LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

SEKHUKHUNE SOUTH DISTRICT

GRADE 12

GEOGRAPHY

Subtropical Anticyclones and Associated weather conditions

Topic Test No.3

07 February 2025

Marks : 60

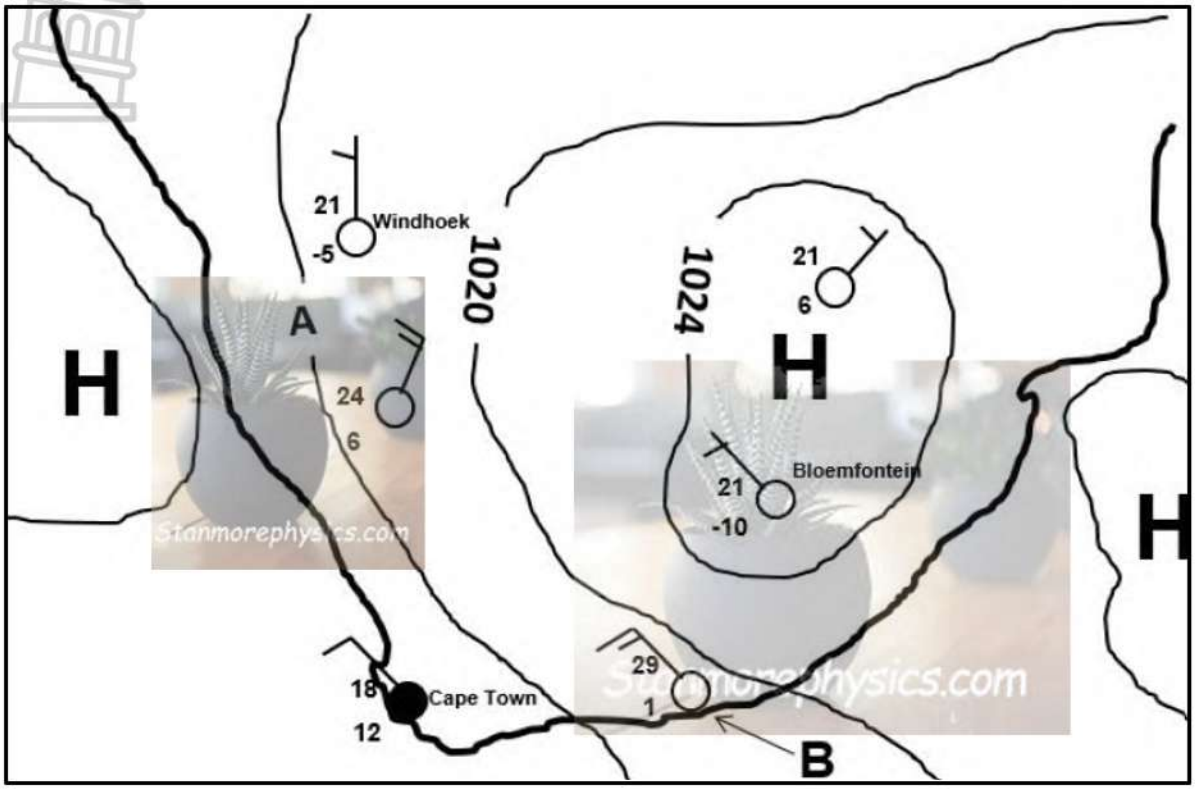
DURATION : 1 Hour

INSTRUCTION AND INFORMATION

- This question paper consists of FIVE questions.
- Answer all the FIVE questions.
- All diagrams are included in the question paper
- Number your answers correctly according to the numbering system used in this question paper.
- Answer in FULL SENTENCES, except when you have to state, name, identify or list.
- Write neatly and legibly

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 B.

Refer to the sketch below to answer QUESTIONS 1.1.1. to 1.1.5.



1.1.1. The season represented on the synoptic weather map is…….
   A. Autumn.
   B. Spring.
   C. Summer.
   D. Winter.

1.1.2. The isobaric interval of the isobars on the synoptic weather map is…..hPa.
   A. 2
   B. 4
   C. 6
   D. 8

1.1.3. The air pressure reading at A is….hPa.
   A. 1016
   B. 1018
   C. 1022
   D. 1024

1.1.4. The dew point temperature indicated at weather station B is……^{0}C.

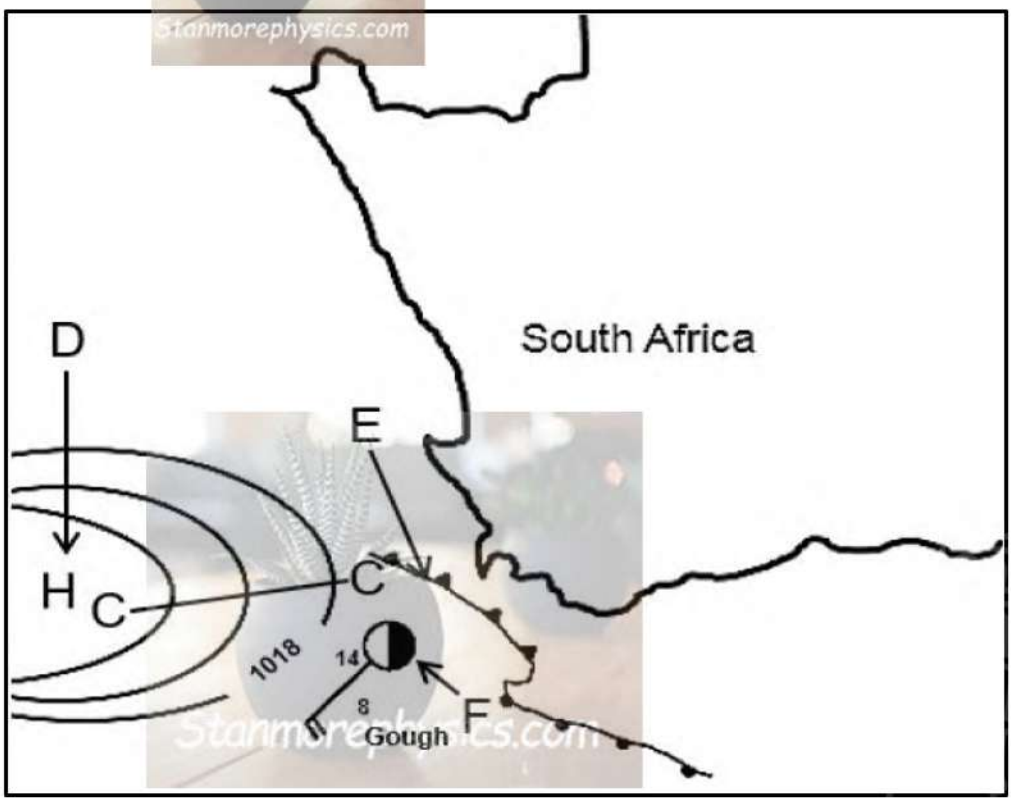
A. 4
B. 29
C. 1
D. 28

1.1.5. The weather stations around the interior high-pressure cell show clear skies due to……air, and the anticlockwise circulation results in…..winds.

(i) Subsiding
(ii) Rising
(iii) South-easterly
(iv) North-westerly

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

Refer to the map below to answer QUESTIONS 1.1.6 to 1.1.8.



1.1.6. Line C-C represents a…..

A. Ridge
B. Saddle
C. Trough
D. Depression

1.1.7. The high-pressure cell at D will cause weather system E to move in a….direction.

A. South-easterly
B. North-easterly
C. South-westerly
D. North-westerly

1.1.8. The weather conditions at weather station F:

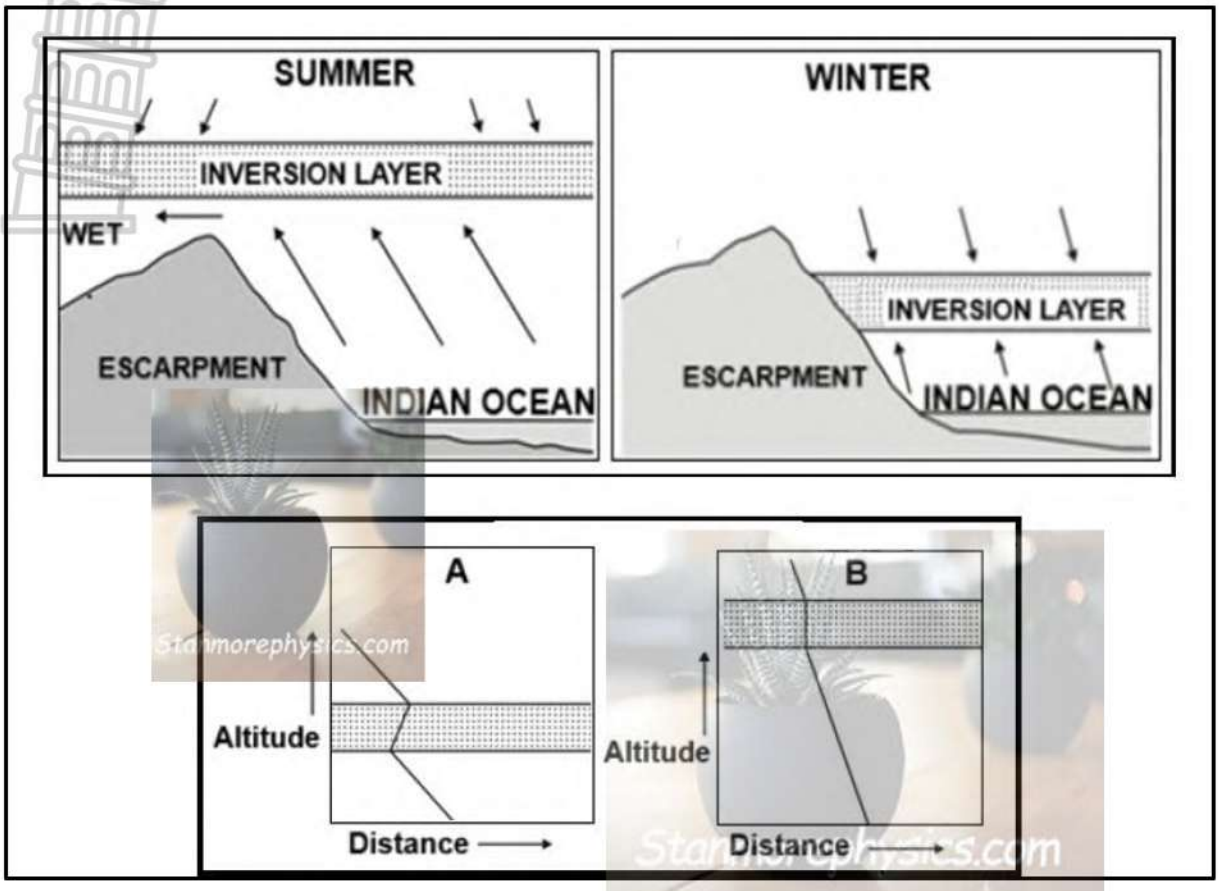
(i) Air temperature is 8^0C
(ii) Cloud cover is 4/8
(iii) South-westerly wind
(iv) Wind speed is 5 knots

A. (i) and (ii)
B. (ii) and (iii)
C. (i) and (iv)
D. (ii) and (iv) (8x1) (8)

1.2. Study the figure below of a Low-pressure cell A associated with travelling disturbances.

1.2.1. Identify low-pressure cell A.
1.2.2. Where does low-pressure cell A originate from?
1.2.3. in which general direction does low-pressure cell A move?
1.2.4. What type of precipitation is associated with low-pressure cell A along the West coast?
1.2.5. Describe the general air rotation around this low-pressure cell A.
1.2.6. With which travelling disturbance is the hot, dry north-easterly wind associated?
1.2.7. Moisture content of offshore winds caused by Low-pressure cell A along the west coast of South Africa. (7x1) (7)

1.3. Refer to the sketches below based on changes in the position of the inversion layer over south Africa.



1.3.1. What is an inversion layer? (1x2) (2)

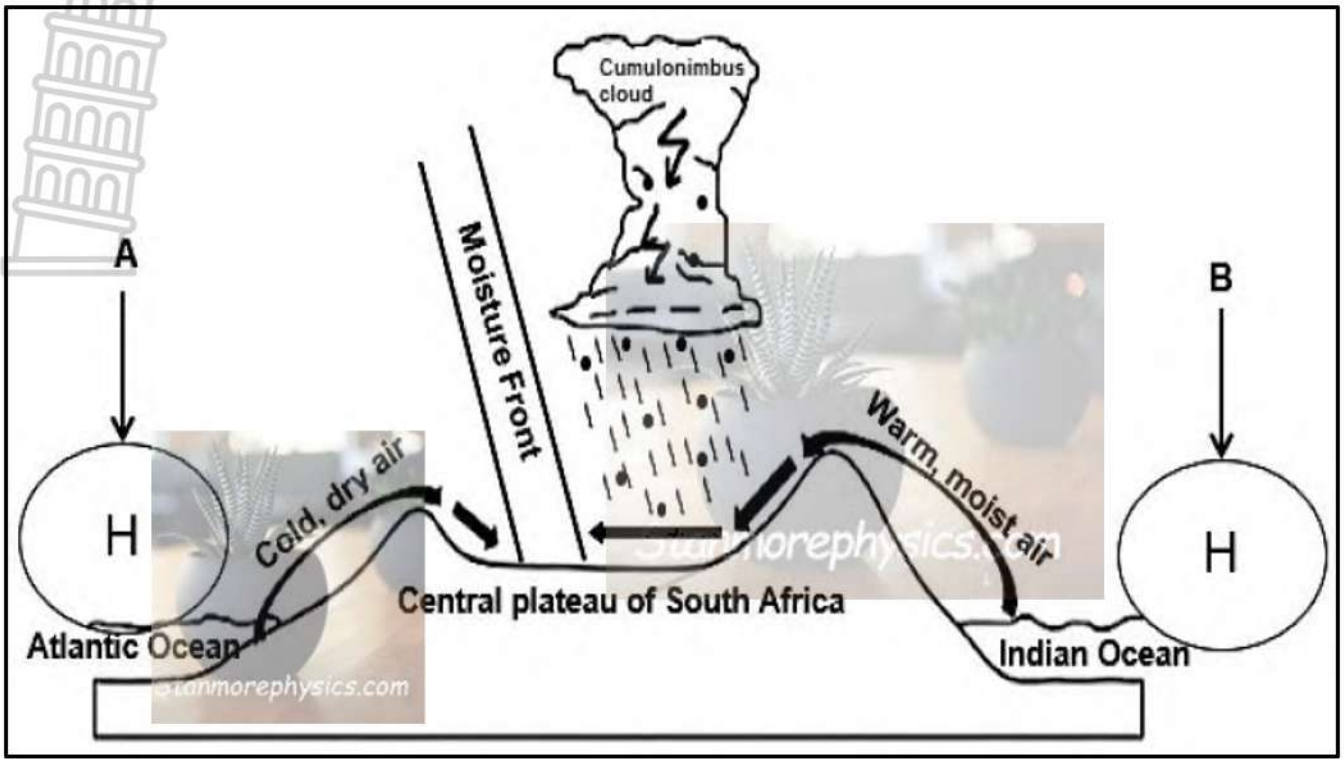
1.3.2. Which graph, A or B, depicts winter conditions? (1x1) (1)

1.3.3. Give a reason for the position of the inversion layer during winter. (1x2) (2)

1.3.4. What climatic conditions experienced over plateau during winter could be unfavourable for farmers? (2x1) (2)

1.3.5. In a paragraph of approximately EIGHT lines, explain how the subtropical anticyclones influence the climate over the interior of south Africa during summer. (4x2) (8)

1.4. Refer to the sketch below on line thunderstorms.



1.4.1. Identify high-pressure cells A and B. (2x1) (2)

1.4.2. Which season is represented by the sketch. (1x1) (1)

1.4.3. Give ONE reason from the sketch for your answer to QUESTION 1.4.2. (1x2) (2)

1.4.4. What is a moisture front? (1x2) (2)

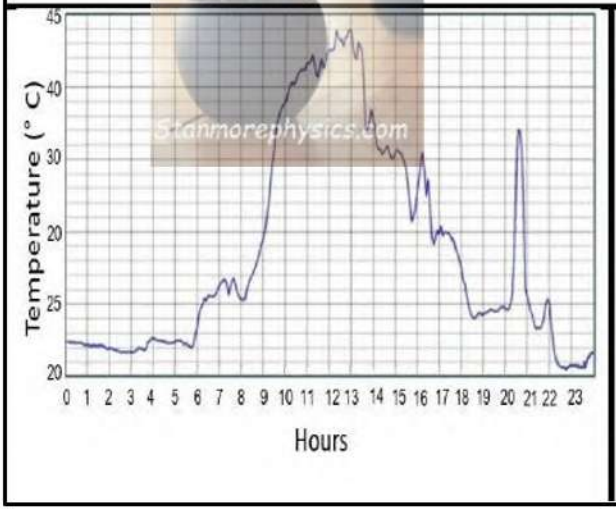
1.4.5. Name TWO forms of precipitation associated with a line thunderstorm. (2x1) (2)

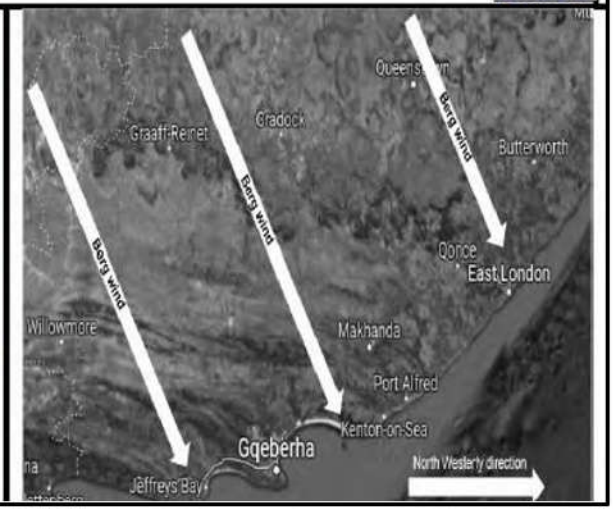
1.4.6. Describe the processes involved in the formation of line thunderstorms. (3x2) (6)

1.5. Refer to the infographic below about berg winds in South Africa.

East London residents were subject to sweltering heat last Saturday after a record-breaking heatwave resulted in a peak temperature of 43,9 °C.
According to the South African Weather Service (SAWS), the heatwave was a result of berg wind conditions, when hot dry winds blow towards the coast from the country's high central plateau.
"As the air descends it gets warmer and by the time it gets to the coast it is extremely hot.", SAWS spokesperson in Gqeberha (formerly Port Elizabeth) Garth Sampson told the *Daily Dispatch* on Monday.
According to statistics released by SAWS, East London's temperature on Saturday was the second highest in the entire Eastern Cape on the day, below Kenton-on-Sea 44,2 °C and above the 42,6 °C recorded in Gqeberha.

[Adapted from https://www.goexpress.co.za/2021/record-breaking-heatwave-hits-east-london/]





1.5.1. What according to the extract, was the result of the record-breaking heat wave in East London? (2x1) (2)

1.5.2. Why does air get warmer as it descends towards the coastal regions? (1x2) (2)

1.5.3. According to the graph, how long did the maximum temperature of 44^0C last? (1x1) (1)

1.5.4. Explain the reason for the north westerly direction of the berg wind direction, cloud cover and air temperature at 13h00. (3x1) (3)

1.5.5. Draw a weather station of east London that illustrates the wind direction, cloud cover and air temperature at 13h00. (3x1) (3)

1.5.6. How will the physical (natural) environment be affected due to the time (answer to QUESTION 1.5.3) that it has been exposed to the 44^0C of the berg wind? (2x2) (4)

==========60 marks==========

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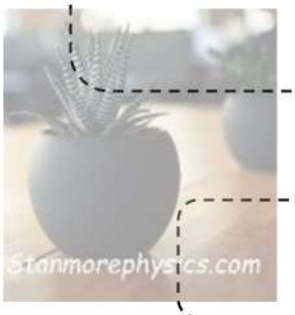


GRADE 12

GEOGRAPHY

Anticyclones

Topic Test No.3

Marking Guideline

Marks : 60

1.1. Multiple choice questions

1.1.1. D
1.1.2. B
1.1.3. A
1.1.4. C
1.1.5. B
1.1.6. A
1.1.7. B
1.1.8. B

1.2. Low pressure A

1.2.1. Coastal low
1.2.2. West coast
1.2.3. West to east
1.2.4. Heavy rainfall
1.2.5. Clockwise
1.2.6. Berg wind
1.2.7. No moisture

1.3. Influence of anticyclones on SA weather

1.3.1. A layer in the atmosphere in which air temperature increases with altitude. (2)
1.3.2. A (1)
1.3.3. Stronger descending air (2)

Strong subsidence (2)

More pronounced/developed anticyclone (2)

Stronger anticyclonic subsiding air (2)

Well-developed Kalahari high pressure cell (2)

Weaker convection current over interior of SA (2)

Colder temperature means less rising air (2) (ANY ONE)

1.3.4. Dry conditions (1)

Low humidity (1)

Frost (1) ANY TWO

1.3.5. During summer, the Kalahari high pressure cell is not very well developed as it shrinks and weakens. (2)

The weakened Kalahari high pressure cell allow the inversion layer to lie above the level of the plateau/escarpment. (2)

Warm moist air (from the south Indian anticyclone) is able to reach the interior of the country because of the weakened Kalahari high pressure cell. (2)

The south Indian high-pressure cell, situated over the Indian ocean, supplies warm, moist air (rain) because of the anticyclonic circulation. (2)

Divergence of air (NE winds) from the south Indian anticyclone onto the interior brings rain (2)

Unstable conditions cause air (from the south Indian anticyclone) to rise, condensation to occur and clouds/rain to form.

Because of the weakened Kalahari high pressure cell, less air subsides (less compressed air which heats up. (2)

Cold and dry air diverges (SW) from the south Atlantic high pressure, bringing cold dry winds towards land. (2)

Ridging of the south Atlantic high pressure diverts moist air from the Indian ocean onto the land. (2)

A strong south-easterly from the south Atlantic high ridge brings a strong onshore wind. (2) (ANY FOUR

1.4. Line thunderstorm

1.4.1. A south Atlantic (1) B- South Indian (1)

1.4.2. Summer (1)

1.4.3. Line thunderstorm (heavy rainfall) occur in the interior (2)

Cumulonimbus clouds. Lighting /hail (2)

Moisture front developed (2)

Air from the east/west reaches the interior. (2)

1.4.4. The boundary (dry line) between two air masses of different moisture content. (2)

1.4.5. (heavy) rainfall (1)

Hail (1)

Thunderstorms (1) ANY TWO

1.4.6. Convergence of warm moist air and cold dry air (2)

Moisture front develops (2)

Cold dry air undercuts warm moist air (2)

Warm moist air rises (2)

Condensation occurs in the eastern side of the moisture front. (2)

Cumulonimbus clouds develops (2) (ANY THREE)

1.5. Berg wind

1.5.1. Peak temperatures of 43,9C (1)

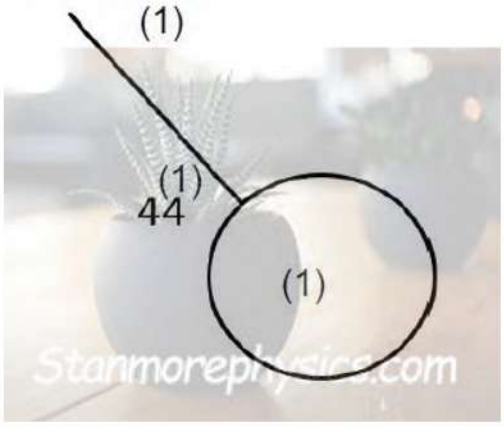
Berg wind conditions (1)

1.5.2. It heats up adiabatically (2)

1.5.3. Between 35-40min/less than an hour (2)

1.5.4. Anticlockwise circulation of air from the Kalahari high descends down the escarpment. (2)

1.5.5. Diagram



(3 x 1) (3)

1.5.6. Moisture will be evaporated from the soil and vegetation (2)

Increases the danger of veld fires (2)

Decreased humidity (2)