

**UNIVERSITY OF SWAZILAND  
DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL SCIENCE AND  
PLANNING  
SUPPLEMENTARY EXAMINATION, JULY 2009  
B.A., B.Ed., B.Sc., B.A.S.S**

**TITLE OF PAPER: INTRODUCTION TO THE NATURAL ENVIRONMENT**

**COURSE CODE: GEP 111**

**TIME ALLOWED: THREE HOURS**

**INSTRUCTIONS: THIS PAPER IS DIVIDED INTO TWO SECTIONS**

**MATERIALS NEEDED: (1) MAP OF SWAZILAND (PWD 18),  
(2) GRAPH PAPER.**

**SECTION A: ANSWER ANY THREE QUESTIONS**

**SECTION B: TECHNIQUES AND SKILLS  
ANSWER ONE QUESTION**

**DO NOT OPEN THIS PAPER UNTIL PERMISSION HAS BEEN GRANTED BY  
THE INVIGILATOR**

## SECTION A

### ANSWER ANY THREE QUESTIONS

#### QUESTION 1

- a. Differentiate between rock physical and chemical weathering. (5 marks)
- b. Describe any two processes of physical weathering and any two processes of chemical weathering, stating where they are most likely to occur (15 marks)

(20 marks)

#### QUESTION 2

Describe the four main atmospheric mechanisms which may cause precipitation.

(20 marks)

#### QUESTION 3

Explain how magma in the asthenosphere may end up as a metamorphic, sedimentary or igneous rock. Use diagrams to illustrate your answer

(20 marks)

#### QUESTION 4

Describe how the Earth's Revolution, Rotation, Inclination and Polarity results in the various seasonal patterns experienced on earth.

(20 marks)

#### QUESTION 5

- a. Explain what is meant by the Green house effect. (5 marks)
- b. Describe any three anthropogenic activities that may enhance this effect.

(15 marks)

(20 marks)

**SECTION C: TECHNIQUES AND SKILLS**

**ANSWER ONE QUESTION ONLY**

**QUESTION 1**

a) Complete the table below: (12 marks)

Area on Map	Scale of Map	True area on Earth
144 cm <sup>2</sup>	1:60 000	.....m <sup>2</sup>
.....cm <sup>2</sup>	1: 150 000	127.7 ha
84 cm <sup>2</sup>	.....	21.38 km <sup>2</sup>

b) With reference to the topographical map of Swaziland (PWD 11), use the six-figure grid reference system to state the location of the following places/features: (4 marks)

- i) Makhebelele dipping tank
- ii) Mlilwane Camp
- iii) Waterford Kamhlaba
- iv) Msunduzi Trigonometrical station

c) With reference to the topographical map of Swaziland (PWD 11), what features are found at the following locations? (4 marks)

- i) 244069
- ii) 117219
- iii) 185288
- iv) 205265

d) Explain fully how would you arrange aerial photographs to attain a stereoscopic view? (12 marks)

e) A camera, with a focal length of 6.0 cm, mounted on an aircraft flying at an altitude of 7 000 metres above sea level was used to take photographs of an area located at approximately 1000 metres above sea level. What is the scale of those aerial photographs? (8 marks)

**(40 marks)**

**QUESTION 2**

a) Define the following terms: (10 marks)

- i) Geographic grid
- ii) Parallels

**TABLE 1: SOLAR RADIATION (RA) EXPRESSED IN EQUIVALENT EVAPORATION (MM/DAY)**

Latitude	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
60°N	1.4	3.6	7.0	11.1	14.6	16.4	15.6	12.6	8.5	4.7	2.0	0.9
50°N	3.7	6.0	9.2	12.7	15.5	16.6	16.1	13.7	10.4	7.1	4.4	3.1
40°N	6.2	8.0	11.1	13.8	15.9	16.7	16.3	14.7	12.1	9.3	6.8	5.6
30°N	8.1	10.5	12.8	14.7	16.1	16.5	16.2	15.2	13.5	11.2	9.1	7.9
20°N	10.8	12.4	14.0	15.2	15.7	15.8	15.8	15.4	14.4	12.9	11.3	10.4
10°N	12.8	13.9	14.8	15.2	15.0	14.8	14.9	15.0	14.8	14.2	13.1	12.5
Equator	14.6	15.0	15.2	14.7	13.9	13.4	13.6	14.3	14.9	15.0	14.6	14.3
10°S	14.6	15.0	15.2	14.7	13.9	13.4	13.6	14.3	14.9	15.0	14.6	14.3
20°S	16.8	15.7	15.1	13.9	12.5	11.7	12.0	13.1	14.4	15.4	15.7	15.8
30°S	17.2	15.8	13.5	10.9	8.6	7.5	7.9	9.7	12.3	14.8	16.7	17.5
40°S	17.3	15.1	12.2	8.9	6.4	5.2	5.6	7.6	10.7	13.8	16.5	17.8
50°S	16.9	14.1	10.4	6.7	4.1	2.9	3.4	5.4	8.7	12.5	16.0	17.6
60°S	16.5	12.6	8.3	4.3	1.8	0.9	1.3	3.1	6.5	10.8	15.1	17.5

Source: Shaw, 1983. *Hydrology in Practice*

**TABLE 2: MEAN DAILY DURATION OF MAXIMUM POSSIBLE SUNSHINE HOURS (N)**

North Lat.	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
South Lat.	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
60°N/S	6.7	9.0	11.7	14.5	17.1	18.6	17.9	15.5	12.9	10.1	7.5	5.9
58°N/S	7.2	9.3	11.7	14.3	16.6	17.9	17.3	15.3	12.8	10.3	7.9	6.5
56°N/S	7.6	9.5	11.7	14.1	16.2	17.4	16.9	15.0	12.7	10.4	8.3	7.0
54°N/S	7.9	9.75	11.7	13.9	15.9	16.9	16.5	14.8	12.7	10.5	8.5	7.4
52°N/S	8.38	9.94	11.8	13.8	15.6	16.5	16.1	14.6	12.7	10.6	8.8	.8
50°N/S	8.58	10.0	11.8	13.7	15.3	16.3	15.9	14.4	12.6	10.7	9.0	8.1
48°N/S	8.8	10.2	11.8	13.6	15.2	16.0	15.6	14.3	12.6	10.9	9.36	8.3
46°N/S	9.1	10.4	11.9	13.5	14.9	15.7	15.4	14.2	12.6	10.9	9.5	8.7
44°N/S	9.3	10.5	11.9	13.4	14.7	1.4	15.2	14.0	12.6	11.0	9.7	8.9
42°N/S	9.4	10.6	11.9	13.4	14.6	15.2	14.9	13.9	12.6	11.1	9.8	9.1
40°N/S	9.63	10.7	11.9	13.3	14.4	15.0	14.7	13.7	12.5	11.2	10.0	9.3
35°N/S	10.1	11.0	11.9	13.1	14.0	14.5	14.3	13.5	12.4	11.3	10.3	9.86
30°N/S	10.4	11.1	12.0	12.9	13.6	14.0	13.9	13.2	12.4	11.5	10.6	10.2
25°N/S	10.7	11.3	12.0	12.7	13.3	13.7	13.5	13.0	12.3	11.6	10.9	10.6
20°N/S	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9
5°N/S	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2
10°N/S	11.6	11.8	12.0	12.3	12.6	12.7	12.6	12.4	12.1	11.8	11.6	11.5
5°N/S	11.8	11.9	12.0	12.2	12.3	12.4	12.3	12.3	12.1	12.0	11.9	11.8
Equator	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

Source: Shaw, 1983. *Hydrology in Practice*

**TABLE 3: VALUES OF  $\alpha T^4$**

°F	0	1	2	3	4	5	6	7	8	9
30	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.6	11.7	11.87
40	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8
50	12.9	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.9
60	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.5	14.8	14.9
°C										
-0	11.2	11.0								
0	11.2	11.4	11.5	11.7	11.9	12.0	12.2	12.3	12.5	12.7
10	12.9	13.1	13.3	13.5	13.7	13.9	14.0	14.2	14.4	14.6
20	14.8	15.0	15.2	15.4	15.6	15.8	16.0	16.2	16.4	16.6

Source: Shaw, 1983. *Hydrology in Practice*