VISION GROUP

NATIONAL PRIDE • GLOBAL EXCELLENCE

HOME SCHOOLING MATERIAL

PASS O LEVEL

MATHS, ICT, CHEMISTRY

YOUR GUIDE AWAY FROM SCHOOL

GUIDE TO MAY 18 PRACTICAL QUESTIONS

COMPUTER STUDIES

JORAM BWAMBALE,
ST MARY'S COLLEGE, KISUBI

GLORIA AKATUKUNDA
NATIONAL TEACHERS COLLEGE, KABALE

1. ELECTRONIC PRESENTATION

SKILL	Slides	Data	Buttons	Images	Background	Mouse	Colour	Bullets	Slide	SmartArt	Animation	Footer	Save	Print	**Total**
EXPECTED	6	6	2	1	2	2	2	2	1	1	1	1	1	1	**30**
ACTUAL															

2. DATABASE MANAGEMENT

									report					Report			
SKILL	Database	Tables	Primary key	Field types	Lookup	R/ship	Form	Entry	Query	Report	Data	Query	Data	Date	Order	Print	**Total**
EXPECTED	1	4	2	1	2	2	2	4	1	1	1	1	3	1	1	1	1
ACTUAL																	

3. WEB DESIGNING

	Page 1							Page 2				Page 3			Page 4					
SKILL	Banner	Header	Motto	Marquee	Links	Intro	Photo	Table	Content	Photo	Back	Topic	Discuss	Intro	Content	Contact	Back	Save	Print	**Total**
EXPECTED	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2		1	**30**
ACTUAL																				

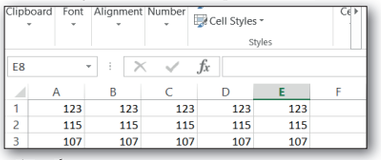
COMPUTER STUDIES PAPER ONE QUESTIONS (0C004)

SECTION A

1. Which technological advancement was in the second generation of computers?
   A. Vacuum tubes
   B. Integrated circuits
   C. Transistors
   D. Microprocessors
2. Suppose you have a 100GB hard disk with the following data:

ITEM	STORAGE SPACE USED
Operating system	12 GB
Program files	2048 MB
Digital Photos and videos	50 GB
Other documents	2048 MB

   How much storage space is currently used? And How much is left?
   A. 67584MB and 34816MB
   B. 64976 MB and 4096MB
   C. 66096 MB and 336304 MB
   D. 336304MB and 66096 MB
3. A computer can play music while the user is typing a document and surfing the Internet. To which computer characteristic does this statement relate?
   A. Diligent. B. Versatile.
   C. Accurate. D. Automatic.
4. Which of the following is the strongest password?
   A. TORORO
   B. ToRoRo@2020
   C. Tororo
   D. tororo@2020
5. How many rows are in the spreadsheet?



   A. 6
   B. 5
   C. 3
   D. 8
6. A computer technician re-installed her computer with a new operating system, but she discovered that the touchpad, which was earlier working, could no longer work. She is encouraged to install …….
   A. drivers.
   B. software patch.
   C. new touchpad.
   D. Application software.
7. Which computer has been designed to be as compact as possible?
   A. Mainframe computer
   B. Micro computer
   C. Super computer
   D. Mini computer
8. Which of the following groups consist of only input devices?
   A. Barcode reader, mouse, camera
   B. Keyboard, mouse, printer
   C. Plotter, Printer, Monitor
   D. Keyboard, Plotter, Camera
9. Which of the following devices uses a hand-held operating system?
   A. Super computers
   B. Desktop computers
   C. PDA
   D. Servers
10. The…… folder in emails retains messages that you have started and are waiting to be sent.
    A. Drafts
    B. Outbox
    C. Sent Items
    D. Inbox
11. You can use the ……. to simultaneously keep multiple webpages open in a browser window.
    A. tab box
    B. address bar
    C. URL
    D. tab row
12. The hardware component that converts your computer's digital signal to an analog signal that can travel over telephone lines is called…….
    A. Switch.
    B. Modem.
    C. Ethernet cable.
    D. Fiber optic.
13. What are the two parts an e-mail address is comprised of?
    A. Initials and password
    B. User name and street address
    C. User name and domain name
    D. User name and recipient name
14. Collecting personal information and effectively posing as another individual is known as…..
    A. spooling
    B. identity theft
    C. spoofing
    D. hacking
15. https://www.visiongroup.co.ug is a typical uniform resource locator, visiongroup represents the.....
    A. type of organisation. B. world wide web.
    C. domain name. D. protocol.
16. What is the difference between a CD-ROM and a CD-RW?
    A. They are the same just two different terms used by different manufacturers.
    B. A CD-ROM can be written to and a CD-RW cannot.
    C. A CD-RW can be written to, but a CD-ROM can only be read from.
    D. A CD-ROM holds more information than a CD-RW.
17. A specific field in a database table that uniquely identifies the records in that table is termed as…….
    A. foreign key.
    B. primary key.
    C. a column.
    D. a row.
18. Which of the following is an example of guided transmission media?
    A. blue tooth. B. infrared.
    C. WI-FI . D. Ethernet cable.
19. A…….. refers to a word, phrase, symbol or design that identifies goods and services.
    A. copyright
    B. trademark
    C. patent
    D. plagiarism

Turn to page II

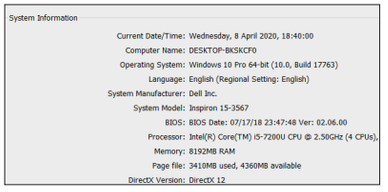
PASS O'LEVEL

Continued from page I

20. When a database user wishes to retrieve data from a database, a …… can be used to retrieve the records.
    A. table
    B. form
    C. query
    D. report

SECTION B

21. (a) Define the term computer generation.
    (b) State two characteristics of computers for each of the following computer generations.
    (i) First generation
    (ii) Second generation
    (iii) Third generation
    (iv) Fourth generation
22. (a) Define the term computer?
    (b) A large IT firm owns and sells computers which are capable of weather forecasting. Apart from weather forecasting, which other three suitable activities can these computers perform.
    (c) Explain two ways how ICT is being applied in each of the following sectors in Uganda.
    (i) Health
    (ii) Police
    (iii) Homes
23. (a) Define the term warm booting.
    (b) State four conditions under which an individual would restart a computer.
    (c)A computer user checked the specifications of his computer and the following screen was arrived at.

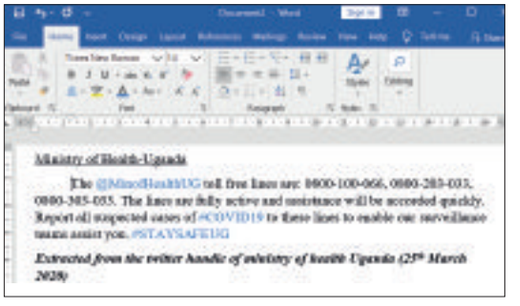


SECTION C

27. (a) Differentiate between the following terms as used in information technology
    (i) Hacking and cracking
    (ii) Unauthorised use and unauthorised access
    (iii) Phishing and pharming
    (b) Explain two unethical conducts you have observed on computer users.
    (c) Explain five Information Communication Technology (ICT) jobs available to professionals in Uganda.
28. (a) Distinguish between the following terms as applied to networks.
    (i) videoconferencing and telecommuting?
    (ii) Hotspot and network topology.
    (b) (i) State four software that can be used for video conferencing.
    (ii) With illustrations, explain three network topologies which are used in IT firms in Uganda.
    (c) Explain three ways how Global Positioning System (GPS) receivers can be used in our daily lives.
29 (a) Explain the following terms as applied to programming.
    (i) Syntax error
    (ii) Debugging
    (iii) Assembler
    (b) Explain two reasons why programmers prefer to use high level languages than using low level languages.
    (c) Using a programming language of your choice, write a program that can allow two integers and subtract them.

i) Which system software operates, manages activities, runs Application programmes and interfaces with the user on this computer?
ii) Which name would this computer display on a network?
iii) State the size of the working space of this computer.
iv) At what speed does the processor run?

24. (a) Differentiate primary storage from secondary storage.
    (b) State three examples of solid-state devices.
    (c) Write the following terms in full.
    (i) CPU
    (ii) ALU
    (d) Explain the following basic operations of machine cycle.
    (i) Fech……
    (ii) Decode……
    (iii) Execute……
25. A new school wishes to have a computer laboratory. The headteacher of this school has contacted you to give him advice on the safety of both the users and the computers.
    (a) Give three ways how he can ensure safety of users in the laboratory.
    (b) In which ways can he ensure safety of computers and other ICT devices in the laboratory.
    (c) Mention four ways how computers are being used in your school.
26. (a) (i) Differentiate a word processor from word processing.
    (ii) Consider the screenshot below



Identify three formatting features which are used in the text.
(b) (i) State two examples of a word processor.
(ii) Explain three advantages of using a word processing software over an ordinary typewriter.

MATHEMATICS PAPER 1SOLUTIONS (MAY 18 ISSUE)

1. Re-arranging the equations

$\sqrt{x}+y=4-(i)$

$2\sqrt{x}-y=5-(ii)$

Equation (i) + equation (ii)

$\sqrt{x}+2\sqrt{x}+0=9$

$3\sqrt{x}=9$

$\sqrt{x}=\frac{9}{3}$

$\left(\sqrt{x}\right)^2=(3)^2$

$x=9$

Substituting $x=9$ in equating (i) gives

$\sqrt{9}+y=4$

$3+y=4$

$y=4-3$

$y=1$

$\therefore x=9$ and y = 1

2 (i) $2*-3=\frac{3(2)^2-10(-3)}{1-2(-3)}$

$=\frac{12+30}{1+6}$

$=\frac{42}{7}$

$=6$

(ii) $7*(2*-3)=7*6$

IVAN GIMEI,
ST MARY'S COLLEGE, KISUBI

AUGUSTUS ISINGOMA,
ST JOHN'S SS, NYABWINA - SHEEMA

$=\frac{3(7)^2-10(6)}{1-(7\times6)}$

$=\frac{87}{-41}$

$=-2\frac{5}{41}$ oR -2.12195 ≈ -2.122 (3 dps)

3 For intersecting chords

AE × ED = CE × ED

Let ED = x, then ED = $x+2$

$(10+x)x=(4+x+2)(x+2)$

$10x+x^2=(6+x)(x+2)$

$10x+x^2=6x+12+x^2+2x$

$10x=8x+12$

$10x-8x=12$

$2x=12$

$x=6$

Therefore, EB = 6cm and ED = (6 + 2) = 8cm

4. $64-(x-5)^2$

$=8^2-(x-5)^2$

$=[8-(x-5)][8+(x-5)]$(A difference of two squares)

$=(13-x)(x+3)$

$(13-x)(x+3)=0$

$13-x=0, \quad x=13$

And $x+3=0$, $x=-3$

Hence $x=-3$ and $x=13$.

5. Let $P=\begin{pmatrix}a & b\\ c & d\end{pmatrix}$

$PP^{-1}=1$ where I is identity matrix.

$\begin{pmatrix}a & b\\ c & d\end{pmatrix}\begin{pmatrix}3 & 0\\ 1 & 2\end{pmatrix}=\begin{pmatrix}1 & 0\\ 0 & 1\end{pmatrix}$

$3a+b=1$ | $3a=1$

$0+2b=0$

$b=0$ | $a=\frac{1}{3}$

$3c+d=0$ | $3c+\frac{1}{2}=0$

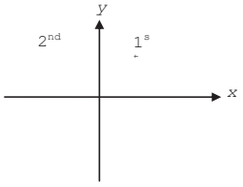
$0+2d=1$ | $3c=\frac{-1}{2}$

$2d=1$

$d=\frac{1}{2}$ | $c=\frac{-1}{6}$

$\therefore$ Matrix $P=\begin{pmatrix}\frac{1}{3} & 0\\ \frac{-1}{6} & \frac{1}{2}\end{pmatrix}$

6. From the Quadrant. Sine is positive in 1st and 2nd quadrants.



$\theta = \sin^{-1}\left(\frac{1}{2}\right)$

$\theta = 30°$ and $\theta = (180° - 30°) = 150°$
Therefore $\theta = 30°$ and $150°$

7. Let Prudence's age be x, Patrick's age will be $2x$.

Patrick	Prudence	Sum of the ages
$(2x + 5)$	$(x + 5)$	40

So

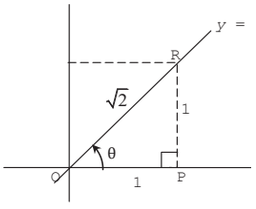
$2x + 5 + x + 5 = 40$
$3x + 10 = 40$
$3x = 40 - 10$
$3x = 30$

After five years, Patrick will be $(2 \times 10) + 5 = 25$ years
Prudence will be $(10 + 5) =$ 15 years

$$x = \frac{30}{3}$$

$x = 10$

8.



The gradient of the $y = x$ is 1.
From the above triangle OPR

$OR = \sqrt{(1)^2 + (1)^2}$
$= \sqrt{2}$

$\tan\theta = 1$

$\sin\theta = \frac{1}{\sqrt{2}}$ and $\cos\theta = \frac{1}{\sqrt{2}}$

Therefore the matrix of rotation is

$$\begin{pmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{pmatrix} = \begin{pmatrix} \frac{1}{\sqrt{2}} & \frac{-1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{pmatrix}$$

9. Range = Height value – Lowest value
= (16 – 7)
= 9

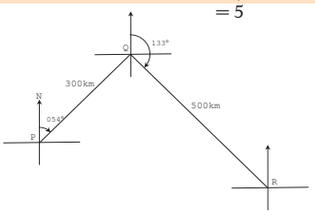
Median $= \frac{10+12}{2}$
$= \frac{22}{2}$
= 11

Lower Quartile $(Q_1) = \frac{8+9}{2} = 8.5$

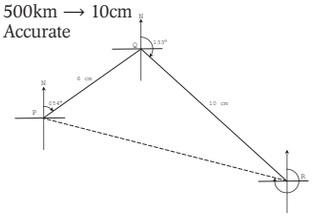
Upper Quartile $Q_3 = \frac{13+14}{2} = 13.5$

Interquartile range = $Q_3 - Q_1$
= (13.5 – 8.5)
= 5

10.



Let 1cm represent 50km
300km ⟶ 6cm
500km ⟶ 10cm
Accurate

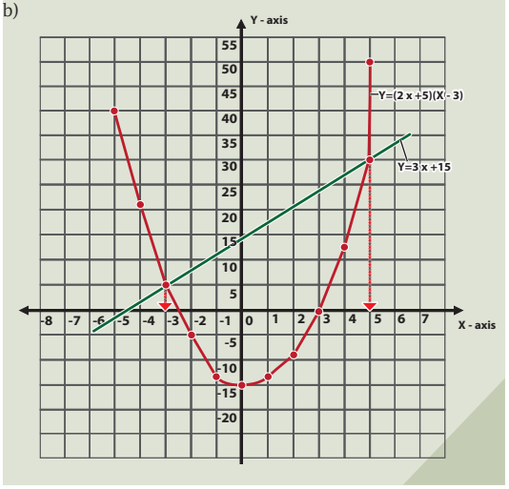


Distance PR = 12.18 cm (± 0.1)
Bearing of P from R = 283°

11. a)

x	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
3x15	-5	-3	-1	1	3	5	7	9	11	13	15	17
x-3	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3
y	40	21	6	-5	12	15	14	9	0	13	30	51

b)



12.

(a) $\begin{pmatrix} 1 & 3 \\ 4 & 2 \end{pmatrix}\begin{pmatrix} 5 & x \\ 1 & y \end{pmatrix} = \begin{pmatrix} 8 & x \\ z & 4 \end{pmatrix}$

$x + 3y = x$
$3y = x - x$
$3y = 0$
$y = 0$
$20 + 2 = z$
$\therefore z = 22$

$4x + 2y = 4$
$2x + y = 2$
$2x + 0 = 2$
$2x = 2$
$x = 1$

$\therefore x = 1$, $y = 0$ and $z = 22$

(b) Let $A = \begin{pmatrix} 3 & 5 \\ 1 & 1 \end{pmatrix}$

$$A^{-1} = \frac{1}{\det}\begin{pmatrix} 1 & -5 \\ -1 & 3 \end{pmatrix}$$

$\det A = (3 \times 1) - (5 \times 1)$
$= 3 - 4$
$= -2$

$$A^{-1} = \frac{1}{-2}\begin{pmatrix} 1 & -5 \\ -1 & 3 \end{pmatrix}$$

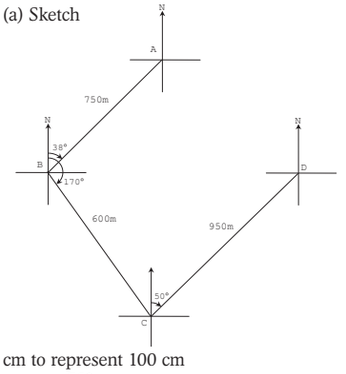
$$= \frac{1}{-2}\begin{pmatrix} 1 & -5 \\ -1 & 3 \end{pmatrix}\begin{pmatrix} 3 & 5 \\ 1 & 1 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \frac{-1}{2}\begin{pmatrix} 1 & -5 \\ -1 & 3 \end{pmatrix}\begin{pmatrix} 7 \\ 1 \end{pmatrix}$$

$$\frac{-1}{2}\begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \frac{-1}{2}\begin{pmatrix} 2 \\ -4 \end{pmatrix}$$

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

$\therefore x = -1$
$y = 2$

13. (a) Sketch



1 cm to represent 100 cm

750m $= \frac{750}{100} = 7.5$cm.

$\overline{BA} = 7.5$cm

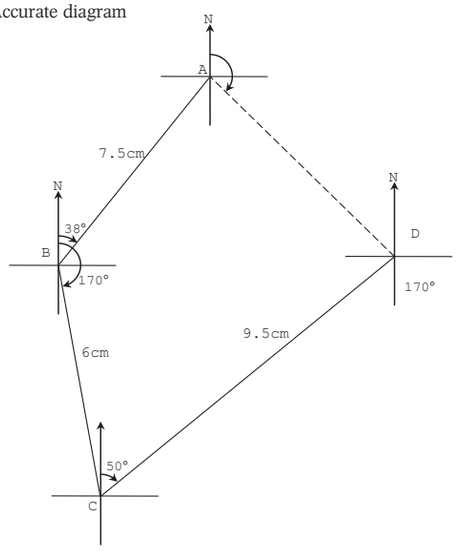
600m $= \frac{600}{100} = 6$cm

$\overline{BC} = 6$cm

950m $= \frac{950}{100} = 9.5$cm

$\overline{CD} = 9.5$cm

Accurate diagram



(b) Distance AD = 4.6cm (±0.1)
Bearing of D from A = 135° (±1)

14. (a) Model weight = 47.75kg. (From the histogram)

(b)

Weight (kg)	f	x	fx	cf	Limits
30-34	3	32	96	3	29.5-34.5
35-39	6	37	222	9	34.5-39.5
40-44	8	42	336	17	39.5-44.5
45-49	12	47	564	29	44.5-49.5
50-54	10	52	520	39	49.5-54.5
55-59	8	57	456	47	54.5-59.5
60-64	5	62	310	52	59.5-64.5
65-69	4	67	268	56	64.5-69.5
	$\Sigma f = 56$		$\Sigma fx = 2772$		

Mean weight $= \frac{\Sigma fx}{\Sigma f}$

Turn to page IV

Continued from page III

$$= \frac{2772}{56}$$

$= 49.5$

$$\text{Median} = L_1 + \left(\frac{\frac{n}{2} - c}{f}\right) xi$$

$L_1 = 44.5$ $\quad n = 56$ $\quad c = 17$ $\quad f = 12$ $\quad i = 5$

$$= 44.5 + \left(\frac{\frac{56}{2} - 17}{12}\right) \times 5$$

Median = 49.0833

≈ 49.0833 (4 dps)

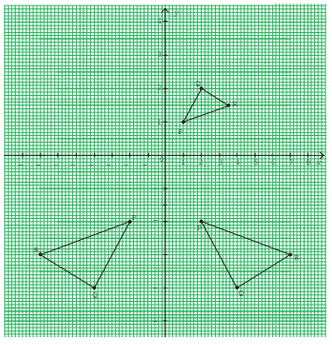
16. (a)
$$\begin{matrix} & P & Q & R & & P' & Q' & R' \end{matrix}$$
$$\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 2 & 4 & 7 \\ -2 & -4 & -3 \end{pmatrix} = \begin{pmatrix} -2 & -4 & -7 \\ -2 & -4 & -3 \end{pmatrix}$$

$P'(-2,-2)$ $\quad Q'(-4,-4)$ and $R'(-7,-3)$

$$\begin{matrix} & P' & Q' & R' & & P'' & Q'' & R'' \end{matrix}$$
$$\begin{pmatrix} -0.5 & 0 \\ 0 & -0.5 \end{pmatrix} \begin{pmatrix} -2 & -4 & -7 \\ -2 & -4 & -3 \end{pmatrix} = \begin{pmatrix} 1 & 2 & 3.5 \\ 1 & 2 & 1.5 \end{pmatrix}$$

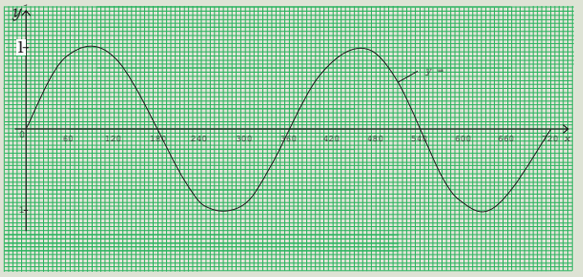
$P''(1,1)$ $\quad Q''(2,2)$ and $R''(3.5,1.5)$

b)



15. (a)

x	0'	60	120	180	240	300	360	420	480	540	600	660	720
$y = \sin x$	0'	0.87	0.87	0	-0.87	-0.87	0	0.87	0.87	0	-0.87	-0.87	0



(b) (i) x = 0°, 180°, 360°, 540° and 720°

(ii) x = 210°, 330°, 570° and 690°

(iii) x = 30°, 150°, 390° and 510°

(iv) x = 90° and 450°

(c) (i) 0.17

(ii) -1

17 (a) $15x + 6x \leq 150$

Dividing by 3 gives

$5x + 2x \leq 50$ ..... (i)

$900{,}000x + 600{,}000y \leq 12{,}600{,}000$

$9x + 6y \leq 126$

$3x + 2y \leq 42$ ..... (ii)

$x + y \leq 20$ ..... (iii)

$x \geq 0$ and $y \geq 0$ ..... (iv)

(b) P = 2,000,000x + 1,500,000

(c) For (i) in a

5x + 2y = 50

x	0	10
y	25	0

Points to plot (0, 25) and (10, 0)

For (ii) in a

3x + 2y = 42

x	0	14
y	21	0

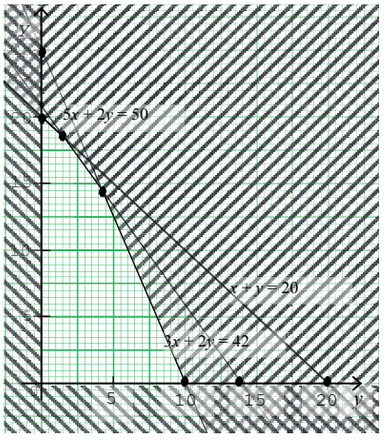
Points to plot (0, 21) and (14, 0)

For (iii) in a

x + y = 20

x	0	20
y	20	0

Points to plot (0, 20) and (20, 0)



c (ii) To Maximise profits, the farmer should use 2 hectares of maize and 18 hectares of beans.

P = 2,000,000x + 1,500,000y

P = (2,000,000 × 2) + (1,500,000 × 18)

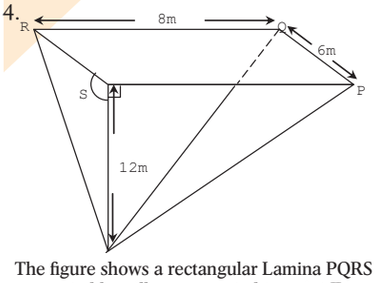
= UGX 31,000,000

MATHEMATICS REVISION QUESTIONS (OM004)

1. Simplify $1 - \left(\frac{1\frac{1}{4} \text{ of } \frac{2}{5} + \frac{1}{6}}{\frac{7}{12} \div 3\frac{1}{2} - \frac{1}{3}}\right)$
2. A forest on a map of scale 1:250,000 is area 4.25cm². Determine the actual area of the forest in km².
3. Solve for p in

$$\sqrt{108} + \sqrt{75} - p\sqrt{12} = \sqrt{27}$$

4.



The figure shows a rectangular Lamina PQRS supported by pillars connected to point T in which PQ=6m, QR=8m and ST=12m .

Find

(i) length $\overline{QT}$

(ii) Angle between the lines $\overline{TQ}$ and $\overline{QS}$.

5. Express 18 and 42 each as a product of its prime factors and hence find their highest common factor (HCF).
6. A line perpendicular to y = 2 – 3x passes through point A(8, 5) and cut the x-axis at point B. find the coordinates of B.
7. Given that n(A') = 12, n(B') = 15, n(A∩B) = 8 and n(ε) = 32.
   a) Represent the above information on a venn diagram.
   b) Find n(A∪B)'
8. Given points A(9, 5) and B(3, 2). Find the value of $\frac{1}{3}\overline{AB} + 3\overline{OA}$.
9. Given that T = {2, 5, 6, 8, 9, 11, 12} and P = {(x, y) where $x \in T$ and $y \in T$ such that y = x + 3}.
   a) Write the elements of set P.
   b) Draw a papygram for set P.
10. A commission of 10% is given to a sales agent for sales up UGX 150,000 and 15% commission for sales in excess of UGX 150,000. Calculate the total commission for UGX 260,000 sales.

SECTION B

11. a) Determine the value of x in $0.25^x \times 8^{(x+1)} = 64$

b) given that $\log_{10}^{x} = \bar{3}.216$ and $\log_{10}^{y} = 1.732$ without using tables or calculators. Determine

(i) $\log_{10}^{(xy)}$ $\quad$ (ii) $\log_{10}^{\frac{\sqrt{x}}{y}}$ $\quad$ (iii) $\log_{10}^{10x}$

12. A teacher told his students to each come with a Graph book (G), a Mathematical set (S) and a Calculator (C). In a class of 50, 2 students did not bring any of the three items, 3 brought G only, 5 brought S only, 4 brought G and C only, while 5 brought all the three items. Those who brought G and S only are 3 less than those who brought S and C only and three times those who brought C only.
   c) Show this information on a Venn diagram.
   d) Find how many students brought
      (i) Each item (ii) C only
   e) If a student is selected at random from the class, what is the probability that she/he brought at least to items?
13. In a certain organisation, the following allowances are tax-free

Transport UGX 2500 per day

Housing UGX 150,000 per month

Water UGX 20,000 per month

Medical UGX 420,000 per annum.

The rates on taxable income per month are as follow.

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

Given that Gimadu paid UGX 126,250 of tax Calculate his;

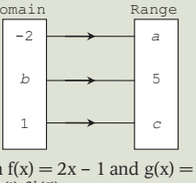
(i) Total monthly allowance

(ii) Taxable income

(iii) Gross income

(iv) Net income

14. a) Use the mapping function f: $x \rightarrow 3x + 5$ to find the values of a, b and c in the arrow diagram below.



b) Given f(x) = 2x – 1 and g(x) = x²

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

(ii) The value of x for which fg(x) = gf(x)

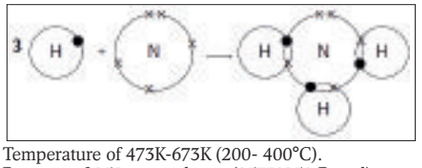
ANSWERS TO CHEMISTRY QUESTIONS IN MAY 18 ISSUE

MUGOGO MOSES,
SEETA HIGH SCHOOL

ANDREW HANNINGTON NSEREKO,
BISHOP'S SENIOR SCHOOL, MUKONO

1. **SECTION A**
a) i) Fractional distillation
ii) Distillate
b)i) Allows indirect heating of the mixture beads in fractionating column.
c) The principle of fractional distillation is that different liquids boil at different temperatures. The miscible liquids boil at different temperatures and evaporate at different temperatures. When the mixture is heated, the liquid with lower boiling point boils and turns into vapours.

2. a) i) $^{1}_{1}H$
ii) $^{14}_{7}N$
b) i) Covalent bond.
ii) - Has low melting points.
- Does not conduct electricity
c)



3. a) i) Temperature of 473K-673K (200- 400°C).
ii) Pressure of 250 atmospheres (25331250 Pascal).
iii) Iron is used as catalyst.
b) If the pressure is increased, the equilibrium position moves in the direction of the fewest molecules of gas. This means it moves to the right in the Haber process, hence more ammonia is formed.

Ammonium nitrate:	Urea
N = (14 x2) = 28 H = (1 x 4) = 4	N = (14 x 2) = 28 H = (1 x 4) = 4 O = (16 x 1) = 16 C = (12 x 1) = 12
Mass of nitrogen/ Rfm = (28/80)x100 = 35%	Mass of nitrogen/ Rfm = (28/60)x100 = 46.7%

4. The statements give some of the chemical properties of metal X and its compounds.
- X does not react with cold water.
- X does not form a precipitate with potassium iodide.
- X dissolves in excess ammonia solution (amended).
- X does not react with oxides of iron (amended).

a) The possible identity for X is copper.
b) The equation for the reaction between X and the oxide of magnesium;
X is less reactive than magnesium. It cannot react with an oxide of magnesium.
c) $Cu(s) + {}^{-}OH(aq) \longrightarrow Cu(OH)_2(s)$
d) Metals are excellent conductors of electricity because the atoms in a metal form a matrix through which their outer electrons can move freely conducting electricity.

5. a) i) An increase in the amount of carbon dioxide creates an overabundance of greenhouse gases that trap additional heat. This trapped heat leads to melting ice caps and rising ocean levels, which cause flooding and global warming.
i) Decomposition of biomaterials like animal refuse and plant parts.
ii) Methane gas is a fuel used both domestically and industrially to provide heat and light.
b)

6. Iron metal was reacted with dilute sulphuric acid.
a) i) A pale green solution was formed and a colourless gas that burns with a blue flame and pop sound.
ii) $Fe(s) + H_2SO_4(aq) \longrightarrow FeSO_4(aq) + H_2(g)$
b) Zinc granules were added to the resultant solution.
i) The green solution faded to colourless solution.
ii) $FeSO_4(aq) + Zn(s) \longrightarrow ZnSO_4(aq) + Fe(s)$

7. a) i) Copper (II) oxide
ii) Gases A – nitrogen dioxide and gas B – oxygen
iii) $Cu(NO_3)_2(s) \longrightarrow CuO(s) + NO_2(g) + O_2(g)$
b)i) sodium carbonate or potassium carbonate
c) $Cu(NO_3)_2(aq) + Na_2CO_3(aq) \longrightarrow 2NaNO_3(aq) + CuCO_3(s)$

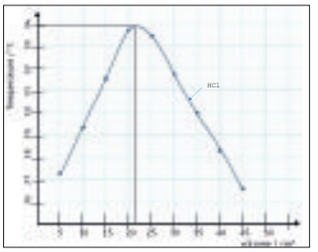
8. a) i) Screening.
ii) Flocculation.
b) i) filtration.
ii) Removes any suspended particles in water.
c) Chlorine combines with water to form chlorine water, which bleaches/removes any colour in water, leaving it colourless.

9. a) i) A black solid and colourless vapour was observed.
ii) $C_{12}H_{22}O_{11}(s) + H_2SO_4(aq) \longrightarrow 12C(s) + 11H_2O(g)$
b) Used as fuel for cooking.
c) i) Dehydrating property.
ii) drying gases
iii) Dehydrates ethanol to produce ethene

10. a) i) Presence of a catalyst – iron
High pressure of 200 atmospheres and temperature 400°C – 450°C
ii) $N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$
b) 25cm³ of nitrogen were reacted with 15cm³ of hydrogen gas. Calculate;
i) The volume of ammonia formed.
3 moles of hydrogen yield 2 moles of ammonia
25 cm³ of hydrogen yields (2/3) x 25
= 10 cm³ of ammonia
ii) The volume of excess gas.
By simple ratios in equation,
3 moles of hydrogen react with 1 mole of nitrogen gas.
15 cm³ of hydrogen react with (1/3) x 15
= 5 cm³ of nitrogen reacted.
But 25cm³ of nitrogen gas was used, therefore, the gas that did not react (excess).
= (25 – 5)
= 20 cm³ of excess nitrogen gas.

SECTION B:

11. (a) The heat of neutralisation (ΔHn) is the heat change that occurs when an acid reacts with a base to form 1 mole of water.
b) An experiment was carried out where different volumes of dilute hydrochloric acid and aqueous sodium hydroxide, both at 25°C, were mixed and stirred with a thermometer. The highest temperature reached by each mixture was recorded in the table below:
i) Plot a graph to represent the above information

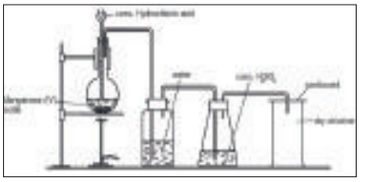


ii) Highest temperature = 33.9°C
Volume of acid = 21cm³,
Volume of base = 29 cm³
c) i) $2H^{+}(aq) + {}^{-}OH(aq) \longrightarrow H_2O(l)$
ii) Heat change = mass of solution (M) x specific heat capacity (C) x temperature change (⊖).
⊖ = highest temperature – initial temperature.
⊖ = 33.9 – 25.
⊖ = 8.9°C.
Mass (M) = (mass of acid + mass of alkali) x density
M = 21+29 = 50 x 1
M = 50g
Substituting in the formula MC⊖,
50 x 4.2 x 8.9
= 1869J
iii) Insulation of the apparatus to minimise heat loss or absorption.
d) Ammonia is a weak alkali, it partially ionises in water to form ammonium ions and few hydroxyl ions. Sodium hydroxide is a strong alkali, it completely ionises in water to form sodium ions and more hydroxyl ions. Formation of water is between the hydrogen ions of acid and hydroxyl ions of the base. The more the hydroxyl ions the more bonds formed generating a higher enthalpy value.

12. Sulphur can be extracted by the Frasch process. In the process, superheated water is used.
a) i) Superheated water is pumped into the sulphur deposit to melt the sulphur for easier extracted.
ii) Has a low melting point insoluble in water
b) i) High temperature.
Gases must be purified and dry.
ii) $S(s) + O_2(g) \longrightarrow SO_2(g)$
iii) To dry the gas
c) i) Vanadium (V) oxide
Platinised asbestos
ii) $SO_2(g) + O_2(g) \xrightarrow[V_2O_5/450^{o}C]{} SO_3(g)$
d) i) The sulphur trioxide formed is added to sulphuric acid which gives rise to oleum (disulphuric acid).
$SO_3(g) + H_2SO_4(l) \longrightarrow H_2S_2O_7(l)$
The oleum is then added to water to form sulphuric acid which is very concentrated.
$H_2S_2O_7(l) + H_2O(l) \longrightarrow 2H_2SO_4(l)$
ii) When sulphur dioxide combines with water in air, it forms sulphuric acid, which is the main component of acid rain.

13. a) Sodium stearate chemical formula is $C_{17}H_{35}COONa$.
i) Coconuts are steam-heated and pressed to extract oil, the oil is filtered and a solution of ash from peeled banana is added and boiled with the oil until frothing stops. Concentrated table salt solution is added to precipitate the soap. Soap floats on top of the mixture, it is filtered off and pressed into shapes for use.
ii) Soap has two ends which have different properties, the hydrophilic head or end which is attracted to water and the hydrophobic tail or end which repel water, but attracts and dissolves hydrocarbons or oil. The hydrophilic end dissolves dirt particles, while the hydrophobic end dissolves the oils in cloth. During washing, soap forms an emulsion in water and helps in dissolving the dirt and oil in clothes.
a) Detergents are sometimes called soapless soaps.
i) "Soap-less soaps" are generally referred to as non-soap cleansers. They differ from regular soap in that they contain synthetic materials rather than the fats or oils used in true soap.
ii) Soaps are obtained from natural ingredients whereas detergents are produced from synthetic sources.
Soaps are biodegradable, while some of the detergents are non-biodegradable.
iii) Soaps have relatively weak cleansing action whereas; detergents have a strong cleansing action.
iv) The functional group in a detergent is the sulphonate group, which does not react with the calcium and magnesium ions in hard water.

14. a) Preparation of a dry sample of chlorine.



Turn to page VI

Continued from page V

Eqn: $MnO_2(S) + 4\,HCl(aq) \longrightarrow MnCl_2(aq) + 2H_2O(l) + Cl_2(g)$

b) i) White fumes were observed

ii) $Cl_2(g) + H_2(g) \longrightarrow 2\,HCl\,(g)$

c) i) The red litmus paper remained red.

ii) White ppt was observed.

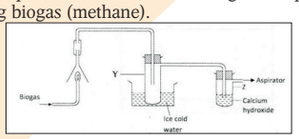
Eqn: $Pb(NO_3)_2\,(aq) + 2HCl\,(aq) \longrightarrow 2HNO_3(aq) + PbCl_2(s)$.

d) Uses of chlorine gas

- Cleaning drinking water
- Treating swimming pools.
- Making antiseptics.

QUESTIONS OC004

1. The set up below was used to investigate the products of burning biogas (methane).



a) Identify the product formed in test tube Y.
b) i) State what is observed in test tube Z.
ii) Write an equation of reaction.
iii) Explain the observation in b(i) above.
c) Mention one source of biogas.

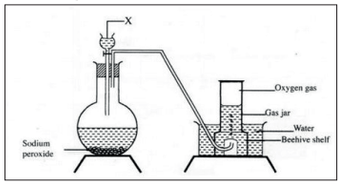
2. The table below shows atomic numbers and masses of elements. (The letters do not represent actual symbols of the elements)

Element	Q	R	S	T	U
Atomic number	5	17	13	18	5
Atomic mass	10	37	27	40	11

a) i) Which element(s) are isotopes?
ii)What causes isotopy?
b) Compare the melting points of elements R and S.
c) Element T is a noble gas. Explain why T does not react with other elements.

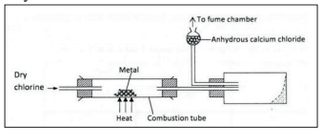
3. a) Define the term allotropy
b) Diamond and graphite are allotropes of carbon.
i) Explain why graphite is soft while diamond is very hard.
ii) State one use of graphite basing on its softness.
c) Explain why carbon forms many compounds.

4. The figure below can be used to prepare oxygen gas in the laboratory.



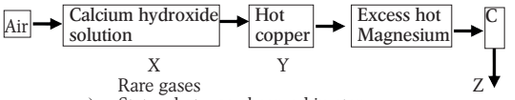
a) Identify substance X
b) What property of oxygen makes it possible for it to be collected as shown in the above set up?
c) i) Write an equation leading to formation of oxygen
d) How oxygen gas useful;
i) To plants and animals
ii) In space crafts

5. The diagram below illustrates a method of preparing salts by direct synthesis.



a) i) Identify two salts which can be prepared by this method.
ii) Write an equation for preparation of one of the salt identified in a(i) above.
b) Explain why sodium chloride cannot be prepared by this method.

6. Air was passed through reagents as shown below.

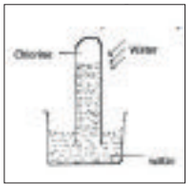


a) State what was observed in step;
i) X
ii) Y
b) Write a chemical equation for a reaction in step Z.
c) i) Identify the substance C.
ii) State the role of substance C.
d) state one application any rare gas.

7. a) Define solubility of a salt.
b) In an experiment to determine the solubility in water at 30°C, the following results were obtained.
- Mass of empty evaporating dish = 26.2g
- Mass of evaporating dish + saturated solution = 42.4g
- Mass of evaporating dish + dry solid Y = 30.4g

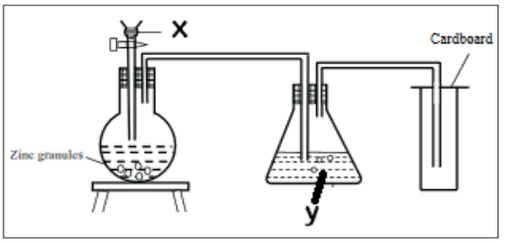
Use this data to calculate the solubility of Y at 30°C.

8. The figure below shows an experiment involving chlorine.



a) i) State what was observed after sometime.
ii) Explain your observation.
ii) Write an equation of reaction.
b) State what will be observed when red litmus paper is immersed in the resultant solution.

9. To prepare a sample of dry hydrogen gas, the set up below was used.

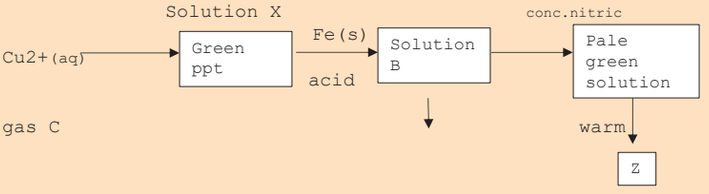


a) i)State the chemical nature of liquid X.
ii) Give an example of liquid X.
iii) Write an equation of reaction leading to preparation of hydrogen gas shown.
b) i) identify liquid y.
ii) State the role of y in the set up.
c) Identify two (2) errors made in the set up.

10. 5.0g of calcium carbonate was reacted with $25cm^3$ of a 0.1M hydrochloric acid until there was no further reaction.
a) State what was observed.
b) Write the equation of reaction.
c) Calculate the mass of calcium carbonate that remained unreacted. (Ca = 40, C=12, O=16).

SECTION B

11. Study the reaction scheme below and answer questions that follow.



a) Identify:
i) Solution X.
ii) Write an equation leading to formation of the green ppt.
b) i) Identify gas C.
ii) Explain how gas C is produced
iii) write an equation of reaction.
c) i) identify the type of reaction leading to the formation of the pale green solution.
ii) Explain how solution B forms a pale green solution.
iii) Write an equation of reaction.
d) i) Identify substance Z.
ii) How does warming affect the conversion of the pale green solution to substance Z.

12. a) What is a chemical cell?
b) i) describe how electromotive force is generated in a daniel's cell.
Write:
i) half equations at each electrode.
iii) write the overall cell equation.
iv) write the cell notation.
c) i) Draw a labelled diagram to show how a spoon can be silver electroplated.
ii) write the half equations at each electrode.

13. a) Without a diagram, describe how a dry sample of hydrogen sulphide gas can be prepare in the laboratory.
b) State what is observed when hydrogen sulphide gas is reacted with the substances below.
i) Iron (III) chloride
ii) Nitric acid
c)i) Name the allotropes of sulphur
ii) State 2 structural differences between the allotropes of sulphur.
iii) Briefly describe how you can prove that the substances named in d (i) are allotropes of carbon.

14. a) The atomic numbers of hydrogen, oxygen, sodium and chlorine are 1, 8, 11 and 17, respectively.
i) Write the electronic configurations of hydrogen, oxygen, sodium and chlorine.
ii) State one difference between the compounds formed in a (ii).
b) Sodium, magnesium, aluminium, phosphorous and sulphur are some of the elements in period 3 of the periodic Table.
State,
i) in each case, the class of the oxide of the elements.
ii) the trend in the metallic character of elements of period 3 of the periodic table and explain your statement basing your answer on the oxides whose classes you have stated in b(i).
c) i) Name one reagent that can be used to distinguish aluminium ions from magnesium ions in a solution.
ii) State what would be observed if the reagent you have named in c (i) was treated separately with aluminium and magnesium ions.