SUB MATH HOME ASSIGNMENT

SECTION A : (40 MARKS)

Answer all questions from this section

1. A curve passing through point A(0, 8) has a gradient function $2x + 5$. Find the equation of the curve. ***(05 marks)***

2. Solve the equation;
   $3^{2x} - 3^{x} - 6 = 0$. ***(05 mark)***

3. The mass (kg) of 10 candidates in Naalya S.S was recorded as follows, 60, 83, 72, 51, 64, 80, 75, 56, 90 and 85. Find the standard deviation. ***(05 marks)***

4. A discrete random variable x has the following probability distribution:
   P(X = 1) = 0.1, P(X = 2) = 2P (X = 4) and P(X = 3) = 0.3. Find;
   (i) P(X = 2)
   (ii) Expected value of x ***(05 marks)***

5. Find the reflex angle θ such that;
   $2Sin^2\theta + Cos\theta + 1 = 0$ ***(05 mark)***

6. Given that $\overrightarrow{OA} = 2\mathbf{i} + 2\mathbf{j}$ *and* $\overrightarrow{BA} = 7\mathbf{i} - \mathbf{j}$. Find;
   (i) $\overrightarrow{OB}$
   (ii) $\overrightarrow{OM}$, such that $\overrightarrow{AM} = ½ \overrightarrow{AB}$ ***(05 marks)***

7. In 2014, the unit price of salt, price and cooking oil was 1600, 4200 and 3600 respectively. Given that the unit price in 2015 was P, 6800 and 3200 respectively and the simple aggregate price index was 125, find the value of P.
   (05 marks)

8. A car of mass 1.5 tonnes moves along a level road at a constant velocity of $80ms^{-1}$. If its engine exerts a driving force of 5kN, find the resistance that the car is experiencing.
   (05 marks)

SECTION B

9. The table below shows the termly expenditure in thousands of shillings by a school on National water;

Year	Term I	Term II	Term III
2013	303	324	318
2014	336	345	330
2015	321	300	312
2016	339	342	x

(a) Calculate the 3 – termly moving averages for the data. ***(06 marks)***

(b) On the same axes, plot the graphs of the 3 termly moving averages and the termly expenditure. ***(07 marks)***

(c) Use your graph to estimate the value of x. ***(02 marks)***

10. (a) Sketch the curve;
$y = x^2 - 2x - 3$ ***(10 marks)***

(b) Find the area bound by the curve and the x - axis. ***(05 marks)***

11. The marks scored by candidates in a submaths exam were as follows;

64	74	78	59	67	55	61	54
80	58	76	58	74	65	63	83
72	60	71	52	61	57	68	69
62	73	64	59	62	53	81	68
50	75	67	53	80	77	60	71

(a) Construct a grouped frequency table for the data using equal classes of width 4 marks starting with 50 – 53 as the first class. ***(02 marks)***

(b) State the;
(i) Median class
(ii) Modal class and its frequency. ***(03 marks)***

(c) Calculate the;
(i) Mean mark
(ii) Standard deviation ***(10 marks)***

12. (a) Given that $A = \begin{pmatrix} 2 & 4 \\ -6 & 0 \end{pmatrix}$ and $B = \begin{pmatrix} x & 2 \\ y & 5 \end{pmatrix}$. Find the value of x and y such that AB = BA. Hence determine matrix p where P = AB = BA.

(08 marks)

(b) Given the matrix $M = \begin{pmatrix} 1 & 3 \\ 2 & 2 \end{pmatrix}$. Find the value of λ for which matrix N = M - λ I is singular, where I is a 2 x 2 identity matrix. ***(07 marks)***

13. Forces of 7N, 8N, 6N, 4N, 6N and 7N and 7N act along the sides of a regular hexagon ABCDEF in the directions AB, CB, CD, DE, EF and FA respectively. Find the magnitude and direction of the resultant force taking AB as the horizontal axis.

(15 marks)

14. A certain aptitude test has 10 statements that require a candidate to respond by writing true or false. A candidate passes if he or she scores at least eight questions correct;

(a) Find the probability that;

(i) A candidate gets exactly 5 questions correct

(ii) A candidate passes the test ***(09 marks)***

(b) Calculate the expected number and standard deviation of the correctly answered questions. ***(06 marks)***

SECTION A: (40 MARKS)

Attempt **all** *questions in this section.*

1. Three matrices P, Q and I are such that P = $\begin{pmatrix} a & a+1 \\ a-1 & a+2 \end{pmatrix}$ is singular and I is an identity matrix. Find the value of $\boldsymbol{a}$ and hence the matrix **Q** if P + I = Q. (05marks)

2. Given that A(1,2) B(4,3) and C(5, ⁻1) are vertices of a triangle ABC, find angle ABC. (05marks)

3. If $\frac{1}{\alpha}$ and $\frac{1}{\beta}$ are the roots of the equation $4x^2 - 8x + 1 = 0$, find the equation whose roots are $\alpha \; and \; \beta$. (05marks)

4. Two bags contain similar balls. Bag **A** contains 4 red and 3 white balls while bag **B** contains 3 red and 4 white balls. A bag is selected at random and a ball is drawn from it. Find the probability that a red ball is drawn. (05marks)

5. When a polynomial $g(x)$ is divided by $x^2 + 2x - 3$, the remainder is $2x - 2$. find the remainder when $g(x)$ is divided by;

   $x - 1$ (03marks)

   $x + 3$ (02marks)

6. The table below shows the price per kg of three food crops.

Item	Price per kg (shs)		Weights
	2000	**2010**	
Beans	4000	5000	3
Millet	3000	4000	3
Maize	2500	3000	4

   i) Calculate the price index of each item for 2010 basing on 2000. (03marks)

   ii) Calculate the weighted price index for 2010. (02marks)

7. The number of computers sold by **JA** Company in a period of 8months is as shown below.

No. of computers	250	200	220	270	220	260	300	240
Month	Jan	Feb	Mar	April	May	Jun	Jul	Aug

Calculate the four point moving averages for the data. (05marks)

8. Three forces of magnitudes 5N, 12N and 10N on bearings of 060^0, 210^0 and 330^0 respectively act on a particle. Find the resultant of the system of forces. (05marks)

SECTION B: (60 MARKS)

Attempt only **four** *questions in this section.*

9. The table below shows the cumulative frequency distribution of marks of 800 candidates who sat a national mathematics contest.

Mark(%)	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
F	30	80	180	330	480	610	700	760	790	800

a) Calculate the mean and standard deviation (08marks)
b) Construct an Ogive for the data and use it to estimate the;
i) Median mark (04marks)
ii) Quartile deviation (02marks)
c) Proportion of candidates that failed if the pass mark was 50% (01mark)

10. A quadratic curve has gradient function *(k - 2x)* and is such that when $x = 1$, $y = 2$ $and we \square nx =$ -1, y = 0.

ind the value of **k** and state the equation of the curve.
(07marks)
Sketch the curve.
(05marks)
Find the area bounded by the curve and the x-axis. (03marks)

11. The table below gives marks obtained in mathematics examination (**M)** and physics Examination (**P)** obtained by 10 candidates.

Candidates	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
Math (M)	35	56	65	78	49	82	20	90	77	35
Physics (P)	57	75	62	75	53	100	38	82	82	20

(i) Draw a scatter diagram and comment. (07 marks)
(ii) Find the score in mathematics by a candidate who scored 82 in physics.
(02marks)
iii) Calculate the rank correlation coefficient and comment on your result.
(06marks)

12. a) A and B are events such that P(A) = $1/3$, P(A or B but not both) = $5/12$ and P (B) = $1/4$. Calculate:

P (A∪B)
(04marks)
P (A′∩B)
(02marks)
P (B′/A)
(02marks)

(a) Two men fire at a target. The probability that Allan hits the target is ½ and the probability that Bob does not hit the target is $^1/_3$. Allan fires at the target first followed by Bob. Find the probability that:

Both hit the target (02marks)
Only one hits the target (03marks)
None of them hits the target. (02marks)

13. a) Given that 2sin(A-B) = sin (A + B)
Show that tan A = 3tan B. (03marks)
Hence determine the possible values of A between -180^0 and 180^0 when B=30^0. (03marks)

(b) Solve the equation $sin2x - cos2x = 1$ for $0^0 \leq x \leq 360^0$.
(06marks)

(c) Without using tables or calculators, show that $\cos 75^0 = \frac{\sqrt{2}(\sqrt{3}-1).}{4}$
(03marks)

14. a) Bodies of mass 6kg and 2kg are connected by a light inextensible string passing over a smooth fixed pulley with the masses hanging vertically. Find the acceleration of the system when released from rest. (05marks)

(b) A body of mass 2kg moves along a smooth horizontal surface with speed of $2ms^{-1}$. It then meets a rough horizontal surface whose co-efficient of friction is 0.2. Find the horizontal distance it travels on the rough surface before it comes to rest.
(05marks)

(b) A particle of mass 5kg rests on a smooth surface of a plane inclined at angle 30^0 to the horizontal. When a force X acting up the plane is applied to the particle, it rests in equilibrium. Find the normal reaction and force X. (05marks)

Happy Easter (Resurrection Sunday)