

KAGADI PROGRESSIVE SECONDARY SCHOOL
THE NEW LOWER SECONDARY SCHOOL
CURRICULUM S.4 HOLIDAY WORK

Candidates name:_____

Stream:_____

CHEMISTRY

ITEM 1

Mary was given an assignment about atoms and their structures, Help her complete her assignment. You are provided with the table showing the number of electrons, protons, neutrons in the atoms of elements A, B, C, D and E.

Atoms	Electrons	Protons	Neutrons
A	8	8	8
B	13	13	14
C	16	16	16
D	Y	11	11
E	8	Z	10

Study the table and use it to answer questions that follow

- a). Determine the values of
i) Y

ii) Z

b) State the mass number of atom C

c) Indicate which of the atoms

i) Are isotopes

ii) Belong to the same group in the periodic table

d) Write the electronic configuration of

i) atom C

ii) ion of A

iii) ion of B

ITEM 2

2. In Uganda, most people use underground water from lakes, Wells, rivers, boreholes, and springs. This water is said to be polluted. This is attributed to the presence of salts dissolved in water.

a) Name one substance that causes

i) Temporary hardness of water

ii) Permanent hardness of water.

ITEM 3

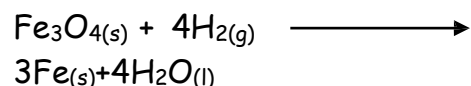
During installation of satellite dishes, alloys are preferred to pure metals.

(a) Explain why

b) In Uganda, mineral elements are extracted in the areas of Karamoja (gold), Kitaka-Mbarara (silver), Kilembe (copper and Cobalt). These minerals play a great role in stimulating the economic growth of the country. Suggest three ways of how minerals can be extracted giving reasons why.

ITEM 4

Hydrogen reacts with iron(II) oxide according to the following equation



Calculate the volume of hydrogen measured at room temperature that would be required to produce 3.36g of Iron. (Fe = 56, 1mole of gas occupied 24dm^3 at room temperature)

ITEM 5

Mary was cleaning at home and she found a bottle containing a substance **J**

whose molecular formulae is **C₃H₈**. Help her identify the compound

- i) Write the structural formula of **J**
- ii) Name **J**

iii) Name the group of organic compounds to which **J** belongs giving a reason why.

b) The bottle had a precaution that stated that " it is not wise to burn **J** in a living room with closed windows and doors. Explain why

c) Suggest one use of **J**

ITEM 6

In our daily lives, bonding plays a very vital and significant role. The air we inhale, the gas used in automobiles, the diet we take, the medicines we consume all explain the role of bonding. Using illustrations, describe three ways how chemical bonding is useful

b) A certain compound **T** was analyzed in the laboratory by bio chemists and it was found to contain 40.0% carbon, 6.7% hydrogen and the rest being oxygen.

i) Calculate the empirical formula of **T** (H=1, C=12, O=16)

ii) Determine the molecular formula of **T** (Relative formula mass of **T**=60).

Item 8

There are very many processes and changes that occur to matter. Some of these processes are accompanied by chemical reactions under favorable conditions for example fermentation, burning, rusting, digestion and so many others. You are required to write balanced chemical equations for the following reactions.(score 8)

- a) Sulphur burns in oxygen to form Sulphur dioxide gas.
- b) Methane burns in oxygen to form Carbon dioxide and water.
- c) Zinc metal reacts with hydrochloric acid to form Zinc chloride and hydrogen gas.
- d) Copper oxide reacts with hydrogen gas to form copper metal and water vapour

ITEM 9

1 a)DORCUS a S.3 student lives with her parents in Kampala city but comes for holidays in ENTEBBE. In her routine house works she realized that whenever she is boiling water it takes a longer time to boil when in Kampala compared to when she is in Arua.This has made her confused. Make a write-up explaining her observations

B) Manyibaku trading Centre in the outskirts of Arua city is a very dirty trading Centre heavily flooded with polyethene bags, plastic bottles from beverages and other items which makes it one of the dirtiest places in the city. As such the trading Centre committees have called for a meeting to have this issue addressed. As a concerned member, write a brief advice for the committee on what can be done.

C) A family organized for outing during Christmas day and everyone ordered for his or her choice of drinks. Shamim ordered for a cold drink(soda) and placed it on the table for some times. After a few minutes, droplets of water were seen on the bottle, something she failed to understand and kept on wondering what could be the problem with her drink. Briefly explain to her what is happening.

D) You have been awarded a contract to construct a modern school gate for your school. Prepare a brief document that will guide you and the engineers on the choice of materials that you will use to build this modern gate for the school. In each case relate the choice of the material to its physical property.

1. E) Below is part of conversation between four students of Mvara s.s day section on their way to home

Atama:(recording the groups notes about practical), what happened

Kitongo:it went fizzy(foamy)

Atama: Did you see any new substance formed?

Kitongo: No

Wadri: What shall I write that was formed

Hassan: A blue colour

Make a conclusion about the types of changes these students were conversing

F) Peptic ulcers commonly known as heart burns is caused by too much hydrochloric acid produced during the digestion of foods in the stomach and normally treated by taking magnesium tablets. Explain how Magnesium tablets makes one relieved from heart burns.

ITEM 10

A resident of Mvara Congo zone fetches water daily from two sources of water: borehole and nearby spring. When she uses this water from these two sources, she

realized that she uses a lot of soap while washing her clothes. One day she boiled the water from the borehole for bathing but remembered that she had not washed one of her shirts and washed it with the boiled water instead and used little soap than it used to be. This has forced her to try boiling the spring water as well and used it for washing her clothes but still used a lot of soap as it used to be. This has confused her more. Prepare an article to clear away her dilemma. (score 15)

1. In one of the parliamentary sessions of the 11th parliament of the republic of Uganda, one of the honorable members raised a concern that the enhanced salary for the science teachers should be scrapped off which created a heated debate in that sitting with many saying that the subjects including chemistry have done nothing for this country. As a young chemist justify the statement of these members of parliament.(score 15)
2. The school management committee(SMC) of Yawe secondary school has organized a budget meeting for the academic year 2024 to purchase learning materials for the school and a member

has proposed that the modern periodic table should be one of the materials to be purchased which many members did not agree. Insist on the need to include the modern periodic table among the items to be purchased. *(score 15)*

ITEM 11

Recently there is a general increase in the temperature in the whole world which has impacted much on the climate. One of the effects is the elevated temperature particularly at night. In one of the summits organized for the climatic changes in Africa under the United Nations climate change conference, the members strongly agreed that man has to be blamed for this rise in temperature and that it is man who can also reduce it. Evaluate the meeting's resolution. *(score 15)*

ITEM 12 There is increasing prices for fuels used at homes for cooking especially fire wood and charcoal yet they are needed every day. This calls for the sustainable use of the firewood and charcoal. Guide the locals on how to make sustainable use of these fuels. *(score 15)*

ITEM 13

Lake Katwe in western Uganda is known to be the source of salts that is used in homes for cooking and

other uses. The president of the republic of Uganda has therefore asked the scientists for whom he had increased their salaries to do everything possible to get the common salt from this lake. As a young scientist, guide the fellows on how salt can be obtained from this lake. *(score 15)*

PHYSICS

ITEM 1

Calculate work done by an engine which exerts whose tractive force is 9000 N over a distance of 6 m

ITEM 2

In your group, discuss and make a presentation about renewable and nonrenewable sources of energy giving examples of each and their effects on environment.

ITEM 3

MECHANICAL ENERGY

Did you know that potential and kinetic energy form mechanical energy?

Assignment

a) Research about the meaning of potential energy and kinetic energy.

Gravitational potential energy



a) Make research about it

Item 4

Last year as your friend was passing near form three class, he heard them talk about acceleration due to gravity and he wondered what that statement means, In pairs, research on gravitational potential energy and its relationship with mass of the body, acceleration due to gravity and height above the reference level.

Item 4

Value based question about work done by friction

Amon pulled a box of soap on a smooth tiled floor and he didn't use a lot of energy. When he pulled the same box on rough floor, he got tired very fast.

Use knowledge of work and energy to explain the two scenarios.

Item 5

Power

Your colleague praises himself that he is more powerful than other person in class, Research on meaning of power and its expression which relates power and work done or energy and time taken.

b) In pairs research and Carry out an investigation on how human power can be measured using stairs and stop clock or watch and hence measure power of your



b)Competency: understand and use the relationship between energy, work done, force, and power in the operation of simple machines.

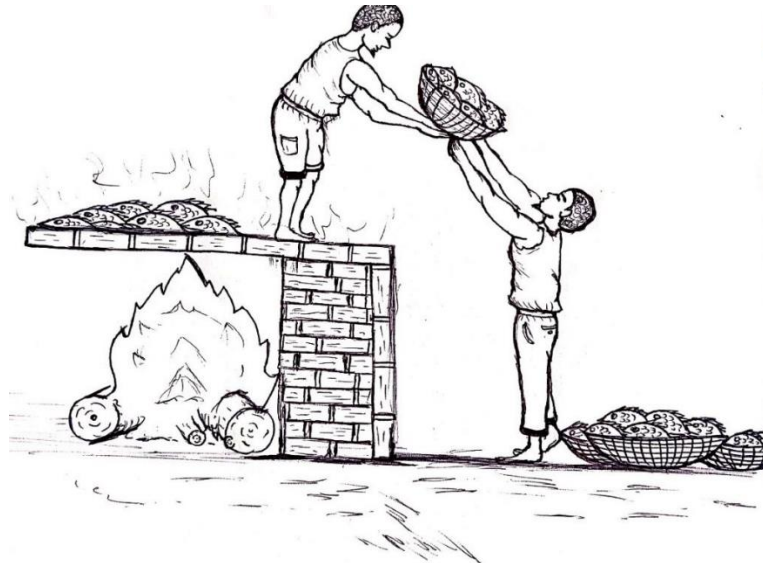
Scenario:

Kyamate brothers is a group of ambitious young men dealing in fish business around

Zengebe shores of Lake Kyoga in Nakasongola District.

They catch the fish, smoke on five feet high stand and then sell it in nearby markets.

SUPPORT



Their business has been making good profits not until recently when they realised

fire wood was getting exhausted from the nearby forests and the fish was at times too heavy for them to lift by hand to the smoking stands as they grew older.

They have written a letter to you, as a district physicist asking to be guided about their challenges.

Task

Prepare a written document to them educating them about their challenges and suggesting alternative solutions.

Item 6

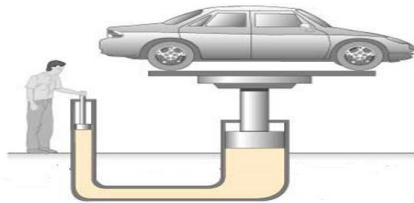
In pairs, use wooden blocks of different surface area provided to investigate the relationship between force and area of contact.



Item 7

In garages and at service stations, mechanics use a small machine is used to lift a big car in order to remove the tyres. In your pair, research and discuss about principle of transmission of pressure in fluids and how it applies in;

(i) Hydraulic press



Item 8



Mortar and concrete are made by mixing different materials with different properties. In pairs, research and discuss the materials that make mortar, concrete and explain how reinforcing concrete changes its properties.

Item 9

a) Name the types of curved mirrors below;



i) Of the two surfaces of the mirror which surface is suitable for reflection

ii) Why do you think the curved mirrors are also called spherical mirrors?

Item 10

You have been provided with tea spoons, in which circumstance is a tea spoon used as;



- (i) A concave mirror
- (ii) Convex mirror

Item 11

ELECTROSTATICS



a) The physics department in your school organized a quiz. One of the test items is to give the meaning of electrostatics, describe the structure of an atom, neutral atom, positively charged atom and a negatively charged atom. Briefly present your work in writing.

b) Understand everyday effects of static electricity and explain them in terms of the buildup and transfer of electrical charge.

c) Apply knowledge of electrostatic charge to explain the operation of devices like lightning conductors.

Item 12

Many people think that in space there is only the moon, the sun and other stars.

In pairs,

- (a) Make a scale model of the planets and place them in order of their relative distances from the sun and write briefly other components of the solar system.
- (b) Prepare a presentation on main characteristics of the inner four and outer four planets
- (c) Two friends had an argument about the moon as a satellite. With justification. Settle your friends' argument.
- (d) You have been given a scholarship to go to USA. The ambassador requests you to briefly talk about inner and outer planets, write a brief document

about inner and outer planets.

- (e) You have been part of a debate with the motion 'the earth is the only planet that supports life 'and you are a proposer. Briefly write down your views.

Item 13

A brass band was invited to play during a celebration near a tall building, a distance slightly more than 17m away. Two friends standing in the same direction and in line with the playing band, heard the sound from the band at different intervals of time which attracted them to go and attend the celebration. On arrival, the sound they heard was unclear, confused and indistinct. Later in the night during the celebration, coloured lights flashing red, blue and green made the colours of their clothes look different from the original colours which puzzled them.

Hint: *Speed of sound in air = 330 ms^{-1} .*

The two friends heard sound after 4 s and 5 s, respectively. The friends were originally wearing yellow clothes.

Task:

As a physics student, help the two friends to understand why;

- (a) they heard the sound at different intervals.
- (b) the sound they heard was unclear, confused and indistinct
- c) the colour of their clothes kept changing when coloured lights flashed on them.

BIOLOGY

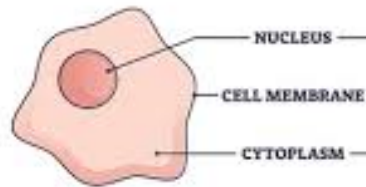
1. Study the pictures of common organisms in our environment.



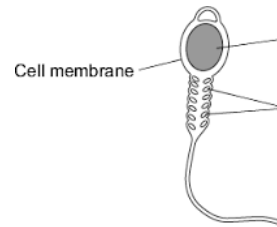
- a) Using the knowledge of classification, put these organisms into two appropriate biological groups (2 marks)
- b) (i) Chose one of the groups above and explain why you put those organisms in the same group (2 marks)

2. Cell A is an animal cell which changed into cell B as shown below:

Cell A



Cell B



- What change took place?(2marks)
- Explain the change mentioned in a) above(2 mark)
- What biological description is given to cell B? (1 mark)

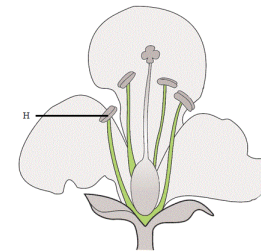
3. A laboratory technician went to the bush to collect specimens. On returning, he noticed many fruits of black jack on his trouser. He picked and threw them away in the compound.



- What biological advantage did the black jack achieve? (2 marks)
- Briefly explain how the black jack fruits were able to achieve the advantage mentioned in (a) above. (2marks)

c) How does the achievement mentioned in (a) above contribute to the success of black jack plant species? (2marks)

4. (a) The diagram shows a section through a flower



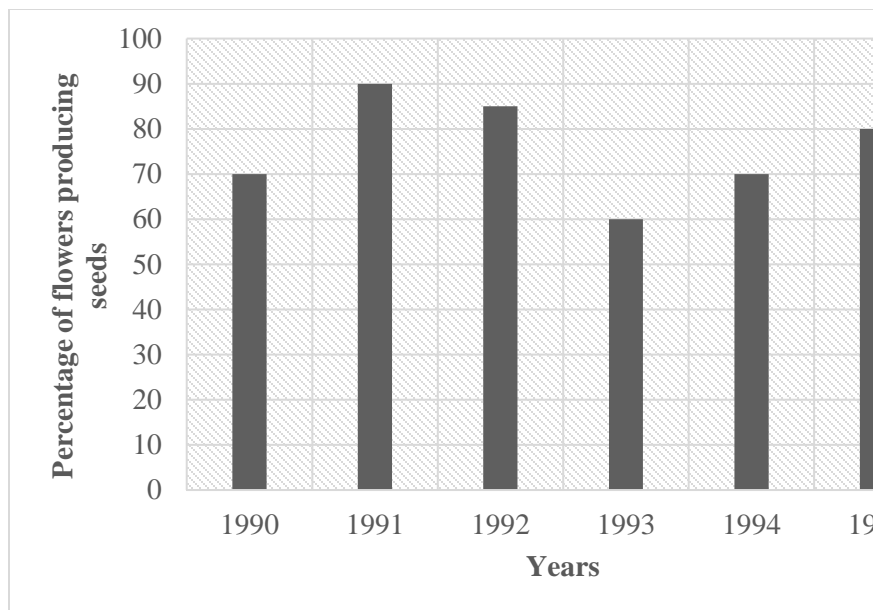
- Name the structure labelled H on the diagram (1 mark)

Mark the diagram with the letter X to show the exact position where fertilization occurs.

(1 mark)

- Using a feature shown in the diagram and suggest an agent that is responsible for pollination of the flower. (2 mark)

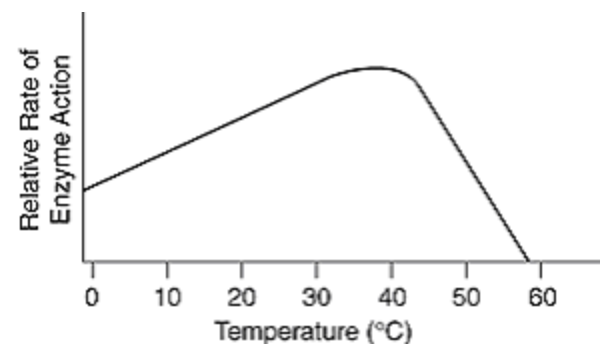
b) The chart below shows the percentage of sunflowers that produced seeds in a garden between 1990 and 1995 together with the average environmental temperature. Use the information to answer the questions that follow.



Year	1990	1991	1992	1993	1994	1995
Average Environment Temperature (°C)	8	11	9	7	8.1	10

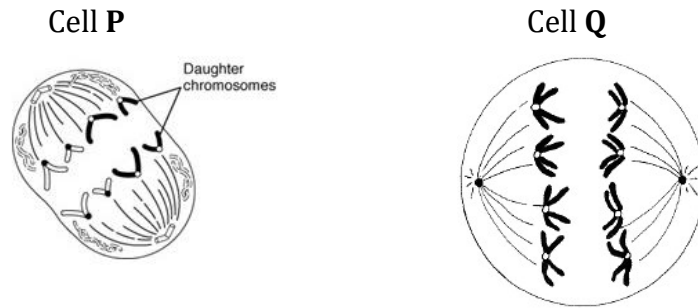
- In which three years were the fewest plants pollinated? (1 mark)
- What do these three years have in common? (1 mark)
- What conclusion can you draw from your answers in (i) and (ii) above? (2 marks)

5. The graph shows enzyme activity under a given condition. Study the graph and answer the questions that follow.



- What does the graph show?
 - Based on the graph, what general statement can be made about the optimum temperature of different enzymes?
- What is the effect on the enzyme if temperature is increased beyond the optimum value?
 - What is the effect on the rate of reaction if temperature is increased beyond the optimum value?

6. The figure below shows two cells: **P** and **Q** which were taken from different parts of the same plant. Each cell is at a certain stage of cell division. Cell **P** was taken from a side branch and cell **Q** was taken from the ovary.



a) What type of cell division is represented by:

(i) Cell P (1 mark)

(ii) Cell Q (1 mark)

b) What is the role of the cell division taking place in:

(i) Cell P (1 mark)

(ii) Cell Q (1 mark)

7. The heart is a specialized organ in the human body.

a) Name the specialized function of the human heart (1mark)

b) How is the human heart specialized to the function you have named in (a) above? (1mark)

c) Why would the human heart be inefficient if it was not divided into four chambers? (3 marks)

8. A couple has four children. The first three children born were girls and then a boy was born fourth. The couple is

expecting their fifth child. The father is 100% sure that the fifth child will be a boy. Show how you would demonstrate to the father that the chance of producing a boy is NOT 100%.

(4marks)

SECTION B (60 MARKS)

Attempt ANY FOUR questions in this section

11. A student feeling thirsty sees a bottle of water on the table. He picks and drinks the water.

(a) What are the actions involved in the process of picking the bottle of water to the mouth? (12 marks)

(b) Explain why a dog which has lost its senses stops being useful in defending the home? (3 marks)

12. A family bought a piece of cultivated land on a hilly place.

a) Describe the problem that the soil would experience during a rainy season. (1 mark)

b) What advice would you give to this family to reduce the problem on their land? (14 marks)

13. The Ministry of Health in Uganda has a programme on vectors and disease control in communities around Lake Regions. The most recent was on treated nets distribution.

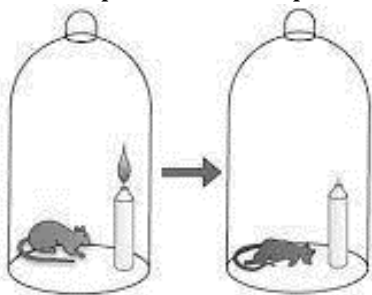
a) i) What is a vector?
(1 mark)

ii) Suggest the aim of the above programme by the ministry of health. (1 mark)

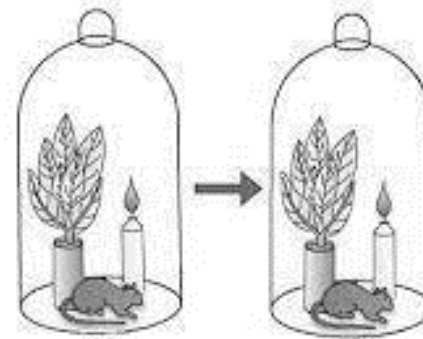
b) Suggest to the communities any other ways that can be carried out to achieve the aim of the programme named in (a)(ii) above.
(13 marks)

14. The diagram below shows an experiment that was conducted by a scientist called Joseph Priestly in 1772. In this experiment, it was assumed that heat had no effect on the organisms.

Experiment setup A



Experiment setup B



At start of the
experiment

After some hours
rat is dead
rat is still alive

At start

a) Describe and explain what happened in both experiment set A and B
(13 marks)

b) What logical conclusion do make from the observation from set A and B?
(2marks)

15. A community in Uganda, is cutting down trees in a nearby forest to create new space for farming because food yields from the land they are currently using has declined. A government authority has stopped them from clearing the forest. The community members see no reason why they should be stopped.

a) What general term or phrase would be used to refer to what the community is doing to the forest? (1mark)

b) Write an essay to the community which will make them to appreciate the government's action and how they can stay on their current land. (14 marks)

16. A teenage girl living with HIV and on treatment, has become pregnant by a teenage boy.

The teenagers have become the talk of the community.

a) What is the possible talk about the teenagers by the community? (3 marks)

b) What challenges are faced by the teenagers from the talk? (6 marks)

c) Suggest way forward to help the teenagers. (6 marks)

BEST WISHES FROM THE MANAGEMENT