EXAMINATION	NATIONAL SENIOR CERTIFICATE
GRADE	12
DATE	MAY/JUNE 2025
SUBJECT	GEOGRAPHY
PAPER	1
MARK TOTAL	150
DURATION (HOURS)	3
NUMBER OF PAGES	20

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. Eg.1022 hPa / 16°C / 38 m.
8. Draw fully labelled diagrams when instructed to do so.
9. You may use a non-programmable calculator.
10. You may **NOT** use a scale ruler.
11. Write neatly and legibly, in **BLUE** ink only.

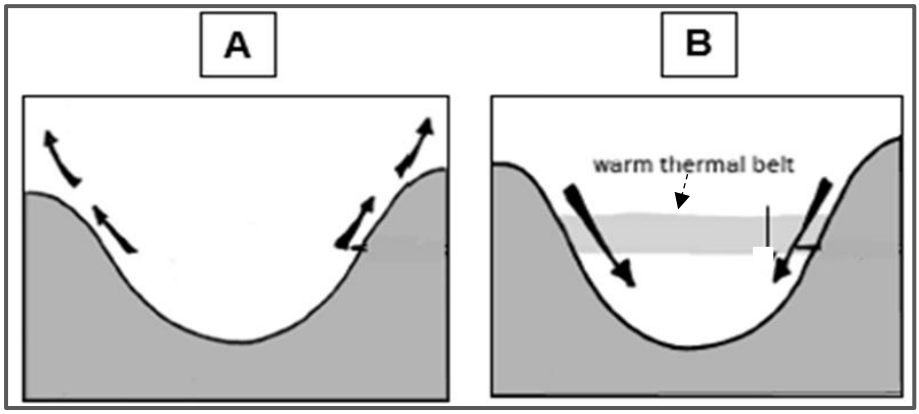
SECTION B: ADDITIONAL INSTRUCTIONS AND INFORMATION

12. Extracts of a 1:50 000 topographical map **2630AA CAROLINA** and a 1:10 000 orthophoto map **2630 AA 8 CAROLINA**, of a part of the mapped area, are provided.
13. The position of features is indicated with capital letters **G**, **H, I** … etc. on the topographical map and numbers **1**, **2** … etc. on the orthophoto map, if applicable.
14. Show all your 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.
15. 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 The diagrams show microclimatic changes in a valley.



[Source adapted from: https://www.elimuza.com/grade-12/grade-12-study-guides]

1.1.1 Choose the correct word between the brackets:

The variations in the conditions in a valley as seen in Diagrams **A** and **B** happen (seasonally/daily). (1x1) (1)

1.1.2 a) Identify the wind shown by the arrows in Diagram **A**. (1x1) (1)

b) Identify the wind shown by the arrows in Diagram **B**. (1x1) (1)

1.1.3 Choose the correct word between the brackets:

The winds indicated by the arrows in Diagram **A** develop in the (day/night) because of (insolation/re-radiation) on the valley floor. (2x1) (2)

1.1.4 Choose the correct word/s between the brackets:

a) The thermal belt, shown in Diagram **B,** is trapped by air from a (descending/ascending) high pressure cell. (1x1) (1)

b) The air at the bottom of the valley in Diagram **B** can sometimes form a frost pocket because temperatures may (drop below zero /be zero) degrees. (1x1) (1)

(7)

1.2 Choose the correct word/concept from the list given below to make each of the following statements true. Write only the question numbers (1.2.1 to 1.2.8) and the correct answer in your ANSWER BOOK. You may use each word only once, e.g. 1.2.9 Trees.

Cooler, High-rise buildings, Humidity, Precipitation, Hygroscopic nuclei, Transpiration, Pollution dome, Acid rain, Evaporation, Roof gardens, Light reflective, Dark, Smog, Inversion layer, Warmer

1.2.1 The temperature in the central part of the city is … than the surrounding suburban and rural areas.

1.2.2 … have large surface areas that absorb heat.

1.2.3 … from water surfaces reduces the temperature of the surrounding area.

1.2.4 In cities there are more … that water vapour can condense around, increasing the frequency of precipitation in cities.

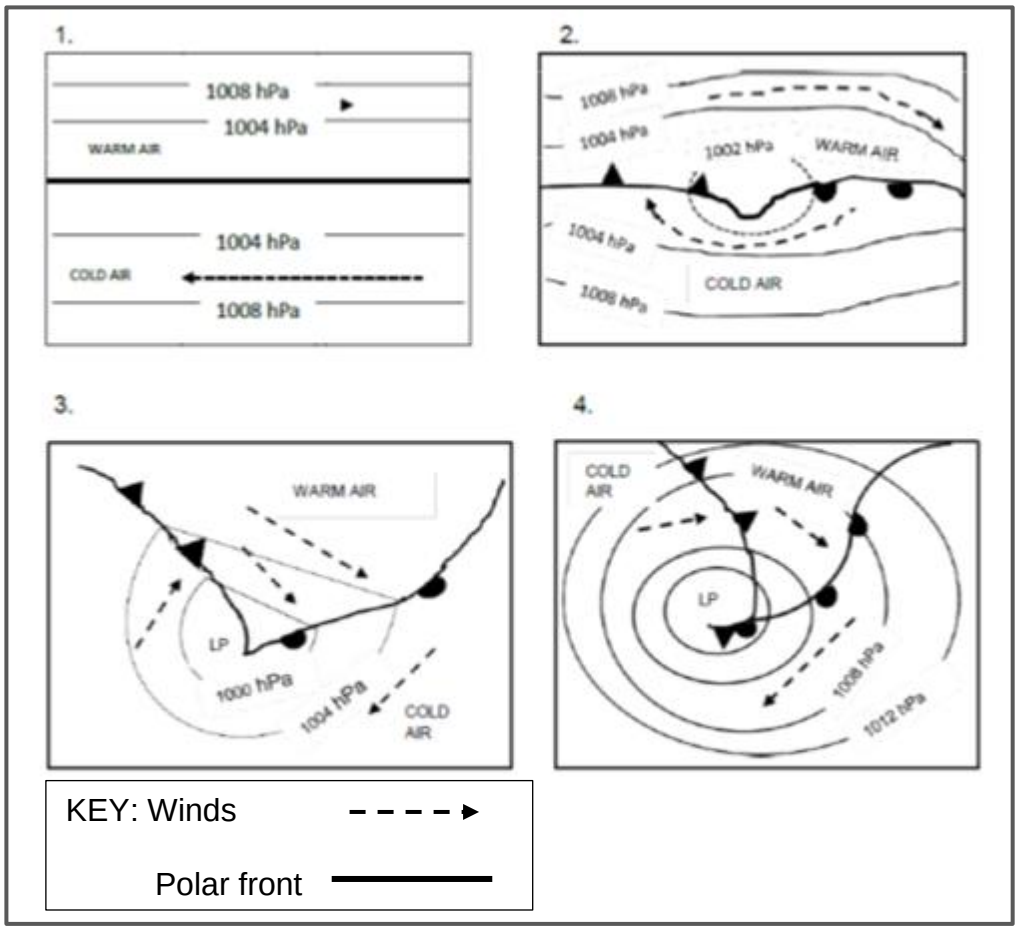
1.2.5 … forms when sulphur dioxide and nitrogen oxides mix with rainwater.

1.2.6 Air pollution often mixes with fog in cities to form …

1.2.7 The … contributes to the formation of a pollution dome over the city.

1.2.8 The use of air conditioners can be reduced by painting the roofs of buildings with/in … colours. (8x1) **(8)**

1.3 Refer to the diagrams below showing the stages of development of a mid-latitude cyclone in the Southern Hemisphere.



[Source: Examiner's own sketch]

1.3.1 Identify the winds referred to as "cold air" in Stage **1**. (1x1) (1)

1.3.2 What is the latitude/area where the boundary between the two air masses in Stage **1** occur? (1x1) (1)

1.3.3 Name Stage **2** of this system**.** (1x1) (1)

1.3.4 List the types of clouds associated with the two fronts in Stage **3**. (2x1) (2)

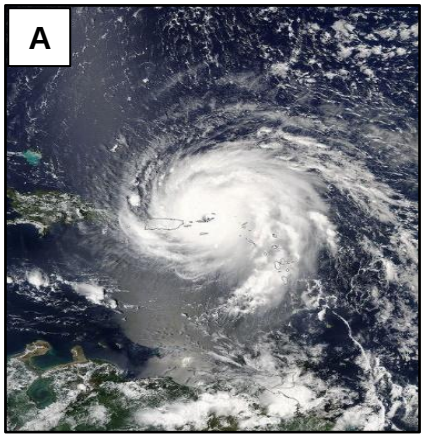
1.3.5 Describe the processes taking place in the mid-latitude cyclone marked Stage **4.** (2x2) (4)

1.3.6 The interior of South Africa experiences very different conditions to those experienced by the Western Cape when a mid-latitude cyclone moves over the country. Discuss the differences in the weather experienced in each of these areas. (3x2) (6)

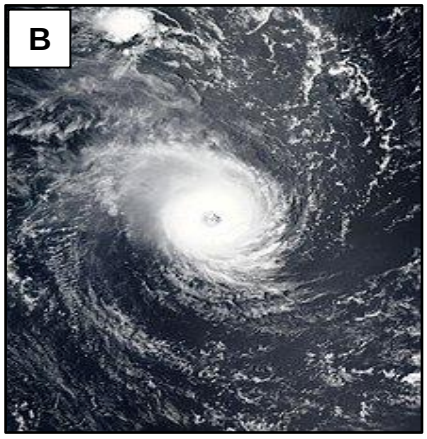
(15)

1.4 The satellite images show types of weather systems that bring violent weather conditions to areas and cause great destruction.

SATELLITE IMAGES



[Source: https://climateanalytics.org/]



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

1.4.1 Identify the type of weather system in the satellite images. (1x1) (1)

1.4.2 At which latitudes do these systems develop? (1x1) (1)

1.4.3 These weather systems occur on the eastern sides of continents in the Northern and Southern Hemisphere.

a) Which of the two satellite images, **A** or **B**, shows the weather system in the Southern Hemisphere? (1x1) (1)

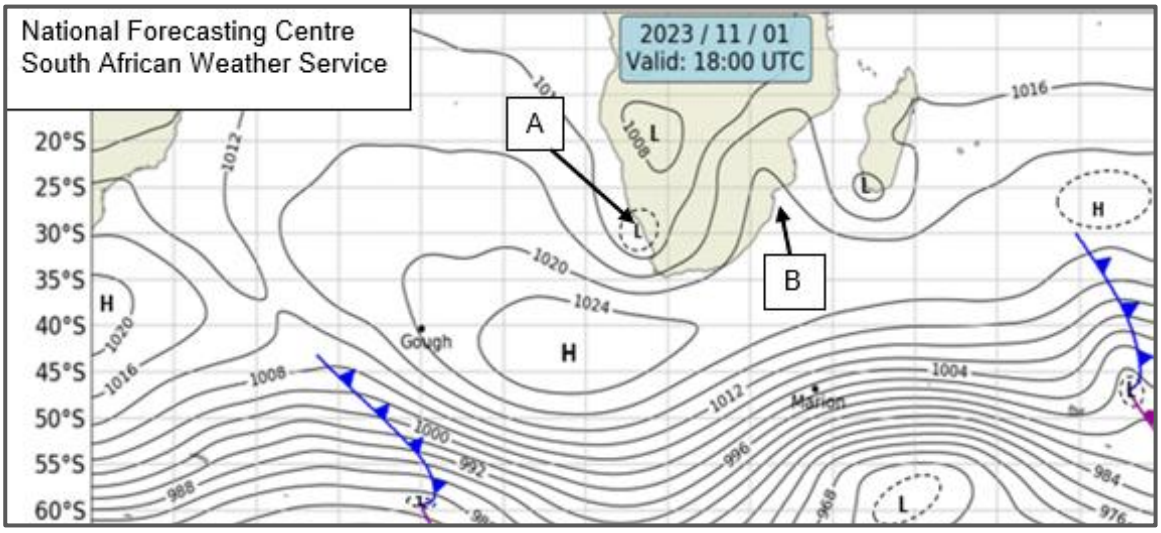
b) Justify your answer to QUESTION 1.4.3 a) with evidence from the satellite images. (1x2) (2)

c) Why do these weather systems occur on the eastern side of continents? (1x2) (2)

1.4.4 In a paragraph of **8 to 10 lines**, discuss how authorities can prepare for and manage the destruction caused by these weather systems. (4x2) (8)

(15)

1.5 A synoptic weather map of Southern Africa showing typical zonal flow south of 45° S latitude, a ridging high pressure south of the country and an absence of any mid-latitude cyclone near the land.



[Source: https://afriwx.co.za/images/synoptic-chart-weather-south-africa]

1.5.1 Identify the season represented by the synoptic weather map. (1x1) (1)

1.5.2 a) Name the pressure cell labelled **A**. (1x1) (1)

b) Describe the directional movement along the coast, of the cell labelled **A.** (2x1) (2)

1.5.3 Explain how the clockwise circulation of air into the cell at **A** impacts on the weather of the area in its current position. (2x2) (4)

1.5.4 a) Would you expect berg winds to blow towards the coast affecting the area at **B**? (Yes/No) (1x1) (1)

b) Justify your answer to QUESTION 1.5.4 a) by referring to the conditions (pressure cell distribution) that give rise to berg winds. (3x2) (6)

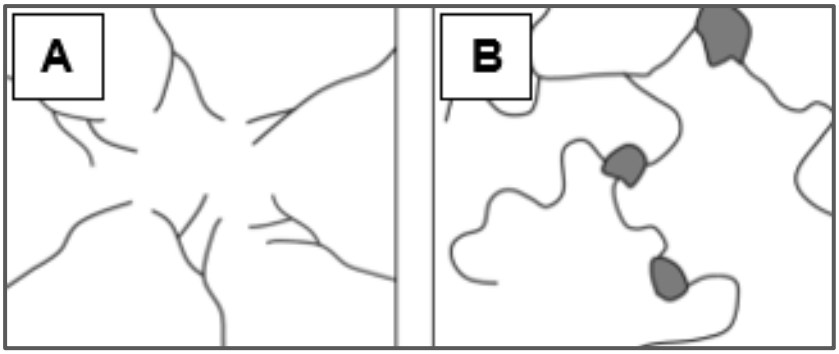
(15)

TOTAL QUESTION 1: [60]

QUESTION 2: GEOMORPHOLOGY

2.1 Four options are provided as possible answers to the following questions. Choose the correct answer and write only the question numbers (2.1.1 to 2.1.8) and the correct letter (A–D) in your ANSWER BOOK, e.g. 2.1.9 A.

Refer to the diagrams showing two drainage patterns below to answer QUESTIONS 2.1.1 to 2.1.2.



[Source: https://openoregon.pressbooks.pub/earthscience]

2.1.1 A … drainage pattern is formed at **A** around a central high lying area where streams flow outwards.

A rectangular
B centripetal
C trellis
D radial

2.1.2 The drainage pattern at **B** would typically form in an area …

A with well jointed igneous rocks.
B where there are parallel fold mountains.
C where the gradient and rock types are uniform.
D that was covered by an ice sheet which has melted.

2.1.3 Which of the following statements DO NOT apply to the river in the photograph below?

[Source: Examiner's own photograph]

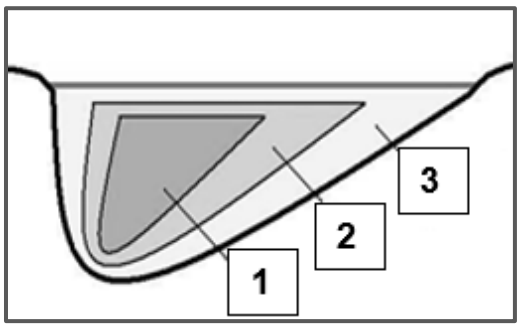
A The water flows in sheets.

B The riverbed is uneven.

C The flow of the river is laminar.

D The gradient of the river is gentle.

2.1.4 The speed of the river in the meandering channel below is the fastest at …



[Source: https://www.virtual-geology.info/languedoc/romain]

A 1.

B 2.

C 3.

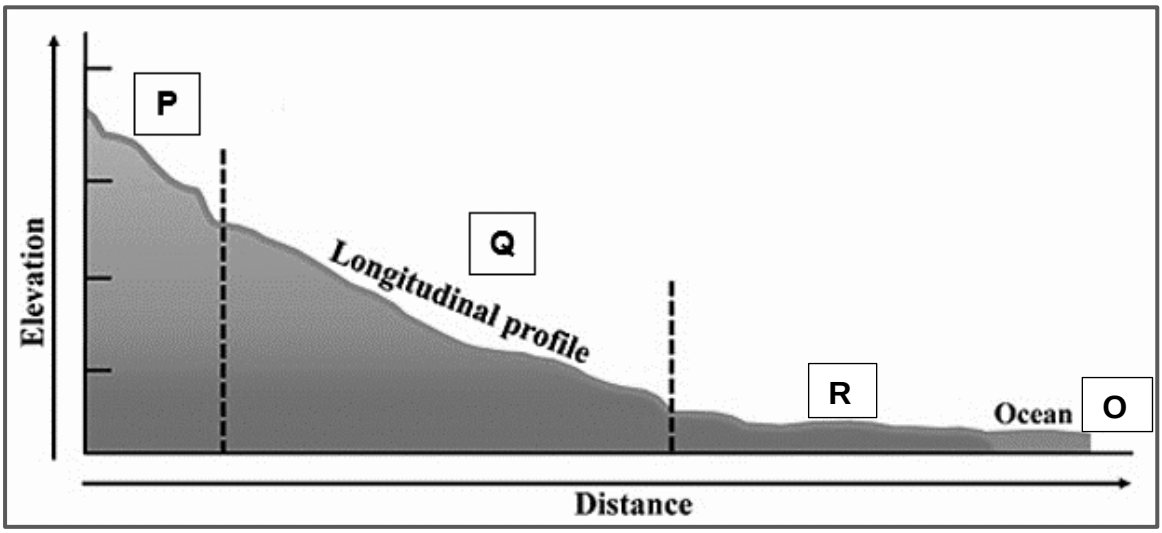
D 2 and 3.

2.1.5 The … is the amount of water flowing in a river channel past a certain point in a given time, and is measured in …

i. velocity
ii. discharge
iii. km/hr.
iv. cumecs.

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

Refer to the longitudinal profile below to answer QUESTIONS 2.1.6 to 2.1.8.

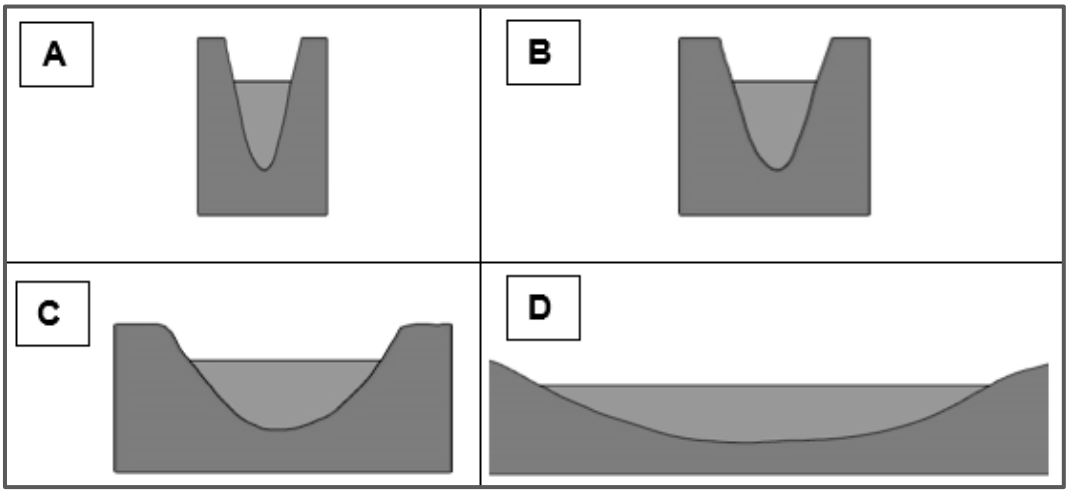


[Source: https://geography-revision.co.uk/a-level/physical/the-long-profile-of-a-river/]

2.1.6 The stage of the river with the highest elevation is at …

A O – permanent base level.
B R – lower course.
C Q – middle course.
D P – upper course.

2.1.7 Which of the sketches below represents a cross profile of Stage **Q** on the longitudinal profile?



[Source: https://mammothmemory.net/]

2.1.8 The longitudinal profile in the diagram can be described as …

A having a smooth, concave shape.

B graded because of the uneven shape.

C ungraded because it has many temporary base levels.

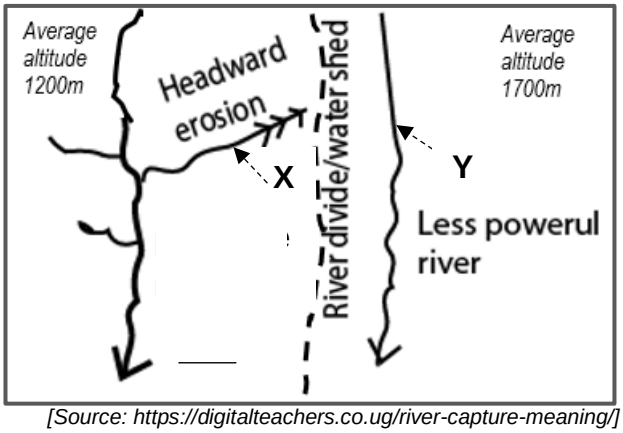
D having many permanent base levels of erosion. (8x1) **(8)**

2.2 Choose the most correct term/concept from **COLUMN B** to fit the definition/statement in **COLUMN A**. Write only the correct letter (A–K) next to the question numbers (2.2.1 to 2.2.7) in your ANSWER BOOK. Each term/phrase may only be used once, e.g. 2.2.8 L.

COLUMN A		COLUMN B	
2.2.1	Area drained by a river system.	A	Surface run off
2.2.2	Point where one river joins another.	B	Isostatic uplift
2.2.3	Ridges of high ground between river channels.	C	Valley within a valley
2.2.4	A type of river that is never supplied with underground water.	D	Interfluve
2.2.5	The rising of the land that causes rejuvenation.	E	Exotic
2.2.6	The rejuvenated river begins to erode a new valley.	F	Tributary
2.2.7	Vertical erosion leads to this type of meander between steep valley sides.	G	Watershed
		H	Drainage basin
		I	Episodic
		J	Entrenched
		K	Confluence

(7x1) **(7)**

2.3 Refer to the sketch map below of two river systems before river capture (stream piracy) took place.



[Source: https://digitalteachers.co.ug/river-capture-meaning/]

2.3.1 Define the term *river capture.* (1x2) (2)

2.3.2 The river at **X** (captor stream) has more energy than the river at **Y** (less powerful river). State a possible reason for this. (1x1) (1)

2.3.3 Draw a sketch map to show the river systems in the diagram after river capture (stream piracy) took place. Provide the following labels for your sketch map:

- Elbow of capture
- Wind gap
- Misfit stream (4x1) (4)

2.3.4 In a paragraph of **8 to 10 lines,** explain <u>how and why</u> the captor stream will change after river capture took place. (4x2) (8)

(15)

2.4 Refer to the information on two different fluvial landforms below:

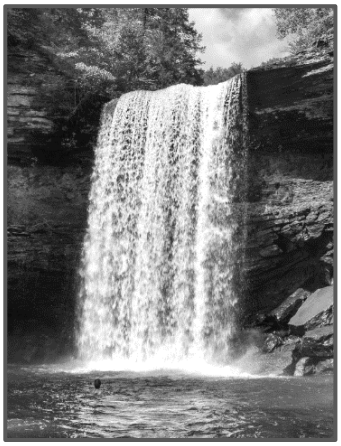
A waterfall occurs where a river's water drops over a steep rocky ledge into a plunge pool below. Rushing water and sediment topple over the waterfall, eroding the plunge pool at the base, and the splash causes chemical and physical weathering behind the waterfall. The resulting erosion at the base of a waterfall can be very dramatic and cause the waterfall to "recede".

[Source adapted from: https//education.nationalgeographic.org/resource/waterfall/]

PHOTOGRAPH A

[Source: https://www.watersportswhiz.com/classes]

PHOTOGRAPH B



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

2.4.1 In which course (stage) of a river are these fluvial landforms found? (1x2) (2)

2.4.2 Identify the landform in:

a) Photograph **A**

b) Photograph **B** (2x1) (2)

2.4.3 Describe the riverbed of the landform in Photograph **A**. (1x2) (2)

2.4.4 Refer to the extract.

a) Name the feature that develops at the bottom of a waterfall. (1x1) (1)

b) Explain how the erosion at the base and behind waterfalls cause them to retreat upstream. (2x2) (4)

2.4.5 Discuss the economic value for a local community, of having the landform **B** in their area. (2x2) (4)

(15)

2.5 Refer to the infographic below**:**

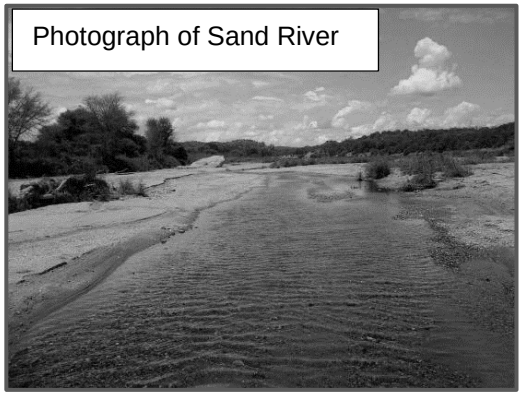
THE POWER OF CITIZEN SCIENCE **BY JACQUELINE GOLDIN, *THE CONVERSATION***

About 30% of the water on the planet is under the ground, and not easily accessible. Little is known about this "invisible" groundwater. This is especially so in areas of the Limpopo province. The region has a rich diversity of vegetation from Savannah Bushveld to open Savannah with a good grass layer. The main surface river flowing through this region is the Sand River.
The area has a population growth rate of over 2,1 %, 45 % are under the age of 20; 13% have no schooling and 53 % are female. Other major issues people in the area have to deal with are that 89 % of households have to use pit latrines and 97 % have no refuse collection.

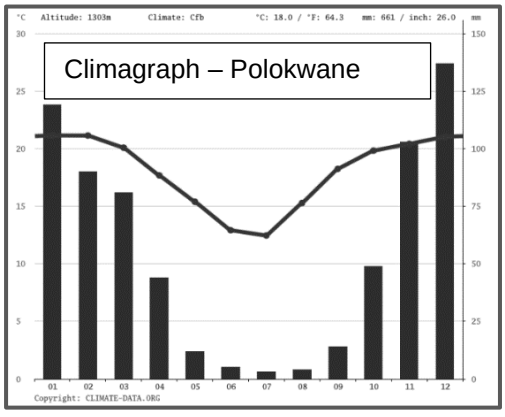
Research is taking place in two villages, Ga-Komape and Ga-Manamela, near Polokwane, to find out more about this underground water resource.
This is important, as 74% of people in rural areas like these depend on groundwater for their crops and domestic water supply using numerous boreholes. People use this water but there is very little knowledge about how much there is, how it recharges or whether it is clean. The inflow of this groundwater to rivers affects the water quality throughout the drainage basin.
Residents from the villages have recently been trained to capture groundwater data and surface flow information. They use a simple dip meter to work out the depth at which water can be found below ground (this upper level is referred to as the watertable), record rainfall levels from rain gauges e.g. climagraph, and take images of water flows in rivers e.g. photos. This data is captured on smart phones and relayed to a website for the research and to the relevant water management authorities. The authorities also need to assist and educate the community regarding the creation of a buffer zone around the boreholes in which no other polluting activities are permitted e.g. graveyards and cattle kraals.

[Source adapted from: https://phys.org/news/2021-11-south-african-groundwater]

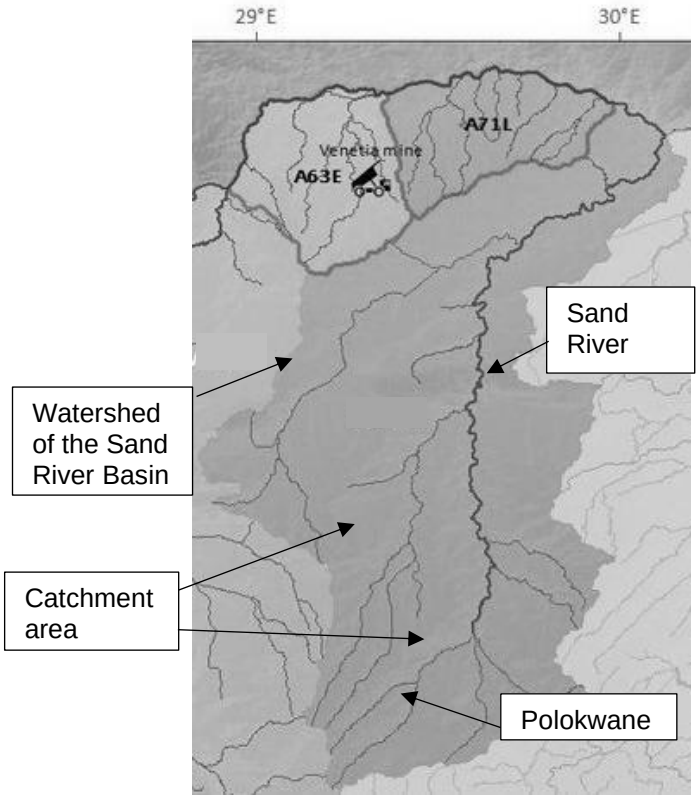
Photograph of Sand River



[Source: Tripadvisor – Sand River resort]



[Source: Climate Data.Org – Polokwane]



[Source: Researchgate.net/figure/The Mogalakwena-and- Sand tributaries]

2.5.1 Define the term *catchment area.* (1x2) (2)

2.5.2 What percentage of people living in rural areas depend on groundwater for their livelihood? (1x1) (1)

2.5.3 State **ONE** primary data collection method used by the residents for collecting information for the researchers. (1x1) (1)

2.5.4 a) Give the term used to describe the edge of a drainage basin. (1x1) (1)

b) How do pit latrines and lack of refuse collection affect groundwater and surface rivers? (2x2) (4)

2.5.5 Explain how the authorities that manage this drainage basin can improve the water quality of the Sand River, taking into consideration the information mentioned in the text. (3x2) (6)

(15)

TOTAL QUESTION 2: [60]

SECTION B

QUESTION 3: GEOGRAPHICAL SKILLS AND TECHNIQUES

Refer to the Addendum.

3.1 MAP SKILLS AND CALCULATIONS

3.1.1 The direction from spot height 1642 at **1** to spot height 1696 at **2** on the orthophoto map is …

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

3.1.2 The map code of the orthophoto map directly west of 2630 AA 8 is ...

A 2630 AA 3
B 2630 AA 7
C 2630 AA 9
D 2630 AA 2 (1x1) (1)

3.1.3 … is the closest neighbouring country to the town of Carolina.

A Lesotho
B Mozambique
C Botswana
D Eswatini (1x1) (1)

3.1.4 Calculate the gradient of the slope between Trigonometrical Beacon (Δ) 119 in block **B1** and spot height 1593 in block **C2** on the topographical map. SHOW ALL CALCULATIONS.

Formula: Gradient = $\frac{\text{Vertical Interval}}{\text{Horizontal Equivalent}}$ (4x1) (4)

3.1.5 a) Is the gradient that you calculated in QUESTION 3.1.4 steep or gentle? (1x1) (1)

b) Give a reason for your answer by referring to the landscape on the topographical map. (1x2) (2)

(10)

3.2 MAP INTERPRETATION

3.2.1 The river next to the fence **F** in block **D2** on the topographical map, is … and it is flowing …

i. perennial
ii. non-perennial
iii. east-north-east.
iv. west-south-west.

A i and iii
B i and iv
C ii and iii
D ii and iv (1x2) (2)

3.2.2 The aerial photograph used to compile the orthophoto map was taken between 13:00 and 14:00. Where will the shadows fall, if this aerial photograph was taken between 09:00 and 11:00?

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

3.2.3 Refer to the topographical map and the orthophoto map.

a) Is the farmhouse located at **3** on the orthophoto map, at the bottom of the valley? (1x1) (1)

b) Which direction does the slope face (aspect)? (QUESTION 3.2.3 a)) (1x1) (1)

c) Describe **ONE** climatological advantage of the site of the farmhouse. (QUESTION 3.2.3 b)) (1x2) (2)

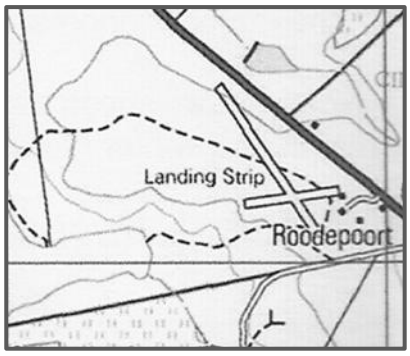
3.2.4 Refer to the non-perennial river on the <u>western</u> side of block **C2** on the topographical map.

a) Determine the stream order of the river when it enters the farm dam. (1x1) (1)

b) Describe the change in the stream order of the river (QUESTION 3.2.4 a)) after an extended period of heavy rainfall in the area. (1x2) (2)

3.2.5 Refer to the longest runway of the landing strip in block **C3** on the topographical map (extract provided).

a) Give ONE climatological and
b) ONE physical reason for it facing north-west/south-east.



(2x1) (2)

(12)

3.3 GEOGRAPHIC INFORMATION SYSTEMS

3.3.1 Refer to the topographic map and orthophoto map.

The feature marked **4** on the orthophoto map is a school.

a) Choose the correct words between the brackets to make the statement true:

The amount of people that are employed at **4** is an example of (spatial/attribute) data whereas the location of the buildings is (spatial/attribute) data. (2x1) (2)

b) Large buildings are visible at **4**. Which data layer on the topographical map would have been considered to determine whether the ground is level enough to build such large buildings? (1x1) (1)

3.3.2 Refer to the topographical map and the orthophoto map.

a) Define the term *buffering*. (1x2) (2)

b) Was buffering done in block **D5** on the topographical map around the school (QUESTION 3.3.1)? (1x1) (1)

3.3.3 The large dam in block **D5** on the topographical map can also be seen on the orthophoto map. How is remote sensing used to indicate whether the water volume is high or low at any given time? (1x2) (2)

(8)

TOTAL QUESTION 3: [30]

GRAND TOTAL: [150]

THIS PAGE IS FOR ROUGH WORK ONLY.