VISION GROUP

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HOME SCHOOLING MATERIAL

PASS O' LEVEL

Mathematics, chemistry, ICT

YOUR GUIDE AWAY FROM SCHOOL

PAPER ONE (OCOMP007) SOLUTIONS

JORAM BWAMBALE,
ST MARY'S COLLEGE, KISUBI

GLORIA AKATUKUNDA
NATIONAL TEACHERS COLLEGE, KABALE

COMPUTER STUDIES

SECTION A

1. **A:** A minicomputer is designed to host programs and data for a network. Its processor is designed to run faster than that of a microcomputer.
2. **A:** First generation computers were the largest in size because of the use of vacuum tubes. The computers available currently are small in size because most of the circuits have been simplified and placed on a microprocessor.
3. **B:** A dedicated computer support only one task assigned to it.
4. **A:** Processors, integrated circuits and memory chips are physical components of a computer. The only non-tangible part is the program. It is a set of instructions that tell the hardware on how to carry out the processing of tasks.
5. **B:** An operating system enables a computer to operate, manage its activities and the resources under its control, run application programs and interface with the user. It does not run the actual application activities (designing websites) and writing programs.
6. **B:** A system analyst studies the system in an organisation to determine what changes need to be made and how to best accomplish these changes. He/she constructs the structure of the program for the programmer to write the source code.
7. **C:** A copyright is the legal right to sell, publish or distribute an original artistic or literary work. It is held by the creator of a work as soon as it exists in the physical form. Sharing copyrighted files without permission breaks copyright laws.
8. **B:** A Trojan horse is a type of malware that masquerades as something else – usually an application program.
9. **D:** A relationship in a database helps a user to link the tables. The primary key uniquely identifies records in a database, a query is used to retrieve data from a database and a form is used to feed data in a database.
10. **A:** ALT+F5 has no default function, SHIFT+S helps to type letters in lowercase or uppercase and CTRL+S is for saving the document.
11. **A:** Syntax error. A programming error that occurs when the programmer has not followed the rules of the programming language. The compiler converts a program in high level language to low level language at once. Logic charts represent the work flow.
12. **A:** Spreadsheet program involves complex calculations and charts, web design involves developing content which can be viewed on the www, database management deals with management of data. Word processing looks at developing text-based documents.
13. **A:** A compiler is a language translator. It translates to low level language, such as machine language. Java is a high-level language. An algorithm has instructions designed to perform a specific task. A debugged program is a program which has been checked for errors.
14. **D:** When you start a computer, the CPU resets itself and it looks for the BIOS (Basic Input Output system) instructions and runs the Power On Self Test. (POST).
15. **C:** The human readable form of a program is referred to as source code. A word size refers to amount of data that a CPU can manipulate at one time. Instruction set refers to the collection of basic machine language commands that the CPU can understand. Cache is a memory used to speed up processing.
16. **A:** The subject line describes the content which is normally included in the message.
17. **B:** Embedded computers are tiny computers embedded into products to perform specific functions or tasks for that product. Robotics refers to the study of robot technology, while mainframe are used to store data.
18. **D:** The right order is character, record, field, file, database
19. **A:** UDB wireless network adapter.
20. **A:** A firewall helps in locking some computers outside from accessing your computer.

SECTION B

21. (a) **A database** is a collection of related data that is stored and organised in a manner that enables information to be retrieved as needed, while a **database management system** (DBMS), also called database software, is the type of program used to create, maintain and organise data in a database, as well as to retrieve information from it.
    (b) Advantages of using a database management system.
    - It is easy to enter and retrieve data in a short period of time.
    - A DBMS is flexible since it can be redesigned, to hold thousands of data.
    - Improved data sharing (DBMS allows many users at the same time).
    - It is easier to update data.

    (c) i) **A validation rule** ensures that only valid data is entered into the field. If data typed into a field does not match or it is out of range of the validation rule, an error will be generated.
    ii) **Validation text** is the error message generated and displayed to the user when a validation rule is violated.

22. (a)i) A database administrator is responsible for setting up and managing large databases within an organisation.
    ii) An ICT instructor trains users about a particular program, system or technology.
    iii) A web master is responsible for all technical aspects of a website.
    iv) A web designer designs and develops websites.
    (b) Arguments for and against ICT.
    Advantages
    - ICT improves communication. It is much faster to move information using ICT.
    - Cost effective. ICT saves costs on communication.
    - Great availability. ICT has made it possible for businesses to be automated giving access to websites.
    - Creation of new jobs.
    - ICT has created educational opportunities.

    Disadvantages
    - ICT has replaced most workers on jobs.
    - ICT has affected privacy issues as people's private information is being exposed.
    - ICT devices have reduced the capability of humans recalling and spelling words as they now rely on technology.

23 (a) **Transmission media** refers to the physical or non-physical link between two or more computers in which a signal can be made to flow from source to destination.
    (b) Two types of transmission media
    - Wired/ guided transmission media.
    - Wireless/ unguided transmission media.

    (c) i) **A hub** transmits all data received to all network devices connected to the hub, regardless of which device the data is being sent to while **a switch** identifies which device connected to the switch is the one the data is intended for and sends the data only to that device, rather than sending data out to all connected devices.
    ii) The different sections of a fiber optic cable.
    - The entire cable is surrounded by strengthening material and covered by a plastic covering.
    - The core of each fiber is a single glass or plastic tube, which is surrounded by a reflective cladding.
    - A protective plastic coating protects each fiber; a cable contains multiple fibers.

    iii) Advantages of using a fiber-optic cable.
    - It is fast and supports high bandwidth.
    - It can be used for long distances because it suffers attenuation.

24. (a) Services offered by the internet.
    - World wide web
    - Electronic mail
    - Chat rooms

    (b)i) Cookie is a small file stored on a user's hard drive by a web server, commonly used to identify personal preferences and settings for that user.
    ii) A webinar is a seminar presented via the Web.
    iii) A wiki is a collaborative webpage that is designed to be edited and republished by a variety of individuals.
    iv) A blog is a webpage that contains short, frequently updated entries in chronological order, typically by just one individual.

25. (a) Stages of a system development life cycle.
    - Planning
    - System analysis
    - System design
    - System development & Implementation
    - System Maintenance

    (b) System analysis in relation to software development.
    System analysis is a phase of the system development life cycle in which the current system and identified problems are thoroughly examined to determine what should be done.
    (c) Roles of a system analyst in a system development cycle.
    - **Planning.** During this phase, the systems analyst studies the problem and suggests solutions.
    - **System analysis.** If management decides that further analysis is warranted, the systems analyst studies the current system and user needs in depth.
    - **System design.** The systems analyst develops a model of the new system.
    - **System implementation**. After system components have been acquired, the systems analyst supervises the process of changing to the new system, converting data, training users and so forth.
    - **System maintenance.** The systems analyst evaluates the system on an ongoing basis to determine any corrections or modifications that should be considered.

26 (a) Programming languages which were used in;
    i) First generation
    - Machine language

    ii) Second generation
    - Assembly language

    (b)i) BIOS – Basic Input Output instruction. This is a sequence of instructions the computer follows during the boot process.
    OR
    A firmware used to perform hardware initialisation during the booting process and provides the runtime services for operating system.
    ii) POST – Power On self-Test. It checks on existing drives, basic input/output devices and communicates in case of a problem.
    OR
    The POST takes an inventory of system components, checks each component to see if it is functioning properly, and initialises system settings, which produces the beeps you may hear as your computer boots.
    (c) Characteristics of modern computers.
    - Accurate
    - Fast at processing instructions.
    - Versatile
    - Diligent
    - Automation
    - Artificial intelligence

SECTION C

27. A school bought the following items: Intel® core ™ i5-7200U CPU @2.7 GHz (4 CPU), 8192 MB of RAM, sound card, speakers, monitor, keyboard, 500 GB hard disk, a floppy disk drive, a CD -R/W drive, mouse,

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modem, printer and a joystick. The software supplied include: windows 10 Pro, a compiler, spreadsheets, graphics, word processor, presentation, Adobe pdf reader, antivirus, and Microsoft Access.

(a) Identify any three devices which shall be used to:

i) Enter data in the computer
- Keyboard, mouse, joystick.

ii) Display data from the computer
- Speakers, monitor, printer.

(b) Given the specifications above, at which speed shall the computer process the information?

2.7GHz x 4 = 10.8GH z

Since the processor has 4 cores @ 2.7 GHz, the speed shall be 10.8 GHz

(c) Some of the students in the school use the computer to do homework. Name the software used to;

i) Do calculations and draw graphs.
- Spreadsheets

ii) Write an essay.
- Word processor

iii) Make a poster.
- Graphics software

(d) Students enjoy playing noisy computer games.

i)Which two hardware items are needed to produce sound?
- Sound card, speakers

ii) Which input device is mostly used for playing games?
- joystick

(e) Specifications you would consider when buying a computer
- The RAM size
- Storage capacity
- Processor speed

28. Using a programming language of your choice, write a program that calculates roots of a quadratic equation ($ax^2 + bx + c = 0$.

```
Using C programming;
#include<stdio.h>
#include<math.h>
main ( )
{
int a, b, c;
float d, root1, root2;
printf(" Enter a of the quadratic equation");
scanf("%d",&a);
printf(" Enter b of the quadratic equation");
scanf("%d",&b);

printf(" Enter c of the quadratic equation");
scanf("%d",&c);
d=b*b-(4*a*c);
root1=(-b+sqrt(d))/(2*a);
root2=(-b-sqrt(d))/(2*a);
printf(" the first root is %f",root1);
printf(" the second root is %f",root2);
return 0;}
```

NOTE: *This program only looks at obtaining two real roots of the quadratic equation.*

29. (a) i) **Backups** can be used to recover/restore/prevent lost data.

ii) **Air conditioners** regulate the temperature in the rooms where computers are kept.

iii) **Uninterruptible power supply (UPS)** supplies power to the computer system when the main source of power is off.

iv) **Firewall** programs block access to a computer from outside computers and enable each user to specify which programs on his or her computer are allowed to have access to the Internet.

v) **Passwords** control access to computer systems/ facilities.

(b) Precautions that you would expect an organisation to take to prevent illegal access to its computer-based systems.
- Enforce data and information access control policies on all employees to control access to data.
- Use file passwords to prevent any person from getting access to the electronic files
- Enforce network security measures, e.g. use of firewalls
- Encrypt the data and information during transmission
- Perform frequent audit trails to identify threats to data and information.
- Lock the doors, (i.e. keep the computers in a strong room, which should remain firmly locked when nobody is using it).
- Avoid welcoming strangers into the computer room
- Use of personal identification cards
- Use of fingerprint identification
- Install security alarms at strategic access points so as to alert the security personnel in case of a break in.
- Use of special voice recorders that would be able to analyse the voice of a trespasser and check against the database containing the voice patterns

COMPUTER STUDIES PAPER TWO QUESTIONS (0COMP008)

SECTION A (40 marks)

This section consists of 2 equally weighted questions
Attempt all the questions

1 (a) WORD PROCESSING

(i) Type the following poem using a word processing software

I remember oh I remember
My 1st mathematics lessons
So scared was I
So hard was it
I remember oh I remember
The quadratic equations therein

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

So scared was I
So hard was it

I remember oh I remember
The symbols were not easy either
∑ ≤ ≥ ¥ ≠
So scared was I
So hard was it.

(ii) Set your work to A5 portrait, Times New Roman, font size 12, and double line spacing

(iii) Indent the second stanza to 1" left and 1" right

(iv) Set the first stanza to drop cap "dropped" and the last stanza to drop cap "in margin"

(v) Insert a different background for each of the stanzas.

(vi) Insert your name as a watermark

(vii) Save your work as your name

(viii) Print your work.

1 (b) SPREADSHEET

The following are S4 end of term results

Name	Chem	Biol	Phy	MTC	Eng	Geog	Hist	Comp
Ekanya	36	40	75	59	40	49	35	60
Ocan	73	65	20	30	30	55	52	80
Asiimwe	50	70	35	45	40	69	55	79
Matovu	60	71	40	80	30	57	44	55
Mbabazi	31	67	59	70	51	30	48	48
Atenyi	45	55	79	58	50	38	60	38
Biira	81	70	40	30	25	62	69	70
Oluka	70	62	50	25	45	61	66	50
Kiplangat	63	60	40	31	38	89	70	45
Kia	50	49	70	42	47	69	80	35

i. Open a spreadsheet software and enter the above information.
ii Insert a heading for the information.
iii. Using a formula calculate the average performance for each of the students.
iv. Rank the students based on the average performance.
v. Due to an error in setting of exams, the teacher for English has decided to adjust the students marks by increasing their performance by 20% each.
vi. Insert a new column after English and name it new mark.
vii. Using absolute cell referencing calculate values in the column new mark.
vii. Calculate the maximun and minimum performance for each subject.
viii. Insert your name as footer.
ix. Set a colour other than white as a background for your work
x. Save your work and print it

SECTION B (60 MARKS)

2. ELECTRONIC PRESENTATION

(i) Prepare a six slide presentation about the administration of your school as follows

Slide 1: title slide
Slide 2: text box that shows the list of student leaders in the school for example head prefects, class prefects, sports prefects etc
Slide 3: table showing the various clubs and sports done in your school
Slide 4: organisational chart showing the hierarchy in your school from the headteacher to the class leaders.
Slide 5: the lyrics of the first stanza of your school anthem with a record of you singing the anthem. (you can as well use the National Anthem)
Slide 6: your concluding remarks and a callout with the words thank you very much.

(ii) Insert your name as a footer

(iii) Vary the animations and transitions in your work.

(iv) Save your work as your name and print your work as handouts.

3. DATABASE MANAGEMENT

The tables below show the attendance record for the staff of one secondary school for Monday and the staff address records respectively

Staff No	Name	Title	Time of arrival	Time of departure
AZ001	Johnson	H/M	8:00am	5:00pm
AZ002	Pascal	Gateman	7:00am	3:00pm
AZ003	Joan	Cook	6:00am	1:00pm
AZ004	Peace	Cleaner	6:00am	1:00pm

Staff No	Telephone number
AZ001	0732123456
AZ002	0732263412
AZ003	0732151218
AZ004	0732184617

(i) Create a database for the school staff

(ii) Design the attendance record and staff address tables using the fields in the tables above.

(iii) Create a relationship between the tables

(iv) Create a tabula form with a red background that and use it to enter data in the tables.

(v) Create a query that returns the number of hours each member of staff spent at school and indicating the staff telephone numbers

(vi) Create labels that can be used by the staff that indicate their name, title and telephone number.

(vii) Create a report that returns the above information.

a. Your report should be portrait
b. The names should be sorted in alphabetical order.
c. The report should have a background other than white with a relevant heading.
d. Insert your name as a footer for the report

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(viii) Print your reports

2. **WEB DESIGNING**

(i) Prepare a website that will be used to spread the information on covid19. Your website should have 5 pages as follows.

Page 1: home page with a heading, moving marquee, relevant text and links to the other pages

Page2: spread of covid; text that shows how covid19 is spread and how it can be prevented.

Page 3 Discussion forum where people can continuously discuss the effects of covid19 in their lives.

Page4: your own video recording as you talk about the effects of the virus on your life. Insert a text explaining how students can effectively use their time during the lockdown.

Page 5: concluding remarks with a provision for the website visitors to contact you.

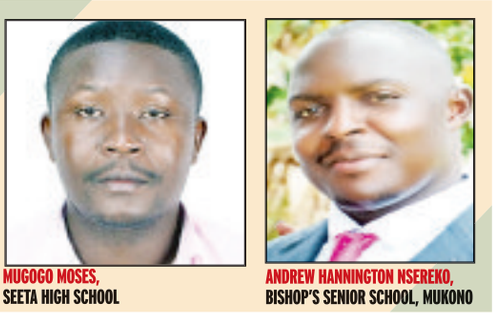
(ii) All pages should be able to link to previous and next page

(iii) Prepare a well-designed and attractive website

(iv) Vary the background for your pages and insert relevant pictures

(v) Save your work as a website and print you work.

CHEMISTRY REVISION ANSWERS (OCHEM007)



MUGOGO MOSES, SEETA HIGH SCHOOL

ANDREW HANNINGTON NSEREKO, BISHOP'S SENIOR SCHOOL, MUKONO

SECTION A

Qn.1. a). It is a technique for separating dissolved chemical substances by taking advantage of their different rates of movement across adsorbent medium.

b). i). glucose and fructose

ii). galactose

c). cannot be used to separate large quantities of mixtures Paper chromatography does not give/reveal quantities of substances present in a mixture

Qn.2. a). Nitrogen is 78.09% in dry air

b). components of air are separated by fractional distillation of liquid air.

Atmospheric air is filtered of pollutants like dust and other suspended particles then compressed and heated to drive out vapour/water. The compressed air is cooled, carbon dioxide freezes earlier at -78.5oC so it is obtained as dry ice. The rest of air is slowly heated to separated nitrogen at -195.8 °C. The residual liquid is largely oxygen which can be vaporised at −183 °C.

c). It is used to manufacture fertilisers, nitric acid, nylon, dyes and explosive

Qn.3.

a. i). C

ii). D

iii). B.

b). i). Diatomic molecules are molecules made of two atoms chemically bonded together.

ii). This arrangement allows two chlorine atoms to share their outermost orbit electrons, achieving stability, compared to the single atom.

Qn.4. a)

●. The number of energy level in the electronic configuration of an element is represented in the periodic table as the period number the element located.

●. The number of electrons in the outermost shell/ valence shell of an element is represented in the periodic table as the group number that element is situated in.

●. The number of electrons in all shells of an element is represented in the periodic table as the element's atomic number

b). Al^{3+}

c). Aluminium reacts with oxygen to form aluminium oxide.

i). $Al(s) + O_2(g) \xrightarrow{4.48}{16} Al_2O_3(s)$

ii). $Al(s) + 3^{-}OH(aq) \longrightarrow Al(OH)3(s)$

Qn5. a). i). A Normal salt is formed when all the hydrogen ions (H^+) of an acid, have been replaced by metal ions or by the ammonium ions (NH_4^+) for example sodium chloride while an acidic salt is a salt is formed when part of the hydrogen ions (H^+) of an acid, are replaced by metal ions or by the ammonium ions (NH_4^+) for example sodium chloride. For example sodium hydrogen carbonate.

ii). Amphoteric oxides are those that react with acid as well as basic substances. For example aluminium oxide while neutral oxides are those that neither acidic nor basic rather they have no reactivity with acidic or basic substances for example carbon monoxide.

b). Pour 50cm³ dilute hydrochloric acid into a test tube. Add a small amount of magnesium ribbon to the acid. Fizzing is seen and the magnesium disappears. Continue adding acid and stir with a spatula until some magnesium remains. Filter off the residue of magnesium. Pour off the magnesium chloride solution into an evaporating basin. Heat the evaporating basin until all the water has evaporated. Leave until crystals form. Then pat the crystals dry with blotting paper.

Qn.6. a). (i)

C	H	O
1.68	0.14	4.48
$\frac{1.68}{12}$	$\frac{0.14}{1}$	$\frac{4.48}{16}$
0.14	0.14	0.28
$\frac{0.14}{0.14}$	$\frac{0.14}{0.14}$	$\frac{0.150}{1000}$
1	1	2

The empirical formula of U is CHO2

(ii). 1000cm3 of solution contains 0.150 moles of KOH

1cm3 of solution contains $\frac{0.0001905}{0.086}$ moles of KOH

12.7cm3 of solution contains $\frac{0.150 \times 12.7}{1000}$ of KOH

0.001905 moles of KOH

from moles ratio, 1:2, moles of U = 0.001905x ½ moles

0.086g of sample U contain 0.00381 moles

1g of U contains $\frac{0.0009525}{0.086}$ = 0.011

Qn. 7. $2SO2(g) + O2(g) \rightleftharpoons 2SO3(g)$ H = −197 kJ/mol

a). Vanadium penta oxide

b). i). increasing temperature will lead to formation of more sulphur trioxide however so equilibrium shifts to the right, however beyond 450°C, equilibrium shifts to the left.

ii). If the pressure of the system is increased, this favours the reaction which produces fewer molecules that is the forward reaction.

Qn. 8. a). Haematite

b). carbon monoxide

c). i). molten slag

ii). molten iron

d). $Fe_2CO_3(s) + 3CO(g) \longrightarrow Fe(l) + 3CO_2(g)$

Qn.9. a). The standard enthalpy change of combustion of a compound is the enthalpy change which occurs when one mole of the compound is burned completely in oxygen under standard conditions, and with everything in its standard state.

b). i). MC

(200×1) × 4.2 × (70 − 22)

200 × 4.2 × 48 = 403.20 KJ.

Rfm of Butane (C_4H_{10}) is 58;

1g of butane when burnt yielded 403.20KJ of heat 58g in 1 mole yielded

$\frac{403.20 \times 58}{1}$ = **23,385.6KJ/mol**

Qn.10. a). i). concentrated hydrochloric acid.

ii). concentrated sulphuric acid

b). $MnO_2(s) + 4HCl(aq) \quad MnCl_2(aq) + 2H_2O(l) + Cl_2(g)$

c). i). Downward delivery or upward displacement of air.

ii). It is denser than air.

CHEMISTRY REVISION QUESTIONS (OCHEM008)

SECTION B:

11. 1g of magnesium ribbon was reacted with hydrochloric acid at room temperature in order to investigate how the rate of reaction varies with time. The results obtained were recorded as shown below.

Time(seconds)	0	20	40	60	80	100	120	140	160	180
Volume of gas produced(cm^3)	0	10	20	26	32	35	38	39	40	40

a). i). Briefly explain why magnesium ribbon is normally cleaned with sand paper before being put into the acid.

ii). Write a chemical equation for this reaction

b). i). plot a graph of volume of gas produced against the time taken. Label the graph C.

ii). From your graph determine the rate of production of the gas at 110 seconds.

c). On the same axis sketch the graph you would expect to obtain if:

i). The same mass of powdered magnesium was used instead of magnesium ribbon. Label the graph A.

ii). If the temperature of the solution mixture was reduced from 25.0°C to 15.0°C. Label the graph B.

d). Determine the mass of magnesium ribbon that remained unreacted in this experiment.[Mg=24, Molar gas volume=24.0dm³ at s.t.p]

12. a). Explain the following observations:

i). The colour of aqueous copper (II) sulphate fades when a piece of magnesium metal is dropped into the solution.

ii). A piece of iron bar is coated with a brown substance when left in the open on a rainy day.

b). A sample of water is suspected to contain aluminium ions (Al3+). Describe a laboratory experiment that can be carried out to show that Al^{3+} ions are present in the water sample.

c). In an experiment to determine the number of moles of water of crystallisation of a hydrated compound $Na_2SO_4.XH_2O$, 5g of the compound were heated strongly to a constant mass.

i). Explain how a constant mass was obtained.

ii). During the experiment, the mass of the residue was found to be 2.205 g. Determine the number of moles of water of crystallisation in the compound. (Na = 23.0 ; O = 16.0 ; S = 32.0 ; H = 1.0)

13. a). What is meant by a molar heat of neutralisation?

b). In an experiment to determine the molar heat of neutralisation, 50 cm³ of IM hydrochloric acid was neutralised by adding 10 cm3 solution of dilute sodium hydroxide. (**OCHEM008 continues on page XX**)

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1. $3x^2-7x+4=0$
   Using factorisation method
   $3x^2-3x-4x+4=0$
   $3x(x-3)-4(x-3)=0$
   $(3x-4)(x-3) = 0$
   $3x-4=0$ or $x-3=0$
   $x=^4/_3$ or $x = 3$

2. Det A = $(^-3\times5) - (^-1\times7)$
   $= ^-15+7$
   $= ^-8$

$$A^{-1} = \frac{1}{-8}\begin{pmatrix} 5 & -7 \\ 1 & -3 \end{pmatrix}$$

$$= \begin{pmatrix} \frac{-5}{8} & \frac{7}{8} \\ \frac{-1}{8} & \frac{3}{8} \end{pmatrix}$$

3. $(^-12)^2 + (^-5)^2 = r^2$
   $r^2 = 169$
   $r = 13$

$$\sin\theta = \frac{-5}{13}$$

$$\cos\theta = \frac{-12}{13}$$

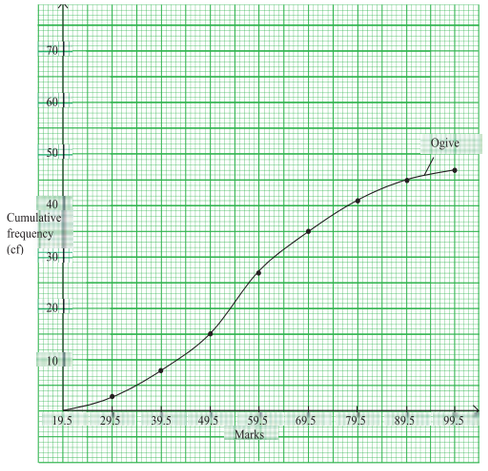
4. Re-arranging the equation gives
   $5x-4y= 17$ ..... (i)
   $3x + 4y = 23$ …….. (ii)
   Using elimination method
   Equation (i)+(ii)

$$\frac{8x}{8} = \frac{40}{8}$$

$x = 5$
Substituting $x=5$ in equation (i) gives
$(5\times5)-4y=17$
$4y =8$
$y=2$

5.

Cumulative frequency	Class boundaries
3	19.5 – 29.5
8	29.5 – 39.5
15	39.5 – 49.5
27	49.5 – 59.5
35	59.5 – 69.5
41	69.5 – 79.5
45	79.5 – 89.5
47	89.5 – 99.5



6. z = (35× 2) (Angles subtended at the centre of the circle is the angle at the circumference)
   z = 70
   y = x
   x + y + z
   x + x + 70 = 180
   2x = 110
   x = 55 and y = 55

IVAN GIMEI,
ST MARY'S COLLEGE, KISUBI

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

MATHEMATICS SOLUTIONS

7. i). $\left(\sqrt{3}x\right)^3 - (2)^2$ = (a difference of two squares)

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

   ii). $5h^2+5h-8h-8$
   $= 5h(h + 1) - 8(h + 1)$
   $= (5h - 8)(h + 1)$

8. multiplying by 2a both sides

$$2ax = -b \pm \sqrt{b^2 - 4ac}$$

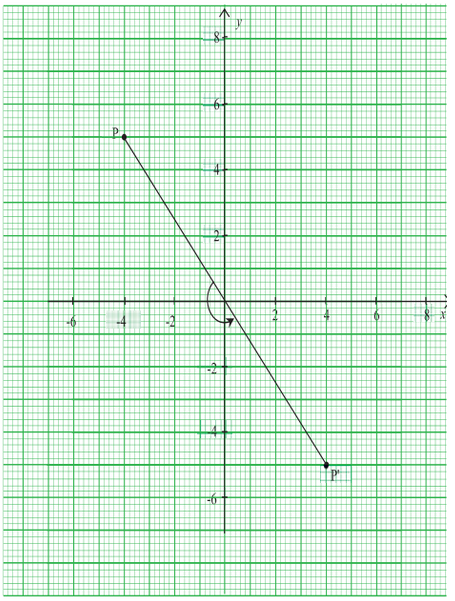
$$\pm\sqrt{b^2 - 4ac} = 2ax + b$$

Squaring both sides gives
$b^2-4ac=(2ax + b)^2$
$4ac = b^2-(2ax+ b)^2$
Dividing by 4a gives

$$c = \frac{b^2 - (2ax+b)^2}{4a}$$

9. i). $2^*2=2-(2^2x2)+2x2$
   $= 2-8+4$
   $= ^-2$
   ii). $3^*m=3-3m^2+3m$
   $3=3-3m^2+3m$
   $3m^2-3m=3-3$
   $3m(m-1)=0$
   $3m=0$ or $m-1= 0$
   $m=0$ or $m=1$

10.

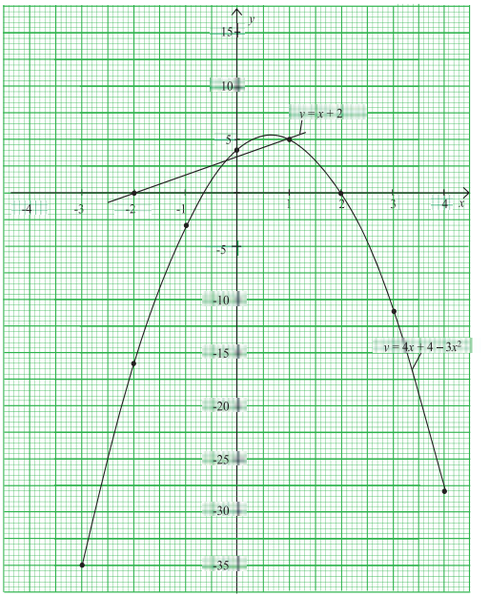


New position of P is $P^1(4, -5)$

11. a.

x	-3	-2	-1	0	1	2	3	4
$4x$	-12	-8	-4	0	4	8	12	16
4	4	4	4	4	4	4	4	4
$-3x^2$	-27	-12	-3	0	-3	-12	-27	-48
y	-35	-16	-3	4	5	0	-11	-28

b)



c) i). x = 0.7or x=2
   ii). $y=4x+4-3x2$
   Equation (i) – Equation (ii)
   gives y = x + 2.
   Points to plot (0, 2) and (-2, 0)
   From the graph x = 1.4 and x = 0.4

12. a).

Marks	Tally	Frequency (f)	Mid	fx	Cumulative frequency	Class boundaries
30 – 39	////	5	34.5	172.5	5	29.5 – 39.5
40 – 49	//// ///	8	44.5	356	13	39.5 – 49.5
50 – 59	//// //// /	11	55.5	599.5	24	49.5 – 59.5
60 – 69	//// //// //	12	64.5	774	36	59.5 – 69.5
70 – 79	//// //// ////	15	74.5	1117.5	51	69.5 – 79.5
80 – 89	///	3	84.5	253.5	54	79.5 – 89.5
90 - 99	//	2	94.5	189	56	89.5 – 99.5
		$\sum f = 56$		$\sum fx = 3462$		

a). i) Mean = $\frac{\sum fx}{\sum f}$

$=\frac{3462}{56}$
$=61.8214$
$=61.82\%$ (two decimal places)

ii). Median = $L_i + \left(\frac{\frac{N}{2} - cfb}{fm}\right)i$

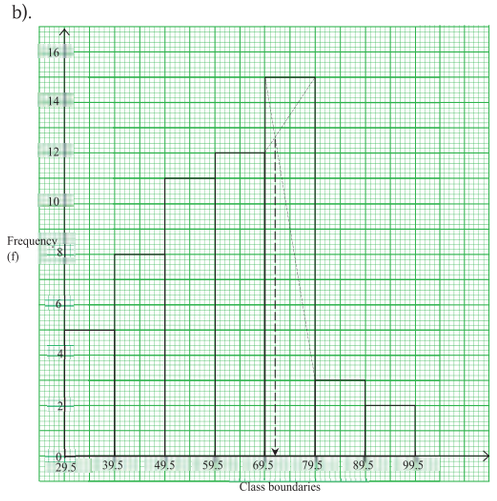
$$= 59.5 + \frac{(28-24)10}{12}$$

$= 62.8333$
$= 62.83\%$
(two decimal places)

Continues on page 52

Continued from page 51

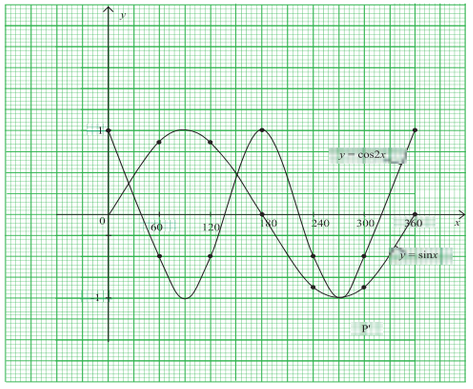
b).



Modal mark = 71.5

13. a).

x	0	60	120	180	240	300	360
$2x$	0	120	240	360	480	600	720
$y = \sin x$	0	0.87	0.87	0	-0.87	-0.87	0
$y = cos2x$	1	-0.5	-0.5	1	-0.5	-0.5	1



b) (30°, 0.5) (150°, 0.5) and (270°, -1)

14. a). Re-arranging the equations

$5x - 3y = 10$

$2x + y = 4$

$$\begin{pmatrix} 5 & -3 \\ 2 & 1 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 10 \\ 4 \end{pmatrix}$$

$$\frac{1}{11}\begin{pmatrix} 1 & 3 \\ -2 & 5 \end{pmatrix}\begin{pmatrix} 5 & -3 \\ 2 & 1 \end{pmatrix} = \frac{1}{11}\begin{pmatrix} 1 & 3 \\ -2 & 5 \end{pmatrix}\begin{pmatrix} 10 \\ 4 \end{pmatrix}$$

$$\frac{1}{11}\begin{pmatrix} 11 & 0 \\ 0 & 11 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{11}\begin{pmatrix} 22 \\ 0 \end{pmatrix}$$

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

$x = 2$ and $y = 0$

b). (i). $\begin{pmatrix} 5 & 3 & 8 & 2 \\ 2 & 0 & 3 & 1 \\ 4 & 0 & 5 & 2 \\ 5 & 3 & 3 & 3 \end{pmatrix}$ is a 4×4 matrix

(ii). Cost matrix = $\begin{pmatrix} 300,000 \\ 150,000 \\ 100,000 \\ 185,000 \end{pmatrix}$

(iii). $\begin{pmatrix} 5 & 3 & 8 & 2 \\ 2 & 0 & 3 & 1 \\ 4 & 0 & 5 & 2 \\ 5 & 3 & 3 & 3 \end{pmatrix}\begin{pmatrix} 300,000 \\ 150,000 \\ 100,000 \\ 185,000 \end{pmatrix} = \begin{pmatrix} 3,120,000 \\ 1,085,000 \\ 2,070,000 \\ 2,805,000 \end{pmatrix}$

For market A she spent sh3,120,000
For market B she spent sh1,085,000
For market C she spent sh2,070,000
For market D she spent sh2,805,000
Cost price for all the produce = (3,120,000 + 1,085,000 + 2,070,000 + 2,805,000)
= sh9,080,000

(iv). $\begin{pmatrix} 5 & 3 & 8 & 2 \\ 2 & 0 & 3 & 1 \\ 4 & 0 & 5 & 2 \\ 5 & 3 & 3 & 3 \end{pmatrix}\begin{pmatrix} 350,000 \\ 180,000 \\ 145,000 \\ 200,000 \end{pmatrix} = \begin{pmatrix} 3,850,000 \\ 1,850,000 \\ 2,525,000 \\ 3,325,000 \end{pmatrix}$

= (3,850,000 + 1,535,000 + 2,525,000 + 3,325,000)
= sh11,235,000
Profit = Selling price – Cost price
= (11,235,000 – 9,080,000)
sh 2,155,000

15. a). By calculation

using $\begin{pmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{pmatrix}$

Matrix of rotation through 180 about the origin

$$\begin{pmatrix} \cos 180 & -\sin 180 \\ \sin 180 & \cos 180 \end{pmatrix}$$

$$\begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$$

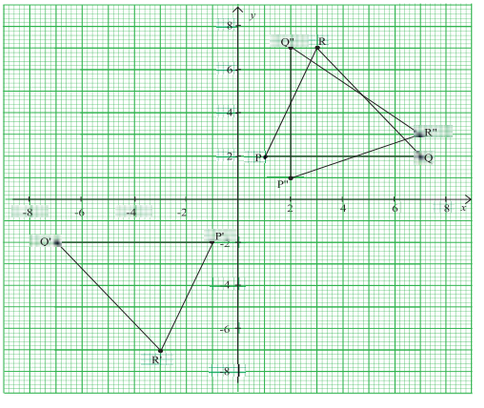
$$\begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}\begin{pmatrix} P & Q & R \\ 1 & 7 & 3 \\ 2 & 2 & 7 \end{pmatrix}\begin{pmatrix} P^1 & Q^1 & R^1 \\ -1 & -7 & -3 \\ -2 & -2 & -7 \end{pmatrix}$$

Matrix of reflection in the line y = x

$$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$$

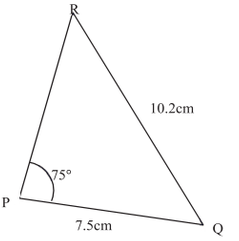
By matrix multiplication

$$\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}\begin{pmatrix} P^1 & Q^1 & R^1 \\ -1 & -7 & -3 \\ -2 & -2 & -7 \end{pmatrix} = \begin{pmatrix} P^{11} & Q^{11} & R^{11} \\ 2 & 2 & 7 \\ 1 & 7 & 3 \end{pmatrix}$$

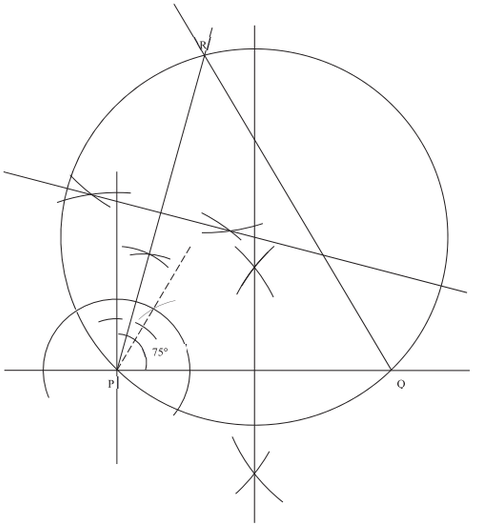


16. aaf1

Sketch



Accurate diagram PQ=7.5cm and OR=10.2cm



a). ii). Angle PQR = 60°

b). ii). Radius of the circle = 5.3cm

iii). Area of the circle

$A = \pi r^2$

$= 3.14 \times (5.3)^2$

$= 88.25878$

$= 88.2588 cm^2$

17. Let x represent bus and y represent mini bus

$500,000x + 300,000y \leq 3,000,000$

$5x + 3y \leq 30$ …… (i)

$65x + 18y \geq 220$ … ……. (ii)

$x \leq y$ ……. (iii)

$x > 0$ …….. (iv)

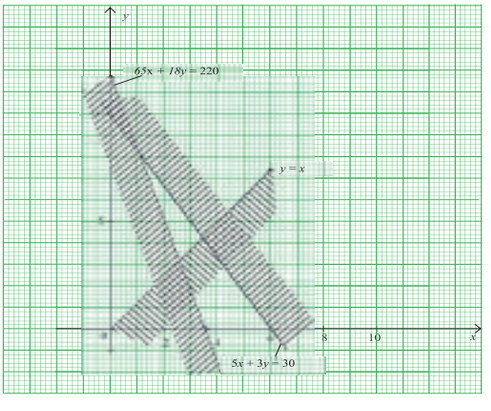
$y > 0$ …… (v)

Points to plot

For equation (i) 5x + 3y = 30 (0, 10) and (6, 0)

For equation (ii) 65x + 18y = 220 (0, 12.2) and (3.4, 0)

For equation (iii) x = y (0, 0) (3, 3) (4, 4) and (5, 5)



Number of trips made by the bus are 3 and those made by mini bus are 5

Turn to page 53

MATHEMATICS QUESTIONS OM007

1. Simplify: $\dfrac{1\frac{1}{2}-\left(8\frac{1}{3}\div 2\frac{1}{4}\right)}{1\frac{1}{5}\ \text{of}\ \left(1\frac{1}{4}+1\frac{2}{3}\right)}$

2. Given that: P = {Triangular numbers between 8 and 40} Q = {Square numbers between 8 and 40}
Find:
   i. PnQ
   ii. n(PnQ

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. A box has length 5cm and volume of 40cm3. A similar box is to be made with a volume of 1080cm3.
Calculate its length.

5. Given that $f(p)=3p^2-15$ and $g(p)=\dfrac{1}{p+3}$

Find;
(a). $gf(p)$
(b). the value of p for which $gf(p)$ is meaningless.

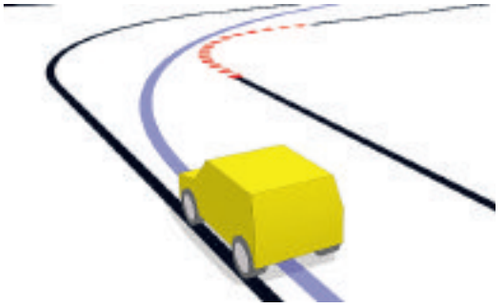
6. An article is sold at UGX3000 and a seller makes a profit of 25%. How many articles must the seller sell in order to make a profit of Shs.10,800?

7. Express: $\left(\dfrac{3}{3\sqrt{2}-2\sqrt{5}}\right)-\left(\dfrac{1}{3\sqrt{2}+2\sqrt{5}}\right)$ in the form

$a\sqrt{2}+b\sqrt{5}$

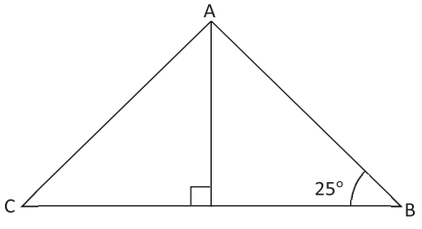
State the values of a and b.

8. The total sideways force (F) experienced by a given car rounding a circular bend varies as the square of the speed of the car and inversely as the radius of the circle. A certain car goes round a bend of radius 50m at 20 ms^{-1} and experiences a total sideways force (F) of 12000N. What sideways force will it experience while going round a bend of radius 30m at 15 ms^{-1}



9. In the triangle ABC below, AT is perpendicular to BC,

angle **ABT=25°**. AT=TC and AC= 10cm Find the length of **AB** .



10. Arono cycles from P to Q at an average speed of 16kmh^{-1}.She cycles back at 12kmh^{-1}. What is his average speed for the whole journey in ms^{-1}?

SECTION B

11. (a) Given that line M passes through the points (1,0) and (-1, 4).
Find ;
   i. Equation of line M.
   ii. Equation of line N which is a perpendicular bisector of line M above.
   iii. The points at which line N cuts the x - axis
(b). The points A, B, and C have coordinates (2,1), (7,4) and (4,*y*) respectively. If AB and BC are of equal length, find the possible values of *y*.

12. A total of **100** vehicles were inspected and **52** vehicles passed the road worthy test. The rest of the vehicles (reminder) had faults in: Brakes (**B**), Lights (**L**) and steering (**S**) as follows;-
n(BnS'nL') = n(BnL) = n(SnL'nB') = 2n(BnS) = 2n(LnB'nS') = 4n(SnLnB') = 4n(BnLnS)
(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.

13. Denis and Edmond are to travel on a bicycle and motor cycle respectively. When Denis is 21km away from town A and riding at steady speed of 12kmh^{-1} towards B, Edmond sets off for town A on his motorcycle at a steady speed of 36 kmh^{-1} from town B.

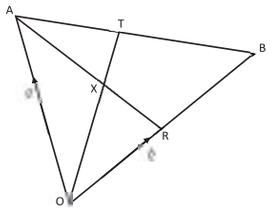
Edmond is expected to ride for $3^1/_4$ hours to reach town A.
Calculate;
a). The distance between town A and B.
b). Find when and where Edmond and Denis met.
c). The extra time Denis remains in motion when Edmond has reached town.

14. Members in an organisation formed a loan scheme in which the interest rate on a loan is 4% per month declining balance (interest calculated on the unpaid balance). Maria got a loan of sh1.6million on November 2, 2013.
She was able to pay back sh300,000 by the second of each following month.
(a). What is the unpaid balance by February 3, 2014?
(b). If on March 2, 2014, she cleared the loan and its interests.
How much does she pay?
(c). How much interest has she paid for the loan?

15. (a). The ages of Irene and Rita are in the ratio of **15:8** respectively. In 10 years, the ratio of Irene's age to
Rita's age will be **5:3**.

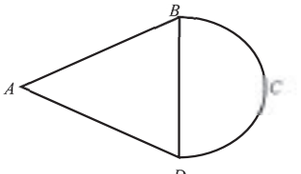
Find;-
i. The present ages of Irene and Rita.
ii. If "**t**" years ago Irene was **five** times as old as Rita, find the value of **t**.
(b). Six men can cultivate an area of **280m²** in 2 hours. What area would **five** men cultivate in 3 hours working at the same rate?

16. The figure below shows a triangle **OAB** in which point R is the mid-point of **OB**.
Given that: OA = **a** ; OB = **b** ; AT : TB = 1 : 2.
(a). Find in terms of a and b, the vectors;
   i. AB
   ii. AT
   iii. OT
   iv. AR



(b). Given that $\overrightarrow{AX}=\overrightarrow{kAR}$ and $\overrightarrow{OX}=\overrightarrow{LOT}$; Find $\overrightarrow{OX}$ in terms of:
   i). **a**, **b** and **k**.
   ii). **a**, **b** and **L**. hence find the values of **k** and **L**.

17. The figure below shows a horizontal section of a pond, ABD is an equilateral triangle of 8 meters and BCD is a semi-circle.



The sides of the pond are vertical and the water is 6m deep.
Calculate;
   (i). The area of the sides in contact with water.

CHEMISTRY REVISION QUESTIONS (OCHEM008) CONTINUES...

During the experiment, the data in the table below was obtained.

Volume of sodium hydroxide (cm^3)	0	10	20	30	40	50	60
Temperature of mixture (°C)	25.0	27.0	29.0	31.0	31.0	30.0	29.0

i). Write the equation for the reaction in this experiment.
ii). Plot a graph of temperature against volume of sodium hydroxide added.
c). Determine from the graph the:
i). Volume of sodium hydroxide which completely neutralises 50cm^3 of lM hydrochloric acid.
ii). Change in temperature, T, when complete neutralisation occurred.
d). Calculate:
i). The heat change, H when complete neutralisation occurred. (Specific heat capacity = 4.2 Jg^{-1} K^{-1} density of solution 1.0 gcm^{-3})
ii). How would the value of molar heat differ if 50cm^3 of lM ethanoic acid was used instead of lM hydrochloric acid?
Give a reason.

14. Copper pyrites is an ore containing compounds of copper.
a). i). What is an ore?
ii). Name any other ore of copper
b). CuFeS2 is heated in air.
Write chemical equations for the reaction.
c). Copper (II) oxide can be reduced by heating with carbon.
Write an equation for this reaction.
d). Copper made by this reduction is impure.
Impure copper can be purified using electrolysis.
i). Name the electrolyte used.
ii). Write the equations for the reactions at both electrodes.
e). State two uses of copper metal.