HOME SCHOOLING MATERIAL

PASS O’ LEVEL

Mathematics, chemistry, ICT
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 best to 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 law.

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: 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.

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 processor refers to a word processing system 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 data processing. An instruction set is a set of instructions used to control the operations of the processor. It is a subset of the instruction set that is available to the programmer.

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, which mainframe are used in the field of manufacturing.

18. D: The right order is character, record, field, file, database


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.

(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) A database administrator is responsible for setting up and managing large databases within an organisation.

(b) Arguments for and against using IT.

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.

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24. (a) Services offered by the internet.

- World wide web
- Electronic mail
- Chat rooms

(b) Computer 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.

25. (a) Stages of a system development life cycle.

- Planning
- Analysis
- Design
- Implementation
- 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 current system and identifies problems that require further investigation.
- System analysis. If management decides that further analysis is warranted, the systems analyst studies the current system and identifies problems that require further investigation.
- 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.

- Machine language
- Assembler language
- High level language

(b) BIOS – Basic Input Output instruction. This is a sequence of instructions the computer follows during the boot process.

27. A school bought the following items: Intel® core ™ i5 (15th Gen), 6 cores CPU (62.7 GHz (4 CPU), 8192 MB of RAM, sound card, speakers, monitor, keyboard, 590 GB hard disk, a floppy disk drive, a CD-R/RW drive, mouse,
From page 32

mode, 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?
      - 2.7 GHz x 4 = 10.8 GHz

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 postcard, speakers
      - Graphics software
   (d) Students enjoy playing noisy computer games.
      i) Which two hardware items are needed to produce sound?
         - Speaker, microphone
      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

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:

```c
#include<stdio.h>
#include<math.h>
main()
{
    float a, b, c;
    float root1, root2;
    printf("Enter a of the quadratic equation\n");
    scanf("%f", &a);
    printf("Enter b of the quadratic equation\n");
    scanf("%f", &b);
    printf("Enter c of the quadratic equation\n");
    scanf("%f", &c);
    d = b*b - 4*a*c;
    root1 = (-b + sqrt(d)) / (2*a);
    root2 = (-b - sqrt(d)) / (2*a);
    printf("The first root is \%.2f\n", root1);
    printf("The second root is \%.2f\n", root2);
}
```

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

29. (a) (i) Backup can be used to recover/restore/prevent lost data
   (ii) Air conditioners regulate the temperature in the rooms where computers are kept.
   (iii) Uninterruptable 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 organization 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 computer in a strong room, which should remain firmly locked when not in use.
- Avoid welcome 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 noise of a trespasser and check against the database containing the voice patterns.

**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 symbols were not easy either
   $y \leq x \neq z$
   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.

2. (b) SPREADSHEET

The following are 34 end of term results

<table>
<thead>
<tr>
<th>Name</th>
<th>Ekwan</th>
<th>Ikpe</th>
<th>Atimowo</th>
<th>Morogo</th>
<th>Mishazi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1</td>
<td>56</td>
<td>78</td>
<td>79</td>
<td>56</td>
<td>60</td>
</tr>
<tr>
<td>Grade 2</td>
<td>56</td>
<td>60</td>
<td>56</td>
<td>56</td>
<td>60</td>
</tr>
<tr>
<td>Grade 3</td>
<td>56</td>
<td>60</td>
<td>56</td>
<td>56</td>
<td>60</td>
</tr>
<tr>
<td>Grade 4</td>
<td>56</td>
<td>60</td>
<td>56</td>
<td>56</td>
<td>60</td>
</tr>
<tr>
<td>Grade 5</td>
<td>56</td>
<td>60</td>
<td>56</td>
<td>56</td>
<td>60</td>
</tr>
<tr>
<td>Grade 6</td>
<td>56</td>
<td>60</td>
<td>56</td>
<td>56</td>
<td>60</td>
</tr>
<tr>
<td>Grade 7</td>
<td>56</td>
<td>60</td>
<td>56</td>
<td>56</td>
<td>60</td>
</tr>
<tr>
<td>Grade 8</td>
<td>56</td>
<td>60</td>
<td>56</td>
<td>56</td>
<td>60</td>
</tr>
</tbody>
</table>

(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 the 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 the average in the column new mark.

(viii) Calculate the maximum and minimum performance for each subject.

(x) Insert your name as a footer.

(x) 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: A slide 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 thankyou very much.

Off.

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.

<table>
<thead>
<tr>
<th>Staff</th>
<th>Name</th>
<th>Title</th>
<th>Time of entry</th>
<th>Time of departure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Off</td>
<td></td>
<td>8:00 Am</td>
<td>5:00 Pm</td>
</tr>
<tr>
<td>2</td>
<td>Office</td>
<td></td>
<td>8:00 Am</td>
<td>5:00 Pm</td>
</tr>
<tr>
<td>3</td>
<td>English</td>
<td></td>
<td>8:00 Am</td>
<td>5:00 Pm</td>
</tr>
</tbody>
</table>

Staff Name

Staff Name telephone number

(i) Create a database for the staff records.

(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.

**Continues on page 50**
CHEMISTRY REVISION ANSWERS (OChem007)

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 separated by paper chromatography because they give the same spot on paper.

Qn. 2. a) Nitrogen is 78.09% in dry air.
b) components of air are separated by fractional distillation of liquid air.
   c) Air is filtered of pollutants like dust and other suspended particles, then the air is passed through the liquid to separate the components.
   d) Atmospheric air is filtered of pollutants like dust and other suspended particles, then the air is passed through the liquid to separate the components.
   e) The residual liquid is largely oxygen which can be vaporised.

Qn. 3.
   a. C
   b. B
   c. B
   d. Diatomic molecules are molecules made of two atoms chemically bonded together.
   e. This arrangement allows two chlorine atoms to share their outermost orbit electrons, achieving stability, compared to the single atom.

Qn. 4. a)
   i. The number of energy level in the electronic configuration of an element is represented in the periodic table as the number of the element.
   ii. The number of the outermost shell of an element is represented in the periodic table as the group number that element is positioned in.
   iii. The number of electrons in all shells of an element is represented in the periodic table as the number of the element’s atomic number.

Qn. 5. a) i. Sodium chloride is formed when the acid reacts with the metal ions to form sodium ions.
   ii. Aluminum reacts with oxygen to form aluminum oxide.
   c) Al(s) + O2(g) → Al2O3(s)

Qn. 6.
   a) 1.68 0.14 4.48
   b) 1.68 0.14 4.48
   c) 12 15 15
   d) 0.14 0.14 0.28
   e) 0.14 0.14 0.150
   f) 0.14 0.14 1000
   g) The empirical formula of U is CH2O2
   h) 1000×3 solution contains 0.150 moles of KOH
   i) 1.0 M of KOH 0.01795 moles of KOH
   j) 0.086 of sample U contain 0.00381 moles
   k) 1g of U contains 0.00952 25SO2(g) + O2(g) → 25SO3(g) 11 = 1.97 25 SO2 + O2 = SO3
   l) 25SO3 = 0.011 25SO2 + O2 = 0.11
   m) 0.086 = 0.011
   n) Vansadum peroxide oxide

Qn. 7.
   a) Haematite
   b) Carbonate
   c) Molten slag
   d) MgO(g) + O2(g) → Mgo(l) + 3CO(g)
   e) 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.

Qn. 8.
   a) 12 15 15
   b) 0.14 0.14 0.28
   c) 0.14 0.14 0.150
   d) 0.14 0.14 1000
   e) The empirical formula of U is CH2O2
   f) 1000×3 solution contains 0.150 moles of KOH
   g) 0.01795 moles of KOH
   h) 0.086 of sample U contain 0.00381 moles
   i) 1g of U contains 0.00952
   j) Vansadum peroxide oxide
   k) 25SO3 = 0.011
   l) 25SO2 + O2 = 0.11
   m) 0.086 = 0.011
   n) Vansadum peroxide oxide

Qn. 9.
   a) MgO(g) + O2(g) → Mgo(l) + 3CO(g)
   b) 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.
   c) 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.

Qn. 10.
   a) i. Concentrated hydrochloric acid
   b) i. Concentrated sulphuric acid
   c) Downward delivery or upward displacement of air.
   d) It is denser than air.

CheMistry REVIsIon QUEStIONS (CheM008)

SECTION B

Qn. 11.
   a) 1g of magnesium ribbon was heated 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:
   b) i. MC
      (200 × 1) × 4.2 x (70 – 22) 200 × 4.2 × 48 = 403.20 KJ.
      Rn of Butane (C4H10) is 58.
      1g of butane when burnt yields 403.20 KJ of heat 58g in 1 mole yields
      403.20 × 58 = 3,850 KJ/mol

Qn. 12.
   a) Briefly explain why magnesium ribbon is normally cleaned with sandpaper before being put into the acid.
   b) Write a chemical equation for this reaction.
   c) Plot a graph of volume of gas produced against the time taken. Label the graph C.
   d) From your graph determine the rate of production of the gas at 15.0 seconds.
   e) 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°C to 15°C. Label the graph B.
      iii. Determine the mass of magnesium ribbon that remained unreacted in this experiment. [Mg = 24, Molar gas volume = 24.0 1/Mol]

Qn. 13.
   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 wire is coated with a brown substance when left in an open air in a rainy day.
      b) A sample of water is suspected to contain aluminium ions (Al^3+). 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 Na2SO4 ∙ xH2O. 5g of the compound were heated strongly to a constant mass.
      d) Explain how a constant mass was obtained.
      e) 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).
      f) What is meant by a molar heat of neutralisation?
      g) In an experiment to determine the molar heat of neutralisation, 50 cm^3 of 1M hydrochloric acid was neutralised by adding 10 cm^3 solution of sodium hydroxide. (OChem008 continues on page 22).
Continued from page 35

1. \(3x^2 - 7x + 4 = 0\)
   Using factorisation method
   \(3x^2 - 3x - 4x + 4 = 0\)
   \(3x(x - 1) - 4(x - 1) = 0\)
   \((3x - 4)(x - 1) = 0\)
   \(3x - 4 = 0\) or \(x - 1 = 0\)
   \(x = \frac{4}{3}\) or \(x = 1\)

2. \(\text{Det } A = (3 \times 5) - (1 \times 7)\)
   \(= 15 - 7\)
   \(= 8\)

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

4. \(\sin \theta = \frac{5}{13}\)
   \(\cos \theta = \frac{12}{13}\)

5. Re-arranging the equation gives
   \(5x - 4y = 17\) \(\ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldot
Continued from page 51

b).

Modal mark = 71.5

<table>
<thead>
<tr>
<th>x</th>
<th>0</th>
<th>50</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
<th>450</th>
<th>500</th>
</tr>
</thead>
<tbody>
<tr>
<td>2x</td>
<td>0</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>y = sin x</td>
<td>0</td>
<td>0.87</td>
<td>0.87</td>
<td>0</td>
<td>0.87</td>
<td>0.87</td>
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<td>0.87</td>
</tr>
<tr>
<td>y = cos x</td>
<td>1</td>
<td>-0.5</td>
<td>-0.5</td>
<td>1</td>
<td>-0.5</td>
<td>-0.5</td>
<td>1</td>
<td>-0.5</td>
<td>-0.5</td>
<td>1</td>
<td>-0.5</td>
</tr>
</tbody>
</table>

\[
\begin{align*}
\text{(ii). Cost matrix} = & \begin{pmatrix}
300,000 & 150,000 & 100,000 & 185,000 \\
1,120,000 & 1,085,000 & 2,070,000 & 2,805,000
\end{pmatrix} \\
\text{(iii).} & \begin{pmatrix}
5 & 3 & 8 & 2 \\
2 & 0 & 3 & 1 \\
4 & 0 & 5 & 2 \\
5 & 3 & 3 & 3
\end{pmatrix} \\
\text{For market A she spent sh132,000} & \\
\text{For market B she spent sh108,000} & \\
\text{For market C she spent sh219,000} & \\
\text{For market D she spent sh2,505,000} & \\
\text{Cost price for all the produce} & (3,120,000 + 1,085,000 + 2,070,000 + 2,805,000) & \text{= sh9,080,000}
\end{align*}
\]

\[
\begin{align*}
\text{(iv).} & \begin{pmatrix}
5 & 3 & 8 & 2 \\
2 & 0 & 3 & 1 \\
4 & 0 & 5 & 2 \\
5 & 3 & 3 & 3
\end{pmatrix} \\
\begin{pmatrix}
5,350,000 & 3,850,000 \\
180,000 & 1,850,000 \\
145,000 & 2,525,000 \\
200,000 & 3,325,000
\end{pmatrix} \\
\text{= (3,850,000 + 1,555,000 + 2,525,000 + 3,325,000) & } \\
\text{= sh11,335,000} & \\
\text{Profit} & \text{= (11,335,000 - 9,080,000) } \\
\text{sh 2,255,000} & \\
\end{align*}
\]

\[
\begin{align*}
\text{a).} & \text{ Angle PQR = 60°} & \\
\text{b).} & \text{ Radius of the circle = 5.3cm} & \\
\text{Area of the circle} & A = \pi r^2 & \\
& \text{= 3.14 \times (5.3)^2} & \\
& \text{= 88.25978} & \\
& \text{= 88.2588cm²} & \\
\end{align*}
\]

15. a).

\[
\begin{align*}
\text{Matrix of rotation through 180° about the origin} & \\
\begin{pmatrix}
\cos 180° & -\sin 180° \\
\sin 180° & \cos 180°
\end{pmatrix} & \\
\begin{pmatrix}
-1 & 0 \\
0 & -1
\end{pmatrix} & \\
\end{align*}
\]

\[
\begin{align*}
\text{Matrix of reflection in the line y = x} & \\
\begin{pmatrix}
0 & 1 \\
1 & 0
\end{pmatrix} & \\
\text{By matrix multiplication} & \\
\begin{pmatrix}
0 & -1 \\
-1 & 0
\end{pmatrix} \begin{pmatrix}
p & Q \\
Q & R
\end{pmatrix} & \\
\begin{pmatrix}
-1 & p & Q & R \end{pmatrix} \begin{pmatrix}
-1 & -1 \\
2 & 2
\end{pmatrix} & \\
\text{= (11,335,000 - 9,080,000) } & \\
\text{sh 2,255,000} & \\
\end{align*}
\]

16. aaf1

Sketch

Accurate diagram PQ=7.5cm and OR=10.2cm

17. Let x represent bus and y represent mini bus

\[
\begin{align*}
500,000x + 600,000y & \leq 3,000,000 & \\
x + 3y & \leq 360 & \text{(i)} & \\
65x + 18y & \geq 220 & \text{(ii)} & \\
x & \geq 0 & \text{(iii)} & \\
y & \geq 0 & \text{(iv)} & \\
\end{align*}
\]

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

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
1. Simplify: 
\[ 1 \frac{1}{2} - \left( \frac{8 \frac{1}{2}}{2} \right) \]
\[ = 1 \frac{1}{2} - 4 \frac{1}{2} \]
\[ = 1 \frac{1}{2} - 5 \frac{1}{2} \]
\[ = -4 \]

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

3. Without using tables: Find the value of \( K \).
\[ \log_{\frac{1}{2}}(1) + 2 \log_{\frac{4}{1}}(\frac{1}{2}) - \log_{\frac{5}{22}}(5) = \log K - \log 10 \]

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 \( g(p) = \frac{1}{p+3} \)
Find:
   (a) \( g(f(p)) \)
   (b) the value of \( p \) for which \( g(f(p)) \) is meaningless.

6. An article is sold at \( \text{UGX}3000 \) and a seller makes a profit of 25%. How many articles must the seller sell in order to make a profit of \( \text{UGX}10,800 \)?

7. Express \( \frac{3}{2\sqrt{2} - 2\sqrt{3}} \) in the form \( a\sqrt{2} - b\sqrt{3} \)
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 m/s and experiences a total sideways force (\( F \)) of 1200N. What sideways force will it experience while going round a bend of radius 30m at 15 m/s ?

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

10. Arono cycles from \( P \) to \( Q \) at an average speed of 16km/h. She cycles back at 12km/h. What is his average speed for the whole journey in \( \text{km/h} \)?

11. SECTION B
   (a) Given that line \( M \) passes through the points (1,0) and (4,4).
   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 \((4,9)\) 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 (remainder) had faults in: Brakes (\( B \)), Lights (\( L \)) and steering (\( S \)) as follows:
\[ n(BnSnL) = n(BnL) = n(SnLnR) = 2n(BnSnL) = 2n(BnLnS) = 3n(LnBnS) = 4n(SnLnB) = 4n(BnLnS) \]
(a) Represent the given information on a ven 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 12km/h towards B, Edmond sets off for town A on his motorcycle at a steady speed of 56 km/h from town B.

14. EDMOND is expected to ride for \( \frac{5}{4} \) 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.

15. Members of 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 sh1.6milion on November 2013. She was able to pay back sh500,000 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?
   (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

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.

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

C H E M I S T R Y  R E V I S I O N  Q U E S T I O N S  (OCHEM008) CONTINUES...

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

<table>
<thead>
<tr>
<th>Volume of sodium hydroxide (cm³)</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature of mixture (°C)</td>
<td>250</td>
<td>275</td>
<td>290</td>
<td>310</td>
<td>320</td>
<td>340</td>
<td>350</td>
</tr>
</tbody>
</table>

i. Write the equation for the reaction in this experiment.
ii. Plot a graph of temperature against volume of sodium hydroxide added.
iii. Determine from the graph the:
   a) Volume of sodium hydroxide which completely neutralises 50cm³ of 1M hydrochloric acid.
   b) Change in temperature, T, when complete neutralisation occurred.
   c) The heat change, H when complete neutralisation occurred. (Specific heat capacity = 4.2 Jg⁻¹ K⁻¹ density of solution 1.0 gcm⁻³)
   d) How would the value of molar heat differ if 50cm³ of 1M ethanoic acid was used instead of 1M hydrochloric acid?
   e) 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.
      iii. State two uses of copper metal.