

UNIVERSITY OF SWAZILAND
DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL SCIENCE AND
PLANNING

FINAL EXAMINATION: DECEMBER, 2009
BSc. I, BA 1, HUM 1, BED 1

TITLE OF PAPER : **Introduction to the Physical Environment**

COURSE NUMBER : **GEP 111**

TIME ALLOWED : **3 hours**

INSTRUCTIONS : **ANSWER ONE QUESTION FROM SECTION A**
ANSWER ANY TWO QUESTIONS FROM SECTION B
ILLUSTRATE YOUR ANSWERS WITH APPROPRIATE DIAGRAMS

MARKS ALLOCATED : **EACH QUESTION OF SECTION A CARRIES 40 MARKS.**
THE OTHER QUESTIONS CARRY 30 MARKS EACH.

Material needed: Map of Mbabane (PWD 11)

SECTION A: TECHNIQUES AND SKILLS
CHOOSE AND 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 ²	1:60 000m ²
.....cm ²	1: 150 000	127.7 ha
84 cm ²	21.38 km ²

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) Msunduza 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)

QUESTION 2

a) Define the following terms: (10 marks)

- i) Geographic grid
- ii) Parallels
- iii) Horizontal equivalent
- iv) Satellite image
- v) Watershed

b) With reference to Tables 1, 2 and 3, calculate the amount of in-coming, out-going and the net solar radiation in Leeds under the hypothetical conditions shown below. Leeds is found at 53.48 S and 1.34 W. (15 marks)

Month	e_s	T(° C)	n(hours)	R _i	R _o	H
June	23.9	23.5	13.0			

September	15.1	15.8	6.5			
December	09.8	06.0	3.0			

c) Using the information in Tables 1, 2 and 3, calculate the incoming and outgoing net radiation in the following table for the month of October. (15 marks)

Location	e_s	T (°C)	n(hours)	R _i	R _o	H
22°N	14	21	10.5			
0°	16	27	12			
13°S	12	15	8			

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	7.8
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	15.4	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
15°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
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Source: Shaw, 1983. *Hydrology in Practice*

TABLE 3: VALUES OF σT^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*

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION 3:

Describe the events that occur during the process of continental drifting

(30 marks)

QUESTION 4:

Discuss why the surface temperatures close to the equator are generally higher than those in high latitudes. Give examples.

(30 marks)

QUESTION 5:

Compare the terrestrial planets and some of the larger moons of Jupiter and Saturn according to their rock composition and their atmosphere. Which conclusion may be drawn for the potential existence of life for each of them.

(30 marks)

QUESTION 6:

Describe which soil types are most resistant against weathering and erosion, and why are they? Give examples.

(30 marks)