2.6 The resultant fluvial landform of river capture at **E** is a/an …

A meander.
B waterfall.
C misfit stream.
D oxbow lake.

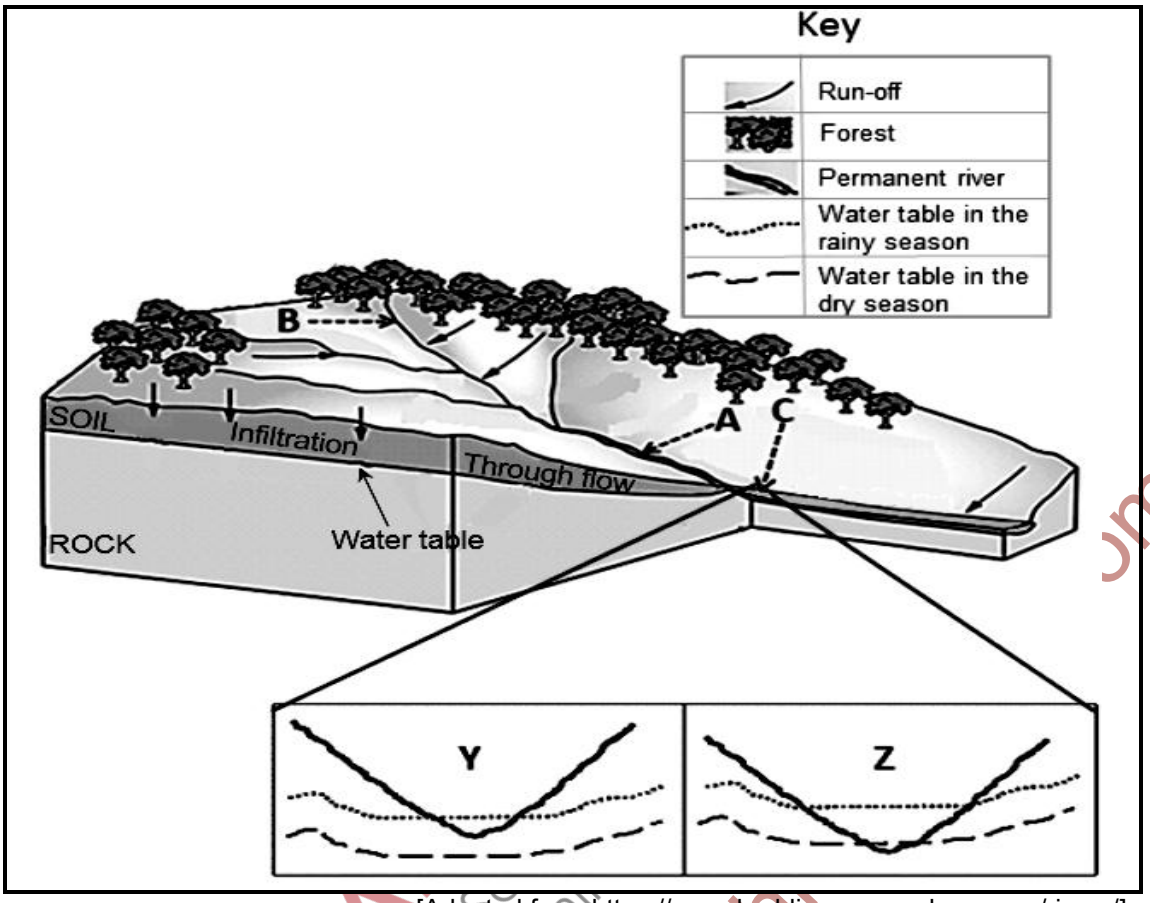
2.2.7 The characteristics of river **F** are that it flows in a … valley and the volume of water …

(i) wide
(ii) narrow
(iii) increases
(iv) decreases

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

(7 x 1) (7)

2.3 Refer to the drainage basin below.



[Adapted from https://www.buddinggeographers.com/rivers/]

2.3.1 The river illustrated in the sketch is (permanent/periodic). (1 x 1) (1)

2.3.2 State TWO characteristics of the river system evident in the sketch. (2 x 1) (2)

2.3.3 Give evidence from the sketch that the surface run-off is greater at **A** than at **B**. (2 x 2) (4)

2.3.4 Refer to **C**.

(a) Which ONE of the cross-sections **Y** or **Z** represents the river at point **C**? (1 x 2) (2)

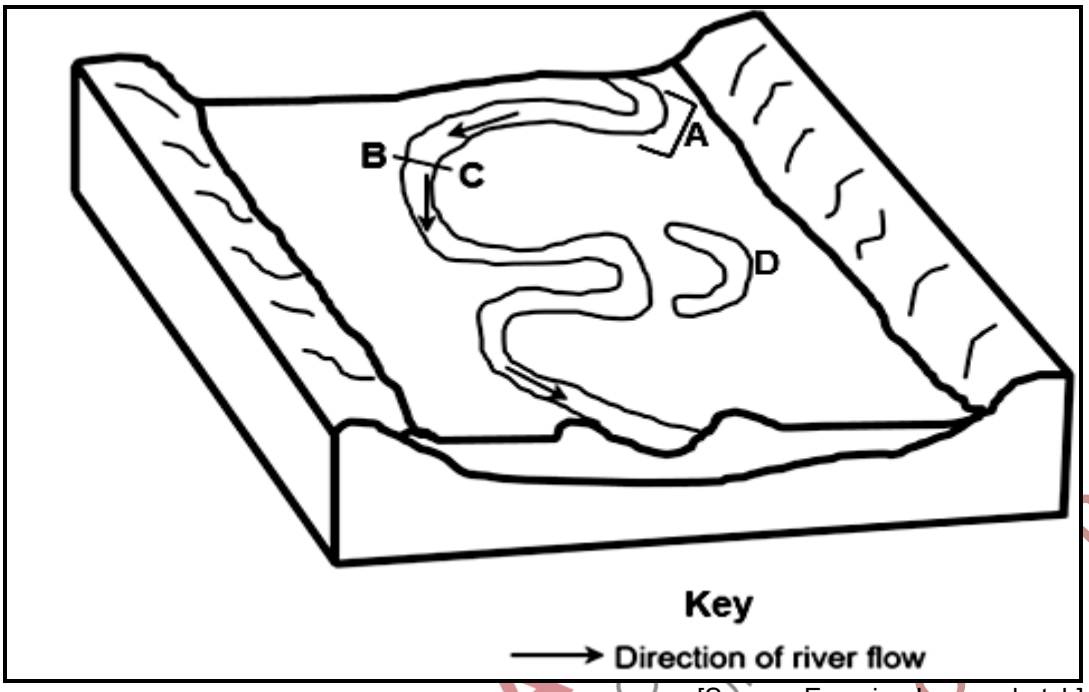
(b) Give a reason for your answer to QUESTION 2.3.4(a). (1 x 2) (2)

2.3.5 How will a decrease in precipitation affect the following:

(a) Water table (1 x 2) (2)

(b) Type of river (1 x 2) (2)

2.4 Refer to the sketch on fluvial landforms below.



[Source: Examiner's own sketch]

2.4.1 The fluvial landforms, illustrated in the sketch, are mainly found in the (middle/lower) course. (1 x 1) (1)

2.4.2 Identify fluvial landform **A** on the sketch. (1 x 1) (1)

2.4.3 (a) Draw a rough cross-section from **B** to **C**. (2 x 1) (2)

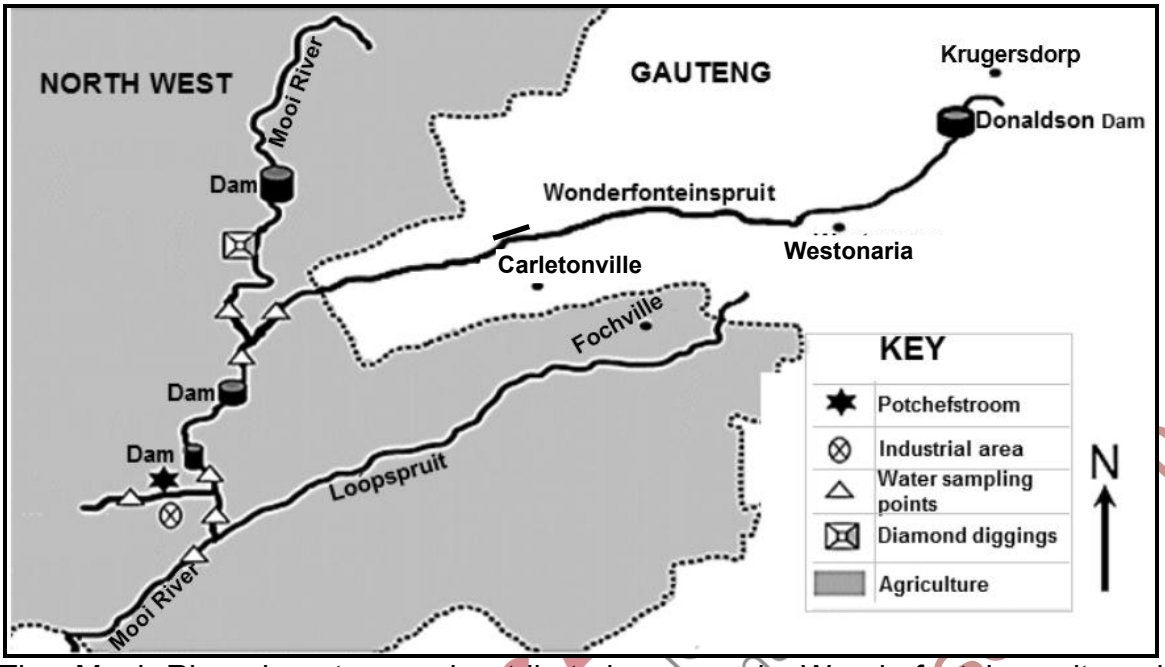
(b) Will erosion take place at **B** or **C**? (1 x 1) (1)

(c) Give a reason for your answer to QUESTION 2.4.3(b). (1 x 2) (2)

2.4.4 In a paragraph of approximately EIGHT lines, describe the processes that resulted in the change of fluvial landform **A** to an ox-bow lake at **D**. (4 x 2) (8)

2.5 Refer to the case study below on catchment and river management.

MOOI RIVER CATCHMENT AREA



The Mooi River has two major tributaries, namely Wonderfonteinspruit and Loopspruit. The Donaldson Dam in the upper Wonderfonteinspruit receives water from various sources, such as sewage facilities, mining areas and informal settlements, that has a negative impact on the quality of water.

The Mooi River flows south, through agricultural land, from where it eventually joins the Vaal River. The main types of land use in the Mooi River catchment area are crop farming and grazing.

According to the Department of Water Affairs (DWA), irrigation and farming are the two major activities polluting the waters of the Mooi River drainage basin, following the removal of natural vegetation. Some small-scale diamond diggings also occur along the Mooi River, destroying the flood plain and riparian (wetlands next to river banks) habitats.

[Adapted from a case study by S Barnard, A Venter and CE van Ginkel]

2.5.1 What does the abbreviation *DWA* in the extract stand for? (1 x 1) (1)

2.5.2 Refer to the case study and identify TWO sources that negatively impact the quality of water of the Donaldson Dam. (2 x 1) (2)

2.5.3 Why are the water sampling points (testing points) important? (1 x 2) (2)

2.5.4 How do agricultural practices in the Mooi River catchment area cause water pollution of the river system? (2 x 2) (4)

2.5.5 Suggest THREE sustainable strategies that can be implemented in order to maintain the quality of water in the Mooi River catchment area. (3 x 2) (6)

[60]

TOTAL SECTION A: 120

SECTION B

QUESTION 3: GEOGRAPHICAL SKILLS AND TECHNIQUES

GENERAL INFORMATION ON MERRIVALE

Coordinates: 29°31'S; 30°14'E

Merrivale is a town in the Umgungundlovu District Municipality in KwaZulu-Natal. It is 145 km north-west of Durban and 5 km south-east of Howick.

Merrivale experiences warm wet summers and dry winter seasons. The temperatures between winter and summer range from 5 °C to 32 °C. The topography within the surroundings of Merrivale varies in elevation from 1 018 metres to 2 308,8 metres above sea level.

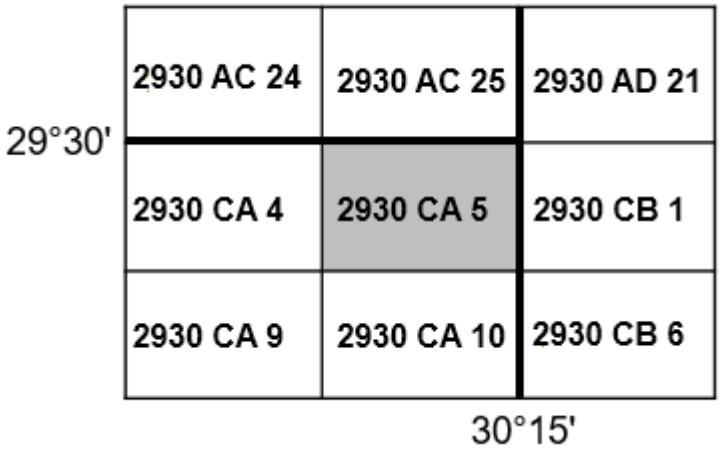
[Adapted from https://en.wikipedia.org/wiki/Merrivale]

The following English terms and their Afrikaans translations are shown on the topographic map:

ENGLISH	AFRIKAANS
Diggings	Delwery
Mooi River	Mooirivier
Sewerage Works	Rioolwerke
Nature Reserve	Natuurreservaat

3.1 MAP SKILLS AND CALCULATIONS

3.1.1 Study the information below. The orthophoto index map sheet west of 2930 CA 5 is …



A 2930 CB 1.
B 2930 CA 4.
C 2930 CB 6.
D 2930 CA 9. (1 x 1) (1)

3.1.2 The scale of 1 : 50 000 shows a … area and … detail as it is a smaller scale than 1 : 10 000.

(i) larger
(ii) smaller
(iii) less
(iv) more

A (i) and (iii)
B (i) and (iv)
C (ii) and (iii)
D (ii) and (iv) (1 x 1) (1)

Refer to the orthophoto map.

3.1.3 Calculate the straight-line distance in metres (m) that the power line covers from **6** in block **B3** to **7** in block **C5**.

Formula: **Actual Distance** = **Map distance x Map scale** (2 x 1) (2)

Refer to the topographic map.

3.1.4 Draw a freehand cross-section from the recreation facility at point **F** in block **D2** to point **G** in block **D3**. Indicate **F** and **G** on your cross-section. (2 x 1) (2)

3.1.5 Is the recreation facility at **F** in block **D2** intervisible from point **G** in block **D3**? (1 x 1) (1)

3.1.6 Calculate the magnetic declination for 2022. The difference in years is 6 years and the annual change is 9' westwards. (3 x 1) (3)

3.2 MAP INTERPRETATION

3.2.1 The wind that blows during the night in block **C2** on the orthophoto map is a/an ... wind.

A anabatic
B valley
C katabatic
D slope (1 x 1) (1)

Refer to block **D4** on the orthophoto map.

3.2.2 (a) Which time of the day (morning/afternoon) was the photograph taken? (1 x 1) (1)

(b) Give a reason for your answer to QUESTION 3.2.2(a). (1 x 2) (2)

3.2.3 Give a climatological reason for the large number of perennial water sources (dams) and furrows found on the topographic map. (1 x 2) (2)

Refer to river **H** in block **B1** on the topographic map.

3.2.4 (a) River **H** in block **B1** generally flows in a north-easterly direction. Give map evidence to support this statement. (1 x 1) (1)

(b) Give evidence why the type of flow of river **H** is associated with laminar flow. (1 x 2) (2)

3.2.5 The drainage pattern **I** encircled in blocks **C3** and **D3** on the topographic map is …

A trellis.
B dendritic.
C radial.
D rectangular. (1 x 1) (1)

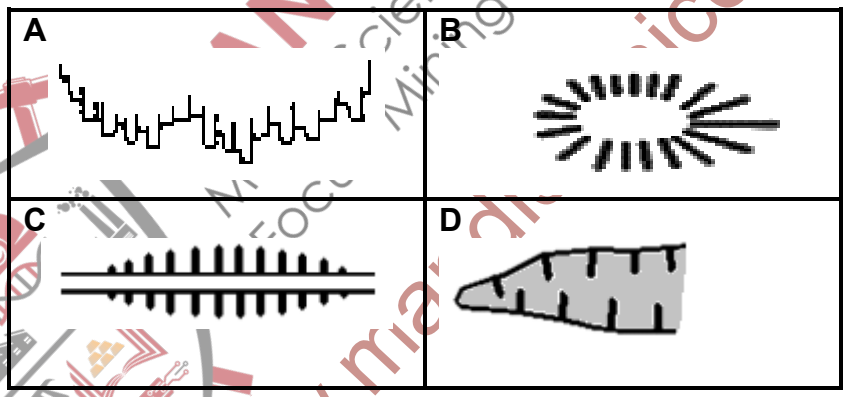
3.2.6 Describe the underlying rock structure that is responsible for the drainage pattern (answer to QUESTION 3.2.5). (1 x 2) (2)

3.3 GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

Refer to the photograph below that shows an environmental issue in block **C2** on the topographic map.

[Source :https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=5574]

3.3.1 Which symbol represents the environmental issue depicted in the photograph?



(1 x 1) (1)

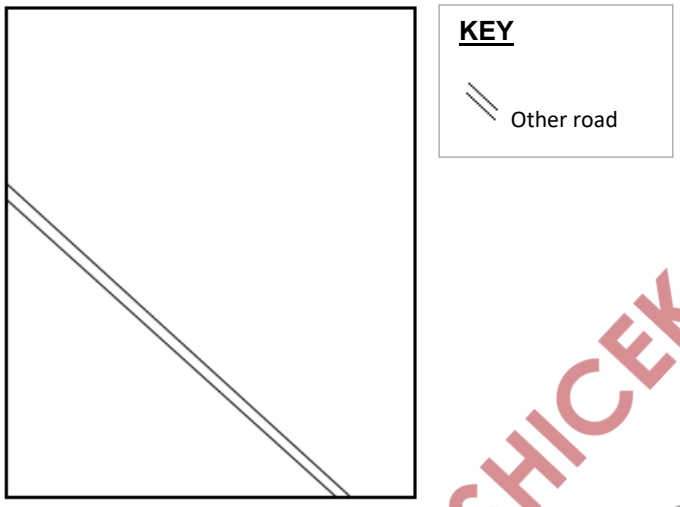
3.3.2 Classify the photograph as either primary or secondary data. (1 x 1) (1)

3.3.3 Give a reason for the high resolution of the photograph. (1 x 1) (1)

3.3.4 How would the high resolution of the photograph assist a GIS specialist to find a solution to the environmental issue depicted (answer to QUESTION 3.3.1)? (1 x 2) (2)

Refer to the sketch below of the infrastructure data layer in block **C3** on the orthophoto map.

Infrastructure data layer



3.3.5 Identify the missing infrastructure data layer, excluded (not indicated) on the sketch above. (1 x 1) (1)

3.3.6 Using the correct reference symbol, redraw the sketch and insert the infrastructure data layer identified in QUESTION 3.3.5. (2 x 1) (2)

TOTAL SECTION B: 30
GRAND TOTAL: 150