S.4 STAHIZA RECESS TERM WORK 2020

LINEAR PROGRAMMING (L.P)

1. Solve the inequality $2x^2 - 2x - 15 < 0$
2. (a) By shading the unwanted regions, show on a graph the region satisfying the inequalities below:

   $x \geq 1;\ y \geq 0;\ x + y \geq 1;\ 5x + 3y \leq 15.$

   b) Use your graph to find the:

   (i) maximum value of the function $x + 7y$;

   (ii) area of unshaded region.

3. An export company is to transport atleast 300 tonnes of pineapples. Two cargo planes are available. A boeing which can carry 30 tonnes of pineapples per flight and an airbus which can carry 20 tonnes of pineapples per flight. The airbus has to make more flights than the boeing. The boeing has to make atleast 3 flights. The company has \$150,000 for transport costs. The cost per flight is \$12,000 for boeing and \$9,000 for airbus. If x is the number of flights made by a boeing and y is the number of flights made by an airbus,

   a. a) Write down four(4) inequalities satisfying the given conditions.
   b. b) Plot graphs of the inequalities you have formed on the same axes and shade the unwanted regions.
   c. c) Find the number of flights each plane should make if the cost of transport is to be minimum.
   d. d) Calculate area of the feasible region.

4 A parking yard has $1000m^2$ of space available and it is used to park coasters and taxis. Each taxi occupies $20m^2$ of space while each coaster occupies $40m^2$ of space. The number of coasters allowed at a time should not exceed 20 and not more than 50 vehicles can be parked at a time. Both types of vehicles are always packed in the parking yard. If x and y represents the number of coasters and taxis parked,

(a) Write down 5 inequalities representing the above information
(b) By shading the unwanted regions, show the region satisfying the inequalities in (a) above

(c) If the parking the for a coaster and taxi are shs 2000 and shs 1500 per day, determine the number of vehicles of each type that should be parked in order to maximize the income. Hence state the maximum income.

5. . Joanita intends to invite six friends to her home. She wants to give each of them a samosa or a chapatti and have at least one of the items for herself. A samosa costs shs. 500 and a chapatti costs shs. 1000 and she has shs. 10,000 altogether. The number of the chapattis must be at least half the number of samosas.

(i) Form inequalities relating the number of samosas and chapatti Joanita can buy.

(ii) Graph the inequalities in (i) above as a region.

(iii) Mark lattice points showing possible solutions.

(iv) What is the greatest number of samosas that she can buy?

(v) What is the greatest number of chapattis that she can buy?

(vi) Which solutions use up all the available money?

Which solution do you think is the best?

6. A school constructed an office block which required 34 tonnes of sand. The school hired a lorry and a tipper truck with capacities of 7 tonnes and 5 tonnes respectively to transport the sand. The cost per trip either by lorry or by tipper truck was 30,000. The money available for transportation was shs 180,000. The trips made by the lorry did not exceed those made by the tipper truck.

a) If x and y represent the number of trips made by the lorry and the tipper truck respectively.

i) Write down five inequalities to represent the given information.

ii) Plot these inequalities in the same axes, shading the un wanted regions.

b) i) From your graph in a) i) above, list all the possible numbers of trips, that each vehicle can make so as to maximize the total tonnage of sand transported.

ii) Find the number of trips by each vehicle that made the greatest total tonnage.

7. A farmer had a field of 70 acres in which he plants potatoes and corn. The seed for potatoes costs sh.20,000 per acre while the seed for corn costs sh.60,000 per acre. The farmer has put aside sh.3,000,000 to spend on the seed. The profit per acre of potatoes is sh.150,000 and the profit per acre of corn is sh.50,000 per acre. Let x represent the acres of potatoes and y represent acres of corn planted.
   a. Write down 4 inequalities for the problem.
   b. Write the profit equation
   c. Find the maximum profit.

8. A manager wishes to hire two types of machines **A** and **B**. He considers the following facts;

	Type A	**Type B**
Floor space	**2 m^2**	**3 m^2**
Number of men to operate	**4**	**3**

He has a maximum of **24 m^2** of floor space and a maximum of **36** men available to operate the machines. In addition he is not allowed to hire more machines of type **B** than type **A**.

a) If he hires **x** machines of type **A** and **y** of type **B**, write down the inequalities satisfying the above information

b) By shading wanted regions, show on a graph region satisfying the above inequalities.

c) If the profit from type **A** machine is **sh. 400,000** per week and from type **B** machine is **sh. 800,000** per week, what number of machines of each type must be hired so as maximize the profit per week

KINEMATICS

9. Towns A and B are 304km apart. At 7.00 am, Ojok leaves town A for town B driving a pickup at a steady speed of 80km/h. After 2 hours, the pick-up breaks down and repairs are done for 30minutes after which he continues his journey at a reduced speed of 60 km/h. One and half hours after Ojok left town A, Ongodia leaves town B for town A driving a car non-stop at a constant speed of 95km/h.
   (a)Using a scale of 1cm: 1hour on the time-axis and 2cm: 50km on the distance axis draw the travel graphs of the two vehicles on the same axes.
   (b) Use your graph to find:

(i)When they met and how far this was from town A
(ii) their time of arrival at the respective destinations.

10. A cyclist sets off from town A at $4:0\ am$ at a speed of $20km/h$r to go to town B $100km$ away. A motorist sets off from town A at $7:30\ am$ at a speed of $100km/hr$ to go town B. Find the:
    (a) distance from A when the motorist over takes the cyclist.
    (b) the time when the motorist over takes the cyclist.
    (c) time the cyclist reached B.

11 . Two friends John and James live 40km apart. One morning John left his house at 9:00am and cycled towards James house at an average speed of 20km/hr. James left his house at 10:30am on the same day and cycled towards John's house at an average speed of 30km/hr. They rested for fifteen minutes and cycled to James' home at an average speed of $18kmh^{-1}$. Determine the:

a) distance from John's house where the two friends met.

b) time of day when the two friends met.

c) time of day they arrived at James house.

12. The distance between Mombasa and Nairobi is 576km. Two buses A and B travel from Nairobi to Mombasa. The average speed of bus A is 24km h^{-1} more than that of bus B. Bus A takes two hours less on the journey. If bus A takes t hours for the journey, find

    a) an equation in terms of t
    b) the time taken by bus A
    c) the average speed of bus B

13. The distance from Kabale to Kampala is around 380km. A bus leaves Kabale at 7:30a.m and travels non-stop to Kampala, at **$60kmh^{-1}$.** At 8:50 a.m a Pajero car leaves Kampala and travels towards Kabale at a steady speed of **$120kmh^{-1}$.**
    (a) On the same exes, draw distance –time graphs showing the journeys of both vehicles and use it to find.

(i) distance and time from Kabale where the two vehicles met.

(ii) The bus then increases its speed by 10kmh^{-1} after meeting the Pajero.

Determine the difference in the times of arrival of the two vehicles.

14. At 6:00am, Peter set off on his bicycle to travel from Mbarara to Masaka 100km away at a steady speed of 20kmh^{-1}. After cycling for 2 hours, Peter rested for half an hour. He then completed the rest of the journey at a steady speed of 5kmh^{-1} more than his original speed. At 6:30 am, a lorry also set off to travel from Mbarara to Masaka at a steady speed of 40kmh^{-1}. After travelling for 1 ¼ hours, the lorry had a mechanical problem which took the driver $^{3}/_{4}$ hours to fix. The lorry then continued at the same steady speed to Masaka.

a) On the same axes, using a scale of 4cm to represent 1 hour on the horizontal axis and 1cm to respresent 5km on the vertical axis, draw a distance line graph for the cyclist and the lorry.

b) From your graph in (a) , determine ;

i) The repective times and distances from Mbarara at which the lorry over took the cyclist.

How long the lorry driver had to wait in Masaka before Peter the cyclist could arrive.

15. Two towns A and B are 450 km apart. A lorry at a steady speed of 90 kmh^{-1} left town A for town B at 6.30am. After travelling a distance of 306km, it rested 30 minutes in town C before proceeding to town B at the original steady speed as before. At 8.00am, a mini-bus left town B for A travelling at a steady non stop speed of 110 kmh^{-1}.

END

a. On the same graph draw a distance–time graph showing the journey for the two vehicles. (Use scale of 2cm to represent 40km and 2cm to represent 1hr).
b. Use your graph to estimate;
   i. When and where the minibus met the lorry.
   ii. The times the vehicles reach their destinations.

   The average speed of the lorry for the whole journey

16. Two taxes A and B move off from rest in the same direction on a straight road. The speed of taxi A increases at a uniform rate of 2m/s while B moves as shown in the table below.

Time(s)	0	1	2	3	4	5	6	7	8
Speed (m/s)	0	0.5	1.5	4	10	15	18	19.5	20

a) Draw on the same axes the speed-time graphs of taxis A and B using the scale, 1cm to represent 1second and 1cm to represent 2m/s.

b) Using the graphs in (a) above, find the

i) Time and speed when taxi B over took taxi A

ii) Difference in the speed of the vehicles after 6 seconds

iii) Distance covered by taxi A.

17. A cyclist sets off from town A at $4:00\ am$ at a speed of $20km/h$r to go to town B $100km$ away. A motorist sets off from town A at $7:30\ am$ at a speed of $100km/hr$ to go town B. Find the:

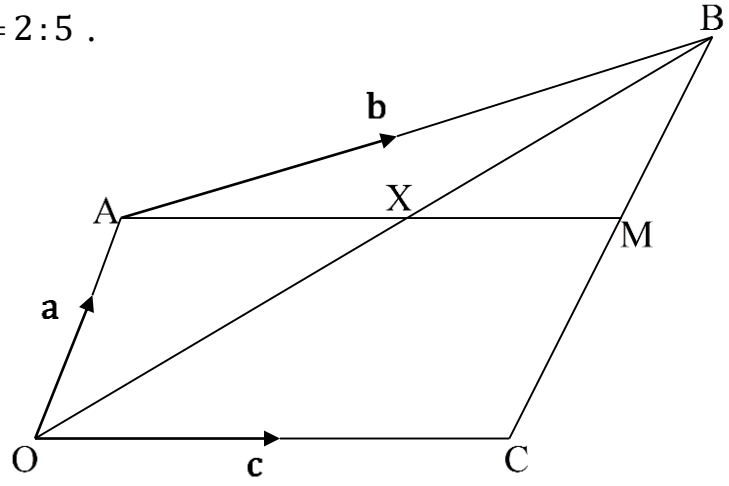
(a) distance from A when the motorist over takes the cyclist.

(b) the time when the motorist over takes the cyclist.

(c) time the cyclist reached B.

VECTORS

18. In the figure below, $\mathbf{OA}=\mathbf{a}, \mathbf{AB}=\mathbf{b}$ and $\mathbf{OC}=\mathbf{c}$. M is the midpoint of CB and X is on AM such that $AX;XM=2:5$.



(a) Express in terms of $\mathbf{a}, \mathbf{b}$ and or $\mathbf{c}$ (i) $\mathbf{CB}$ (ii) $\mathbf{AM}$ (iii) $\mathbf{AX}$

(b) Given also that X is on OB such that $OX;XB=2:5$, express $\mathbf{AX}$ in terms of $\mathbf{a}$ and $\mathbf{b}$ only.

(c) Show that $(\mathbf{b} = \mathbf{c} + 4\mathbf{a})$

(d) show that $\mathbf{CB}$ is parallel to $\mathbf{OA}$

19. Given that the point $A(-8, 6)$ and vector $\boldsymbol{AB} = \begin{pmatrix} 12 \\ 4 \end{pmatrix}$, M is the midpoint of AB.

(a) Find the:

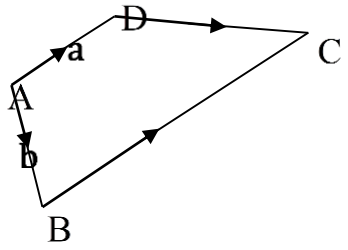
(i) column vector $\boldsymbol{AM}$

(ii) coordinates of M

(iii) magnitude of $\boldsymbol{OM}$

(b) Draw the vector $\boldsymbol{AB}$ on a graph paper from your graph, state the coordinates of B

20. The diagram below shows a trapezium ABCD in which $AD : BC = 2 : 3$ $\overrightarrow{AD} = \mathbf{a}$ and $\overrightarrow{AB} = \mathbf{b}$

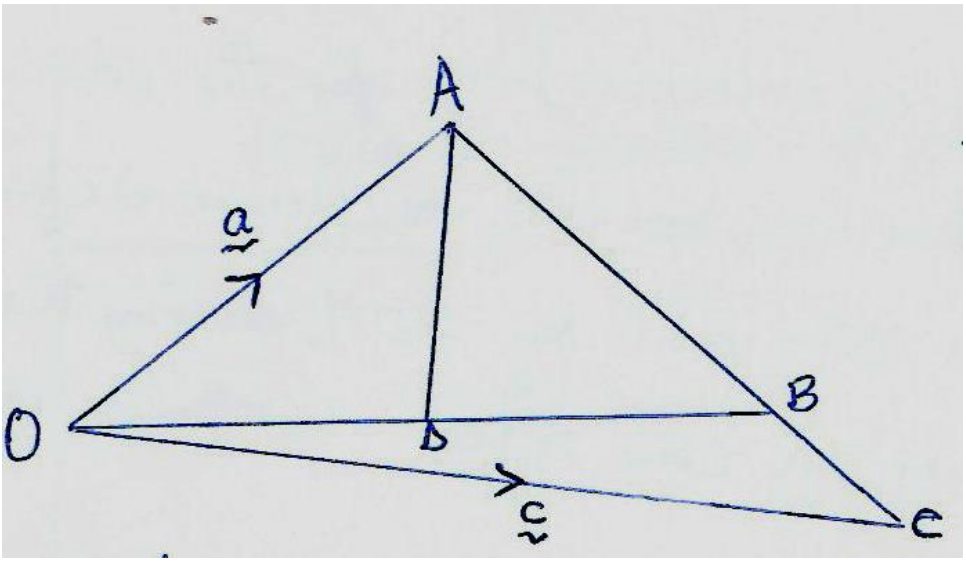


Express the following vectors in terms of $\mathbf{a}$ and $\mathbf{b}$;

i) $\overrightarrow{BC}$ ii $\overrightarrow{BD}$ iii $\overrightarrow{AC}$

Qn If A is $(-5,-3)$, D$(-1,3)$ and $\overrightarrow{AB} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$ AB=$\begin{pmatrix} 4 \\ -2 \end{pmatrix}$, determine the Column vector $\overrightarrow{AD}$ and the Length of $\overrightarrow{BD}$.

21.. In the diagram $OA = a, OC = c, AB = 3BC \text{ and } OD = DB$

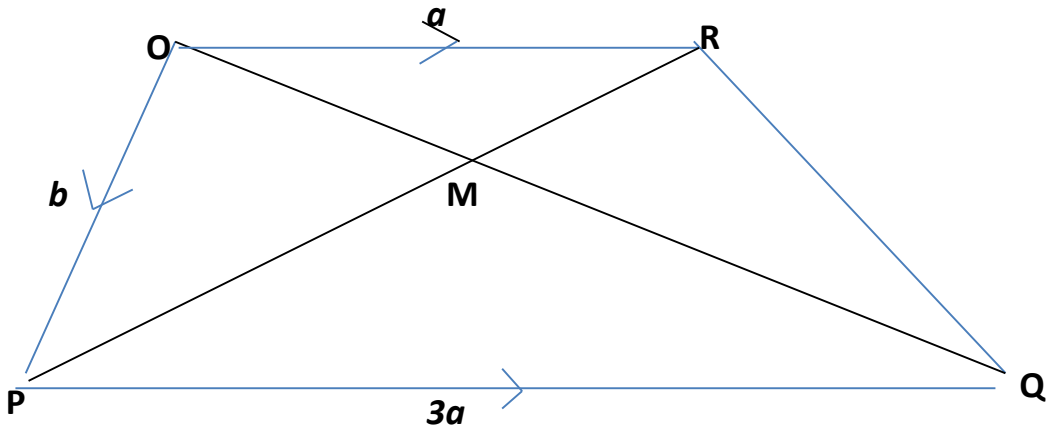


(a) Express the following vectors in terms of $\underset{\sim}{a}$ and $\underset{\sim}{b}$

(i) CA (ii) CB (iii) OB (iv) OD

(ii) Show that AD = $\frac{1}{8}$ (3c – 7a)

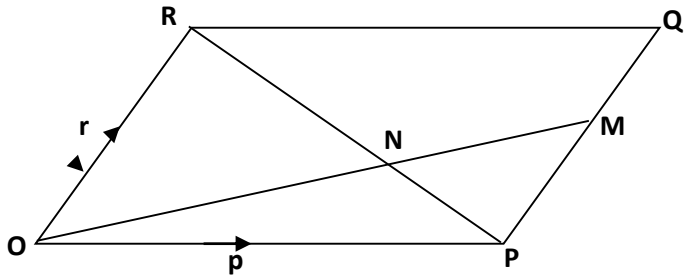
22. The figure below shows a trapezium, in which $\overline{OR}$ is parallel to $\overline{PQ}$. M is a point on $\overline{OQ}$ such that $\overline{OM} : \overline{MQ} = 1 : 3$ and $\overline{PQ} = 3\overline{OR}$.



a) Given that $\overrightarrow{OR} = \boldsymbol{a}$ and $\overrightarrow{OP} = \boldsymbol{b}$, express $\overrightarrow{RQ}$ and $\overrightarrow{OQ}$ in terms of $\boldsymbol{a}$ and $\boldsymbol{b}$.

b) Show that the points P, M and R are collinear.

23.

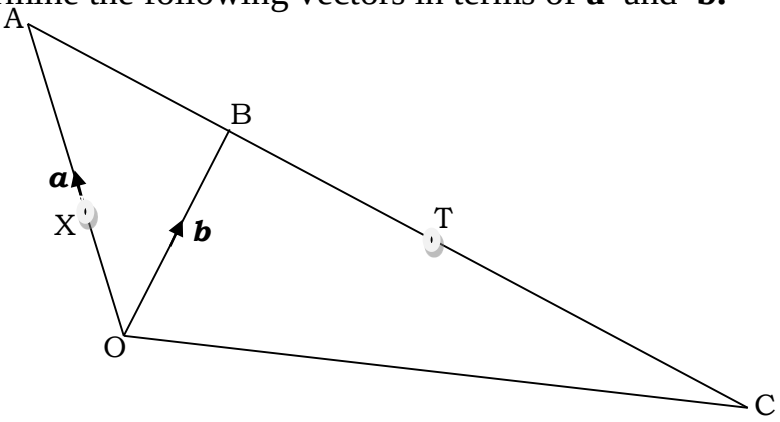


OPQR is a parallelogram. M is the mid point of PQ and OM intersects PR at N. Given that **OP** = p and **OR** = r,

e. Express **PR** and **OM** in terms of **p** and **r.**

f. Given also that **ON** = k**OM,** and that **PN** = h**PR,** where k and h are scalars, find the value of h and k.

24. On the figure below C is on AB produced such that 2AB = BC. T and X are midpoints of AC and OA respectively. Given **OA** = **a** and **OB** = **b**, determine the following vectors in terms of **a** and **b.**



(i) **AB** (ii) **AC**(iii) **OT** (iv) **OC** **v.** Show that **XT** is parallel to **OC**.

S.4 STAHIZA SEMINAR QUESTIONS 2020

PART ONE

1. Given that $a * b = a^b - 5$. Evaluate

   (i) $2 * 3$
   (ii) $(2 * 3) * 4$

2. Given that $m * l = (3m - l)l$, find the value of $(1 * 2) * 4$

3. Make K the subject of the formula $\frac{1}{n^2} = \frac{K^2 + a^2}{hg}$.

   Hence evaluate K if $h = 2,\ n = 1.6, a = 3\ and\ g = 32$.

4. Given that the solutions of the equation $ax^2 + bx + c = 0$ are -9 and 2, state the values of a, b and c.

5. Factorise completely $5a^2 - 20$. Hence solve the equation $5a^2 - 20 = 0$

6. The goals scored by some players in a tournament are summarized in the table below

Goal	1	2	3	4	5
No of players	2	A	3	2	1

If the mean number of goals scored is 2.8. Determine how many players scored 2goals?

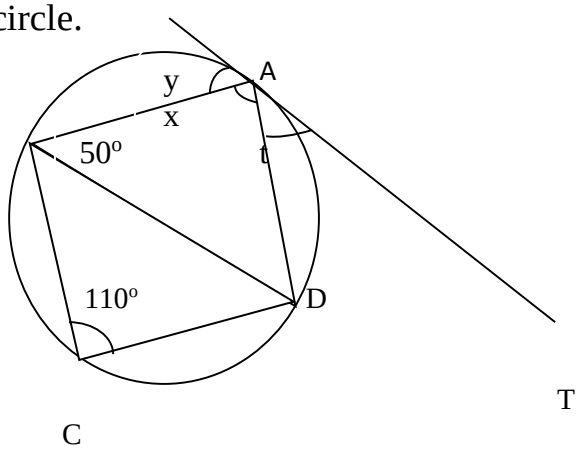
7. Solve the simultaneous equations
   $2x + 5y = 12$
   $3x - y - 1 = 0$ using
   i) Matrix method
   ii) Elimination
   iii) Substitution
   iv) Graphical method
8. In a class, the ratio of boys to girls is 3:2. If five boys leave the class and 10 girls join the class, the number of boys will be the same as that of girls. How many pupils are in the class?

9. Given that tanθ = ¾ and θ is a reflex angle. Without using tables or a calculator, evaluate Sinθ + Cosθ.

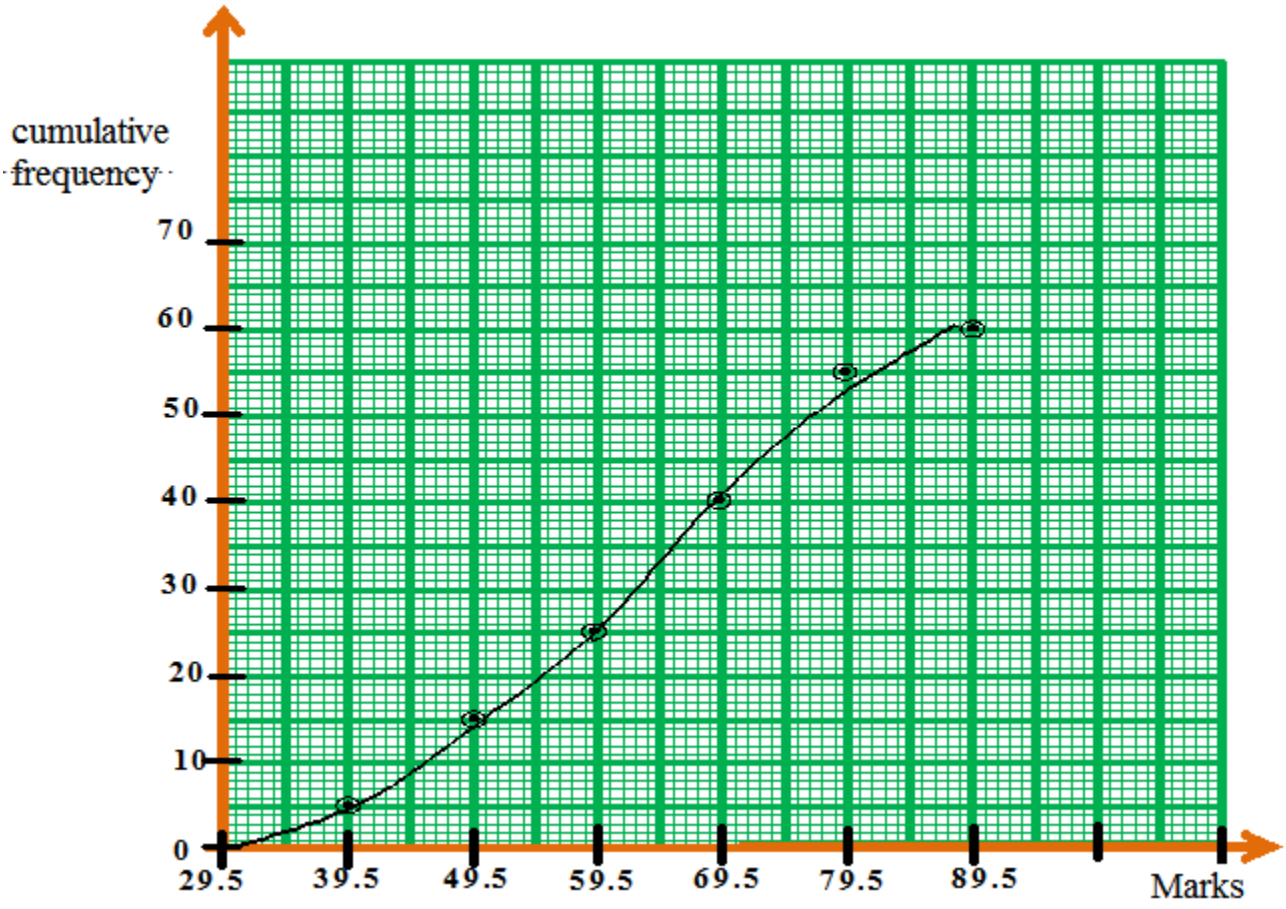
10. Solve the inequality $2x^2 - 2x - 15 < 0$

11. In the figure below AT is a tangent to the circle.

Find the values of the angles x,y and t



12. The diagram below represents the marks scored by **60** *students* in a mathematics test.



Study the diagram above and use it to:

(a) Estimate the median mark of students.

(b) Prepare a frequency distribution and use it to state the:

(i) Class width

(ii) Modal frequency

(c) Calculate the mean mark

13.a) Using a suitable table of values, draw the curve $y = 3 + 5x - 2x^2$ for $-3 \le x \le 4$

.

b) Use the graph to solve the equations.

i) $3 + 5x - 2x^2 = 0$ ii) $2 + 3x - 2x^2 = 0$ iii) $6 - x - x^2 = 0$

c) State the maximum point and the equation of line of symmetry.

14. The triangle PQR with vertices (1,1), (4,1) , and (3,5) respectively is mapped onto $P^1Q^1R^1$ with vertices (1, – 1), (4, – 1) and 3, – 5) respectively by a transformation represented by the matrix M.

(a) Determine the matrix M. Hence describe fully the transformations

(b) The triangle $P^1Q^1R^1$ is then mapped onto $P^{1I}Q^{1I}$ and R^{1I} by a reflection in the y – x = 0. Find the coordinates of $P^{1I}Q^{1I}$ and R^{1I}

(c) The triangle $P^{11}Q^{II}R^{II}$ is rotated through a negative quarter turn to form $P^{III}Q^{III}R^{III}$ find the matrix of rotation hence the co-ordinate of the points $P^{III}Q^{III}R^{III}$

(d) Determine a single transformation matrix that would map PQR onto $P^{1I}Q^{1I}R^{1I}$ Hence describe fully the transformation.

15. Using a ruler, a pencil and a pair of compasses only:

(a) Construct a quadrilateral ABCD such that angle$BAD = 60^0$, angle $ABC = 135^0$, $AB = 6.5cm$, $AD = 8.5cm$ *and* $CD = 11cm$. Measure and record the:

(i) $length\ of\ BC$

(ii) $angle\ BCD$

(b) Draw a circle passing through the vertices of triangle ABD.

c find the radius of the circle

d. Find the area between the triangle and the circle.

16. A parking yard has $1000m^2$ of space available and it is used to park coasters and taxis. Each taxi occupies $20m^2$ of space while each coaster occupies $40m^2$ of space. The number of coasters allowed at a time should not exceed 20 and not more than 50 vehicles can be parked at a time. Both types of vehicles are always packed in the parking yard. If x and y represents the number of coasters and taxis parked,

(d) Write down 5 inequalities representing the above information

(e) By shading the unwanted regions, show the region satisfying the inequalities in (a) above

(f) If the parking the for a coaster and taxi are shs 2000 and shs 1500 per day, determine the number of vehicles of each type that should be parked in order to maximize the income. Hence state the maximum income.

17.(a) i)If the matrix $\begin{pmatrix} n+4 & 3 \\ 4 & n \end{pmatrix}$ has no inverse/ singular, Find the possible values of n

ii) Given that the determinant of $\begin{pmatrix} x & 1 \\ 3x & 2x \end{pmatrix}$ is 10, find the values of x.

(b) A factory makes three products X,Y and Z. The table below shows the units of labourmaterials and other items needed.

	Labour	Materials	Other item
X	4	1	2
Y	2	4	1
Z	1	5	2

Labour costs shs 2000 per unit, material shs 3000 per unit and other item cost shs 5000 per unit.

(i) Write down a matrix representing the products

(ii) Write down a cost matrix

(iii) Using matrix multiplication, determine the cost of each product X, Y and Z in shillings.

17.(a) If $\tan\theta = \frac{3}{4}$, show that $\text{Sin}^2\theta + \text{Cos}^2\theta = 1$.

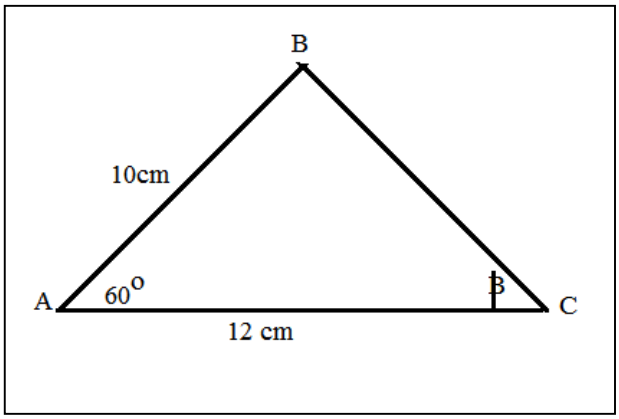
(b) Find the values of θ for the range $0^0 \leq \theta \leq 360^0$ if $\text{Sin}\ \theta = -0.500$.

(c) Use the triangle below to calculate;

(i) length BC.

(ii) Area of triangle ABC

(iii) Angle marked β



PART TWO

1. Express the HCF of 18, 30 and 24 as a fraction of their LCM it's in its lowest terms.

2. Solve for m if $\frac{6^{(3m-1)}}{8} = \frac{27}{36^m}$

3. Without using tables: Find the value of **K**.

$$\log\left(\frac{11}{2}\right) + 2\log\left(\frac{4}{11}\right) - \log\left(\frac{5}{22}\right) = \log K - \log 10.$$

4. Given sets: A = { All natural numbers between10 and 30}

   B = { All prime numbers between 10 and 30}

   Find (i) members of set $A \cap B$ (ii) $n(A \cap B)$

5. Express $0.2454545...$ as a fraction in its simplest form.

6. Given that $f(y) = 3y - 2$ and $g(y) = y^2$, find the values of y for which $gf(y) = 16$.

7. a) Simplify $\frac{\sqrt{112}+\sqrt{28}}{\sqrt{175}-\sqrt{63}}$ in its simplest form.

   b) Express: $\left(\frac{3}{3\sqrt{2}-2\sqrt{5}}\right) - \left(\frac{1}{3\sqrt{2}+2\sqrt{5}}\right)$ in the form $a\sqrt{2} + b\sqrt{5}$. State the values of $\boldsymbol{a}$ *and* b.

8. The coordinates of points A and B are $(-6,15)$ and $(4,5)$ respectively. X is a point on **AB** such that $AX : XB = 1 : 4$. Find (i) **AB** (ii) **OX**

9. A certain sum of money borrowed from a SACCO amounted to Shs.186,000 in only 8 months at an interest rate of 5% per annum. Calculate the interest earned using.

   i) Simple interest

   ii) Compound interest

10. The scale of a map is $1 : 500{,}000$. A forest is represented on the map by a patch of area 2.4cm^2. Find the area of the forest on actual ground in Km^2.

11. A group of 100 people gave information about 3 attributes; wearing glasses, being left handed and having dark hair.
    36 people wore glasses, 28 were left handed and 36 had dark hair. 17 who wore glasses and were left handed.19 who wore glasses and had dark hair 15 who were left handed and had dark hair. Only 10 people wore glasses, were left handed and had dark hair.

    (a)Represent these data on a Venn diagram.

(b)How many people;

(i) wore glasses but was not left handed and did not have dark hair?
(ii) did not wear glasses, were not left handed and did not have dark hair?
(iii) had only two of the attributes?

12. (a) The ages of Irene and Rita are in the ratio of **15 : 8** respectively. In ten years, the ratio of Irene's age to Rita's age will be **5 : 3**. Find;-

i. the present ages of Irene and Rita.

ii. If **"t"** years ago Irene was **five** times as old as Rita, find the value of **t**.

(b) Six men can cultivate an area of **280m^2**in 2 hours. What area would **five** men cultivate in 3 hours working at the same rate?

13. The monthly income tax is levied after the allowances have been deducted. Children allowances are restricted to only 4 children. The allowances are given as follows:

Marriage; shs.50, 000.
Annual medicalallowances; shs.360, 000.
Transport:shs. 1000 per day.
Rent shs. 40,000 per month.
Each child under 10 years shs. 20,000, Each child between 10 and 18 years old shs.10,000,and above 20 years each shs 15,000
James is married with 5 children of which, two children below 10years, twins of age 15 years and eldest of 22 years. His annual gross income in a given leap year is shs. 5.76million.
The tax structure for him is as shown below.

Taxable income	Rate%
60,001- 80,000	5
80,001- 125,000	10
125,001 – 185,000	20
185,001- 300,000	25
Above 300,000	30

Calculate (ii) the monthly income tax he pays.

(iv) His monthly net income

14. (a) The function f is such that $f(x) = 3x + 1$. Find:

i. $f^{-1}(5)$

(b) Given that $f(x) = ax^2 + bx \; and \; f(3) = 24, f(2) = 12$, find the

i $value \; a \; and \; b$

ii $f(2)$

15. Towns A and B are 304km apart. At 7.00 am, Ojok leaves town A for town B driving a pickup at a steady speed of 80km/h. After 2 hours, the pick-up breaks down and repairs are done for 30minutes after which he continues his journey at a reduced speed of 60 km/h. One and half hours after Ojok left town A, Ongodia leaves town B for town A driving a car non-stop at a constant speed of 95km/h.

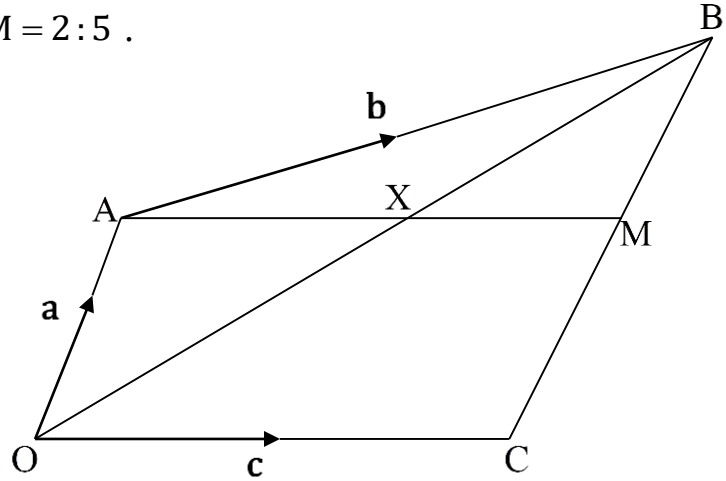
(a)Using a scale of 1cm: 1hour on the time-axis and 2cm: 50km on the distance axis draw the travel graphs of the two vehicles on the same axes.

(b) Use your graph to find:

(i)When they met and how far this was from town A

(ii) their time of arrival at the respective destinations

16. In the figure below, $\mathbf{OA} = \mathbf{a}, \mathbf{AB} = \mathbf{b}$ and $\mathbf{OC} = \mathbf{c}$. M is the midpoint of CB and X is on AM such that $AX; XM = 2:5$.

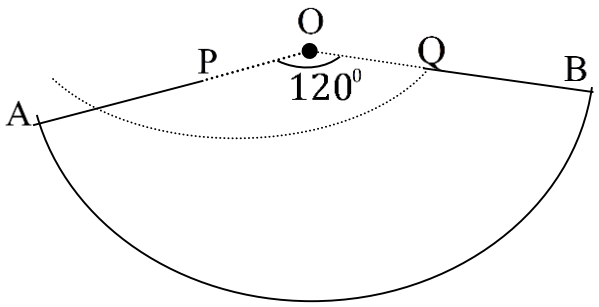


(e) Express in terms of $\mathbf{a}, \mathbf{b}$ and or $\mathbf{c}$ (i) $\mathbf{CB}$ (ii) $\mathbf{AM}$ (iii) $\mathbf{AX}$

(f) Given also that X is on OB such that $OX; XB = 2:5$, express $\mathbf{AX}$ in terms of $\mathbf{a}$ and $\mathbf{b}$ only.

(g) show that $\mathbf{CB}$ is parallel to $\mathbf{OA}$ …. check…..

17. The figure shows a sector OAB of a circle with centre O in form of a card with radius 24cm.



(a) Calculate the length of arc AB(Leave π in your answer)

(b) A sector OPQ of radius 6 cm is then cut off from sector OAB. Find the surface area of the frustrum formed by joining AP and QB (Leave π in your answer)

MORE TRIAL NUMBERS

instructions :identify the paper where they belong.

1. Make x the subject of the formula $\frac{L}{T} = \frac{x^2 - a}{x^2 + a}$

2. Express $\frac{2+\sqrt{3}}{2-\sqrt{3}}$ in the form $p+q\sqrt{r}$. Hence state the values of p, q and r.

3. Without using tables or a calculator, evaluate $\frac{32.135^2 - 17.865^2}{0.7135}$

4. Given two points A(4, 5) and B (-2, 9) find the equation of a line through A and B.

5. A cylindrical tank of diameter 1.4m has a capacity of $3.08m^3$. Find the diameter of a similar tank whose capacity is $83.16m^3$.
6. Given that $x^2 - y^2 = 16$ and $x + y = 8$, determine the values of x and y
7. A triangle ABC whose area is $12cm^2$ is mapped with images $A'B'C'$ by a transformation given by matrix $\begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$. Find the area of triangle $A'B'C'$

8. Given that $a * b = \frac{b^2 - a^2}{a^2 + b^2}$

Find the value of ; (i) $(1 * {}^{-}1)$ (ii) $(1 * {}^{-}1) * {}^{-}4$

9. Solve the equation $\frac{x+2}{3} - \frac{8-x}{2} = \frac{x}{6}$
10. Make *t* the subject of the formula $s = ut + {}^{1}/_{2}\, at^2$.
11. The sides of a triangle are in the ratio 3:4:5 and the perimeter is 48cm. Find the area of the triangle.
12. The mode of *3, 10, 8, 4, 4, 1, 2, x, 3, 2* is 3. Find
    (i) The value of *x*
    (ii) The median

13. Factorize completely $x^2 - 4xy + x - 4y$.
14. Solve the equation $\frac{x}{(x+3)} + \frac{7}{x^2-9} = \frac{5}{x^2-9}$

SECTION B TYPE

15. A total of **100** vehicles were inspected and **60** vehicles passed the road worthy test. The rest of the vehicles (remainder) had faults in: Brakes (**B**), Lights (**L**) and steering (**S**) as follows;- $n(B \cap L \cap S) = 3$; $n(B \cap S^I \cap L^I) = 12$; $n(B \cap S) = 5$; $n(B \cap L) = 8$; $n(S \cap L \cap B^I) = 2$ and $n(S \cap L^I \cap B^I) = n(L \cap S^I \cap B^I)$.

    (a) Represent the given information on a venn-diagram.

(b) How many vehicles had:

i. Faulty steering.

ii. One fault only.

(c) If a vehicle is chosen at random; find the probability that it had at least **two faults.**

16. Michael and Francis leave town R at the same time. Michael rides to town G on a bearing of 060^0 at a speed of 6km/h thus arriving there after 2hours. While Francis heads to town T which is on a bearing of 120^0 at a speed of 5km/h and arrives there after 3hours..

(a) Draw a sketch of the locations of the 3 places.

(b) Calculate (i) how far town G is from town T.

(ii) the bearing of town T from town G.

(c) How far apart will Michael and Francis be after two ***hours?***

18. Below are the marks scored by 50 students in a chemistry test

32	11	42	51	68	36	33	29	59	32
22	56	32	78	45	15	47	53	62	46
37	63	27	47	25	42	25	30	49	23
66	41	56	35	49	73	58	48	17	53
58	31	72	40	65	55	39	28	44	64

(a) Construct a frequency distribution table with equal class intervals, starting with 10 – 19

(b) Draw a cumulative frequency curve and use it to estimate the

(i) Median mark

(ii) Number of students who scored 35% and above

(c) Calculate the mean mark

19. (a) For values of x : $-4 \leq x \leq 4$, draw the graphs of y = $6 + x - 2x^2$ and $y = 5x$ Using 2cm : 1 unit horizontally and 2cm : 5 units vertically.

(b) Use your graph in (a) above to solve the simultaneous equations $y = 6 + x - 2x^2$ and $y = 5x$.

20. a) Given that $h(x) = ax^2 + bx$ whose $h(-1) = 3$ and $h(1) = -1$. Find the values of a and b.

b) Given that $f(x) = x - 2x^2$ and $g(x) = 3 - x$

Determine (i) expressions for $gf(x)$

(ii) the values of $gf(-2)$

c) Given that $f(x) = \frac{9x}{(x+6)(x+2)}$

find i) $f(4)$

ii) value of x for the function to be undefined

21. (a) John deposited shs. 3,500,000 in a bank which offers a compound interest of 12% per annum. How much money did he have in the bank at the end of two years?

(b) In a Revenue authority department, the tax earned on income is calculated as follows. The first shs. 120,000 is tax free and the remaining is taxed at 25%. Find the tax payable on an earned income of (i) shs. 100,000 (ii) shs. 540,000

(c) The cash price of a BodaBoda motorcycle is shs. 2,200,000. It can be bought on a hire purchase terms by making a deposit of 30% of the cash price and then paying 10 monthly installment of 250,000. Find the cost of BodaBoda on hire purchase terms.

22. Using a ruler and a pair of compasses only

(a) Construct a triangle ABC such that AB = ~~8~~6cm, ABC = ~~60~~60° and BAC = 75°

Measure the length BC. Hence calculate the area of the triangle ABC

(b) Construct a circum circle to the triangle ABC. Measure the radius of the circle

23. In an organization, the following allowances are not taxed:

Transport Shs 35,000 per month

Housing Shs80,000 per month.

Water and Electricity Shs 25,000 per month.

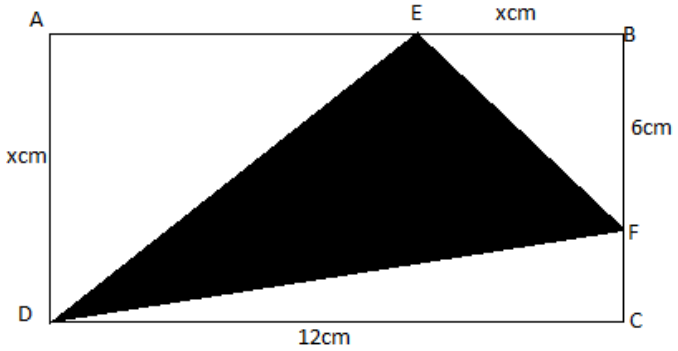
Medical Shs 240,000 per annum.

The rates on taxable income are as follows:

Taxable Income	Rate %
1 – 150,000	10
150,001 – 350,000	15
350,001 – 600,000	20
Above 600,000	25

Given that Samir paidShs 113,750 of tax.
Calculate the (i) total monthly allowances
(ii) taxable income
(iii) gross income
(iv)net income.

24. In the figure below, ABCD is a rectangle 12cm long and xcm wide. Given that $\overline{EB}$ = xcm, $\overline{BF}$ = 6cm and that the unshaded area is 52cm^2,



find;
i) The value of x
ii) The shaded area.

Question: On the same axes draw the graphs of $y = x^3 + 2x^2 – 5x – 8$ and
$y = -(2x + 5)$ for $-4 \leq x \leq 3$. Use 1cm to reprent 5units on the y – axis and 2cm : 1 unit on the x – axis.
From your graph, estimate the solutions of
$x^3 + 2x^2 + 5x – 8 = 0$ (b) $x^3 + 2x^2 = 0$ (c) $x^3 + 2x^2 – 3x – 3 = 0$

25. a)The velocity of the body, Vm/s after time **t** seconds is given by $V = 48t - 6t^2$. Using values of t from 0 to 9, plot the graph of the motion.

b) From your graph, find t which gives the maximum velocity.

Find the acceleration of the body at $t = 2s$.

26. A helicopter flies from Kampala due south for 300km then flies on a bearing of N55°W for 400km and finally flies on a bearing of 065° for 420km.

Using a scale of 1cm to represent 50km,

draw an accurate diagram to show its movement

from your diagram, find the distance and bearing of Kampala from its final destination

Given that the helicopter flies at a steady speed of 200kmhr^{-1}, how long does it take to fly directly back to Kampala.

27. A plane flew from town A on a bearing of 050° to town B at a speed of 100kmh^{-1} for 5 hours. From B, the plane changed course and flew on a bearing of 110° to town C at a speed of 150 kmh^{-1} for 4 hours.

(a) Calculate the

(i) Distance of town C from town A

(ii) Bearing of town C from town A

b)If the plane return from town C directly to town A at a speed of 200kmh^{-1} how long will it take?

28. Two taxis **A** and **B** move off from rest in the same direction on a straight road.

The speed of taxi **A**increases at a uniform rate of **2m/s** while taxi **B** moves as shown in the table below:

Time (s)	0	1	2	3	4	5	6	7	8
Speed (m/s)	0	0.5	1.5	4	10	15	18	19.5	20

(a) Draw on the same axes the speed-time graphs of taxis **A** and **B**using the scale of **1cm** to rep **1** second on the x-axis and **1cm** to rep **2m/s**

on the y-axis.

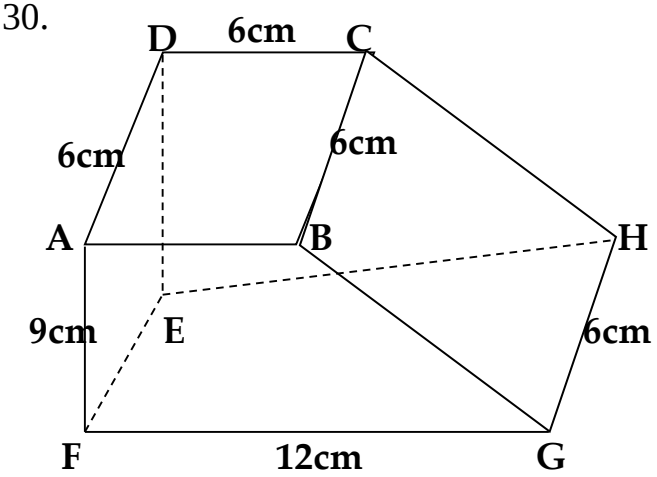
(b) Using the graphs in (a) above, find the;-

i. Time and speed when taxi **B** overtook taxi **A**.

ii. Difference in the speed of the vehicles after **6** seconds.

iii. Distance covered by taxi **A**.

30.



In the figure angle ABG = 120^0, AD = AB = DC = BC = GH = 6cm

Calculate

(i) The lengths AG and DG

(ii) The angle between DG and EFGH

The angle between planes AGHD and BGHC.

END

- ***To the <u>PROBLEMS</u> of your life,you're the <u>SOLUTION</u> ,and to the <u>QUESTIONS</u> of your life ,you're the <u>ANSWER.</u>***
- ***If you are going to achieve excellence in big things, you develop the habit in little matter***
- ***Failure defeats only LOSERS but it inspires WINNERS.***
- ***He who thinks that he can make it,makes it.***
  FINALLY, .. " SUCCESS COMES TO A PREPARED MIND"....
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