1. Find the value of $x$ if $\log_5 625 = x$. *(04 marks)*

2. Given the domain $x = \{-2, -1, 0, 1, 2\}$, use the function $h(x) = x^2 - x$ to find the range. *(04 marks)*

3. The distance between town $A$ and town $B$ is 30 km. A cyclist riding at 8km/h leaves town $A$ and rides towards town $B$. At the same time, another cyclist riding at 12 km/h leaves town $B$ for $A$. Calculate the distance from town $A$ at which the two cyclist meet. *(04 marks)*

4. A right-circular cone has a base radius of 12 cm and vertical height of 15 cm. Find the:

   (a) Slant height of the cone. *(02 marks)*

   (b) Curved surface area of the cone. *(02 marks)*

5. Musa's salary is Shs153,600 per month. He is paid 15% commission on the goods he sells. At the end of a certain month, he had sold goods worth Shs876,000. Determine the amount of money Musa earned that month. *(04 marks)*

6. Without using mathematical tables or a calculator, evaluate

   $$\frac{22}{7} (2.25^2 - 1.25^2)$$

   *(04 marks)*

7. In a class of 54 students, 44 eat meat and 42 eat fish. Three students do not eat any of the foods. Determine the number of students in the class who eat;

   (a) both foods. *(03 marks)*

   (b) only one food. *(01 mark)*

8. A line has a gradient of $-2$. It is parallel to a line $AB$ passing through the point (3, 4). What is the equation of the line $AB$? *(04 marks)*

9. Given the vectors $AB = \begin{pmatrix} 7 \\ -2 \end{pmatrix}$, $BC = \begin{pmatrix} 4 \\ 3 \end{pmatrix}$, and $CD = \begin{pmatrix} -6 \\ 11 \end{pmatrix}$,
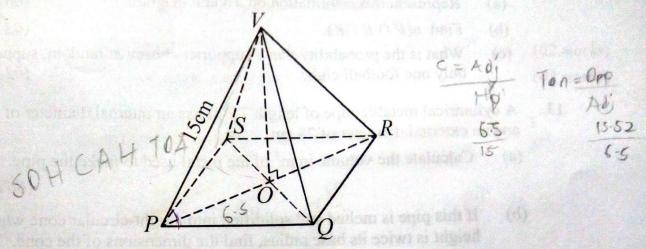
   find;

   (a) $AD$. *(02 marks)*

   (b) $|AD|$. *(02 marks)*

10. The diagram below shows a right rectangular pyramid VPQRS. $PV = 15$ cm and $PR = 13$ cm.



Calculate the angle between the line $PV$ and the base $PQRS$. (04 marks)

## SECTION B: (60 MARKS)

*Answer any five questions from this section. All questions carry equal marks.*

11. (a) Two jugs are similar. The smaller jug has a surface area of 800 cm$^2$ while the larger jug has a surface area of 1250 cm$^2$. The smaller jug has a volume of 1280 cm$^3$. Find the volume of the larger jug.
(06 marks)

(b) The cost of painting a tray is proportional to the square of its length. The cost of painting a tray whose length is 8 cm is Shs15,000. Determine the cost of painting a tray whose length is 12 cm.
(06 marks)

12. The following information is about selected supporters of football clubs (F.C) in Uganda.

$\mathcal{E} = \{$ Supporters of football clubs in Uganda$\}$

$V = \{$ Supporters of S.C.Villa$\}$

$E = \{$Supporters of Express F.C.$\}$

$K = \{$ supporters of KCCA F.C$\}$

$n(\mathcal{E}) = 24$, $n(V) = 13$, $n(K) = 14$,

$n(E \cap V^1 \cap K^1) = 1$,

$n(V \cap K \cap E^1) = 2$,

$n(V \cap K^1 \cap E^1) = 7$,

$n(K \cap V^1 \cap E^1) = 6$ and

$n(V^1 \cap E^1 \cap K^1) = 0$.

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(a)  Represent this information on a Venn diagram.          *(08 marks)*

(b)  Find $n(V \cap E \cap K)$.                              *(02 marks)*

(c)  What is the probability that a supporter chosen at random, supports only one football club?          *(02 marks)*

13.  A cylindrical metallic pipe of length 7.7 m has an internal diameter of 14 cm and an external diameter of 28 cm.

(a)  Calculate the volume in m³ of the metal used to make the pipe.

*(06 marks)*

(b)  If this pipe is melted and solidified into a right-circular cone whose height is twice its base radius, find the dimensions of the cone.

*(06 marks)*

14.  (a)  A bodaboda cyclist buys a motorcycle on a loan amounting to Shs3.5 million at a compound interest rate of 20% per annum. He is to clear the loan and interest within a period of 2 years, in 10 (ten) equal instalments. Determine the;

(i)  interest the bodaboda cyclist pays.

(ii)  amount he pays per instalment.

*(07 marks)*

(b)  A car that costs Ug Shs18 million is charged an import tax at a rate of 130% per car. An importer imports 6 cars. If the exchange rate is 1 dollar ($) = Ug Shs3500, find how much tax the importer will pay in dollars. (Give your answer correct to **one** decimal place) *(05 marks)*

15.  Given that $f(x) = ax^2 + b$, $f(-2) = 6$ and $f(3) = 11$, find;

(a)  the values of $a$ and $b$.

*(05 marks)*

(b)  $f(5)$.

*(02 marks)*

(c)  (i)   $f^{-1}(x)$.

(ii)  $f^{-1}(66)$.

*(05 marks)*

16.  A figure has vertices $A(-1,3)$, $B(-3,5)$, $C(-6,5)$, $D(-8,3)$, $E(-6,1)$ and $F(-3,1)$.

(a)  (i)   Plot the coordinates of the vertices of the figure on a graph paper.

(ii)  Join them to form figure $ABCDEF$.

(iii)  Name the figure $ABCDEF$.          *(06 marks)*

(b)  How many lines of symmetry does figure $ABCDEF$ have? *(02 marks)*
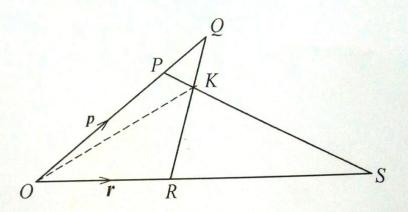
(c)    Use the figure to determine the lengths of;

    (i)    *AD*.

    (ii)    *BE*.    *(02 marks)*

(d)    Find the midpoint of *CF*.    *(02 marks)*

17.    In the diagram below $OP = p$ and $OR = r$, $OS = 2r$ and $OQ = \frac{3}{2}p$.



(a)    Express in terms of *p* and *r* the vectors

    (i)    *QR*.

    (ii)    *PS*.    (04 marks

(b)    The lines *QR* and *PS* intersect at *K* such that $OK = mQR$ and $PK = nPS$ where *m* and *n* are scalars. Express *OK* in terms of

    (i)    *p, r* and *m*.

    (ii)    *p, r* and *n*.

    Hence find the values of *m* and *n*.    (08 mar