GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENG DEPARTMENT OF EDUCATION
MID-YEAR EXAMINATION
2022

GEOGRAPHY

PHYSICAL GEOGRAPHY

QUESTION PAPER

GRADE 11

TIME:	**3 hours**
TOTAL:	**150**
DATE:	**20 JUNE 2022**

This question paper consist of 15 pages.

MAP: 2331CC PHALABORWA

INSTRUCTIONS AND INFORMATION

1. This question paper consists of TWO SECTIONS.

   SECTION A
   QUESTION 1: THE ATMOSPHERE (60 MARKS)
   QUESTION 2: GEOMORPHOLOGY (60 MARKS)

   SECTION B
   QUESTION 3: GEOGRAPHICAL SKILLS AND TECHNIQUES (30 MARKS)

2. Answer ALL THREE questions.

3. ALL diagrams are included in the annexure.

4. Where possible, illustrate your answers with labelled diagrams.

5. Leave a line between subsections answered.

6. Start EACH question at the top of a NEW page.

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

8. Do NOT write in the margins of your ANSWER BOOK.

9. In SECTION B you are provided with a 1:50 000 2331CC PHALABORWA topographical map and an extract of the 2331CC 18 PHALABORWA (NORTH) of a part of the mapped area.

10. Show ALL calculations and use the formulae provided, where applicable. Marks will be allocated for these.

11. Indicate the unit of measurement in the final answer of calculations,
    e.g., 10 km; 2,1 cm.

12. You may use a non-programmable and a magnifying glass.

13. The area demarcated in RED and BLACK on the topographic map represents the area covered by the orthophoto map.

SPECIFIC INSTRUCTIONS AND INFORMATION FOR SECTION B

14. A 1: 50 000 2331CC PHALABORWA topographical map and an extract of the 2331CC 18 PHALABORWA (NORTH) ortho photo of a part of the mapped area.

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 orthophoto map to the invigilator at the end of the examination.

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SECTION A: PHYSICAL GEOGRAPHY

QUESTION 1: THE ATMOSPHERE

QUESTION 1

1.1 1.1.1 G (parallelism) √ (1)

1.1.2 A (revolution) √ (1)

1.1.3 D (insolation) √ (1)

1.1.4 B (orbit) √ (1)

1.1.5 E (terrestrial radiation) √ (1)

1.1.6 I (solstice) √ (1)

1.1.7 C (equinox) √ (1)

1.1.8 H (circle of illumination) √ (1) (8 x 1) (8)

1.2 The following figure illustrates GLOBAL AIR CIRCULATION. Answer the following questions by providing the correct term/concept for the descriptive phrase below, for example 1.2.8 Polar.

FIGURE 1.2 GLOBAL AIR CIRCULATION

1.2.1 Equator√ (1)

1.2.2 High pressure√ (1)

1.2.3 Sub-tropical high√ (1)

1.2.4 Mid-latitude cyclone√ (1)

1.2.5 Upper air divergence√ (1)

1.2.6 Hadley cell √ (1)

1.2.7 Polar cell √ (1) (7 x 1) (7)

1.3.1 Isobars √ (1 x 1) (1)

1.3.2 1020 hPa √ (1 x 1) (1)

1.3.3 C – Saddle√
D – Low pressure √ (2 x 1) (2)

1.3.4 ITCZ has moved southwards, because the south Atlantic and south Indian high pressure systems are close to the land √
Interior of the country experience high temperatures √ (2 x 1) (2)

1.3.5 (a) South √ (1 x 1) (1)

(b) Pressure gradient established√√, because of the high pressure over the ocean and low pressure over the land √√
As air starts to move from high to low, √√ Coriolis force starts to influence the direction. √√ The wind starts to deflect to the left √√ according to Ferrell's law √√ and thus causes southerly winds instead of westerly winds at the weather stations √√
(Any FOUR – Explanation is important) (4 x 2) (8)
[15]

1.4 1.4.1 These winds affect small/certain areas (1) (1 x 1) (1)

1.4.2 Weather conditions during winter and summer are different (2)
Pressure systems change over the land in winter and summer (2) The wind changes direction during the seasons due to the difference of the pressure systems over the land (2)
[ANY ONE] (1 x 2) (2)

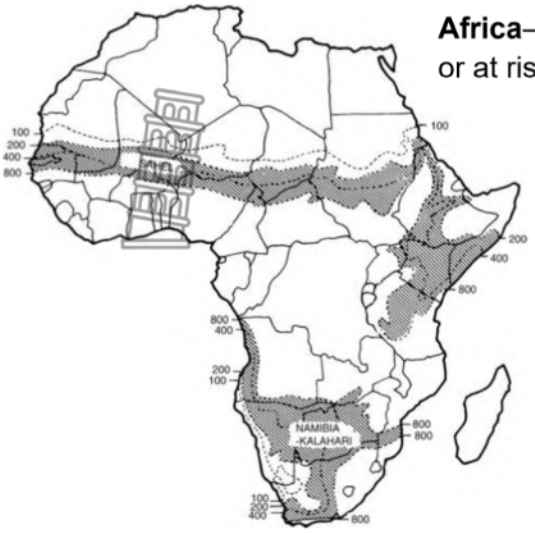
1.4.3 High pressure over central Asia during winter (2)
Air moves from the interior to the ocean and descends down the Himalayan Mountains (2)
The air heats up adiabatically and a hot, dry wind reaches India (2)
[ANY TWO] (2 x 2) (4)

1.4.4 During summer the ITCZ moves southwards (2)
Land gets heated faster than the ocean (2)
Low pressure develops over the land and a high pressure over the ocean (2)
Moist air is pulled towards the land from the ocean, bringing torrential downpours (2)
[ANY TWO] (2 x 2) (4)

1.4.5 Loss of lives due to heavy rainfall (2)
Flooding destroys homes (2)
Flooding of agricultural land causes food shortages (2)
Essential infrastructure is washed away (2)
[ANY TWO] (2 x 2) (4)

[15]

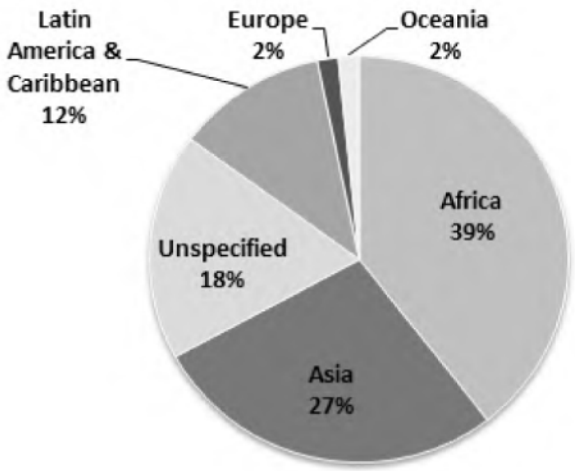
1.5 Refer to the infographic on desertification and answer the following questions.



Africa—Shaded area - area suffering or at risk of desertification.

Desertification can be caused by drought, overpopulation, over-farming, deforestation and climate change. The effects of desertification are seen in many parts of the world.

The most vulnerable region is a 3,000-mile stretch of land that includes ten countries in the Sahel region of Africa. The Sahel is the area between the Saharan Desert and the Sudanian Savannah. This region is under constant stress due to frequent droughts and soil erosion. A dense forest can become a field of dust in a matter of years, making mass migrations inevitable. Africans frequently migrate south in search of fertile land.



[Source: Adapted from: https://borgenproject.org/desertification-in-africa/; https://www.oecd.org/dac/environment-development/DESERTIFICATION-RELATED%20FINANCE%20MARCH%202015_FINAL.pdf https://www.sciencedirect.com/topics/social-sciences/desertification]

1.5.1 *Desertification* is the loss of healthy fertile soil. (1x2) (2)

1.5.2 Africa. (1x1) (1)

1.5.3 SAHEL Region (1x2) (2)

1.5.4 Draught
Over population
Over farming
Deforestation
Climate change (2x1) (2)

1.5.5 Less crops, less exports, less money (2x2) (4)
Food more expensive
Food has to be imported
Unproductive land leads to poverty
Cattle dies, less meat, higher prices
Livestock sold at lower prices
Loss of jobs, unemployment on farms and industries
Farmers borrow money and increase debt
Industries to food and meat industries close down
Less environmental tourism

1.5.6 Collection of rainfall through dams (2x2) (4)
Warning farmers for possible drought years
Control livestock numbers and prevent overgrazing
Plant draught resistant crops
Maintaining healthy vegetation to promote infiltration of water and replenish ground water supplies
Building water transfer schemes
Desalination of seawater
Water restrictions

[15]
[60]

QUESTION 2: GEOMORPHOLOGY

2.1

2.1.1 Concave (1)

2.1.2 Back wasting (1)

2.1.3 Mechanical (1)

2.1.4 Scarp (1)

2.1.5 Sills (1)

2.1.6 Laccolith (1)

2.1.7 Batholith (1) (7 x 1) (7)

2.2 2.2.1 C √ (1)

2.2.2 G √ (1)

2.2.3 A √ (1)

2.2.4 I √ (1)

2.2.5 D √ (1)

2.2.6 F √ (1)

2.2.7 H √ (1)

2.2.8 E √ (1) (8 x 1) (8)

2.3 2.3.1 Homoclinal ridge has a dip slope angle of 25°– 45° (1)

Cuesta has a dip slope angle of 10°– 25 (1) (2 x 1) (2)

2.3.2 Sedimentary rocks (1) (1 x 1) (1)

2.3.3 Faulting (1)
Folding (1)
(**Any ONE**) (1 x 1) (1)

2.3.4 (a) The dip slope is gentler than the scarp slope (2) (1 x 2) (2)

(b) There is more undercutting as softer material is underneath the resistant layer (2)
The dip slope is on the resistant layer and is therefore difficult to erode (2) (2 x 2) (4)

2.3.5 The scarp slope is too steep for agricultural activities (2)
Soil is too thin on the dip slope (2)
Infrastructure like roads and railway lines are very costly to construct (2)
(**Any TWO**) (2 x 2) (4)

[15]

2.4. 2.4.1 (a) mesa (1)

(b) butte (1) (2 x 1) (2)

2.4.2 They are both subjected to scarp retreat or back wasting (1) (1 x 1) (1)

2.4.3 Hard and resistant (2) (1 x 2) (2)

2.4.4 The cap rock does not erode downwards and allows the landscape to maintain its height (2) (1 x 2) (2)

2.4.5 **BENEFIT**
Impressive scenery makes these landscapes a tourist attraction (2)
Recreational activities such as hiking or adrenaline sports can be practised on these landscapes (2)
Livestock farming can be practiced on the pediplains (2)

OBSTACLES
Arid climate in these landscapes makes crop farming impossible (2)
It is difficult to access water for irrigation from these landscapes as the slopes of the canyon are too rugged (2) Settlements are difficult to develop (2)
Difficult to develop infrastructure (2)
[ANY FOUR – MUST REFER TO BENEFITS AND OBTACLES]
(4 x 2)(8) [15]

2.5 2.5.1 A – Convex slope (1)

B – Concave slope (1) (2 x 1) (2)

2.5.2 Very steep, with excessive erosion (2)
There is no soil on this slope element (2)
(**Any ONE**) (1 x 2) (2)

2.5.3 (a) The wearing away or cutting back of a slope
(**Concept**) (1 x 1) (1)

(b) Parallel retreat (1) (1 x 1) (1)

(c) The sketch area occurs in a semi-arid region (2)
Scarp retreat will occur at the cliff (2)
In semi-arid regions the slope angle and length stay constant with the retreat (2)
(**Any ONE**) (1 x 2) (2)

2.5.4 ***Slope element C (Talus slope)***
Lies beneath the cliff (2)
Consists of weathered rock material that has fallen from the cliff (2)
Landslides and soil creep is common on the talus (2)
The angle of the slope remains uniform (2)
The slope is usually concave (2)
Slope element D (Pediment)
It has a gentle slope (2)
It is covered with sediments from the talus slope (2)
The soil is deep because of the gentle angle (2)
Soil creep and sheet wash is common on the pediment (2)
(**BOTH SLOPE ELEMENTS MUST BE MENTIONED – Any THREE characteristics from one slope and ONE from the other slope**) (4 x 2) (8)
[15]

SECTION B: GEOGRAPHICAL SKILLS AND TECHNIQUES (MAPWORK)

3.1 3.1.1 A √ (1)
3.1.2 B√(1)

3.1.3 Bearing: 55° Range: 54~56 √ (1 x 1) (1)

3.1.4 Magnetic Declination

Difference in years = 2022 – 2012 = 10 Years√
Annual change: 2'√
Total Annual change = 10 years x 2' = 20'√
Magnetic Declination = 15° 72' ~16°12'√ West of true North (5 x 1) (5)

3.1.5 Magnetic bearing = True Bearing + Magnetic Declination
= 55°+ 16°12'√
= 71°12' √ (Range: 70°12' ~ 72°12') (2 x 1) (2)
[10]

3.2 MAP INTERPRETATION

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 number.

3.2.1 D southeast √ (1 x 1) (1)

3.2.2 A ridge. √ (1 x 1) (1)

3.2.3 B recreational area√ (1 x 1) (1)

3.2.4 Phalaborwa receives lots of rainfall during summer months and less rainfall during winter months. √ (1 x 1) (1)

3.2.5 Dams build to store water√
Canals build to transport water√
Reservoirs build to store water
Non-perennial rivers (2 x 1) (2)

3.2.6 Flat area suitable for farming√√
Water available
Fertile soil
(Accept other answers). (1 x 2) (2)

3.2.7 (a) Slope will get lower√√
Gradient of talus will get less (1 x 2) (2)

(b) Far from town√√
Far from people
(Accept other answers) (1 x 2) (2)
[12]

3.3	3.3.1	(a)	Line symbol: Rivers√ Contours Hiking trails/ track Power lines	(1)	
		(b)	Point symbol: Point height √ Buildings	(1)	
		(c)	Area symbol: Diggings√ Woodlands	(1)	(3)
	3.3.2	(a)	Raster.	(1 x 1)	(1)
		(b)	GIS could help with relief of area Possible water supplies Accessibility of water Soil type (accept other possible answers)	(2 x 2)	(4)
					[8] **[30]**
				TOTAL:	**150**