GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION

2022

10781

GEOGRAPHY

PAPER 1

TIME: **3 hours**

MARKS: **150**

17 pages

10781E

X05

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 sub-sections 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 2930AC and AD HOWICK and a 1 : 10 000 orthophoto map 2930AC 25 HOWICK are provided.

15. The area demarcated in RED/BLACK on the topographic map represents the area covered by the orthophoto map.

16. Show ALL calculations. Marks will be allocated for this.

17. You must hand in the topographic and the orthophoto maps 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 1.1.7) in the ANSWER BOOK, e.g., 1.1.8 A.

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

A incidence
B aspect
C angle
D gradient

1.1.2 In the Southern Hemisphere, the … -facing slope of a valley receives the most sunlight.

A north
B west
C east
D south

1.1.3 In the Southern Hemisphere, the … in a valley is the south facing slope.

A shadow zone
B insolation zone
C thermal zone
D inversion zone

1.1.4 Katabatic winds occur at night due to terrestrial … from the valley slopes.

A insolation
B convection
C radiation
D conduction

1.1.5 A temperature inversion occurs when a layer of cold air develops … a layer of warm air.

A beneath
B behind
C above
D ahead of

1.1.6 … is/are most likely to occur on the valley floor during winter.

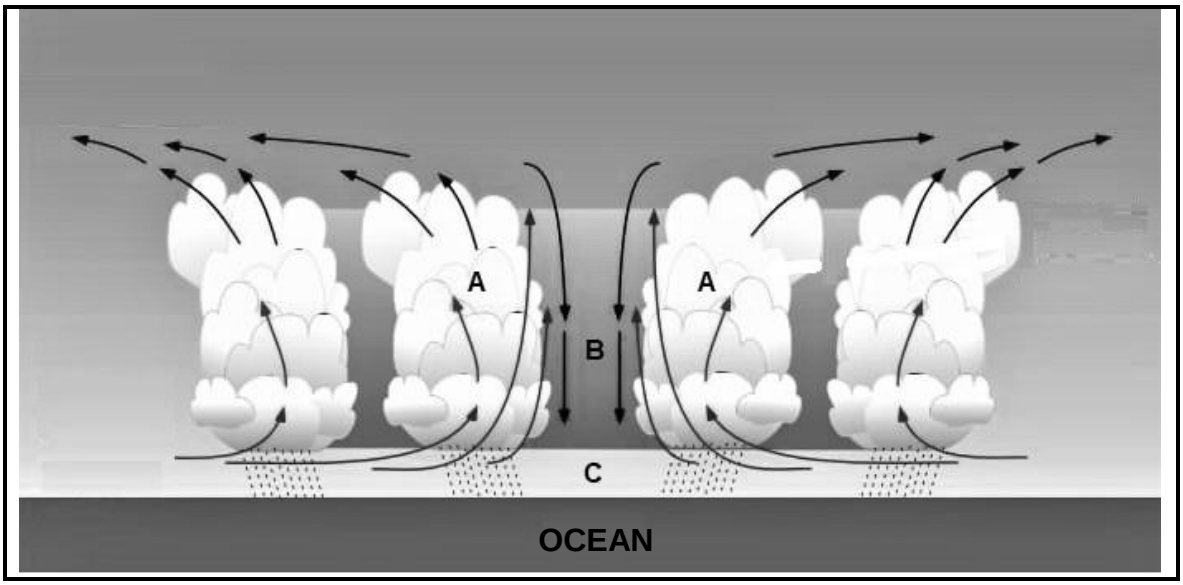
A Radiation fog
B Dew droplets
C Advection fog
D Frost pockets

1.1.7 Radiation fog in a valley is formed by the process of … of water vapour.

A sublimation
B condensation
C evaporation
D transpiration

(7 x 1) (7)

1.2 Study FIGURE 1.2 below, based on a cross-section of a tropical cyclone in the Southern Hemisphere.



[Adapted from: https://www.researchgate.net/figure/Hurricane-structure-courtesy-of-the-University-of-British-Columbia_fig2_282217676]

1.2.1 Indicate the season in which this tropical cyclone could occurred.

1.2.2 State the minimum ocean temperature required for the formation of this tropical cyclone.

1.2.3 In which general direction would this tropical cyclone move?

1.2.4 Name the cloud type found at **A**.

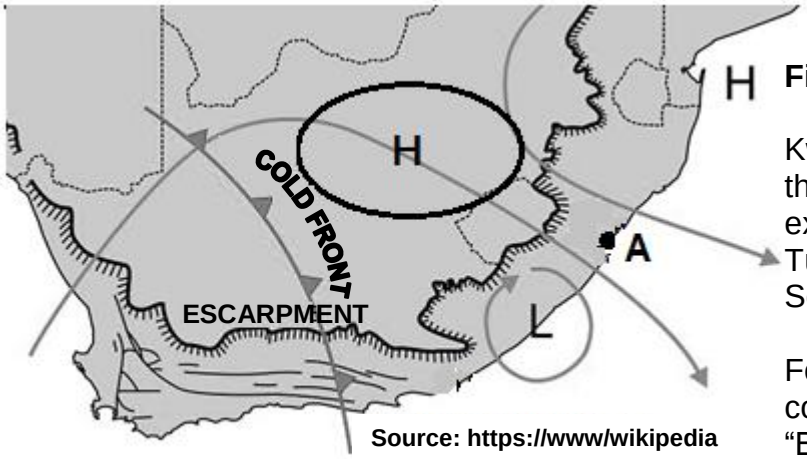
1.2.5 State the precipitation likely to occur from cloud type **A**.

1.2.6 Is the air surface pressure at area **C** low or high?

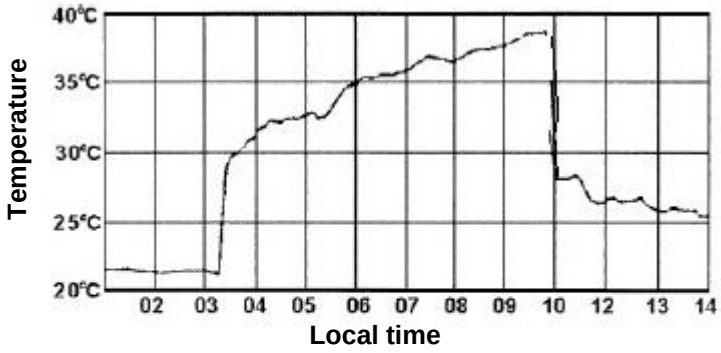
1.2.7 Would the airflow at **C** be described as diverging or converging?

1.2.8 At what stage of development will this tropical cyclone be, when it moves over land? (8 x 1) (8)

1.3 Refer to the infographic showing berg wind conditions over South Africa below.



Source: https://www/wikipedia



Automatic weather station recording of surface temperature at Durban during a berg wind from about 03:15 to 10:00 local time.

Fire warning for East Coast

KwaZulu-Natal – Berg wind conditions that are favourable to runaway fires are expected across the East Coast on Tuesday, the South African Weather Services said.

Forecaster Quinton Jacobs said these conditions would persist until Thursday. "Berg wind conditions, with temperatures in the high 30s are expected for the next three days."

"A strong north-easterly flow is expected over the northern interior on Wednesday during the mid-morning and early afternoon, exceeding 40 km/h at times."

According to the weather bureau, with the recent fine weather and absence of rainfall, the already dry vegetation would further dry out and conditions favourable for the spread of runaway fires will develop.

[Source: https://www.news24.com/news24/fire-warning-for-eastern-cape-20080527]

1.3.1 Which season is being depicted in the diagram? (1 x 1) (1)

1.3.2 Provide evidence from the infographic to substantiate your answer to QUESTION 1.3.1. (1 x 2) (2)

1.3.3 State TWO atmospheric conditions evident in the infographic that have resulted in the formation of berg winds. (2 x 1) (2)

1.3.4 With reference to the temperature graph, explain the process of temperature change from 03:15 to 14:00 as berg winds blow from the interior to the coast. (1 x 2) (2)

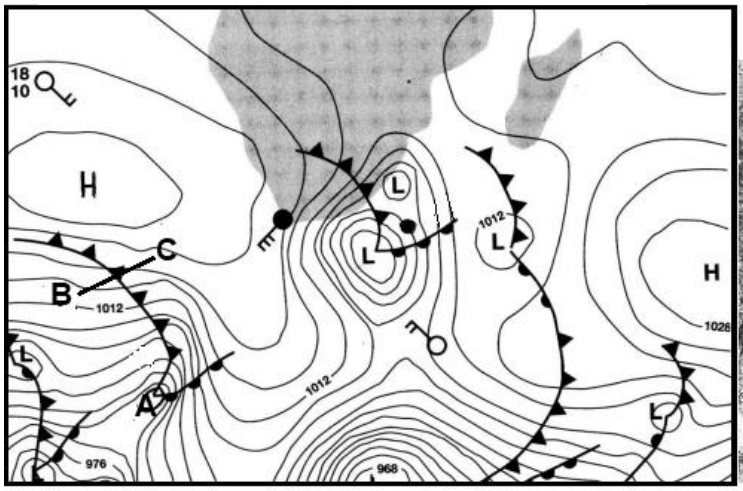
1.3.5 A weather station located at **A** has reported clear skies. Account for this current condition. (2 x 2) (4)

1.3.6 Explain why city **A,** which is situated on the East Coast, will be affected by the release of the fire warning. (2 x 2) (4)

(15)

1.4 Refer to the infographic below on mid-latitude cyclones.

Overview of the weather on 9 June





Weather forecaster, Mike Berridge, has predicted that the Cape's south-western mountains may receive up to 50 mm of rain on Wednesday, June 10, as a mid-latitude cyclone is expected to form near Cape Town.

Capetonians can expect rain for three days this coming week, with downpours falling on Tuesday [June 9], Wednesday [June 10], and Thursday [June 11].

There is a storm predicted to make landfall on Wednesday, and temperatures will range between 11 °C and 15 °C, along with 100% precipitation. On Thursday, temperatures will range between 8 °C and 13 °C with 100% precipitation.

[Source: https://www.capetownetc.com/cape-town/weather/cape-predicted-to-receive-50mm-rains/]

1.4.1 What climatological evidence indicates that this mid-latitude cyclone is occurring in the Southern Hemisphere? (1 x 1) (1)

1.4.2 Explain the concept *family of cyclones*. (1 x 2) (2)

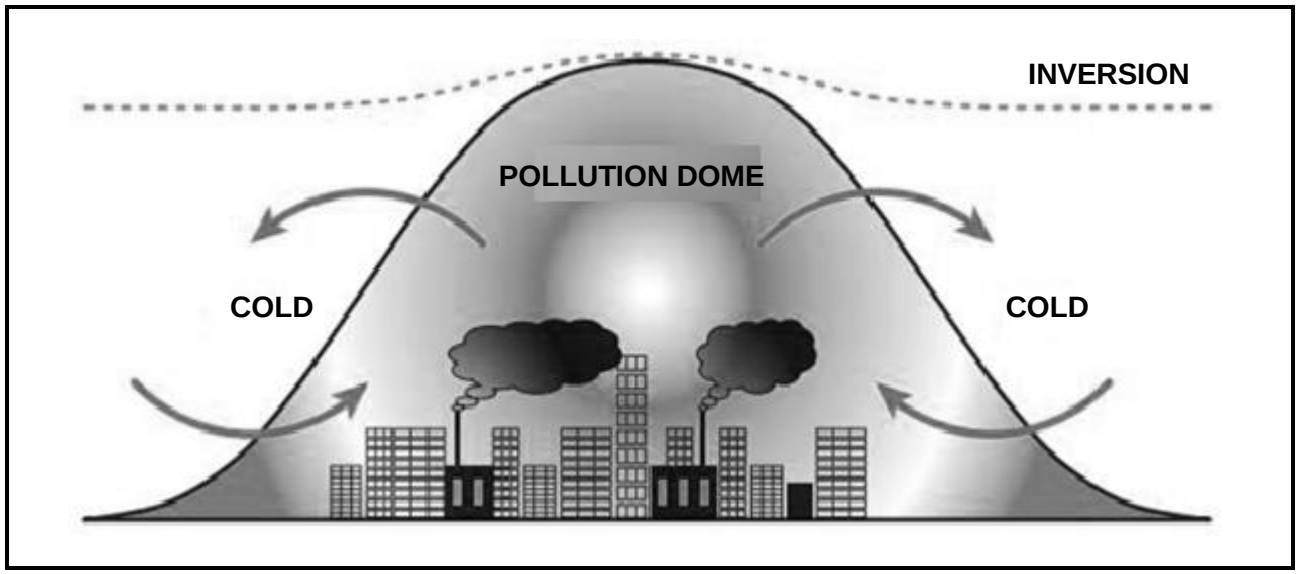
1.4.3 Identify the stage that mid-latitude cyclone **A** is currently in. (1 x 1) (1)

1.4.4 Draw a labelled cross-section from point **B** to point **C** along the cold front. Indicate the cold front, the cold sector and the warm sector. (3 x 1) (3)

1.4.5 A group of tourists wants to attempt the hiking trail to the top of Table Mountain ahead of the cold front. In a paragraph of approximately EIGHT lines, advise the organisers of the hike why the event should be postponed by explaining the expected weather conditions and possible impacts thereof. (4 x 2) (8)

(15)

1.5 Refer to FIGURE 1.5 below showing a pollution dome.



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

1.5.1 Define the term *pollution dome*. (1 x 2) (2)

1.5.2 At night, the pollution dome is lower in elevation (height) than during the day. Explain why this occurs. (2 x 2) (4)

1.5.3 State the environmental problem that results from a pollution dome, which develops close to the surface in a city. (1 x 1) (1)

1.5.4 Describe how the environmental problem identified in QUESTION 1.5.3 develops. (1 x 2) (2)

1.5.5 Air pollution reduces the amount of a city's clean air at night. Explain this statement. (1 x 2) (2)

1.5.6 Provide TWO sustainable strategies that can be implemented in cities to minimise the effects of industries on the pollution dome. (2 x 2) (4)

(15)

[60]

QUESTION 2: GEOMORPHOLOGY

2.1 Read the following statements and choose the appropriate word in brackets that will make the statement TRUE. Write down only the question number (2.1.1 – 2.1.7) and the answer in your ANSWER BOOK.

2.1.1 An increase in rainfall in the middle course of the river will result in increased (lateral/vertical) erosion.

2.1.2 The amount of load that a river can carry is determined by its (gradient/direction) of runoff.

2.1.3 The (volume/velocity) of water is higher in the upper course than in the middle course of a river.

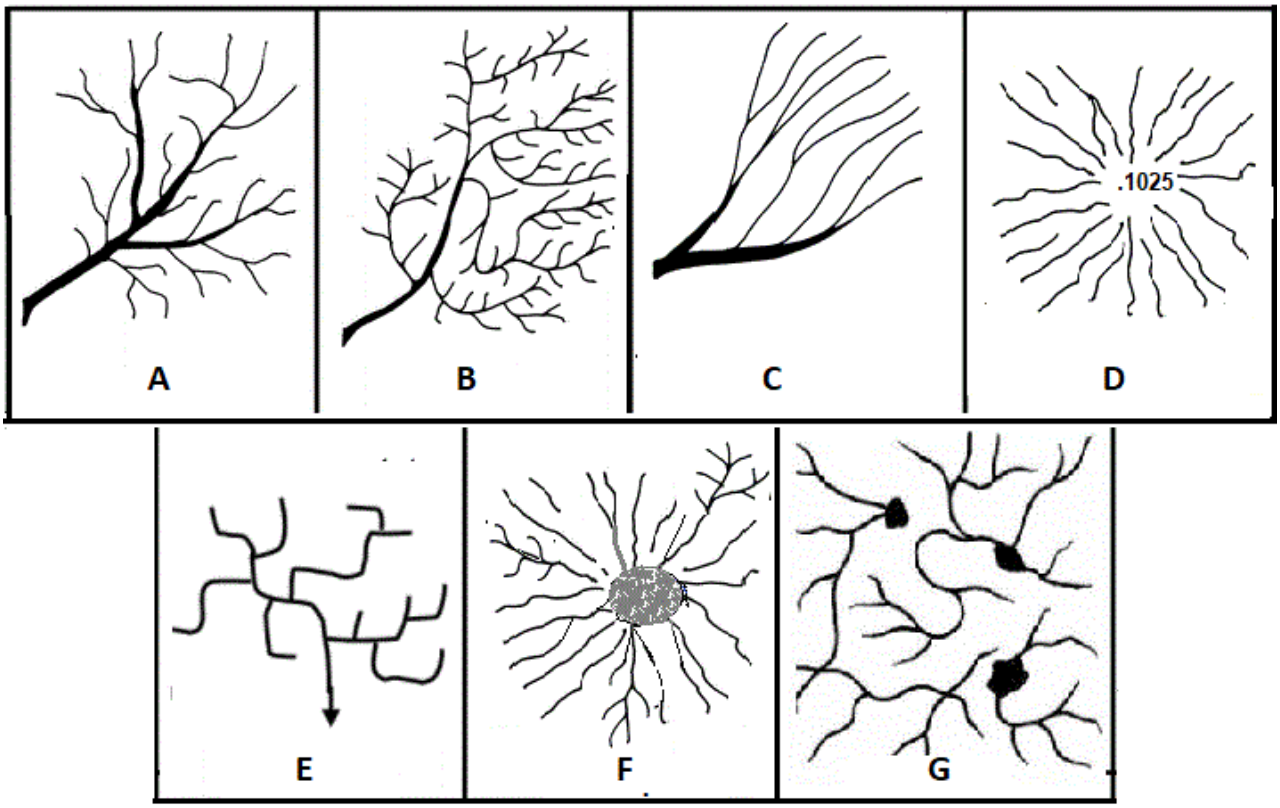
2.1.4 The V-shaped valley in the upper course of a river is a result of (lateral/vertical) erosion.

2.1.5 At the mouth of a river, there is more (deposition/erosion) which results in the formation of a delta.

2.1.6 (Lateral/Vertical) erosion in the middle course results in the migration of a meander downstream.

2.1.7 Rejuvenation closer to the source of the river will result in more (erosion/deposition) in the lower course. (7 x 1) (7)

2.2 Refer to FIGURE 2.2 below and choose the correct letter (A – G) that matches the description of a specific drainage pattern. Write only the letter (A – G) next to the question numbers (2.2.1 to 2.2.8) in the ANSWER BOOK, for example 2.2.9 H. Letters A – G can be used more than once.



[Source: Adapted from lumenlearning.com/geo/chapter/reading-drainage-basins/]

2.2.1 Drainage pattern that formed from rivers flowing into a depression or lake

2.2.2 Drainage pattern formed from rocks of uniform resistance

2.2.3 Drainage pattern commonly found in melting ice regions

2.2.4 Drainage pattern that occurs on a common slope down a linear mountain range

2.2.5 Drainage pattern that develops on alternate layers of hard and soft rocks

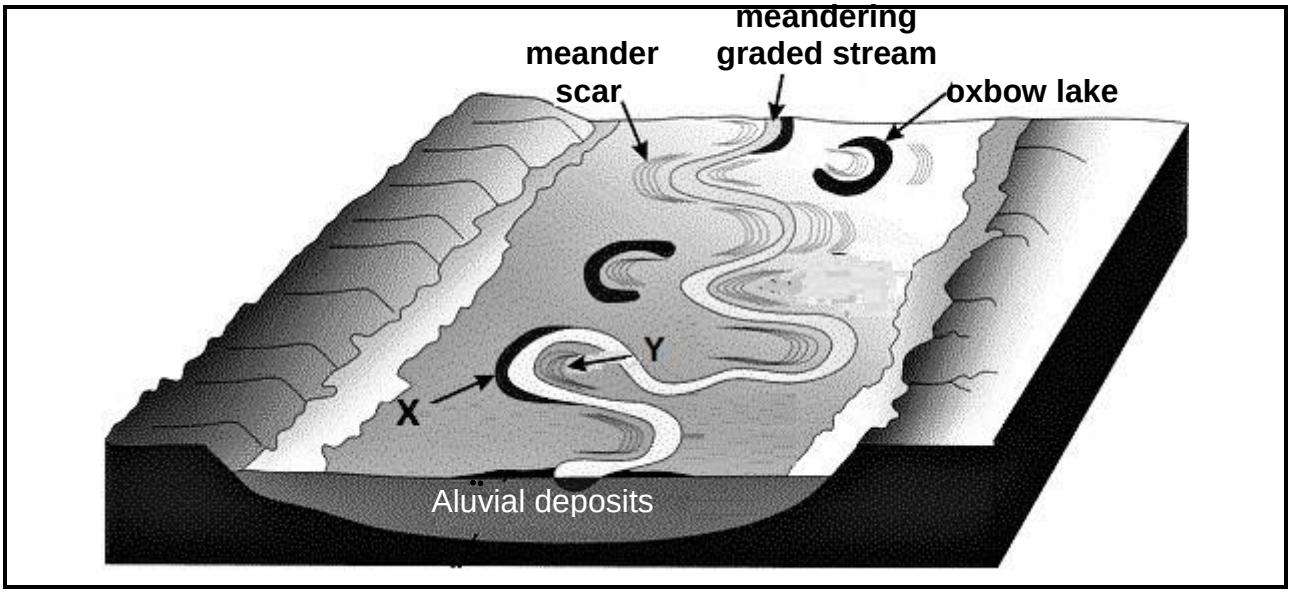
2.2.6 Drainage pattern that commonly forms on areas of volcanic mountains

2.2.7 Drainage pattern formed where prominent ridges lie parallel to one another

2.2.8 Drainage pattern in which the main streams and their tributaries display many right-angle bends

(8 x 1) (8)

2.3 Refer to FIGURE 2.3 below which shows a meandering river.



[Source: https://za.pinterest.com/pin/405394403936861905/]

2.3.1 What is a *meander scar*? (1 x 2) (2)

2.3.2 In which stage of the river can a meander loop and meander scar develop? (1 x 1) (1)

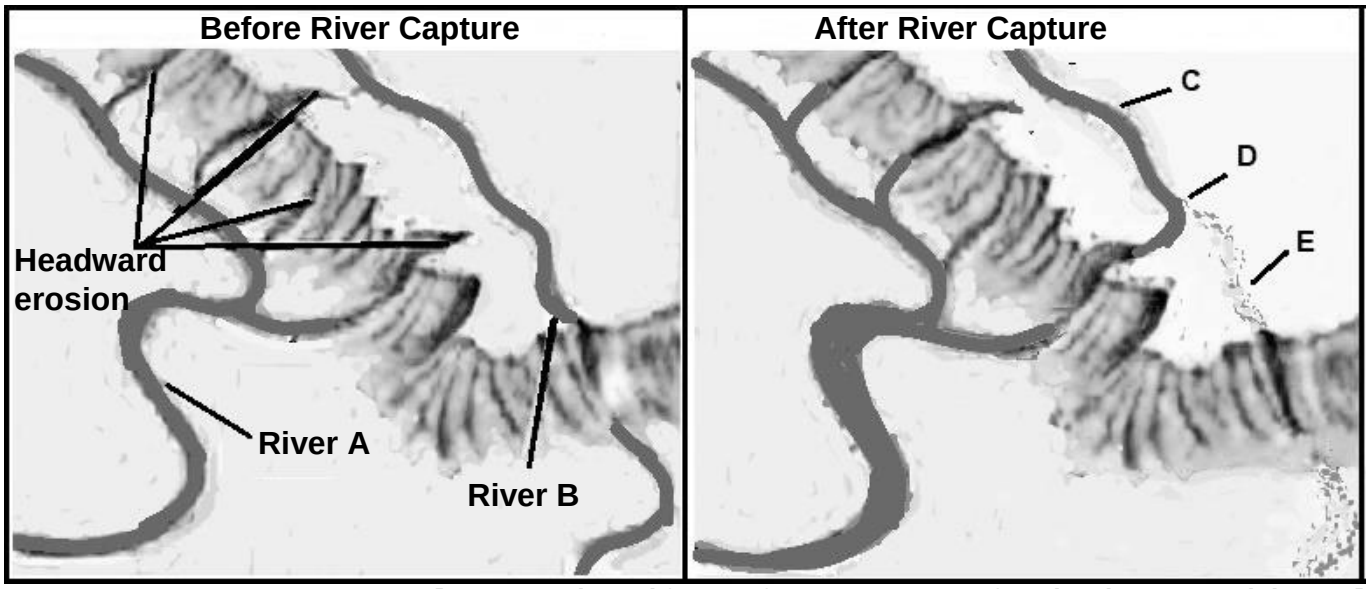
2.3.3 Name the slopes that will develop at **X** and **Y** of the meander loop. (2 x 1) (2)

2.3.4 At which slope, **X** or **Y,** will there be more deposition than erosion? (1 x 2) (2)

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

2.3.6 Explain how a meander scar is formed. (3 x 2) (6)
(15)

2.4 Study FIGURE 2.4 below on river capture.



[Source: Adapted from 7ef562557e76281032f017d156b13e3c Brainly.com]

2.4.1 Define the term *headward erosion*. (1 x 2) (2)

2.4.2 Name ONE possible factor from FIGURE 2.4 that could have resulted in river **A** capturing river **B.** (1 x 1) (1)

2.4.3 Explain how the process of headward erosion contributes to river capture. (2 x 2) (4)

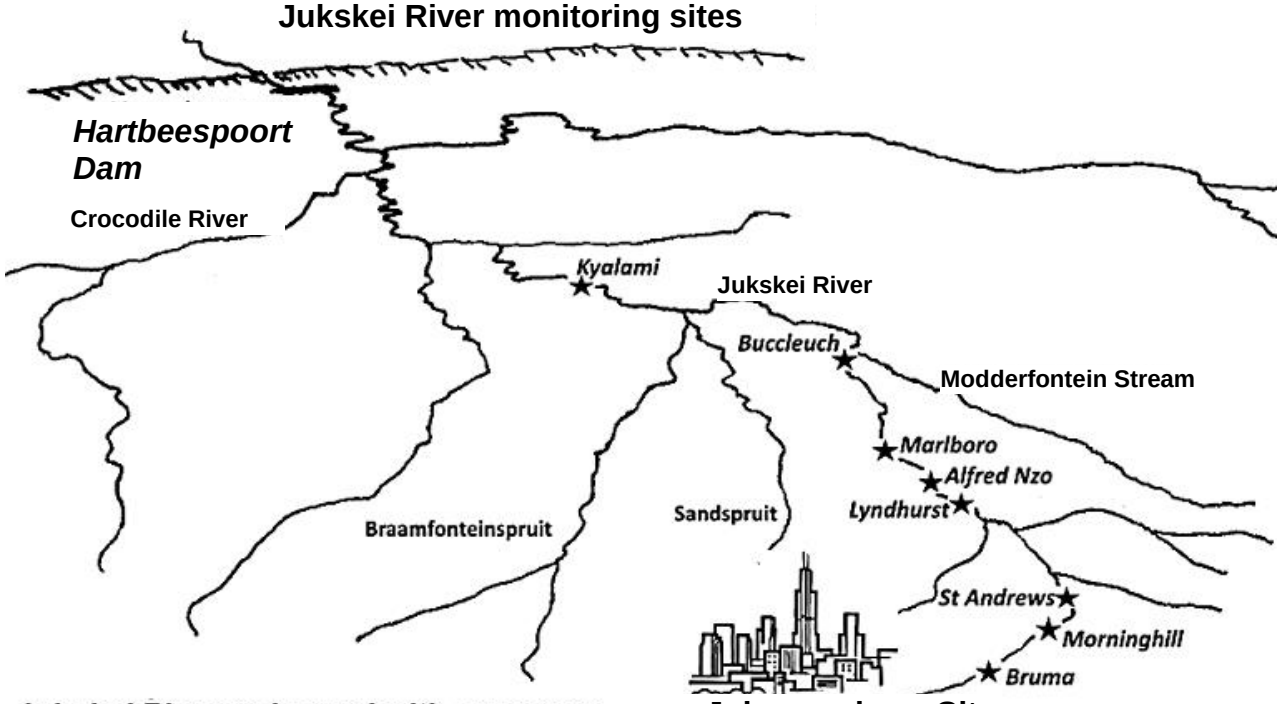
2.4.4 Give the geographical terms for features **D** and **E** which develop from river capture. (2 x 1) (2)

2.4.5 Discuss THREE physical changes that will occur in river **A** as a result of river capture. (3 x 2) (6)

(15)

2.5 Study FIGURE 2.5 below which is an infographic on the Jukskei River catchment area.

Jukskei River monitoring sites



Jukskei River poisoned with sewerage

Residents who use it as a dumping site and toilet, said they did not have waste and rubbish management in the area.



The Jukskei River in Alexandra after heavy rains in Johannesburg and other areas, 25 April 2019.

Johannesburg City

One of Gauteng's largest rivers, the Jukskei, flows northwards, meandering through Bedfordview, flowing into the highly eutrophic Hartbeespoort Dam.
Its roughly 50 km course through the city inexorably marks it as a casualty of Johannesburg's massive urbanisation, its eroded waterways a repository for the city's torrent of sewage, stormwater, litter, industrial waste and building rubble. For water expert Dr Anthony Turton, not only is the Jukskei one of the country's most polluted rivers, it is also one of the "saddest". Its demise, he believes, is a metaphor for "all that is wrong in our society."

[Source: https://www.citizen.co.za/news/south-africa/2920185/jukskei-river-poisoned-with sewage]

2.5.1 Define the concept *river catchment area.* (1 x 2) (2)

2.5.2 Of which river is the Jukskei River a tributary? (1 x 1) (1)

2.5.3 The water quality of the Jukskei River is deteriorating. Substantiate the statement by referring to the infographic. (2 x 2) (4)

2.5.4 In a paragraph of approximately EIGHT lines, suggest possible strategies that can be implemented to deal with the problems identified in QUESTION 2.5.3 in the Jukskei River. (4 x 2) (8)

(15)

[60]

TOTAL SECTION A: 120

P.T.O.

SECTION B

QUESTION 3: GEOGRAPHICAL SKILLS AND TECHNIQUES

Study the background information on Howick below and answer the questions that follow.

BACKGROUND INFORMATION ON HOWICK



Co-ordinates: 29°28′S; 30°14′E

Howick is a town located in KwaZulu-Natal. The town is 1 050 m above sea level with warm summers and cool dry winters. A snappy chill descends upon Howick when snow falls on the nearby Drakensberg. The town is located along the N3 freeway, connecting it with the rest of South Africa. The town is the location of Howick Falls, which is a large waterfall that occurs when the Umgeni River falls 95 metres over dolerite cliffs on its way to the Indian Ocean.

[Adapted from https://en.wikipedia.org/wiki/Howick,_KwaZulu-Natal]

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

ENGLISH	AFRIKAANS
Diggings	Uitgrawings
Golf course	Gholfbaan
River	Rivier
Sewerage works	Rioolwerke
Estate	Landgoed
Golf Driving Range	Gholf-dryfbaan
Nature reserve	Natuurreservaat

3.1 MAP SKILLS AND CALCULATIONS

Various options are provided as possible answers to questions 3.1.1 and 3.1.2. Choose the correct answer and write only the letter (A – D) next to the question numbers in the ANSWER BOOK.

3.1.1 In the topographical map index 2930AC, the 29 and 30 indicate …

A 29°N 30°W.
B 29°S 30°E.
C 29°W 30°N.
D 29°E 30°S (1 x 1) (1)

3.1.2 The Howick waterfall is located in … province.

A KwaZulu-Natal
B Limpopo
C Northern Cape
D Mpumalanga (1 x 1) (1)

3.1.3 What is the difference in height between spot height 1030 in block **E3** and spot height 784 in block **D4** on the topographic map extract? (1 x 1) (1)

3.1.4 Calculate the distance in metres, between spot height 1030 in block **E3** and spot height 784 in block **D4** on the topographic map extract.

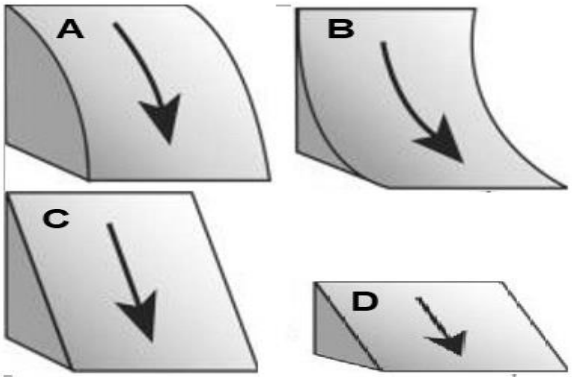
Formula: **Actual distance x Map scale** (2 x 1) (2)

3.1.5 Use the answers in QUESTIONS 3.1.3 and 3.1.4 to calculate the average gradient in metres, between spot height 1030 in block **E3** and spot height 784 in block **D4** on the topographic map extract.

$$\textbf{Average Gradient} = \frac{\textbf{Vertical interval (VI)}}{\textbf{Horizontal equivalent (HE)}}$$ (2 x 1) (2)

3.1.6 Choose the correct answer from the options provided below. Write only the letter (A – D) next to the question number.

A cross section of the slope between spot height 1030 in block **E3** and spot height 784 in block **D4** on the topographic map extract is .... (1 x 1) (1)



3.1.7 Give a reason for your answer to QUESTION 3.1.6. (1 x 2) (2)

(10)

3.2 MAP INTERPRETATION

Refer to the valley at **G** in block **B2** on the topographic map.

3.2.1 (a) Choose the correct answer from the options provided below. Write only the letter (A – D) next to the question number.

The nocturnal (night-time) wind that develops during the night in this area is called a … wind.

A berg
B föhn
C anabatic
D katabatic (1 x 1) (1)

(b) Explain how the wind identified in QUESTION 3.2.1(a) promotes the formation of dense fog at **G**. (1 x 2) (2)

(c) How would the development of fog in this area impact early morning traffic on the secondary road at **G**? (1 x 1) (1)

Refer to the Mgeni River in the south of the topographic map.

3.2.2 (a) In what general direction does the Mgeni River flow? (1 x 1) (1)

(b) Give evidence from the map to support your answer to QUESTION 3.2.2(a). (1 x 1) (1)

3.2.3 Identify the stream order at **H** in block **A4** on the topographic map. (1 x 1) (1)

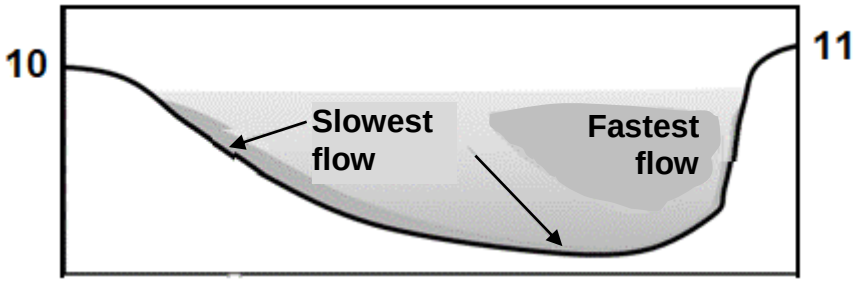
Refer to the orthophoto map.

3.2.4 Landform **8** on the orthophoto map is a … (1 x 1) (1)

A gap.
B spur.
C valley.
D saddle.

3.2.5 Identify the fluvial feature at the base of the Howick waterfall at **9** on the orthophoto map. (1 x 1) (1)

3.2.6 Refer to the freehand cross-section from **10** – **11** on the orthophoto.



(a) Identify the fluvial landform of which the cross-section above is an illustration. (1 x 1) (1)

(b) Name the fluvial processes taking place at **10** and **11** respectively. (2 x 1) (2)

(12)

3.3 GEOGRAPHIC INFORMATION SYSTEMS (GIS)

Refer to block **B1** on the topographic map.

3.3.1 Vector data is data that consists of points, lines and polygons. Identify the following vector data in block **B1** that relates to conservation:

(a) A point feature (1 x 1) (1)

(b) A polygon feature (1 x 1) (1)

Refer to the Howick waterfall in block **E2**.

3.3.2 The location of the Howick Falls at **F** in block **E2** on the topographic map, is an example of (attribute/spatial) data. (1 x 1) (1)

3.3.3 Refer to the Mgeni River which runs through the town of Kwa Mevana in block **E1**.

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

(b) Do you think buffering was applied in the development of the town in block **E1**? (1 x 1) (1)

(c) Give a reason from the topographic map for your answer to QUESTION 3.3.3(b). (1 x 2) (2)
(8)

TOTAL SECTION B: 30

TOTAL: 150

END