EXAMINATION	NATIONAL SENIOR CERTIFICATE
GRADE	12
DATE	NOVEMBER 2024
SUBJECT	GEOGRAPHY
PAPER	1
MARK TOTAL	150
DURATION (HOURS)	3
NUMBER OF PAGES	17

SOUTH AFRICAN COMPREHENSIVE ASSESSMENT INSTITUTE

SUID-AFRIKAANSE KOMPREHENSIEWE ASSESSERINGSINSTITUUT

INSTRUCTIONS AND INFORMATION

1. This question paper consists of **THREE** questions.

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

   SECTION B
   QUESTION 3: MAP SKILLS AND CALCULATIONS (30 MARKS)

2. Answer **ALL THREE** questions.

3. Leave a line between subsections of questions answered.

4. Start **EACH** question at the top of a **NEW** page.

5. Number the answers correctly according to the numbering system used in this question paper.

6. Answer questions in **FULL SENTENCES**, except where you have to state, name, identify or list. Write in full sentences when answering paragraph questions.

7. Units of measurement **MUST** be indicated in your final answer.

8. Draw fully labelled diagrams when instructed to do so.

9. You may use a non-programmable calculator.

10. Write neatly and legibly.

SECTION B: ADDITIONAL INSTRUCTIONS AND INFORMATION

11. Extracts of a 1:50 000 topographical map 3227AC CATHCART and a 1:10 000 orthophoto map 3227 AC 3 CATHCART, of a part of the mapped area, are provided.

12. Show all calculations. Marks are allocated for the calculations/steps and **NOT** full marks for the correct answer only. The correct substitution should be indicated for the stated formula.

13. Return the topographical map and orthophoto map to the invigilator at the end of the examination session.

SECTION A

QUESTION 1: CLIMATE AND WEATHER

1.1 Refer to the following statements regarding mid-latitude cyclones. Choose the correct word between brackets that proves each statement to be true. Write only the correct word on your answer sheet, e.g. 1.1.9 – south.

1.1.1 Winds blow around and into a mid-latitude cyclone in a (clockwise/ anticlockwise) direction in the Southern Hemisphere.

1.1.2 Mid latitude cyclones develop where (polar/tropical) easterly winds converge with westerly winds at 60° north and south of the equator.

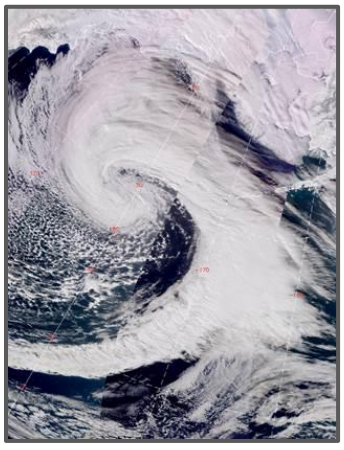
1.1.3 The (mature/occluded) stage is associated with a well-developed cold and warm front.

1.1.4 The change in direction as the systems pass over an area is called (backing/veering) in the Northern Hemisphere.

1.1.5 (Cumulonimbus/Nimbostratus) clouds form at the warm front as the air rises up the front.

1.1.6 When a cold front occlusion occurs, the air ahead of the cold front is slightly (warmer/colder) than the air behind the cold front.

1.1.7 The satellite image below shows a mid-latitude cyclone in the (Southern/ Northern) Hemisphere.



[Source: https://www.eoas.ubc.ca/courses/atsc113/snow/met_concepts]

1.1.8 Cold fronts mostly affect the Southern Cape during (summer/winter) months.

(8 x 1) = **[8]**

1.2 Four options are provided as possible answers to the following questions. Choose the answer and write only the correct letter (A–D) next to the question numbers (1.2.1 to 1.2.7) in the ANSWER BOOK, e.g. 1.2.8 A.

1.2.1 The … is the angle at which the sun's rays strike the slope.

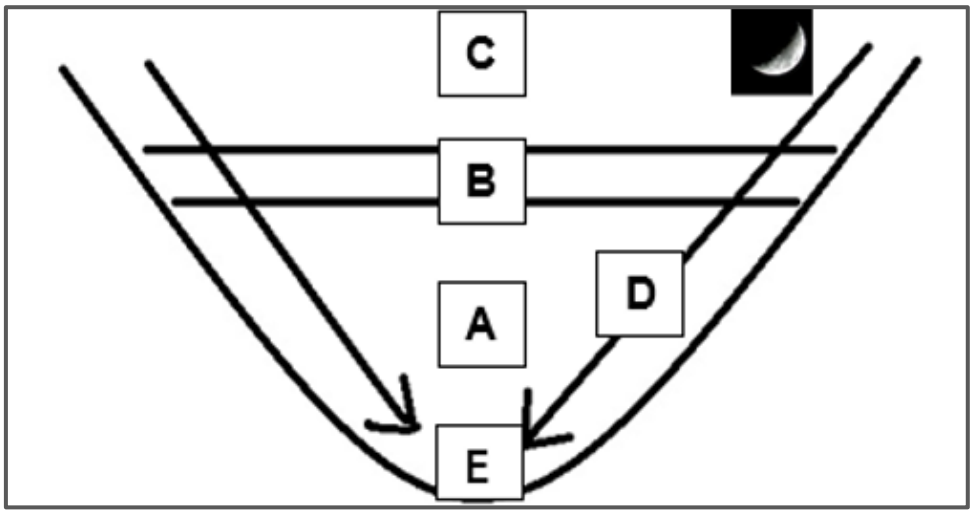
A insolation
B north facing slope
C slope aspect
D shadow zone

1.2.2 Because of the low angle of insolation during winter, a … develops on the … facing side of the valley in the Southern Hemisphere.

i. katabatic wind
ii. shadow zone
iii. south
iv. north

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

Use the sketch showing a valley inversion below to answer QUESTIONS 1.2.3–1.2.6.



[Source: Examiner's own sketch]

1.2.3 The air at **B** is ...

A warmer than at **A** and **C.**
B slightly colder than at **A**.
C warmer than at **A** but colder than at **C**.
D where the temperature in the valley decreases with height from **A** to **C**.

1.2.4 The arrow in the sketch labelled **D** represents …

A anabatic winds.
B katabatic winds.
C upslope winds.
D downslope winds.

1.2.5 When the temperature at **E** is below 0 °C, … will form on the valley floor.

A a shadow zone
B a katabatic area
C radiation fog
D a frost pocket

1.2.6 Where would the best place be to build a house in the valley?

A On the valley floor
B On the slope at **B**
C At the top of the slope
D In the shadow zone

1.2.7 Which of the following statements regarding radiation fog is NOT TRUE?

A It forms as a result of sublimation on the valley floor
B Droplets of water are suspended in the air.
C It forms on a valley floor during the night.
D It dissipates in the early morning due to terrestrial radiation.

(7 x 1) = **[7]**

1.3 Refer to the extract, satellite image and station model below:

CONSECUTIVE TROPICAL CYCLONES IN 2019'

>3,8M
PEOPLE AFFECTED

>1 000
DEATHS

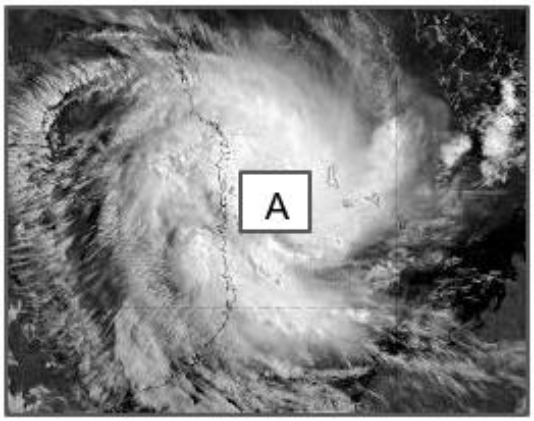
$511M
REQUIRED FUNDING

In March and April 2019, Southern Africa was hit by two consecutive tropical cyclones that left a trail of death, damage and destruction in their paths. In March, Tropical Cyclone Idai weather system's impact came in three waves: in early March, the low pressure system caused flooding in Malawi and in Zambezia and Tete provinces of Mozambique; on 14 March, Cyclone Idai made landfall near the port City of Beira tearing roofs off homes and buildings; finally, over the weekend of 16–17 March, the weather system carried torrential rains across multiple areas in Mozambique – leaving 3 000 km2 of land submerged and stranding people on houses and trees – and Zimbabwe, where landslides devastated villages. On 24 April, Tropical Cyclone Kenneth passed by the Comoros Islands, hitting the northern island of Ngazidja and flooding several villages. The cyclone made landfall in Cabo Delgado province of Mozambique the following day, flattening entire villages. This was the first time in recorded history that two cyclones struck the coast of Mozambique in such close succession, and the furthest north that a cyclone had ever made landfall in the country.

Overall, it is estimated that more than 3,8 million people were affected by the cyclones and floods in the four countries. The storms impacted health and education facilities in all four countries, and caused significant displacement and protection concerns. In Mozambique alone, nearly 285,000 houses were destroyed or damaged. Both cyclones swept through the region during the main harvest, destroying hundreds of thousands of acres of crops, which will significantly impact food security in the months ahead. The humanitarian response in all four countries, led by the respective governments, rapidly scaled up, reaching more than 3 million people.

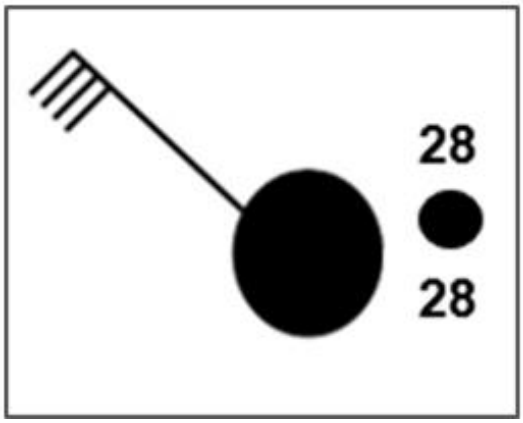
[Source: https://reliefweb.int/report/mozambique/southern-africa-cyclones]

SATELLITE IMAGE OF CYCLONE KENNETH



[Source: https://www.news24.com/news24/bi-archive]

WEATHER STATION MODEL



[Source: Examiner's own sketch]

1.3.1 Which cyclone happened first? (1x1) (1)

1.3.2 Give ONE piece of evidence from the <u>cloud pattern</u> in the satellite image to prove that Kenneth developed in the Southern Hemisphere. (1x1) (1)

1.3.3 Explain how the eye of a tropical cyclone develops. (1x2) (2)

1.3.4 Refer to the weather station model and **A** on the satellite image.

(a) State the amount of cloud cover indicated on the weather station model and the type of cloud that would be appearing at this location.

(2x1) (2)

(b) Comment on the humidity at **A.**

(1x1) (1)

(c) Explain your answer to QUESTION 1.3.4 (b) by referring to the weather station model.

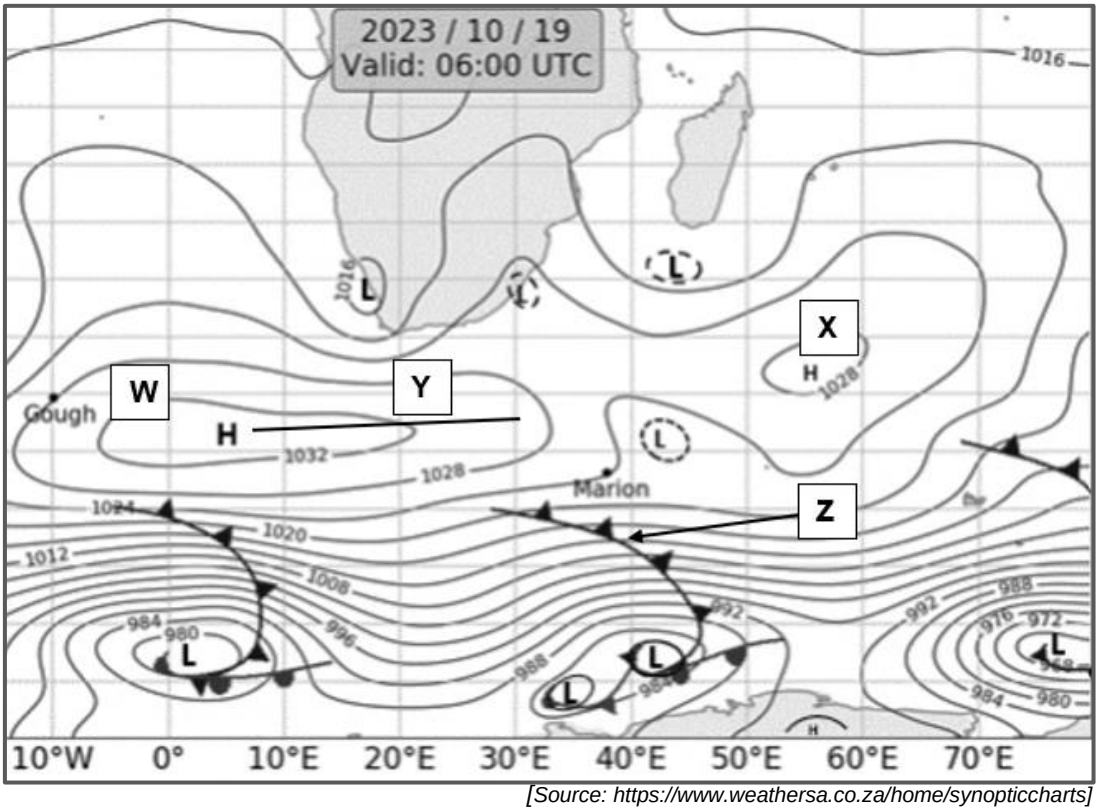
(1x2) (2)

1.3.5 Discuss how the weather conditions associated with tropical cyclones such as Idai and Kenneth affected the people that lived in its path. (3x2) (6)

[15]

1.4 Refer to the extract from the synoptic weather map below.

SYNOPTIC WEATHER MAP OF SOUTH AFRICA ON 19 OCTOBER 2023



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

1.4.1 Identify the high pressures cells labelled:

(a) **W** and

(b) **X** on the synoptic weather map extract. (2x1) (2)

1.4.2 (a) Give the term used to describe the elongated shape of **W** along the line **Y**. (1x1) (1)

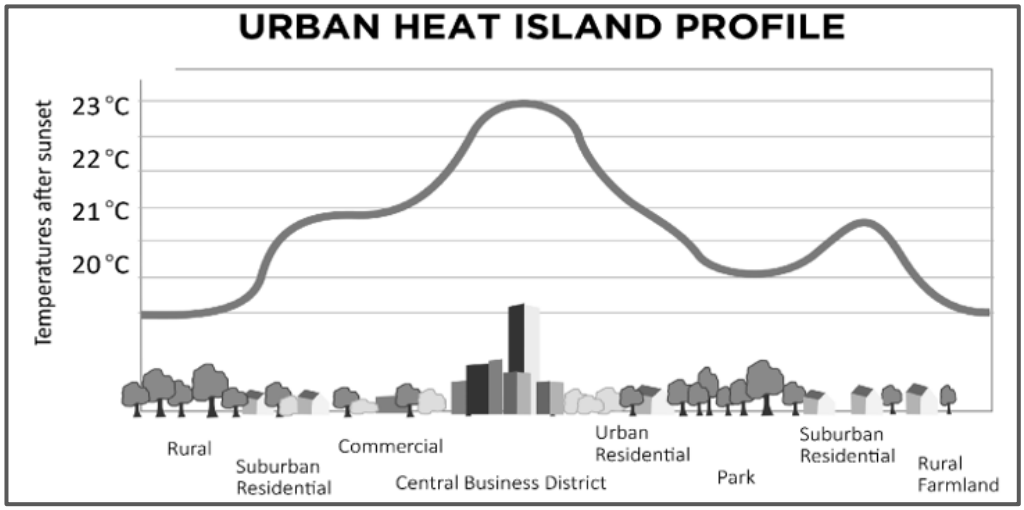
(b) Explain how the shape and position of cell **W** influences the winds over Cape Town. (2x2) (4)

(c) Discuss one advantage and one disadvantage of the winds mentioned in QUESTION 1.4.2 (b). (2x2) (4)

1.4.3 Predict the impact of the front **Z** on the weather of Marion Island during the next 12–16 hours as **Z** moves over Marion Island. (2x2) (4)

[15]

1.5 Refer to the urban heat island profile below.



[Source: https://www.metlink.org/fieldwork-resource/urban-heat-island-introduction]

1.5.1 Define the term *urban heat island*. (1x2) (2)

1.5.2 State the temperature over the central business district. (1x1) (1)

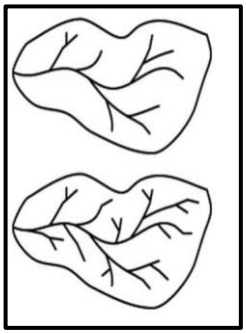
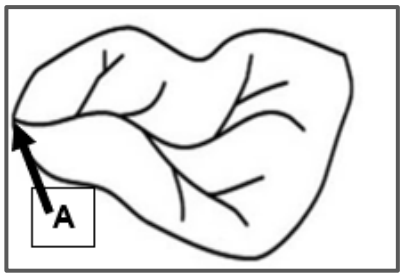
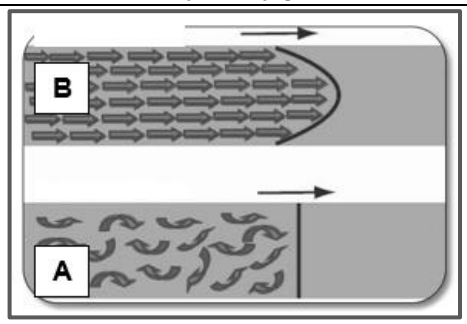
1.5.3 Explain the role of artificial surfaces and high-rise buildings on the high temperatures that are experienced over the central business district. (2x2) (4)

1.5.4 In a **paragraph of 8–10 lines**, discuss ways in which the urban heat island effect can be reduced. (4x2) (8)

[15]

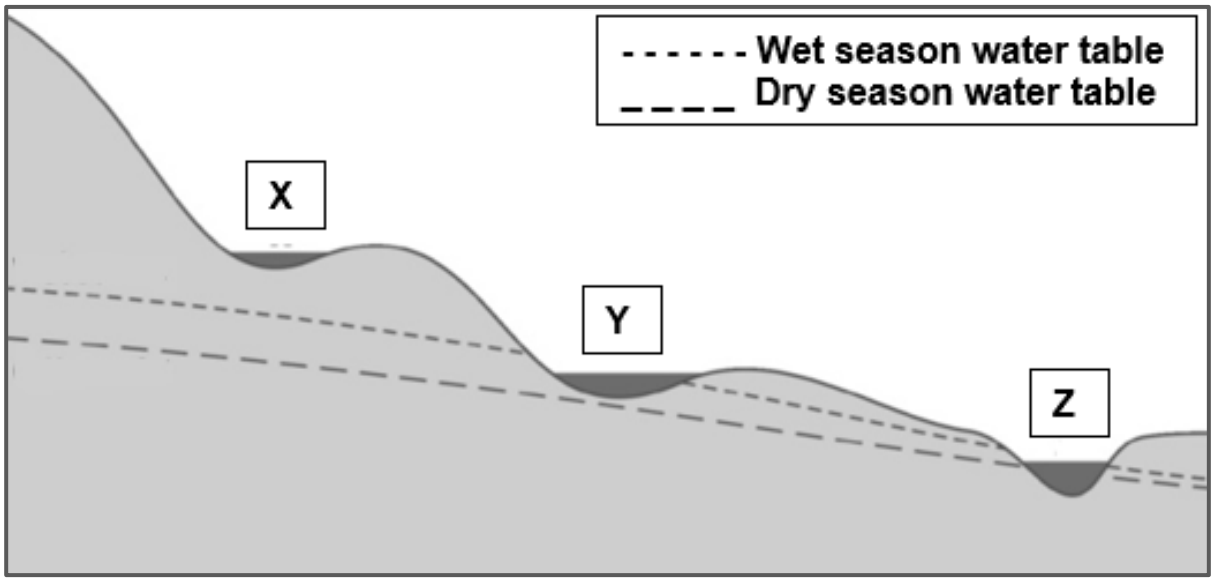
QUESTION 2: GEOMORPHOLOGY

2.1 Choose the correct option from COLUMN B that matches the statement/diagram in COLUMN A. Write only **Y** or **Z** next to the question numbers (2.1.1 to 2.1.7) in your answer book, e.g. 2.1.8 **Y.**

COLUMN A		COLUMN B	
2.1.1	The total length of streams per unit area of a drainage basin	**Y** **Z**	Discharge Drainage density
2.1.2	An example of a low drainage density	**Y** **Z**	 *[Source: https://www.youtube.com/]*
2.1.3	High evaporation rates would result in …	**Y** **Z**	high drainage density low drainage density
2.1.4	An area with high infiltration rates would result in a drainage density with a …	**Y** **Z**	coarse texture fine texture
2.1.5	The stream order at **A** is…  *[Source: https://www.youtube.com/watch?app=desktop&v=4yhlbJY6y1]*	**Y** **Z**	4 3
2.1.6	 *[Source: https://www.dws.gov.za/Groundwater/Groundwater]*	**Y** **Z**	**B** is turbulent flow and **A** is laminar flow. **B** is laminar flow and **A** is turbulent flow.
2.1.7	The discharge of a river in the upper course often has a … flow.	**Y** **Z**	laminar turbulent

(7 x 1) = **[7]**

2.2 Refer to the diagram of a river profile below and provide correct responses for the statements:



[Source: https://www.education.gov.za/Portals/0/Documents/mindset learn]

2.2.1 The process whereby water seeps into the soil. (1x1) (1)

2.2.2 Groundwater that seeps into the river when the water table lies above the bed of the river. (1x1) (1)

2.2.3 Type of river at:

(a) **Y** and
(b) **Z** (2x1) (2)

2.2.4 River, **X**, **Y** or **Z** flows throughout the year. (1x1) (1)

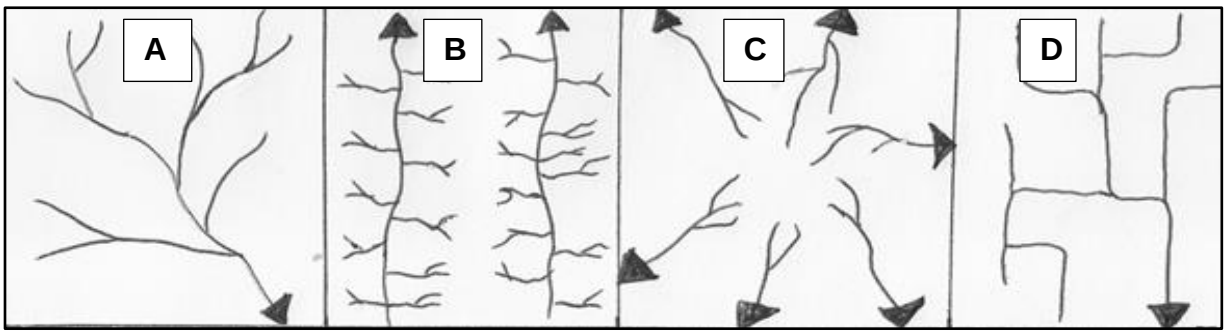
2.2.5 The condition needed for river **X** to flow. (1x1) (1)

2.2.6 A river that rises in high rainfall areas but flows for most of its course through arid regions is an (episodic/exotic) river. (1x1) (1)

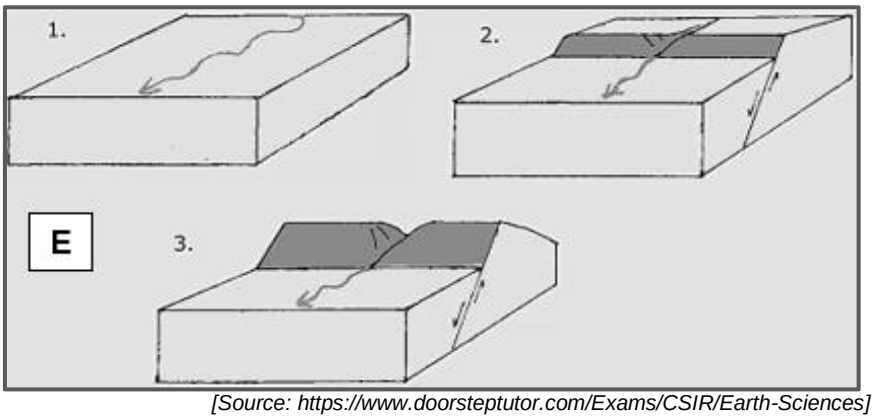
2.2.7 The name of the river that forms the border between South Africa and Namibia that is an example of the type of river mentioned in QUESTION 2.2.6. (1x1) (1)

[8]

2.3 Refer to the diagrams representing different drainage patterns **(A–E)** below.



[Source: Examiner's own sketch]



[Source: https://www.doorsteptutor.com/Exams/CSIR/Earth-Sciences]

2.3.1 Identify the drainage pattern at:

(a) **A** and
(b) **B** (2x1) (2)

2.3.2 Compare the underlying rock structure at **A** and **B**. (2x2) (2)

2.3.3 Which of the four drainage patterns (**A–D**) can develop on a dome where the streams flow outwards and downhill? (1x1) (1)

2.3.4 (a) Which drainage pattern, not represented in the diagram, occurs on very flat areas that have experienced recent glaciation? (1x1) (1)

(b) Describe the characteristics of the drainage pattern mentioned in QUESTION 2.3.4 (a). (1x2) (2)

2.3.5 The drainage pattern at **E** develops over time and does not relate to the rock structure and relief of the area.

(a) Identify the drainage pattern at **E**. (1x1) (1)

(b) Explain how the drainage pattern that you identified in QUESTION 2.3.5 (a) develops. (3x2) (6)

[15]

2.4 Refer to the extract, diagrams, photograph and the flow hydrograph below. They represents a fluvial landform in the lower course of a river:

LEVEES AND FLOOD PREVENTION: HOW DOES THE FORMATION OF A NATURAL LEVEE IMPACT FLOODING?

February 22, 2023

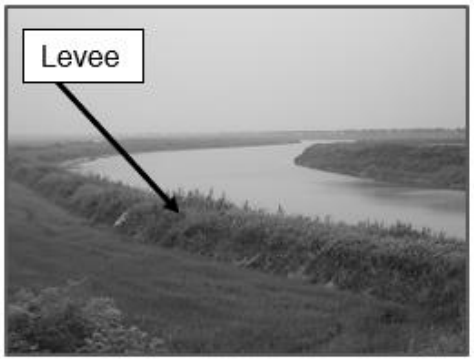
A levee can be a key asset in preventing major flooding from a river, lake, or ocean. Natural levees withstand immense weight and pressure from flooding caused by storm surges.
While a river levee creates a barrier against flooding in its immediate vicinity, it may also make flooding more likely to occur in other spots along the river. This is because the build-up can constrict the water as it flows through the river, which builds up pressure and can make flooding more likely further downstream.

[Source: Adapted from https://trapbag.com/how-formation-natural-levee]

FORMATION OF A LEVEE

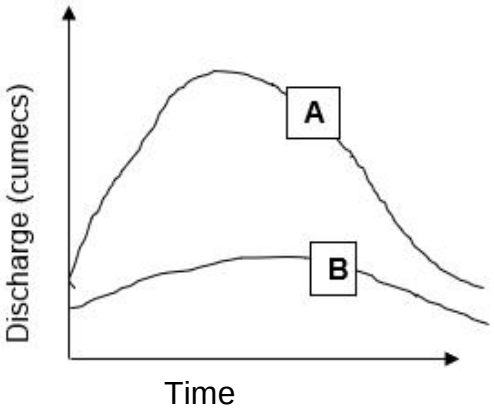
[Source: https://mr-carter-s-igcse-geography/rivers/deposition-flood-plains]

PHOTOGRAPH OF A LEVEE



[Source: https://www.tes.com/teaching-resource/formation]

SIMPLIFIED FLOW HYDROGRAPH



[Source: Examiner's own sketch]

2.4.1 Define the term *fluvial landform*. (1x2) (2)

2.4.2 State the fluvial process that occurs in the lower course of a river that is responsible for the formation of levees. (1x1) (1)

2.4.3 Describe the formation of a levee by referring to the diagrams. (1x2) (2)

2.4.4 Which graph (**A** or **B**) represents the flow condition during which water will leave the river channel? (1x2) (2)

2.4.5 According to the extract, a levee can be a key asset in preventing flooding. In a **paragraph of 8–10 lines,** explain TWO advantages and TWO disadvantages of flood prevention for farming activities on the banks of a river with a levee. (4x2) (8)

[15]

2.5 Refer to the information about the Sundays River drainage basin below.

ACTIVITIES IN THE SUNDAYS RIVER BASIN

The source of the Sundays river is in the Compassberg mountains in the Eastern Cape. The river (250 km long) is said to be the fastest flowing river in South Africa. It empties into the Indian Ocean at Algoa Bay after passing through the village of Colchester which is 40 km east of Gqeberha (Port Elizabeth).

The valley through which it flows is renowned for its game and nature reserves, in particular the Addo Elephant National Park. There are numerous hunting lodges and holiday farms which offer exciting activities such as game viewing, fishing, canoeing, bird watching, hiking, boating, horse riding and 4 x 4 trails.

In the Addo Elephant National Park, limited water resources and overgrazing has led Sanparks to start experimenting with a method to divert elephants from waterholes. An apparatus has been installed at two water holes to allow other animals better access and to protect the integrity of the surrounding veld. This measure is part of the parks strategy to manage the limited water resources, vegetation diversity and an increasing elephant population.

[Source adapted from: https://www.south-african-hotels.com/suburb/sundays-river https://pearsonpark.co.za/activities/https://saasta.ac.za/getsetgo/issues/201705]

2.5.1 Explain the concept *mouth of a river*. (1x2) (2)

2.5.2 State the location of the mouth of the Sundays River. (1x1) (1)

2.5.3 Identify the recreational activity, that a tourist can partake in when staying at a holiday farm <u>on the banks</u> of the Sundays River. (1x1) (1)

2.5.4 Name ONE economic advantage for the people living in the area of using the Sundays River as a tourist attraction. (1x1) (1)

2.5.5 Explain TWO ways in which the activity, mentioned in QUESTION 2.5.3, can negatively affect the health of the Sundays River flowing through a holiday farm. (2x2) (4)

2.5.6 Quote from the extract to explain why Sanparks started to divert elephants from two water holes in the Addo Elephant National Parks. (1x2) (2)

2.5.7 Discuss TWO strategies, excluding the one mentioned in the extract, that Sanparks can implement to manage the limited water resources in the park. (2x2) (4)

[15]

TOTAL QUESTION 2: [60]

SECTION B

QUESTION 3: GEOGRAPHICAL SKILLS AND TECHNIQUES

Refer to the 1:50 000 topographical map extract from 3227AC CATHCART as well as the orthophoto map which represents part of the topographical map area.

3.1 MAP SKILLS AND CALCULATIONS

3.1.1 The scale of the topographical map is … than that of the orthophoto map.

A 5 times smaller
B 10 times smaller
C 5 times bigger
D 10 times bigger (1x1) (1)

3.1.2 The bearing from Trigonometrical Station (Δ) 508 to spot height 1518, both in block **C2** on the topographical map is …

A 329°
B 149°
C 59°
D 239° (1x1) (1)

3.1.3 The aerial photograph used to develop the orthophoto map was taken between …

A 08:00 and 10:00.
B 10:00 and 12:00.
C 12:00 and 14:00.
D 14:00 and 16:00. (1x1) (1)

3.1.4 Draw a free-hand sketch of the slope from spot height 1431 in the northwestern corner of the orthophoto map to the road at **1**. (2x1) (2)

3.1.5 Calculate the vertical exaggeration of a cross section that is drawn from the orthophoto map using a vertical scale of 1 cm = 10 m. SHOW ALL CALCULATIONS.
Formula: Vertical exaggeration = Vertical scale / Horizontal scale (5x1) (5)

[10]

3.2 MAP INTERPRETATION

Refer to the topographical map and orthophoto map.

3.2.1 The area has extreme diurnal (day/night) temperature changes. What is the function of the trees which line the N6 road labelled **1** on the orthophoto map?

A Avenue
B Windbreak
C Fence
D Boundary (1x1) (1)

3.2.2 The local winds in the valley, just north of the school labelled **2** on the orthophoto map, will move … during the day.

A south-east to north-west
B north-west to south-east
C north-east to south-west
D south-west to north-east (1x1) (1)

3.2.3 Refer to the river system demarcated in block **D1** on the topographical map.

(a) Determine the direction of stream flow of the river system in block **D1**. (1x1) (1)

(b) Give ONE piece of evidence from block **D1** to substantiate your answer to QUESTION 3.2.3 (a). (1x2) (2)

(c) Name the stage of the river at **F**. (1x1) (1)

(d) Draw a labelled cross profile sketch of the river at **F**. (2x1) (2)

3.2.4 Refer to the woodland area to the west of the town of Cathcart at **H** on the topographical map.

(a) Explain why the trees would grow well on the south-facing slope of the Windvoëlberg Mountain. (1x2) (2)

(b) Discuss how the woodland area influences the infiltration of rainfall on the slope. (1x2) (2)

[12]

3.3 GEOGRAPHIC INFORMATION SYSTEMS

3.3.1 The data layer mainly responsible for the siting of the golf course at **4** and not on the other side of the national road, on the orthophoto map is …

A soil.
B drainage.
C slope.
D vegetation. (1x1) (1)

3.3.2 What type of spatial object is the golf course referred to in QUESTION 3.3.1? (1x1) (1)

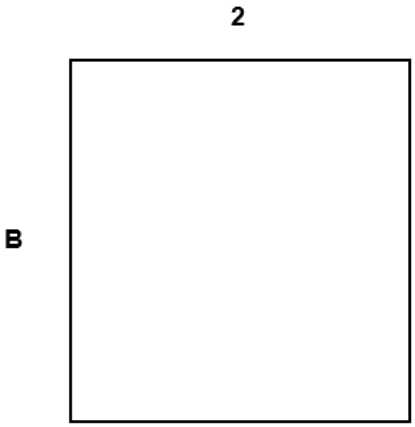
3.3.3 (a) Define the term *remote sensing*. (1x2) (2)

(b) How can remote sensing be used to monitor the water levels of the dam at **5** on the orthophoto map? (1x2) (2)

3.3.4 The map symbols used on a topographical map are examples of data standardisation.

(a) What colour is used to indicate drainage on the topographical map? (1x1) (1)

(b) Draw a rectangle in your answer book like the one below to represent block **B2** on the topographical map. Use the correct map symbol to indicate the position of the reservoir in the block that you drew.



(1x1) (1)

[8]

QUESTION 3: [30]

GRAND TOTAL: [150]

THIS PAGE IS FOR ROUGH WORK ONLY.