



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

FACULTY OF HEALTH AND APPLIED SCIENCES  
DEPARTMENT OF MATHEMATICS

<b>QUALIFICATION:</b>	BACHELOR OF PROPERTY STUDIES/NATIONAL DIPLOMA IN PROPERTY STUDIES/GEOMATICS	
<b>QUALIFICATION CODE:</b>	27DPRS, 27DLMR, 27DLAD, 27BPRS	<b>LEVEL:</b> 5
<b>COURSE CODE:</b>	MSS511S	<b>COURSE NAME:</b> MATHEMATICS AND STATISTICS FOR SPATIAL SCIENCES
<b>SESSION:</b>	JUNE 2022	<b>PAPER:</b> THEORY
<b>DURATION:</b>	3 HOURS	<b>MARKS</b> 100

<b>FIRST OPPORTUNITY EXAMINATION QUESTION PAPER</b>	
<b>EXAMINAR</b>	Dr. Jacob Ong'ala
<b>MODERATOR</b>	Mr. Andrew Roux

<b>INSTRUCTION</b>
1. Answer all the questions 2. Show clearly all the steps in the calculations 3. All written work must be done in blue and black ink

**PERMISSIBLE MATERIALS**

Non-programmable calculator without cover

**THIS QUESTION PAPER CONSISTS OF 5 PAGES** (including the front page)

## SECTION A

### QUESTION 1 - 11 MARKS

(a) Evaluate the following expressions

(i)  $7(23 - 18) \div (12 - 5)$  [2 mks]

(ii)  $3\frac{2}{3} \times 1\frac{3}{4} \div 2\frac{3}{4}$  [3 mks]

(b) Simplify the following expressions completely

(i)  $8x^2y - [3x^2y + (2xy^2 + 4x^2y - (3xy^2 - 4x^2y))]$  [3 mks]

(ii)  $(a^3\sqrt{b}\sqrt{c^5})(\sqrt{a}\sqrt[3]{b^2c^3})$  [3 mks]

### QUESTION 2 - 13 MARKS

(a) Factorise  $3x^2 + 10x - 8$  [3 mks]

(b) Solve for m

$$\frac{1}{3}(3m - 6) - \frac{1}{4}(5m + 4) + \frac{1}{5}(2m - 9) = -3$$
 [4 mks]

(c) Use completing the square method to solve the following quadratic equations

$$2x^2 + 9x - 9 = 0$$
 [6 mks]

(d) Solve the following systems of equation (You may use any method)

$$\begin{aligned} 3x - 6y &= 10 \\ 9x + 15y &= -14 \end{aligned}$$

### QUESTION 3 - 07 MARKS

(a) A drilling speed should be set to 400 rev/min. The nearest speed available on the machine is 412 rev/min. Calculate the percentage over speed. [2 mks]

(b) A map scale is 1:30000. On the map, distance between 2 schools is 6cm. determine the actual distance between the schools giving your answer in Km [2 mks]

(c) The electrical resistance R of a piece of wire is inversely proportional to the cross-sectional area A when  $A = 5\text{mm}^2$ ,  $A = 7.02\Omega$ . Determine

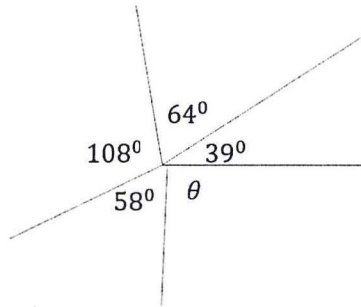
(i) Coefficient of proportionality k [2 mks]

(ii) Cross sectional Area A when  $R = 4\Omega$  [1 mks]

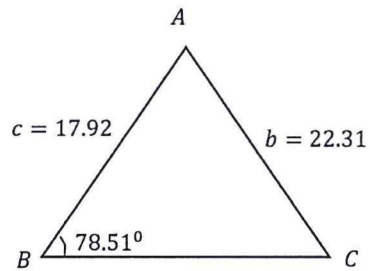
**QUESTION 4 - 13 MARKS**

(a) Evaluate the angle  $\theta$  in the diagram below.

[2 mks]



(b) In the triangle given below, find;



(i) angle C

[3 mks]

(ii) angle A

[2 mks]

(iii) side BC

[3 mks]

(iv) Area of triangle ABC

[3 mks]

## SECTION B

### QUESTION 5 - 17 MARKS

- (a) Indicate whether each of the following variables is quantitative or qualitative. State its measurement scale. (example of data is shown in the bracket) [5 mks]

	Variable	Qualitative/Quantitative	Measurement scale
a	Height (short, tall medium)		
b	Weight (37kg, 74Kg, 300g)		
c	Names (Jane, Grace, Ben)		
d	No. of cars passing a junction (23, 5, 86)		
e	Temperature ( $13^{\circ}C$ , $49^{\circ}C$ , $0.74^{\circ}C$ )		

- (b) Represent the following data sets in a frequency table

- (i) Dataset 1: Blood groups; [4 mks]

A; B; O; A; AB; O; O; A; O; B; A; A; A; O; O;  
O; B; O; AB; B, O, B, O, A, A

- (ii) Dataset 2: Height of male soldier [8mks]

60; 60.5; 61; 61; 61.5; 63.5; 63.5; 63.5; 64; 64; 64; 64; 64; 64; 64; 64.5;  
64.5; 64.5; 64.5; 64.5; 64.5; 64.5; 64.5; 66; 66; 66; 66; 66; 66; 66; 66;  
66; 66.5; 66.5; 66.5; 66.5; 66.5; 66.5; 66.5; 66.5; 66.5; 66.5; 66.5; 67; 67; 67;  
67; 67; 67; 67; 67; 67; 67; 67; 67.5; 67.5; 67.5; 67.5; 67.5; 67.5; 67.5;  
68; 68; 69; 69; 69; 69; 69; 69; 69; 69; 69; 69; 69.5; 69.5; 69.5; 69.5;  
70; 70; 70; 70; 70; 70; 70.5; 70.5; 70.5; 71; 71; 71; 72; 72; 72; 72.5; 72.5;  
73; 73.5; 74

### QUESTION 6 - 16 MARKS

Trudy Green works for the True-Green Lawn Company. Her job is to solicit lawn-care business via the telephone. Listed below are the numbers of appointments she made in each of the last 25 hours of calling. 5, 4,2,7,6,8,5,4,6,4,4,5,4,5,7,4,2,8,3,3,6,3,3 Calculate the following

- (a) Range [1 mks]  
 (b) Mode [1 mks]  
 (c) Median [1 mks]  
 (d) Arithmetic mean [2 mks]  
 (e) Variance [2 mks]  
 (f) Standard Deviation [2 mks]  
 (g) coefficient of variation. [2 mks]

### QUESTION 7 - 23 MARKS

The city council of Windhoek is considering increasing the number of police in an effort to reduce crime. Before making a final decision, the council asks the Chief of Police to survey other cities of similar size to determine the relationship between the number of police and the number of crimes reported. The Chief gathered the following sample information.

City	No of police (X)	No. of Crime (Y)
Oxford	15	17
Starksville	17	13
Danville	25	5
Athens	27	7
Holgate	17	7
Carey	12	21
Whistler	11	19
Woodville	22	6

- (a) Draw a scatter plot [4mks]
- (b) Interpret results in (a) above [2mks]
- (c) Find the correlation coefficient  $r$  [9mks]
- (d) Fit a regression model for the data [6mks]
- (e) Use the regression model above to find  $Y$  when  $X=30$ . [2mks]

- END -