



HOME SCHOOLING MATERIAL

PASS O' LEVEL

COMPUTER, MATH, CHEMISTRY



PASS O'LEVEL

Monday, June 8, 2020



YOUR GUIDE AWAY FROM SCHOOL COMPUTER STUDIES PAPER 2 GUIDE (OCOMP005)



1. (a) WORD PROCESSING

SKILL	Data entry	Headings	Sub headings	Bullets	Columns	Header	Professionalism	Column numbers	Saving	Printer	Total
EXPECTED	5	2	2	2	2	2	1	2	1	1	20
ACTUAL											

(b) SPREADSHEETS

SKILL	Data entry	Total expenditure	Total income	Closing balance	Template	Renaming	Opening balance	Header	Footer	,000 separator	UGX	Saving	Print	Total
EXPECTED	3	2	2	2	2	1	2	1	1	1	1	1	1	20
ACTUAL														

2. ELECTRONIC PRESENTATION

SKILL	Slides	Data entry	Tables	Pictures	Banners	Speaker notes	Animations	Transitions	On mouse click	Slide size	Background	Fonts	Save	Print	Total
EXPECTED	6	3	3	2	2	2	2	2	1	1	2	2	1	1	30
ACTUAL															

3. DATABASE MANAGEMENT

SKILL	Database	Table	Primary key	Field types	Data types	Forms	Data entry	format	switchboard	Report	Orientation	Heading	Query	Formula	Footer	Print	Total
EXPECTED	1	1	1	2	2	3	3	2	4	3	1	1	1	2	2	1	30
ACTUAL																	

4. WEB DESIGNING

SKILL	Pages	Data entry	Links	Company logo	Tracker	Contact us	Feedback	Audio	marquee	Picture	background	Saving	Print	Total
EXPECTED	4	4	2	3	2	2	2	3	2	2	2	1	1	30
ACTUAL														



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COMPUTER STUDIES PAPER ONE QUESTIONS (OCOMP006)

SECTION A

- Which component is responsible for converting the data received from the user into computer understandable format?
 - Memory Unit
 - Arithmetic & Logic Unit
 - Input device
 - Output device
- The only language which the computer understands is.....
 - assembly language
 - binary language
 - basic
 - C language
- Which of the following is used to hold running program instructions?
 - Flash disk
 - Compact disc
 - RAM
 - Hard disk
- Which of the following programs would enable users to perform specific tasks on a smartphone?
 - Android
 - Disk cleaner
 - Antivirus
 - WhatsApp®
- What is the main difference between a mainframe and a super computer?
 - Super computer is much larger than mainframe computers
 - Supercomputers handle complex computations while mainframe host a large amount of data
 - Super computers are much smaller than mainframe computers.
 - Supercomputers are focused to execute as many programs as possible while mainframe uses its power to execute few programs as fast as possible.
- The fifth generation of computers focuses much of the use of
 - Transistors
 - Microprocessor
 - Integrated Circuits
 - Artificial intelligence
- Presentation, spreadsheet and photo-editing are examples of.....
 - system software.
 - operating system.
 - application software.
 - programming languages.
- After a picture has been taken with a camera on your smartphone and processed appropriately, the actual print of the picture is considered.....
 - data.
 - input
 - output
 - process
- In....., an expert can recover and read deleted or damaged files from a criminal's computer.
 - Robotics.
 - Simulation.
 - Forensics
 - Animation.
- Choose the correct combination of the effects of a computer virus.
 - Disk Crash
 - Mother Board Crash
 - Corruption of program
 - Deletion of files
 - System unit crash
 - (i), (ii), (iii)
 - (i), (iii), (iv)
 - (ii), (iv), (v)
 - (i), (iii), (v)
- In a spreadsheet program, =MAX (A2:A5) is an example of a.....
 - value
 - formula
 - cell address
 - function
- In order to send an e-mail to another class on the school's local area network, a student must first know the class'...
 - classroom teacher
 - e-mail password
 - computer type
 - e-mail address
- When a file comprises of instructions that can be carried out by the computer, it is often called a(n)file.
 - Data
 - information
 - executable
 - memory
- To move a picture within a word document, which procedure should a computer user follow?
 - Select, Paste, Print
 - Select, Copy, Paste
 - Select, Paste, Copy
 - Select, cut, Paste
- Which of the following is designed to control the operations of a tablet?
 - Application Software
 - System Software
 - Off shelf Software
 - User
- Which advantage is offered to someone researching using an online database instead of a printed set of similar information?
 - Easier to access information
 - Better charts
 - Easier to understand tables
 - More legible diagrams
- A computer user found a picture in a printed newspaper that he wanted to use as a full-size cover for a report. Using the computer, how might she do this?
 - Print the report and glue the picture

Turn to page 11

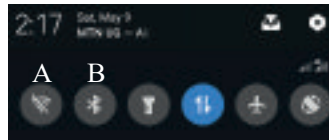
From page I

- B. Save the report and load the picture
C. Load the report, add clip art, print
D. Scan the picture, resize, print
18. What type of resource is most likely to be a shared common resource in a computer network?
A. joystick
B. mouse
C. Keyboard
D. Printer
19. Which of the following controls the process of interaction between the user and the operating system?
A. User interface
B. Language translator
C. Platform
D. Screen saver
20. A language translator that converts program statements line-by-line into machine language is called a(an).....
A. Interpreter
B. CPU
C. Compiler
D. Simulator

SECTION B

21. (a) Define a software licence?
(b) Give two examples for each of the following type of software.
(i) Freeware
(ii) Shareware
- (c) A Senior One student saw a presentation and spreadsheet software on a computer. Explain the use of each of them.
(i) Presentation software.
(ii) Spreadsheet software.
22. (a) What is the difference between data and information?
(b) Mention two devices in an information processing cycle that are at the specified levels of operation.
(i) Input

- (ii) Output.
(iii) Processing.
(iv) Storage.
23. (a) State any two examples of spreadsheet programs.
(b) Explain three advantages of using a spreadsheet program.
(c) Study the function provided
=IF (A3>50, PASS, FAIL)
(i) State the category under which the above function falls.
(ii) State whether the above function will run or not when executed. Give the reason for your answer.
- (b) Give two functions which are in the same category as the one indicated above.
24. (a) (i) What is the difference between a web server and web browser (02 marks)
(ii) Give two examples of web browsers (02 marks)
(b) The screenshot below was obtained from a smartphone.



- (i) What do the icons labelled A and B represent?
(ii) What is the major advantage of using connection A over connection B?
(iii) With an example, define a protocol.
25. (a) Define the following terms as used in storage.
(i) Optical disc
(ii) Disk cache
(b) The following specifications were obtained from a compact disc:
CDR-80, 700MB/80 Min (2x-56x CD-recordable)
What does "80 Min" mean in these specifications.
(c) Sort the following storage media according to the

categories given in the table.
Flash disk, CD, Memory card, DVD, SD card, Blu-ray disc.

Optical storage	Solid state storage

26. (a) Explain the following network area coverages.
(i) Local Area Network.
(ii) Wide area Network.
(iii) Metropolitan Area Network.
(b) Explain the advantage of using each of the cables given below.
(i) Fiber optic cable
(ii) Coaxial cable

SECTION C

27. (a) (i) What is a computer crime.
(ii) Explain any four computer crimes.
(b) Discuss five environmental threats/hazards to computers and information systems.
28. (a) Explain the following terms as used in programming.
(i) An algorithm
(ii) Syntax
(b) Write an algorithm that prompts a user to enter two values, adds them and then displays the result.
(c) Using a programming language of your choice, write a program that can accept a value, obtains its square root and then displays the result.
29. (a) Explain the following terms as used in Information technology.
(i) troubleshooting
(ii) control panel
(iii) cold booting
(iv) uninstalling
(v) warm booting
(b) state any five components/ applets of the system control panel and their uses.

SOLUTIONS FOR MATHEMATICS PAPER 1 (OMTC005)



$$1. \quad 3 \times 4 = \frac{5(3) + 3(3)}{2}$$

$$= \frac{15 + 12}{2}$$

$$= \frac{27}{2}$$

$$= 13.5$$

$$-2 \times (3 \times 4) = -2 \times 13.5$$

$$= \frac{5(-2) + 3(13.5)}{2}$$

$$= \frac{-10 + 40.5}{2}$$

$$= \frac{30.5}{2}$$

$$= 15.25$$

2. $\frac{1}{5}(2x - 5) \frac{1}{3} < (2x + 1)$

Multiplying both sides by 15 gives

$$2x - 5 < 15(2x + 1)$$

$$2x - 5 < 30x + 15$$

$$2x - 30x < 15 + 5$$

$$-28x < 20$$

$$\frac{-28x}{-28} < \frac{20}{-28}$$

$$x > \frac{-20}{28}$$

$$x > \frac{-5}{7}$$

3. $M = \begin{bmatrix} 4 & -3 \\ 6 & 1 \end{bmatrix}$

$$\text{Det } M = (4 \times 1) - (6 \times 3)$$



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$$M^{-1} = \frac{1}{22} \begin{bmatrix} 1 & 3 \\ 22 & 4 \end{bmatrix}$$

$$\therefore M^{-1} = \begin{bmatrix} \frac{1}{22} & \frac{3}{22} \\ \frac{3}{11} & \frac{2}{11} \end{bmatrix}$$

4. Let the age of the Seventh boy be x
- $$\frac{17 + 13 + 15 + 12 + 15 + 8 + x}{7} = 13$$
- $$\frac{80 + x}{7} = 13$$
- $$80 + x = (13 \times 7)$$
- $$80 + x = 91$$
- $$x = 91 - 80$$
- $$x = 11$$
- $\therefore$ The Seventh boy is 11 years.
5. $(x+2)$ and $(x-\frac{1}{3})$ are factors
 $(x+2)(x-\frac{1}{3}) = 0$
 $x^2 - \frac{1}{3}x - \frac{2}{3}$

$$x^2 + \frac{5x}{3} - \frac{2}{3} = 0$$

Multiply by 3 throughout

$$3x^2 + 5x - 2 = 0$$

OR

$$\text{Sum of the roots} = \frac{-2 + \frac{1}{3}}{\frac{3}{3}}$$

$$\text{Product of the roots} = \frac{-2 \times \frac{1}{3}}{\frac{3}{3}}$$

$$x^2 - (\text{Sum of the roots})x + \text{products of the roots} = 0$$

$$x^2 - \left(\frac{5x}{3}\right)x - \frac{2}{3} = 0$$

Multiplying by 3 gives

$$3x^2 + 5x - 2 = 0 \text{ as the required quadratic equation}$$

6. $5x^4 - 80y^4$

$$= 5(5x^4 - 16y^4)$$

$$= 5((x^2)^2 - ((2y)^2)^2)$$

$$= 5[x^2]^2 - ((2y)^2)[x^2 + (2y)^2]$$

$$= 5((x - 2y)(x + 2y)(x^2 + 4y^2))$$

7. $\begin{pmatrix} 3 & 1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} 5 \\ -4 \end{pmatrix} = \begin{pmatrix} 15 + -4 \\ 5 + 0 \end{pmatrix}$

$$= \begin{pmatrix} 11 \\ 5 \end{pmatrix}$$

$\therefore$ Therefore image of (5, -4) under the transformation matrix

$$\begin{pmatrix} 3 & 1 \\ 1 & 0 \end{pmatrix} \text{ is } (11, 5)$$



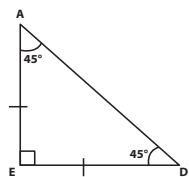
For enquiries, send an email to
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8. From the diagram $AE = ED$ and angle $AED = 90^\circ$



Using $\triangle ABE$
 $(AB)^2 = (BE)^2 + (AE)^2$
 $(AE)^2 = 82 + 5^2$
 $AE = \sqrt{89}$

Using $\triangle ADE$
 $\sin 45^\circ = \frac{ED}{AD}$, But $\sin 45^\circ = \frac{1}{\sqrt{2}}$

$$AD \cdot \frac{1}{\sqrt{2}} = \sqrt{89}$$

Multiplying both sides by $\sqrt{2}$

$$AD = \sqrt{89} \times \sqrt{2}$$

$$AD = \sqrt{178}$$

$$= 13.3417$$

$$\therefore AD = 13.3 \text{ (1 decimal place)}$$

9. $\sqrt{2} \tan \theta = 1$

$$\tan \theta = \frac{1}{\sqrt{2}}$$

$$\theta = \tan^{-1} \frac{1}{\sqrt{2}}$$

$$= 35.2644, 215.2644$$

$$\therefore \theta = 35.3^\circ \text{ and } 215.3^\circ \text{ (1 decimal place)}$$

10. a)

1	2	3	4
2	4	5	6
3	5	6	7
4	6	7	9
7	9	10	11

b) $\frac{5}{12}$

SECTION B

11. a)

$$P = \sqrt{\frac{3+2R}{5R-3}}$$

Squaring both sides

$$\frac{P^2}{1} = \frac{3+2R}{5R-3}$$

$$P^2(5R-3) = 3+2R$$

$$5RP^2 - 3P^2 = 3+2R$$

$$5RP^2 - 2R = 3+3P^2$$

$$R \frac{(5P^2-2)}{5P^2-2} = \frac{3+3P^2}{5P^2-2}$$

$$R = \frac{3+3P^2}{5P^2-2}$$

For $P = 2$

$$R = \frac{3+12}{20-2}$$

$$R = \frac{15}{18}$$

$$\therefore R = \frac{5}{6}$$

11. b) Let x represent the price for a book and y represent the price for a pen.

$$5x + y = 2,700 \quad (i)$$

$$12x + 2y = 6,400 \quad (ii)$$

Solving (i) and (ii) simultaneously

$$2 \mid 5x + y = 2,700 \quad (i)$$

$$1 \mid 12x + 2y = 6,400 \quad (ii)$$

$$10x + 2y = 5,400 \quad (i)$$

$$12x + 2y = 6,400 \quad (ii)$$

Equation (ii) - Equation (i) gives

$$(12x - 10x) + (2y - 2y) = (6,400 - 5,400)$$

$$2x = 1,000$$

$$\frac{2x}{2} = \frac{1000}{2}$$

$$x = 500$$

Substituting $x = 500$ in equation (i) gives

$$5(500) + y = 2,700$$

$$2,500 + y = 2,700$$

$$y = 2,700 - 2,500$$

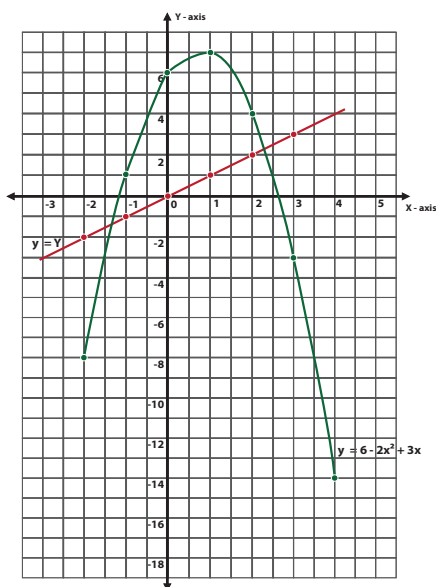
$$y = 200$$

The cost of a book was UGX 500.

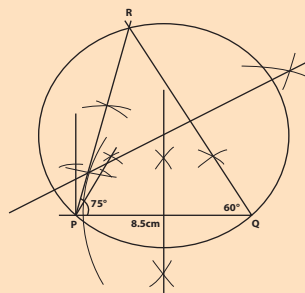
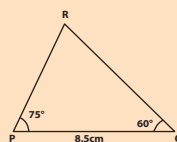
The cost of a pen was UGX 200

- 12 (a)

x	-2	-1	0	1	2	3	4
$-2x^2$	-8	-2	0	-2	-8	-18	-32
$3x$	-6	-3	0	3	6	9	12
6	6	6	6	6	6	6	6
Y	-8	1	6	7	4	-3	-14



- 13 a)



b) $PQ = 10.8 \text{ cm}$
 $QR = 11.9 \text{ cm}$

c) ii) $r = 6.2 \text{ cm}$
 $A = \pi r^2$
 $= (3.142)(6.2)^2$
 $= 120.77848$
 $\approx 120.7785 \text{ cm}^2 \text{ (4 decimal places)}$

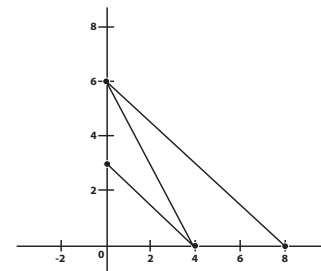
14 (a)
$$\begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} R & R^1 \\ 0 & 4 & 0 \\ 0 & 0 & 3 \end{pmatrix} = \begin{pmatrix} 0 & 4 & 0 \\ 0 & 0 & 6 \end{pmatrix}$$

Vertices of R^1 are (0, 0), (4, 0) and (0, 6)

b)
$$\begin{pmatrix} 2 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} R^1 & R^1 \\ 0 & 4 & 0 \\ 0 & 0 & 6 \end{pmatrix} = \begin{pmatrix} 0 & 8 & 0 \\ 0 & 0 & 6 \end{pmatrix}$$

Vertices of R^1 are (0, 0), (8, 0) and (0, 6)

- c)



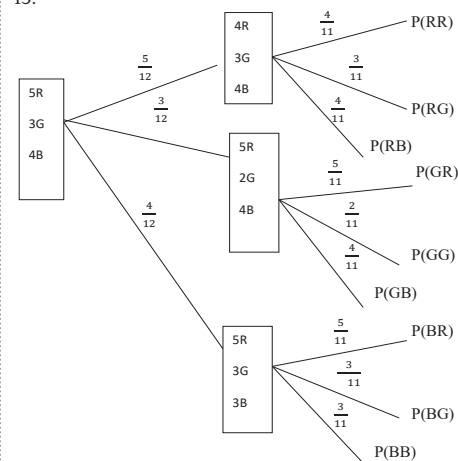
d)
$$\begin{pmatrix} 2 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix} = \begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$$

Therefore $N =$

$$\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$$

Matrix of enlargement scale factor 2.

- 15.



(i) $P(RR) + P(GG) + P(BB)$

$$P(RR) = \frac{5}{12} \times \frac{4}{11} = \frac{20}{132}$$

$$P(GG) = \frac{3}{12} \times \frac{2}{11} = \frac{6}{132}$$

$$P(BB) = \frac{4}{12} \times \frac{3}{11} = \frac{12}{132}$$

$$= \frac{20}{132} + \frac{6}{132} + \frac{12}{132}$$

$$= \frac{38}{132}$$

$$= \frac{19}{66}$$

(ii) $\frac{4}{11} \times \frac{5}{11} \times \frac{5}{11} = \frac{100}{1331}$

(ii)
$$P(RR) + P(RG) + P(RB) + P(GR) + P(BR)$$

$$= \left(\frac{5}{12} \times \frac{4}{11} \right) + \left(\frac{5}{12} \times \frac{3}{11} \right) + \left(\frac{5}{12} \times \frac{4}{11} \right) + \left(\frac{3}{12} \times \frac{5}{11} \right) + \left(\frac{4}{12} \times \frac{5}{11} \right)$$

$$= \frac{90}{132}$$

(iii)
$$\frac{15}{132} + \frac{20}{132} + \frac{15}{132} + \frac{12}{132} + \frac{20}{132} + \frac{12}{132}$$

$$= \frac{94}{132}$$

- 16 (a) Re-arrange the equations

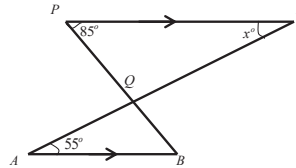
$$4x - 6y = 5$$



MATHEMATICS PAPER (OMTC006)

SECTION A

- Find the next two values in the sequences below
 - 1, 1, 2, 3, 5, 8, 13, ...
 - 11, 22, 110, 121, 202, 220, ... in base three
- Y varies inversely as the square of x . The difference between the value of y when $x = 6$ and $x = 10$ is 16. Find the law connecting x and y
- The coordinates of A and B are $(a-1)$ and $(3, b)$ respectively. Given that $(5, 2)$ is the midpoint of line segment AB, find;
 - column vector $\overrightarrow{AM}$
 - the length of vector $\overrightarrow{AM}$ correct to 2 decimal places.
- Use logarithm tables to evaluate $\sqrt[3]{0.841 \times 32.7}$ correct to 3 significant figures.
- Express $\frac{1}{\sqrt{5} + \sqrt{2}}$ in the form $a + b\sqrt{c}$. Hence state the values of a, b and c .
- Given that $f(x) = \frac{x-1}{x^2-x-12}$. Determine the values of x for which $f(x)$ is undefined.
- The ratio of new price to the old of a book is 5:4
 - Find the percentage increase in the price of the book
 - If the old price of the book is UGX 3000, find the new price of the book
- In the figure below, $\overline{PR}$ is parallel to $\overline{AB}$ $\overline{AQ} = 4m$ $\overline{QR} = 21m$ $\overline{PR} = 14m$ and $\overline{AB} = 7m$.


Find ; a) angle x

b) length $\overline{PQ}$ and $\overline{QB}$

- A map is drawn to a scale of 1: 200,000. Calculate the area of a field in km^2 that is represented by 2cm^2 on the map.
- A chord of length 16cm is 6cm away from the centre of a circle; calculate the circumference of the circle. Use $\pi = 3.14$

SECTION B

- A survey was conducted on 30 employees to establish the transport means they preferred. It revealed that 7 preferred taxi (T) and Boda (B), but not Private cars (P), 5 preferred Taxi and private cars, but not Boda, 2 preferred Boda and private cars, but not Taxi, while 3 preferred neither of the transport means. Those who preferred private cars only were twice those who preferred all the 3 means of transport and a third of those who preferred Taxi only. 4 preferred Boda only.
 - Represent this information on a Venn diagram.
 - From the Venn diagram, determine the how many people preferred;
 - All the 3 means.
 - private cars.
 - taxi s.
 - Find the probability that a person chosen at random from the group used only one type of means.
- (a) Given that $f(x) = \frac{x^2-1}{3}$, find ;
 - $f^{-1}(x)$
 - The values of $f^{-1}(8)$.
- If $g(x) = x^2 - 2x - 1$ and $h(x) = x + 3$, find the value of x for which $hg(x) - gh(x) = 2$.

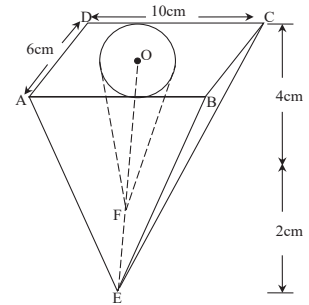
- (a) without using a table or calculator, simplify the following;

$$\left(\frac{16}{625}\right)^{\frac{3}{4}} \times (0.16)^{\frac{1}{2}} \times \left(\frac{5}{2}\right)^{-1}$$

- $\frac{1}{2} \log_{10} 16 - 2 \log_{10} \left(\frac{a}{5}\right) + \log_{10} a^2$

- Henry takes a train for two thirds of his journey, a bus for seven-eighths of the remainder and walks the rest of the journey. If his bus journey is 3km longer than what he walks. How long is the complete journey?

- A conical hole is drilled in a solid wooden pyramid as shown in the figure below.


Given that $\overline{AD} = 6\text{cm}$, $\overline{AB} = 10\text{cm}$, depth of the cone $\overline{OF} = 4\text{cm}$ and $\overline{FE} = 2\text{cm}$.

Find (i) the maximum volume of water the cone contain.

(ii) Volume of the remaining solid wood.

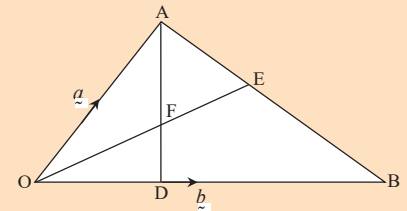
(iii) Surface area of the remaining solid wood.

- Two cyclist A and B moved off from rest in the same direction. The speed of car A increases at a uniform rate of 20kmh^{-1} while the speed of B is as given in the table below.

Time (hr)	0	1	2	3	4	5	6	7	8
Speed (kmh^{-1})	0	5	15	40	100	150	180	195	200

- Using a suitable scale, draw on the same axes the velocity-time graph of cars A and B.
- From your graph find the;
 - Time when the cars have equal speeds and the magnitude of the speed.
 - Difference in speeds after 5 hours.
 - Distance covered by car A in the 8 hours.

- In the figure below, E is the mid-point of $\overline{AB}$, $\overline{OD} : \overline{DB} = 2:3$ and F is the point of intersection of $\overline{OE}$ and $\overline{AD}$.


Given that $\overline{OA} = a$ and $\overline{OB} = b$. Express the following vectors in terms of a and b .

(i) $\overline{AB}$ (ii) $\overline{OE}$ (iii) $\overline{AD}$

Given further that $\overline{AF} = h\overline{AD}$ and $\overline{OF} = k\overline{OE}$. Find the two different expressions of $\overline{OF}$ in terms of h, a, b . Hence find the scalars h and k .

Show that points O, F and E are collinear.

- The table below shows a tax structure of some country.

Income sh	Tax rate %
1-50,000	Tax free
50,001-200,000	12
200,001-300,000	25
300,001-400,000	32
Above 400,000	40

Tax is levied on monthly income after the following allowances have been deducted.

Shs.45,000 for transport, Shs.64,000 for insurance, Shs.630,000 annually for feeding, Shs.11,800 for water and electricity, Shs.40,000 for airtime and communication. Family allowances are also offered at the following rates; Shs.5,000 for each child below 10 years old and Shs.15,000 for each child aged between 10 and 19 years.

Mr. Madete earns a gross monthly salary of Shs.645,000 and has 5 children aged 7, 12, 18, 22 and 30 years. Family allowance is paid for only 3 children.

Calculate;

- His total monthly allowance.
- His income tax as a percentage of his gross monthly income.
- His net income.

$$\frac{1}{28} \begin{pmatrix} 4 & 6 \\ 2 & 4 \end{pmatrix} \begin{pmatrix} 4 & -6 \\ 2 & 4 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{28} \begin{pmatrix} 4 & 6 \\ -2 & 4 \end{pmatrix} \begin{pmatrix} 5 \\ -1 \end{pmatrix}$$

$$\frac{1}{28} \begin{pmatrix} 28 & 0 \\ 0 & 28 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{28} \begin{pmatrix} 14 \\ -14 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1/2 \\ -1/2 \end{pmatrix}$$

$$x = 1/2 \text{ and } y = -1/2$$

$$\text{b.(i)} \quad P\theta = \begin{pmatrix} 3 & -1 \\ 4 & 5 \end{pmatrix} \begin{pmatrix} 3 & 1 \\ 0 & 2 \end{pmatrix} = \begin{pmatrix} 9 & 1 \\ 12 & 14 \end{pmatrix}$$

$$\theta P = \begin{pmatrix} 3 & 1 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} 3 & -1 \\ 4 & 5 \end{pmatrix} = \begin{pmatrix} 13 & 2 \\ 8 & 10 \end{pmatrix}$$

$$P\theta - \theta P = \begin{pmatrix} 9 & 1 \\ 12 & 14 \end{pmatrix} - \begin{pmatrix} 13 & 2 \\ 8 & 10 \end{pmatrix}$$

$$\therefore P\theta - \theta P = \begin{pmatrix} -4 & -1 \\ 4 & 4 \end{pmatrix}$$

$$\text{(ii)} \quad (P+\theta)^2 = \left(\begin{pmatrix} 3 & -1 \\ 4 & 5 \end{pmatrix} + \begin{pmatrix} 3 & 1 \\ 0 & 2 \end{pmatrix} \right)^2 = \begin{pmatrix} 6 & 0 \\ 4 & 7 \end{pmatrix}^2$$

$$= \begin{pmatrix} 6 & 0 \\ 4 & 7 \end{pmatrix} \begin{pmatrix} 6 & 0 \\ 4 & 7 \end{pmatrix} = \begin{pmatrix} 36 & 0 \\ 52 & 49 \end{pmatrix}$$

$$\therefore (P+\theta)^2 = \begin{pmatrix} 36 & 0 \\ 52 & 49 \end{pmatrix}$$

- $10x + 20y \leq 500$
 $x + 2y \leq 50$ (i)
 $x + y \leq 42$ (ii)
 $y \leq 16$ (iii)
 $x > 0$ and $y > 0$ (iv)

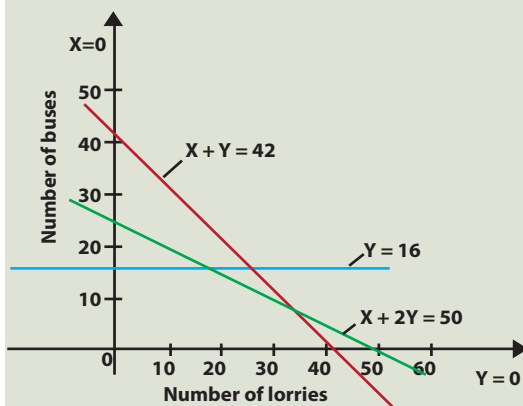
For (i) $x + 2y = 50$

x	0	50
y	25	0

For (ii) $x + 2y = 42$

x	0	42
y	42	0

For (iii) $y = 16$

For (iv) $x = 0$ and $y = 0$

Income that is the objective function $I = 5000x + 20,000y$. Using 100,000 as the suitable value of I

$$5000x + 20,000y = 100,000 \quad \text{(i)}$$

$$5x + 20y = 100$$

$$x + 4y = 20 \quad \text{(ii), is the search line}$$

Maximum point is (18, 16) that is, 18 lorries and 16 buses.

$$\text{Maximum income} = (5000 \times 18) + (16 \times 20,000) = \text{UGX } 410,000$$

SOLUTIONS TO CHEMISTRY ISSUE 5 (OCHEM005)

- Density of gases as compared to air.
 - Balloon X is displaced upwards because the gas therein is less dense than air. Balloon Y contains a gas which is denser than air so it is displaced down wards.
 - Gas X – upward delivery/downward displacement of air.
Gas Y – downward delivery/upward displacement of air.
 - Used in advertisement balloons.
- The two miscible liquid mixtures have different boiling points at which when they are heated, the liquids can be separated.
 - Paper chromatography is based on the principle where molecules in mixture are applied onto the surface, the components have different speed along a stationary phase (stable phase) carried by a mobile phase. The more soluble ones will move more rapidly and further up the paper than the other less soluble component(s).
 - Air contains substance (gases and suspended matter) not chemically combined together and can be separated by physical means.
- A white ring is formed closer to the end with hydrochloric acid (at point x)
 - $\text{NH}_3(\text{g}) + \text{HCl}(\text{g}) \longrightarrow \text{NH}_4\text{Cl}(\text{s})$
 - Gases or matter is made up of particles/molecules that are constantly moving. Lighter molecules move faster than heavier ones. The molecules of ammonia are lighter than the molecules in hydrogen chloride. The molecules in ammonia diffuse faster than those of hydrogen chloride, hence forming ammonium chloride (product) closer to the side with hydrogen chloride.

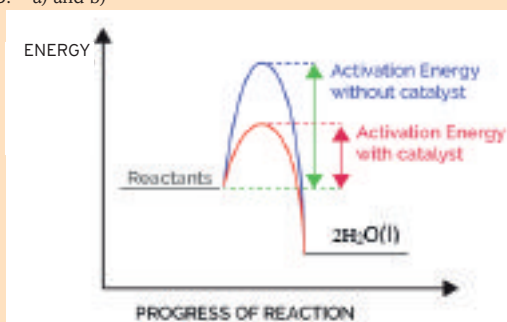
- An isotope is a variant of a particular chemical element which differs in neutron number and consequently in nucleon number.

b)

Symbol	Name	Charge
n^0	Neutron	0
p^+	Proton	+1
e^-	Electron	-1

- b) Using the symbol T to represent tritium, give the formulae of
- T
 - NaH

- a) and b)



- c) When a catalyst is added, the activation energy is lowered. This lowers the energy required to form products hence the reaction is faster.

- A **redox reaction** is a reaction in which one species is reduced and another is oxidised.
 - Haematite contain iron (III) oxide, Fe_2O_3 . The oxygen is removed from the iron (III) oxide to form iron. This is a reduction reaction. The oxygen removed from haematite is added to carbon monoxide, forming carbon dioxide, this is an oxidation reaction. Since the process of extracting iron involves both reduction and oxidation reactions, it is a redox reaction.
 - $\text{Fe}_2\text{O}_3(\text{s}) + 3\text{CO}(\text{g}) \longrightarrow 2\text{Fe}(\text{l}) + 3\text{CO}_2(\text{g})$
- In the first set up, a pale green solution gradually



MUGOGO MOSES,
SEETA HIGH SCHOOL

ANDREW HANNINGTON NSEREKO,
BISHOP'S SENIOR SCHOOL, MUKONO

- turned colourless
In the second setup, a colourless gas that burns with a blue flame and a pop-sound is evolved.
- $\text{Zn}(\text{s}) + \text{FeSO}_4(\text{aq}) \longrightarrow \text{ZnSO}_4(\text{aq}) + \text{Fe}(\text{s})$
 - Used to fill weather station balloons.
Used to harden margarine
- Polypropene,
 - It can be used at temperatures beyond 100°C
 - It is insoluble in organic solvents like oil.
 - It has low usability temperature. With hot food, polychloroethene bags melts and dissolves in organic food and this may cause ill health.
 - High density polyethene**
 - Food packaging
 - Shopping bags
 - Dustbins crates
 - Water pipes
 - Low density polyethene**
 - Squeezable bottles
 - Cling film milk carton lining
 - Flexible water pipes cable jacketing
 - Polyethene material is non-biodegradable. Poor disposal of polyethene leads to pollution of soil and blockage of drainage systems.
 - Graphite** has a very high melting and boiling point because the strong covalent bonds that hold the carbon atoms together in the layers require a lot of heat energy to break.
 - The layers in graphite can slide over each other because the forces between them are weak. This makes graphite slippery
 - Making lead pencils.
 - Used as lubricant in electric devices.
 - the empirical formula of X

C	H	O
$\frac{0.18}{1}$	$\frac{0.18}{1}$	$\frac{0.96}{16}$
0.06	0.18	0.06
$\frac{0.06}{0.06}$	$\frac{0.18}{0.06}$	$\frac{0.18}{0.06}$
1	3	1

The empirical formula is CH_3O

 - This is also called the hydration of ethene. Steam is reacted with ethene in presence of phosphoric acid as a catalyst at a temperature of about 300°C and pressure of 60 atmospheres
 - The orange solution of potassium dichromate turns green.

SECTION B

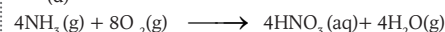
- The reaction generates heat. Increasing or applying heat will lower the rate at which the products are formed.
 - The reaction proceeds with increase in volume, since pressure and volume are inverse proportions. Increasing pressure will lower the rate of formation of products.
 - During the reaction, ammonia and oxygen are passed through a powdered catalyst.
 - Platinum
 - To increase the surface area upon which the reaction takes place
 - The catalyst lowers the activation energy required to form products. When applied, the reaction goes faster.
 - At STP, 1 mole of a gas occupies 22.4dm^3
Moles of nitrogen monoxide:
 22.4dm^3 of a gas at STP occupy 1 mole of nitrogen

monoxide
 1dm^3 of a gas at STP occupies $\frac{1}{22.4}$ moles of nitrogen monoxide
 720dm^3 of a gas occupy $\frac{1}{22.4} \times 720$ moles nitrogen monoxide
 $= 32.143$ moles of nitrogen monoxide

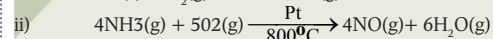
From equation,
The mole ration of $\text{NO} : \text{HNO}_3$ is 1:1, hence the moles of nitric acid is 32.143 moles.

Mass of nitric acid = moles of nitric acid $\times$ molecular formula of nitric acid $\times$
 $= 32.143 \times 63$
 $= 2,025\text{g}$ of nitric acid

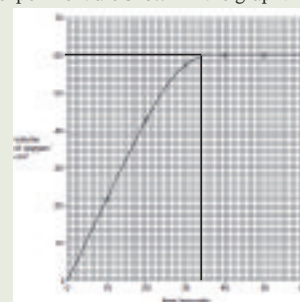
(d)



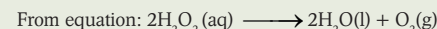
- Carbon burns in limited air to form carbon monoxide gas
 $2\text{C}(\text{s}) + \text{O}_2(\text{g}) \longrightarrow 2\text{CO}(\text{g})$



b) Manganese(IV) oxide catalyses the decomposition of aqueous hydrogen peroxide. In an experiment 50.0cm^3 of aqueous hydrogen peroxide was mixed with 0.50g of manganese(IV) oxide. The total volume of oxygen formed was measured every 10 seconds. The results of the experiment are shown in the graph.



- 36 seconds
- At the start, the graph shows an exponential increase in the volume of oxygen formed with time, due to a high concentration of reactants. However, later, as the concentration of reactants reduce, the volume of oxygen formed lowers until there is no more increase in volume of oxygen formed when the reactants are used up.
- From the graph, it is 60cm^3 of oxygen gas
 - 22400cm^3 occupy 1 mole of oxygen at STP
 1cm^3 occupies $\frac{1}{22400}$ moles of oxygen
 60cm^3 occupies $\frac{1}{22400} \times 60$ moles of oxygen
 $= 0.002679$ moles of oxygen



1 mole of oxygen is produced by 2 moles of hydrogen peroxide
 0.002679 moles of oxygen are produced by (2×0.002679) moles of hydrogen peroxide
 $= 0.005357$ moles of hydrogen peroxide

50.0cm^3 of solution contain 0.005357 moles of hydrogen peroxide

1cm^3 of solution contains $\frac{0.005357}{50}$ moles of hydrogen peroxide
 1000cm^3 of solution contains $\frac{0.005357}{50} \times 1000$ moles of hydrogen peroxide
 $= 0.107\text{mol/dm}^3$ hydrogen peroxide

- A colourless gas that turns lime water milky is given out.
 - Calcium oxide is manufactured by the decomposition of calcium carbonate.
 - $\text{CaCO}_3(\text{s}) \longrightarrow \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$
 - A drying agent in preparation of dry ammonia gas.
 -

Metal carbonate	Identity
U	Be
V	Ca
X	Ba
Y	Any group I metal carbonate e.g. Na_2CO_3
Z	Mg

