S.4 EXTRA MATHS HOLIDAY WORK TERM 1 2016

Attempt all the equation.

1. Without using tables or a calculator ,evaluate;

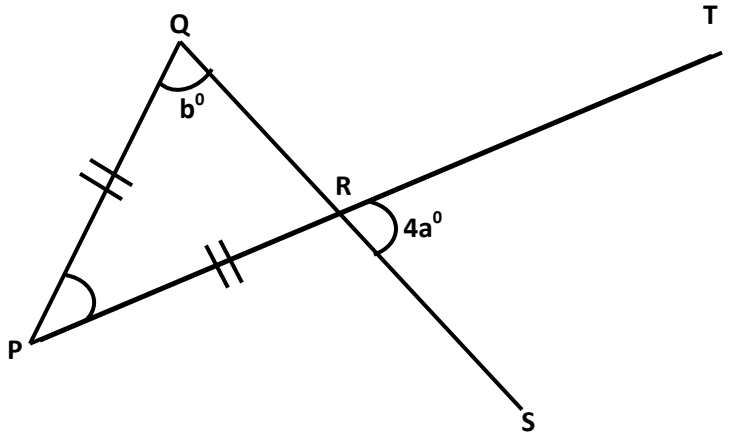
$$\left(\frac{1}{125}\right)^{-\frac{1}{3}} \div \left(\frac{1}{8}\right)^{\frac{2}{3}}$$ **(04 marks)**

2. Simplify;$\sqrt{28} + \sqrt{175} - \sqrt{63}$. Give your answer in the form $a\sqrt{b}$ where a and b are constants. **(04 marks)**

3. Factorize the expression $5y^4 - 405$ completely. **(04 marks)**

4. A and B are two sets such that $n(\varepsilon) = 38$, $n(A \cap B) = 12$, $n(A) = 25$ and $n(A' \cap B') = 4$. Find ;
   (i) $n(A' \cap B')$. **(03 marks)**
   (ii) $n(B')$. **(01 mark)**

5. In the figure below, PQR is an isosceles triangle in which $\overline{PQ} = \overline{PR}$. PRT and QRS are straight lines .Given that angle SRT = 40^0 , determine the values of the angles marked a and b.

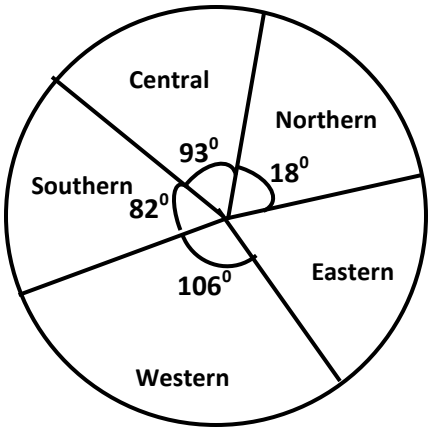


(04 marks)

6. Given that $P = \begin{pmatrix} -1 & 2 \\ 3 & -4 \end{pmatrix}$ and $Q = \begin{pmatrix} -2 & -1 \\ 5 & -6 \end{pmatrix}$, evaluate $(P - Q)^2$. **(04 marks)**

7. A shopkeeper sells 7 kg of rice at shs 12,600. If the cost of rice then increased by 50 % ,how much will 3 kg of rice cost? **(04 marks)**
8. Without using tables or a calculator ,evaluate ;
   $\log_{10} 7 - \log_{10} 35 + \log_{10} 5000$. **(04 marks)**

9.



The pie chat above represent the number of students who come from the various regions of Uganda at Makerere University .If the number of students who come from the central region is 6,231 ,determine the ;

(a) Student's population at Makerere University.

(b) Number of students at Makerere University who come from the eastern region. **(04 marks)**

10. Given that $\underset{\sim}{OB} = \begin{pmatrix} 5 \\ -8 \end{pmatrix}$ and $\underset{\sim}{OA} = \begin{pmatrix} -16 \\ -36 \end{pmatrix}$.

(a) Determine the column vector for $\underset{\sim}{AB}$.

(b) Hence find the length of vector $\underset{\sim}{AB}$. **(04 marks)**

11. (a) Express $x^2 + 12x - 45$ in the form $(x + a)^2 - b$. Hence ,solve the equation $x^2 + 12x - 45 = 0$. **(06 marks)**

(b) Given that $f(x) = \frac{x+5}{2}$, $g(x) = \frac{1-3x}{3}$, determine the value for which $fg(x) = \frac{x^2+2x-20}{6}$. **(06 marks)**

12. Four secondary schools football teams of Ntare H.S , Layibi college ,Mvara S.S and St. Mary's Kitende qualified for a football tournament ,which was played in two rounds with other teams.

First round;

Ntare H.S won three matches, drew one and lost one match.

Layibi College won two matches, drew one and lost two matches.

Mvara S.S won one match, drew three and lost one match.

St. Mary's Kitende won four matches, drew one and lost no match.

Second round;
Ntare H.S won three matches, drew two and lost no match.
Layibi College, won two matches, drew two and lost one match.
Mvara S.S won no match, drew three and lost two matches.
St. Mary's Kitende won three matches, drew two and lost no match.

(a) Write down ;
   (i) A 4 x 3 matrix to show the performance of the four teams in each of the two rounds. **(02 marks)**
   (ii) A 4 x 3 matrix which shows the overall performance of the teams in both rounds. **(02 marks)**

(b) If three points are awarded for a win, one point for a draw and no point for a loss, use matrix multiplication to determine which school won the tournament. **(03 marks)**

(c) Given that MTN donated shs 3,450,000 to be shared by the four teams according to the ratio of their points scored in the tournament, find how much money each team got. **(05 marks)**

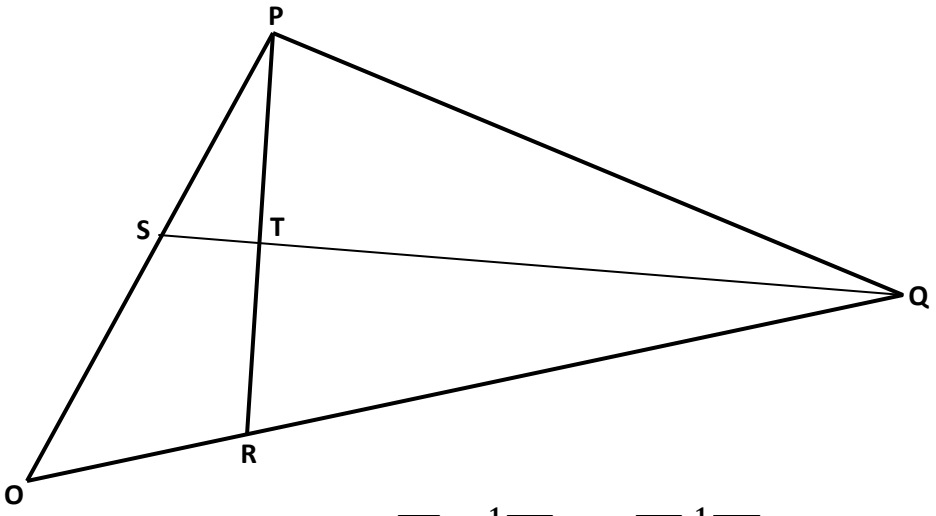
13. Copy and complete the table below in which $y = x^2 - 4x + 2$.

X	-2	-1	0	1	2	3	4	5	6
x^2	4					9		25	
-4x	8		0	-4	-8	-12	-16		-24
+2	+2		+2						
y	14				-2				14

(04 marks)

(a) Draw the graph of $y = x^2 - 4x + 2$ for the domain $-2 \leq x \leq 6$. **(03 marks)**
(b) Use your graph to estimate the roots of the equation $x^2 - 4x + 2 = 0$. **(02 marks)**
(c) Using the same axes, draw the line $y = 2x$. **(01 marks)**
(d) Use your graphs to estimate the roots of the equation $x^2 - 6x + 2 = 0$.
(02 marks)

14.



In the figure above OPQ is a triangle in which $\overline{OS} = \frac{1}{3}\overline{OP}$ **and** $\overline{OR}\ \frac{1}{3}\overline{OQ}$. **T** is a point on $\overline{QS}$ such that $4\overline{QT} = 3\overline{QS}$.

(a) Given that $\underset{\sim}{OP} = \underset{\sim}{p}$ and $\underset{\sim}{OQ} = \underset{\sim}{q}$,express the following vectors in term of $\underset{\sim}{p}$ **and** $\underset{\sim}{q}$ **.**

(i) $\underset{\sim}{SR}$ **(ii)** $\underset{\sim}{QS}$ **(iii)** $\underset{\sim}{PT}$ **(iv)** $\underset{\sim}{TR}$. **(08 marks)**

(b) Hence show that P, T and R lie on a straight line. **(04 marks)**

15. The distance from Mbale to Kampala is 270 km .A Tata lorry travelling at a steady non – stop speed of 40 kmh^{-1} leaves Mbale for Kampala at 6 :15 am .One and a quarter hours later , a taxi – bus leaves Kampala travelling at a steady non – stop speed of 60 kmh^{-1} heading for Mbale.

Calculate the ;

(a) Distance from Mbale at which the two vehicles meet. **(04 marks)**

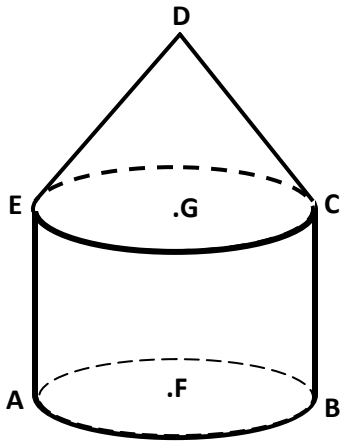
(b) Time when the two vehicles meet. **(02 marks)**

(c) Time when the Tata lorry arrives in Kampala **(02 marks)**

(d) Time when the mini – bus arrives in Mbale. **(02 marks)**

(e) Difference in the time of arrival of the two vehicles at their respective stations. **(02 marks)**

16. The diagram below shows a giant water tank ABCDE which is made in the shape of a right cone mounted on a cylinder .The radius of the cylinder$\overline{AF} = \overline{EG} = 6\ m$. The slant length of the cone $\overline{ED} = \overline{CD} = 7.5\ m$ and the height of the cylinder $\overline{BC} = \overline{AE} = 10\ m$.



(a) If the tank has to be painted on the outer surface ,calculate the surface area to be painted in m^2.(Take π = 3.142) **(04 marks)**

(b) Calculate the volume of the water needed to fill the tank in m^3 (Take π = 3.142).

(08 marks)

17. A bank manager earns a gross salary of shs 1,600,000 per month which includes an allowance of shs 400,000 tax free .The rest of his income is subjected to an income tax which is calculated as follows;

8.5 % on the first shs 500,000.

14.5 5% on the next shs 300,000.

30 % on the next shs 200,000.

45 % on the next shs 160,000.

65 % on the remainder.

Calculate the;

(a) Taxable income. **(02 marks)**

(b) Monthly income tax paid by the bank manager. **(08 marks)**

(c) Percentage of the bank manager's monthly gross that goes to paying monthly income tax. **(02 marks)**

END.