KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

GEOGRAPHY

COMMON TEST

MARCH 2024

MARKS: 60

TIME: 1 hour

N.B. This question paper consists of 8 pages.

INSTRUCTIONS AND INFORMATION

1.   The paper consists of **TWO** QUESTIONS:
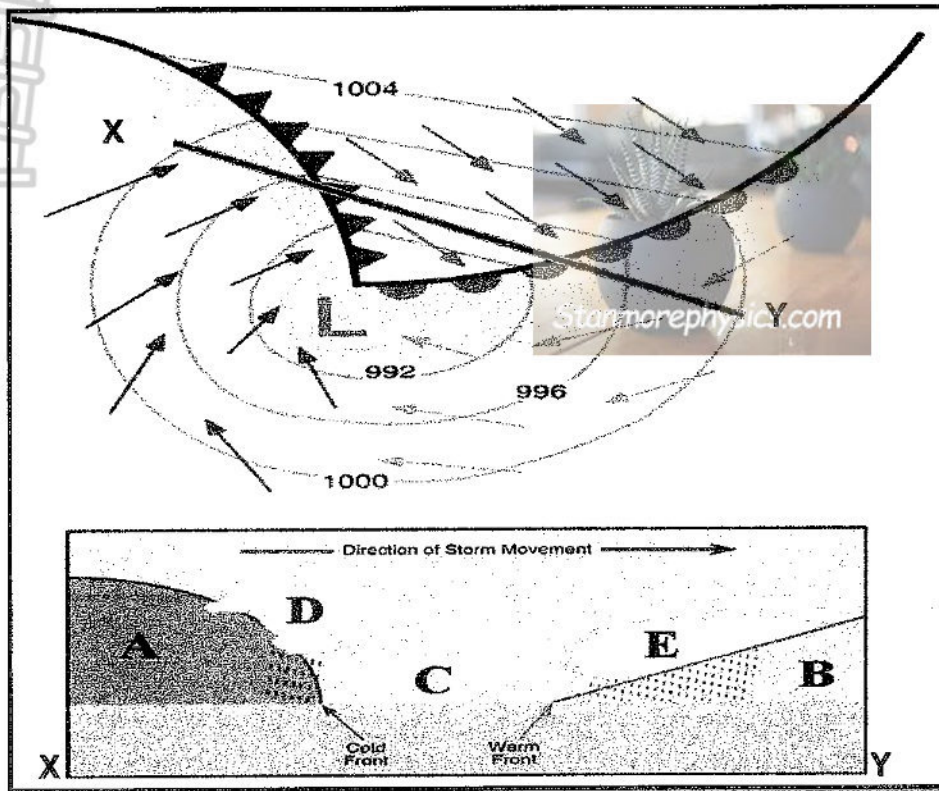
     QUESTION 1:   CLIMATE AND WEATHER

     QUESTION 2:   GEOMORPHOLOGY

2.   Answer **ALL** questions.

QUESTION 1 : CLIMATE AND WEATHER

1.1   Refer to a plan view and a cross section of a mid-latitude cyclone from **X** to **Y**.

[Source: Adapted from www.physicalgeopgraphy.net]

1.1.1   Name the stage of development of the mid- latitude cyclone represented in the diagram above.   (1 x 1)(1)

1.1.2   In which direction is the air circulating in the above weather system?   (1 x 1)(1)

1.1.3   With reference to temperature, describe the air characteristic at **A**.   (1 x 1)(1)

1.1.4   Describe the pressure gradient along the warm front in sector **B**.   (1 x 1)(1)

1.1.5   What does the letter **C** represent, the warm or cold sector?   (1 x 1)(1)

1.1.6   Which cloud type, **D** or **E** will produce more intense rainfall?   (1 x 1)(1)

1.2   Refer to the infographic below on Tropical Cyclone Belal.

Note: Cone shows uncertainty in forecast, not all areas that will be impacted

Source: GDACS. All times GMT

In January 2024, Tropical Cyclone Belal lashed Réunion and Mauritius, islands in the southwest Indian Ocean east of Madagascar, with torrential rain and flooding.

NASA's Terra satellite acquired the top image at about 06:00 Universal Time on January 14. The storm strengthened that day to a category-2 tropical cyclone, with sustained winds of at least 177 kilometers per hour.

Belal made landfall over northwestern Réunion on the morning of January 15 bearing sustained winds near 190 kilometers per hour. Mauritius, located 226 kilometers northeast of the French island of Réunion, was also hit by strong winds and heavy rain as Belal's centre passed south of the island nation. According to news reports, authorities in Réunion issued the highest storm alert (purple); officials in Mauritius issued a category-3 cyclone warning, the second-highest alert of the island's warning system. Tropical cyclone Belal caused heavy flooding, trees were snapped and uprooted with major damage to homes and at least three deaths in Mauritius on Monday as cars were washed away by surges of water in the Indian Ocean island's capital city and elsewhere.

Scientists say human-caused climate change has intensified extreme weather in the region.

Source: https://earthobservatory.nasa.gov/images/152328/tropical-cyclone-belal

1.2.1   According to the extract, what is a *category 3 tropical cyclone*?   (1 x 1) (1)

1.2.2   How many tropical cyclones occurred before tropical cyclone Belal?   Give a reason for your answer.   (1 + 1)(2)

1.2.3   Explain a possible reason for tropical cyclone Belal increasing in intensity from a category- 2 cyclone on 14 January to a category-3 cyclone on 15 January 2024.   (1 x 2)(2)

1.2.4   Suggest how the satellite tracking of tropical cyclone Belal helped in reducing the loss of lives in Réunion and Mauritius islands.   (1 x 2)(2)

1.2.5   Write a paragraph of approximately EIGHT lines, outlining the possible impacts of tropical cyclone Belal on the economy of the islands of Réunion and Mauritius.   (4 x 2)(8)

1.3   Refer to the sketch below depicting micro climate.
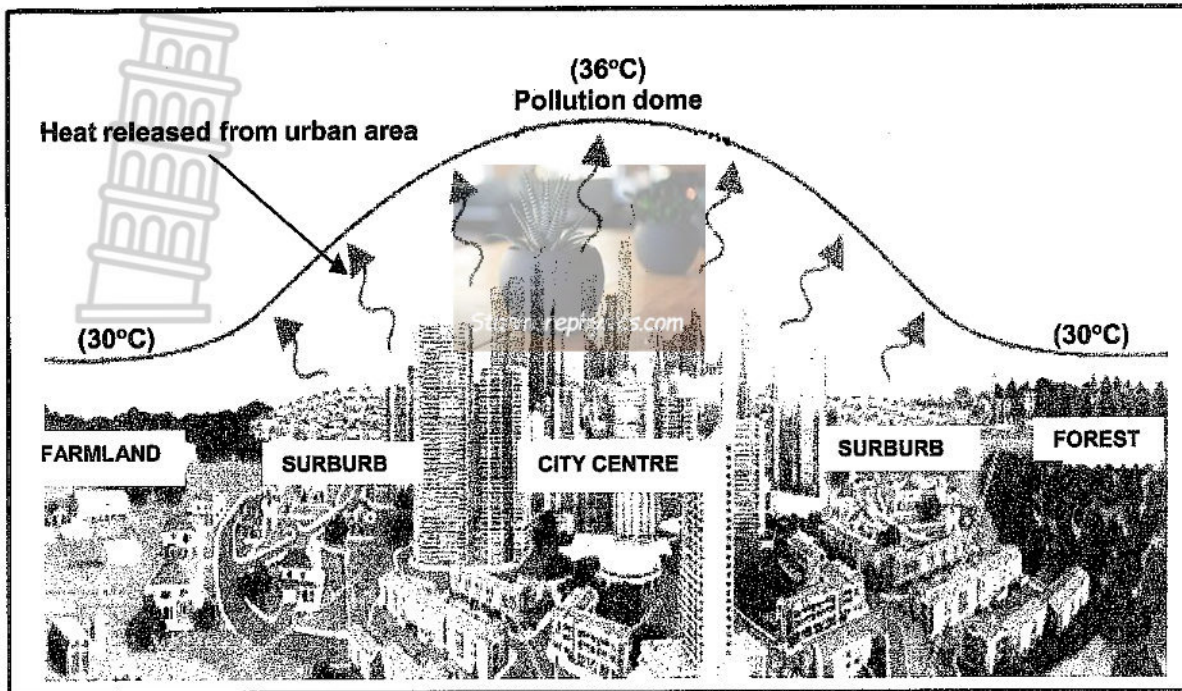
[source:https://www.google.com/search?q=heat+island+and+pollution+dome]

1.3.1   Give the term used to describe the warm air over the city centre.   (1 x 1) (1)

1.3.2   Calculate the difference in temperature between the city centre
        and the forest?   (1 x 1)(1)

1.3.3   Explain ONE reason from the diagram, why this difference occurs.   (1 x 2)(2)

1.3.4   State ONE impact the pollution dome can have on the health of
        people living in the central parts of the city.   (1 x 1)(1)

1.3.5   Explain why the shape of the pollution dome is not the same
        during the day and night.   (2 x 2)(4)
                                                                                  [30]

QUESTION 2: GEOMORPHOLOGY

2.1 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 (2.1.1 to 2.1.6) in the ANSWER BOOK, e.g. 2.1.7 D.

Points **X**, **Y** and **Z** shows the different stages (courses) from the source to the Mouth of a river and the points **S-T** along the meander found at **Z**.
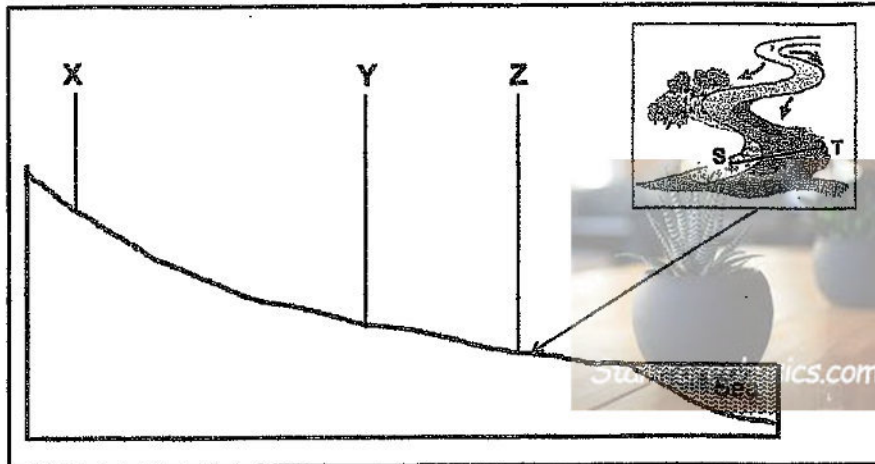
Examiner's own sketch/Nov 2021

2.1.1 The profile of a river from bank to bank shown by the line labelled **S-T**, show the … of the river.

    A   volume
    B   width
    C   length
    D   gradient

2.1.2 The stages (courses) represented **X**, **Y** and **Z** are …

    A   middle, upper, lower.
    B   lower, middle, upper.
    C   upper, middle, lower.
    D   upper, lower, middle.

2.1.3 … describes the river valley at **Z**.

    A   Wide and shallow
    B   Wide and deep
    C   Narrow and shallow
    D   Narrow and deep

2.1.4 At **X** the river has turbulent flow due to a … riverbed.

    A   steep and level
    B   gently sloping and even
    C   rough and uneven
    D   smooth

2.1.5 Slope **S** on the meander is the … slope.

    A   slip-off
    B   concave
    C   undercut
    D   steep

2.1.6 Slope **T** on the meander is associated with a …

    A   steep gradient and deposition.
    B.   gentle gradient and erosion.
    C.   convex slope with erosion.
    D.   concave slope with erosion.

(6x1) (6)

2.2   Refer to the drainage patterns illustrated in sketches **A** and **B** below.
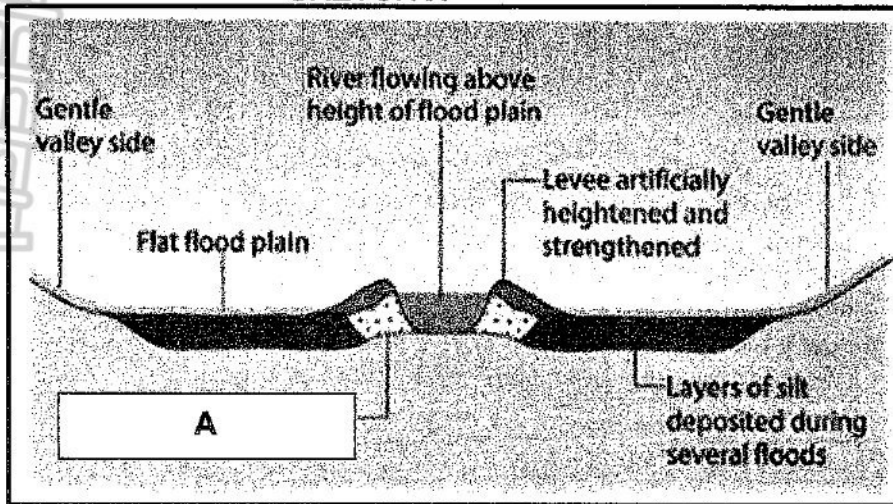

[Adapted from https://www.google.com/search?+<rainage+pattern&tbml]

2.2.1 Identify drainage pattern in sketches **A** and **B**. (2x1) (2)

2.2.2 State the underlying rock structure and rock type on which the drainage pattern in **A** developed. (1+1) (2)

2.2.3 Explain how the underlying rock structure influenced the drainage pattern in **B**. (1x2) (2)

2.2.4 Determine the stream order at point **X** in sketch **B**. (1x2) (2)

2.2.5 The drainage density in sketch **A** is (high/low) (1x1) (1)

2.2.6 Choose the CORRECT word between brackets to make the statement TRUE. The higher the stream order, the (higher/lower) the drainage density. (1x1) (1)

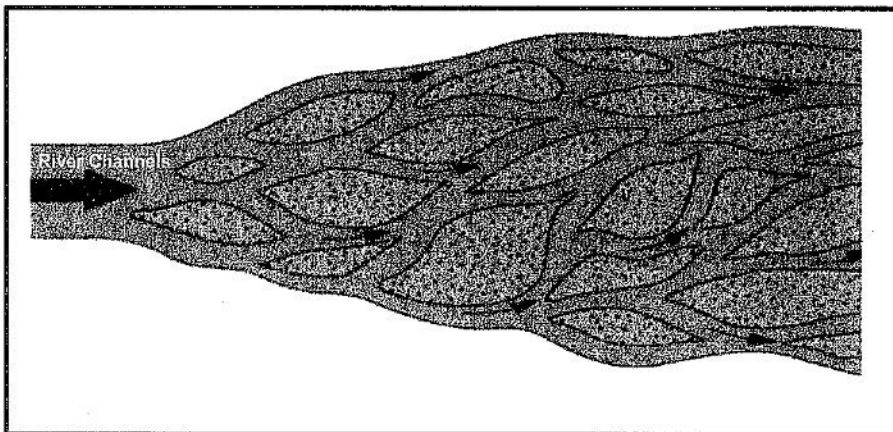2.2.7 Explain how the slope (gradient) influences the drainage density in sketch **B**. (1x2) (2)

2.3   Refer to the sketches **X** and **Y** on fluvial landforms below.

SKETCH X

Gentle valley side

River flowing above height of flood plain

Gentle valley side

Levee artificially heightened and strengthened

Flat flood plain

A

Layers of silt deposited during several floods

[Adapted from google images]

SKETCH Y

River Channels

[Adapted from google images]

2.3.1   The fluvial landforms shown in the sketches **X** and **Y** are
        mainly found in the (middle/lower) course.   (1x1) (1)

2.3.2   Identify fluvial landform **A** in sketch **X**.   (1x1) (1)

2.3.3   Explain how fluvial landform **A** develops.   (2x2) (4)

2.3.4   Discuss ONE positive impact of fluvial landform **A** to farmers
        located on the flood plain.   (1x2) (2)

2.3.5   Identify fluvial landform illustrated in sketch **Y**.   (1x1) (1)

2.3.6   In sketch **Y** the main river is forced to split into smaller
        channels called ...   (1x1) (1)

2.3.7   Explain how fluvial landform identified in QUESTION 2.3.5
        develops.   (1x2) (2)

TOTAL: [30]
GRAND TOTAL: 60

KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

GEOGRAPHY

MEMORANDUM

COMMON TEST

MARCH 2024

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

MARKS: 60

N.B. This question memorandum consists of 5 pages.

QUESTION 1

1.1

1.1.1   Mature✓

1.1.2   Clockwise✓

1.1.3   Cold air✓

1.1.4   Gentle pressure gradient✓

1.1.5   Warm sector ✓

1.1.6   D/Cumulonimbus✓

                                                             [6]

1.2

1.2.1   A storm with sustained winds near 190 kilometers per hour, torrential rain and heavy flooding✓
A storm that causes snapped and uprooted trees✓
A storm that causes major damage to homes✓
A storm that cause vehicles to be washed away by surges of water✓   (1 x 1) (1)
(ANY ONE)

1.2.2   One✓
Named alphabetically in the season of occurrence✓   (2 x 1) (2)

1.2.3   Cyclone Belal tracked in the warm waters of the Indian Ocean that was ideal for promoting high rate of evaporation✓✓
Friction over the large sea track was minimum, assisting rising air (convection) ✓✓
The water vapour content over the ocean is greater, containing latent heat and this formed the trigger for the full development of the cyclone✓✓
Human-caused climate change has intensified extreme weather in the region✓✓   (1 x 2) (2)
(ANY ONE)

1.2.4   Information is received immediately and can be used to warn people ✓✓
Information can be monitored and evacuation plans can be devised, especially for people in low lying areas. ✓✓
Can take images of large inaccessible areas. ✓✓
The intensity of the storm can be monitored ✓✓
Information can be used to determine wind speed, temperature, wind direction ✓✓
Can be used to predict the path ✓✓   (1 x 2) (2)
(ANY ONE)

1.2.5 Damage to infrastructure which is costly to repair✓✓
Damage to beachfront properties which would negatively affect tourism and the economy✓✓
Loss of crops which leads to food shortages, higher prices and food imports✓✓
Loss of fertile soil leads to increase in production costs and rise in food prices✓✓
Less income generated by farms✓✓
Loss of life will reduce the economically active✓✓
Industries that depend on the primary sector for a supply of raw materials are adversely/negatively affected and have to close temporarily✓✓
Disruption to water and electricity supply due to damaged cables and burst pipes✓✓
Increase in health care costs due to outbreak of diseases✓✓
Increase in insurance claims and cost as a result of storm damage✓✓
Job losses result in loss of income✓✓

(4 x 2)(8)

1.3.1. Urban heat island/pollution dome ✓   (1 x 1) (1)

1.3.2 6°C ✓   (1 x 1) (1)

1.3.3 Geometric shapes of buildings increases surface area for heating✓✓
Building density traps heat✓✓
Multiple reflection of heat✓✓
Less plants/vegetation in city centre to reduce heat ✓✓
Pollutants above city trap/prevent heat from escaping✓✓
Tall buildings prevent circulation ✓✓
Less evaporation because of fewer water surfaces
Concrete in urban areas is able to store three times more heat than the same volume of soil or vegetation✓✓
Concrete absorbs heat slowly during the day and releases it slowly at night thus raising temperatures considerably✓✓
Cities contain a large number of tarred streets which absorbs heat, giving rise to high temperatures✓✓   (1 x 2) (2)
[ALSO ACCEPT ANSWERS FROM OPPOSITE PERSPECTIVE: RURAL AREAS/FARMLAND/FORESTS]
(ANY TWO)

1.3.4   Respiratory problems/asthma/sinusitis✓
Skin irritations (disorder)✓
Heat stroke/cardiac arrest/human discomfort/fatigue ✓
Eye irritations ✓
Allergies ✓
Heat stress (hypertension) ✓   (1 x 1) (1)
(ANY ONE)

1.3.5   Most pronounced/developed at night because air is subsiding✓✓
High temperatures during the day lead to rising convection
currents (and therefore has a greater vertical dimension✓✓
Colder air subsides at night time therefore the pollution dome lies lower
at night ✓✓
Fewer urban activities (or examples of) at night time that
releases heat over the city centre therefore the pollution dome
is compressed/more intensely developed✓✓
[Any TWO]   (2 x 2) (4)
                                                                 [30]

QUESTION 2

2.1

2.1.1 B (width) ✓
2.1.2 C (upper, middle, lower) ✓
2.1.3 A (wide and shallow) ✓
2.1.4 C (rough and uneven) ✓
2.1.5 A (slip-off) ✓
2.1.6 D (concave slope with erosion) ✓   (6x1) (6)

2.2

2.2.1 A-Rectangular ✓
       B-Dendritic ✓   (2x1) (2)

2.2.2 **Rock structure**
       Jointed/faults ✓
       Horizontally layered ✓
       [ANY ONE]

       Rock type
       Igneous ✓
       Sedimentary ✓
       [ANY ONE]   (1+1) (2)

2.2.3 Tributaries join the main river at acute angles ✓✓
       Tributaries resembles the branches of a tree ✓✓
       [ANY ONE]   (1x2) (2)

2.2.4 4ᵗʰ (order) ✓✓   (1x2) (2)

2.2.5 Low ✓   (1x1) (1)

2.2.6 Higher ✓   (1x1) (1)

2.2.7 The steeper slope (gradient) promotes runoff (cuts more river channels)✓✓(1x2) (2)

NSC – Memorandum

3.1

2.3.1 Lower ✓   (1x1) (1)

2.3.2 (Natural) levee✓   (1x1) (1)

2.3.3 Forms on the banks of rivers that have been subjected to repeated
       flooding. ✓✓
       After the floods waters have receded it leaves behind gravel,
       sand and silt which builds up to form raised banks called a levee. ✓✓   (2x2) (4)

2.3.4 Reduces flooding of the flood plain and therefore loss of crops and
       equipment. ✓✓
       It prevents fertile soil from the floodplain washing back into the river. ✓✓
       (ANY ONE)   (1x2) (2)

2.3.5 Braided stream. ✓   (1x1) (1)

2.3.6 Distributaries. ✓   (1x1) (1)

2.3.7 The gentle gradient in the lower course decreases river flow ✓✓
       The slow flowing river deposits its load within its channel. ✓✓
       (ANY ONE)   (1x2) (2)

                                                                             [30]
                                                              GRAND TOTAL: 60