

S475/1  
S.6 SUB – MATHEMATICS  
Paper 1  
July, 2019  
 $2\frac{2}{3}$  hours

Uganda Advanced Certificate of Education  
INTERNAL MOCK EXAMINATIONS 2019  
SUB – MATHEMATICS  
Paper 1  
2 hours 40 minutes

INSTRUCTIONS

- Answer **all** the eight questions in section **A** and any **four** questions in section **B**.
- Any additional question(s) answered will **not** be marked.
- Silent, non-programmable scientific calculators and mathematical tables with a list of formulae may be used.
- Where necessary, take acceleration due to gravity,  $g = 9.8ms^{-2}$ .

### SECTION A (30 MARKS)

1. Express  $\frac{4}{5+2\sqrt{2}} - \frac{5}{5-2\sqrt{2}}$  without a surd in its denominator. (05 marks)
2. A green, Red and three yellow balls are to be arranged in a row. What is the probability of having a red ball next to a green ball. (05 marks)
3. Solve the differential equation  $4x \frac{dy}{dx} = 3$ , given that  $x = 1$ , when  $y = 2$ . (05 marks)
4. The data below shows the temperature in degrees in a certain city at midday during the first week of May 12, 16, 14, 11, 12, 15, 13. Calculate the 3 point moving averages for the data. (05 marks)
5. Given that  $\alpha$  and  $\beta$  are roots of the equation  $x^2 + 5x + 6 = 0$ . Form an equation whose roots are  $\frac{1}{1-\alpha}$  and  $\frac{1}{1-\beta}$  (05 marks)

6. A continuous random, variable X has a probability distribution below;

$$f(x) = \begin{cases} k(x^2 - 1): & 0 < x < 2 \\ 0 & ; \text{ otherwise} \end{cases}$$

Find;

- (a) Value of constant  $k$ ,
- (b)  $P(x > 1)$

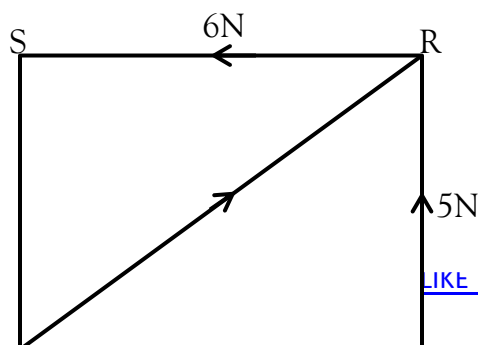
(05 marks)

7. Given that  $A = \begin{pmatrix} 2 & 1 \\ -1 & 0 \\ 3 & 5 \end{pmatrix}$  and  $B = \begin{pmatrix} -1 & 2 \\ 0 & 1 \\ 3 & 4 \end{pmatrix}$ . Find the value of

- (a)  $2B - A$
- (b) order of matrix T if  $T = 2B - A$ .

(05 marks)

8. PQRS is a square, forces of 3N, 5N, 6N, and  $6\sqrt{2}$  N act along PQ, QR, RS, and PR respectively.





Calculate the resultant force of the system (05 marks)

### SECTION B

9. The table below shows the prices and quantities of building materials between 2014 and 2015.

ITEM	PRICES IN UG SHS		QUANTITIES	
	2014	2015	2014	2015
Iron sheets	45,000	55,000	8	5
Cemment	28,000	35,000	12	18
Sand	140,000	105,000	10	10
Tiles	30,000	37,000	4	3
Nails	3,500	4,800	22	15

Taking 2014 as the base year, Calculate

- Price relative for each item. (05 marks)
- Simple average index for 2015 (04 marks)
- Weighted aggregate price index for 2015 and hence comment on your result. (06 marks)

10. (a) Solve for  $\theta$  :  $\sin \theta - 2 = 2\cos^2 \theta - 3$ , for  $0 \leq \theta \leq 360^\circ$  (07 marks)

(b) If  $\sin A = \frac{24}{25}$  and A is obtuse, and  $\tan B = \frac{3}{4}$  and B is acute. Find without using tables or calculator,

- $\sin(A + B)$  (04 marks)
- $\tan(A - B)$  (04 marks)

11. (a) Events A and B are independent such  $P(A) = \frac{1}{3}$  and  $P(B) = \frac{3}{4}$ . Find the probability that

- both A and B occur (03 marks)
- only one of the events occur (04 marks)

(b) A random variable X has a probability distribution function given below.

$x$	-1	0	1	2
$P(X = x)$	0.1	0.3	0.4	0.2

(a) Calculate;

(i) the mean mark (03 marks)

(ii) the standard deviation (04 marks)

12. (a) Find and determine the nature of the turning point of the curve  $y = 5 + 8x - 4x^2$ .

Hence sketch the curve. (10 marks)

(b) Calculate the area bounded by the curve  $y = 5 + 8x - 4x^2$  and line  $y = 5$ . (05 marks)

13. The table below shows the marks scored by 50 students in a class.

Marks	$- < 30$	$- < 40$	$- < 50$	$- < 60$	$- < 70$	$- < 80$
Number of students	3	11	29	40	47	50

(a) Calculate;

(i) the mean mark (03 marks)

(ii) the standard deviation (04 marks)

(b) Display the data on an ogive and use it to estimate the:-

(i) median mark (02 marks)

(ii) range of middle 50 percentile mark. (03 marks)

14. Body of mass 8kg rests on a rough horizontal table and is connected to another body of mass 3kg by a light inextensible string passing over a smooth pulley fixed at the edge of the table. The 3kg mass hangs freely. The coefficient of friction between the 8kg mass and the table is 0.3. The system is released from rest. Find the

(i) acceleration of the system. (05 marks)

(ii) tension in the string (05 marks)

(iii) distance the 3 kg mass covers after 2 seconds. (05 marks)

END