HOME SCHOOLING MATERIAL

PASS O LEVEL

BIOLOGY, PHYSCIS, ENGLISH
SECTION A

1. Which of the following classes of phyllum arthropoda contain three (or more) segments? 

2. The figure below shows the effect of temperature on the rate of photosynthesis. 
   ![Graph showing the effect of temperature on photosynthesis]
   Which of the following explains the shape of the graph from 30°C to 50°C? 
   A. There was no more water on the plant.  B. Sunlight intensity was too high.  C. Enzymes for photosynthesis were denatured.  D. Semi-circular canal.

3. A man heterozygous for blood group A married a woman heterozygous for blood group B. Which of the following is true? 
   A. All their children would be a.  B. O.  C. A group.  D. B or O.

4. The type of nitrogenous waste excreted by organisms in fresh water body is 

5. Which of the following microorganisms is found in soil and decomposes humus? 

6. Primary growth in plants causes an increase in the; 

7. A seed that failed to germinate due to hard and impermeable testa can be caused to germinate by 
   A. allowing it undergo after ripening.  B. budding the testa.  C. treating it with growth promoters.  D. exposing the seed to high temperature.

8. Some bacteria in the human alimentary canal digests cellulose for humans but obtain simple nutrients digested by them. Which of the following describes the relationship between humans and the bacteria? 

9. Which of the following structures are used by amoeba in both locomotion and feeding? 

10. The neural spine in vertebrae function for: 
    A. Articulation with adjacent vertebrae.  B. Attachment of muscles.  C. Passage of vertebrae blood vessels.  D. Articulation with ribs.

11. The cusps and ridges on the crown of molar teeth enable them to effectively 
    A. Grind food materials.  B. Masticate food materials.  C. Cut food materials.  D. Bite food materials

12. The growth response of pollen tube to chemicals secreted by the ovary shows that pollen tubes is 

13. Which component of the ecosystem releases energy locked up in bodies of dead organisms for use by major plants? 

14. In which part of the human female reproductive system does fertilization occur? 

15. Which fin on a fish bears repeatedly, causing the tendency of the head of the fish to deflect sideways during movement? 

16. Which of the following pairs has the highest level of classification and organization of an animal? 
    A. Phylum and system.  B. Kingdom and organism.  C. Species and cell.  D. Genus and tissue.

17. A plant has leaves with the following characteristics: Lamina divided into five lobes, network venation and presence of a leaf stalk. Which of the following is the type of leaves found in the plant? 

18. Which of the following is the gland and the hormone it secretes that affects permeability of the kidney tubules for reabsorption of water from glomerular filtrate? 

19. Which part of the inner ear functions to cause hearing? 

20. Which of the following mixtures of soil of different types would have the highest water retention capacity? 

21. The part of the flower that withers and falls off after fertilization is the; 

22. The following are characteristics of an insect: 
    I. Undergoes incomplete metamorphosis.  II. Has a pair of long antennae.  III. Has two pairs of wings.  IV. Has movable ovipositor. 
    Which of the following insects show the above characteristics? 

23. Which gland releases its secretions in a duct to the target organ while releasing some directly into blood? 

24. In which part in a human male does metositis occur? 

25. The cells found in skin epidermal layers of a leaf are; 

26. The figure below shows the relationship between the temperature of an organism with the temperature of its surrounding. 
   ![Graph showing temperature relationship]
   Which of the following classes of organisms does the body and environmental temperature show the relationship above? 

27. Which of the following types of fruits are mungos and tomatoes, respectively? 

28. During succession on bare rocks, the first group of organisms to grow are; 

29. An organism in an association that derives benefits but without the other member of the association benefiting or being harmed is a; 

30. Which of the following is correct about the roots and root stems? 

SECTION B

31. The figure below shows the rate of blood flow to different organs in a human at rest and during physical activity as well as the pressure of blood flow in two blood vessels in a minute. 
   ![Graph showing blood flow rates]
   Part of the body: 
   At rest: 
   During physical activity: 
   Heart muscle: 0.2 1.0 2.0 1.0 
   Skeletal muscle: 0.4 5.0 15.0 10.0 
   Skin: 0.4 0.0 0.0 0.0 
   Kidney: 0.0 0.0 0.0 0.0 

   a) Explain the difference in the rate of blood flow to each organ.  
   b) Heart muscle.  
   c) Skeletal muscles.  
   d) Kidney.  
   e) Skin. 

   32. a) Plot a graph of the relationship between blood pressure in blood vessel A and time. 
       b) With reason identify the blood vessels A and B. 

   33. a) Compare the advantage of sexual reproduction. 
       b) Describe conjugation in a nuccard. 
       c) Suggest the advantages of sexual reproduction.

   34. a) The figure below shows different types of feathers in birds. 
       i) Label the feathers as A, B and C respectively. 
       ii) With reasons identify each type of feather shown above. 
       iii) State adaptations of feathers A to its function. 
       iv) Construct a dichotomous key to identify the types of feathers A, B and C above.

SECTION C

34. a) Suggest the role of Gregor Mendel in understanding genetics. 
    b) The importance of knowledge of genetics in improvement of agricultural production. 
    c) A red flowered plant was crossed with a white flowered plant and all F1 offspring were pink flowers. 
    d) Explain the phenotypes of the F2 offspring. 
    e) Carry out a genetic cross to show the inheritance of flower colour in the plants.

35. a) Describe the main features of nutrition in mammals. 
    b) State the difference between physical and chemical digestion. 
    c) Describe the chemical digestion that occurs in human body. 
    d) State adaptations of the 10cm to its functions.

36. a) Suggest the meaning and examples of reflex action. 
    b) Describe Pavlov’s experiment on conditioned reflex. 
    c) Suggest the relevance of the conclusion of Pavlov’s experiment. 

37. a) Suggest the difference between breathing and gaseous exchange. 
    b) Explain the need for gaseous exchange systems in large size animals.
    c) Describe the features of an efficient respiratory surface. 
    d) Construct an experiment to show that heated air contains carbon dioxide.
ENGLISH LANGUAGE SOLUTIONS (OENG008)

SAMPLE OF A CURRICULUM VITAE (CV)

Question: You are in your Senior Four vacation and you have applied for a part-time job at a supermarket in town. Write a curriculum vitae to accompany your application.

CURRICULUM VITAE

Biography:
1. Name: Rwazahura Keith
2. Physical address: Kawuku, Wakiso
3. Telephone contact: 070596732
4. E-mail address: keithrwazahura@gmail.com
5. Profile: Keith is an outgoing, sociable and hardworking young man with a background in sales, balancing of records and treasury.

Education Background:
- 2017 – 2020: St. Christine S.S.
- 2016 – 2019: Mr. St. George P/S

Work Experience:
- 2018 – 2020: Chairperson Inventor’s Club
  - Supervising club activities
  - Keeping records
  - Balancing club funds
- 2017 – 2018: Founder Inventor’s Club Canteen
  - Sales assistant during free hours
  - Supervising/overseeing canteen activities
  - Treasure of club funds
- 2014 – 2016: Treasurer, Writer’s Club
  - Arranging club funds
  - Soliciting for funds internally and externally
- 2013 – 2015: Class captain
  - Supervising class hygiene
  - Drawing the duty rota
  - Punishing unco-operative members

Key Skills
1. Communication
2. Research
3. Interpersonal skills
4. Public relations and excellent communication

Personal Attributes
1. High level of confidentiality and honesty
2. Reliability
3. Quick at learning new things
4. Sociable

Language proficiency:
- English: Good
- Luganda: Good
- Russian: Good

Hobbies and Interests
- Reading business books and articles
- Swimming
- Photographing and writing proposals

References:
1. M. Muyarwaba Edgar, Headteacher, St. Christine S.S.
2. Ms. Tumwebaze Sarah, Patrons, Inventor’s Club, St. Christine S.S., P.O. Box 2323, Mbaale.
3. Telephone Contact: 0781328756
4. Telephone Contact: 0782542221
5. Email: emaniiyuywom@gmail.com

N.B: You are advised (advising not to skip lines for purposes of examinations as it leads to loss of marks.)

INFORMATIVE ESSAY/COMPOSITION

For an informative essay, you can use idioms, vocabulary and other means of expression, where applicable. However, such a question may not give you a lot of chances to use a wide range of vocabulary and idioms.

Each point should be discussed in its own paragraph.

You need a sound introduction and conclusion.

Avoid skipping paragraphs as well as block paragraphs.

Use connectors or transitional phrases to start different paragraphs to avoid monotony.

SAMPLE INFORMATIVE COMPOSITION

Question: Discuss the steps that should be taken to avoid contagious diseases in our community.

This question requires you to write an informative essay. You are expected to avoid the various remedies to the problem of contagious diseases.

THE STEPS THAT SHOULD BE TAKEN TO AVOID CONTAGIOUS DISEASES IN OUR COMMUNITY:

The issue of contagious diseases has been a long-standing threat in the health of developing countries as well as in developed countries. These are diseases that flourish in areas that are not well-developed. Most of these stem from poor hygiene, especially in poverty-stricken households and rural areas of the world. It is only once when COVID-19 took the world by storm and wreaked havoc in developed countries like China, USA and Italy, leading millions to their graves and leaving great economies devastated. Other examples of contagious diseases are cholera, Ebola and so much more. How then should people keep themselves out of harm’s way?

To begin with, it is a proven fact that proper handwashing with disinfectants like soap and using sanitizers is considered one of the most effective control measures to kill pathogens. Since hands are the most important tool that reaches every part of the body, it is paramount that people keep them clean as they seem to be the major means of transport by which germs enter our bodies, causing contagious diseases.

In relation to the above, although it is almost a reflex action for one to wash themselves, experts advise us to desist from the temptation of touching the mouth, nose and eyes, especially with unwashed hands. This is because those parts are the highway portal of entrance for the disease-causing germs. In so doing, one shall remain safe from contagious diseases.

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PAPER ONE

SECTION A

1. Assume you are the Head Prefect of your school. You have been asked to write a report to the Head teacher on the state of natural environment at your school. In your report, you may include:
   - Pollution
   - Care of trees, flowers and compound
   - Litter disposal
   - General cleanliness (bathrooms/toilets, kitchen/dining hall)
   - Any other environmental issues
   - Make recommendations on how the natural environment can be improved.

SECTION B

Choose one of the following questions and write a composition:

1. Write a composition beginning: “Open the door, now!”
2. Describe an election campaign for the prefects that took place at your school.
3. Describe how you would improve the conditions in your home area if you were a member of parliament.
4. “Starvation has killed people instead of the coronavirus in Uganda.” Do you agree? Give reasons for your answer.
5. How should Ugandans spend their money during the COVID-19 lockdown?
6. Write a story to describe the saying “Do not count your chickens before they are hatched”.

PAPER TWO

ENGLISH LANGUAGE QUESTIONS (OENG009)

1. Read the passage below and answer the questions that follow:

   Population control has been a burning issue in developing countries in general, and Uganda in particular. Most countries realize that if they allow themselves to be over populated, the repercussions will be great. It is obvious that even within the families, many children have become more of a problem than a blessing. In our own country, the government, the Church and individuals have always stressed the need to have a population that the country can easily cope with. It has been the wish of the government that couples should have a maximum of four children. The negative effects of over-population are far reaching. When there are too many people in a country, jobs become scarce. The country suffers from a high rate of unemployment because of insufficient job opportunities.

   In a country that relies on agriculture for its economic growth, the issue of land is crucial. If a country is over-populated, there will not be enough land for the people to cultivate. People will, therefore, start cultivating the marginal lands and this could lead to the spread of deserts. When there is not enough land to cultivate, people do not have enough to eat and this may result in illnesses like kwashiorkor and marasmus. As land becomes scarce, another problem arises. People from the rural areas are forced by circumstances to move into the urban areas in search of jobs. With the migration into towns, the towns become so overcrowded that people are forced to put up slums for shelter. These slums become a health hazard to their dwellers. And when the people from the rural areas do not get jobs in the urban centres, they become frustrated. If they have no other way of making money, they turn to crime, i.e. becoming robbers or pick-pockets.

   Lack of education is another result of over-population. When the number of children being born every year continues to grow, the government reaches a stage where it cannot build enough schools to cater for all of them. As a result, some of them end up not going to school though they are supposed to. Such children may in future become juvenile delinquents, or even hardened robbers when adults.

   A country that is over-populated finds it difficult to cope with the health problems of its people. The medical facilities will not be adequate to cater for such a high density population. The people will therefore be sickly, infant mortality rate will be high and life expectancy very low.

   The problem of over-population has a great effect on individuals, but even at the family level. A family that has many children often finds it difficult to feed, clothe and educate them. The parents of such children may also find it difficult to cope with the situation, spouses blame each other for their financial problems and in the long run, this may lead to family break up!

(Adapted from: Integrated English: Kenya Institute of Education)

Question:

1. In not more than 120 words, summarise the consequences of over-population as shown in the passage.

2. Read the following passage and answer the questions that follow:

   The gamekeeper was helpful. The Personnel Manager? Ask in that block. He pointed out the brown and black prefabricated building. Beside another one was being erected and men were working on stood gelds.

   Dora stepped into the large room. Inside were two desks, one occupied by two girls. They were talking in low voices to a smartly dressed young man. Dora chose to ask at the second desk where a kindly-looking middle-aged woman sat typing at a machine.

   “I'm looking for the Personnel Officer.”

   The woman smiled and did interrupt her work. “We don't have one in our company, but the manager is going to be here any time soon.”

   “Well, I'm looking for a job.” He said.
The woman studied Dona for a moment. It was probably his presence that had attracted her. His calmness, his neatness, his manner, his bearing—

ALL THE JOBS ARE FILLLED, she said with some regret, but we still need two watchmen.

Dona raised his eyebrows self-consciously at the woman and she responded with a smile. Then he strode out of the factory block, the important buff etched on his smooth face.

Outside he paused and watched the men erecting the scaffolding. On his left side, a man of about thirty, very old in overall and he offered Dona a stub of cigarette.

"No, thanks," he said curtly. "There's always the army," the gatekeeper continued, "the police. You have the build for it." He looked Dona up and down in quick appraisal, eyes blazing. "And if you're lucky and wind up on the traffic section you even get to grow a fat stomach, the old man asked Dona's father a fat stomach free of charge. So now gatekeepers try to cheer me up, Dona thought angrily. He had been an innocent bystander in the ill-concealed hostility. Dona had learnt to set up receptionists at a glance and this one looked mean and formidable, a formidable man of a man.

At last the receptionist picked up the phone and spoke into it. Then he handed it to the man beside Dona to go on up to the stairs.

"And you?" the receptionist glared at Dona.

"Where?" Dona said curtly.

Dona forgot his job-bumping manner in automatic response to the ill-concealed hostility.

"Do you have an appointment?" the receptionist asked darkly.

"No."

"What do you want?"

Dona could have stopped the torture then but he shrugged and continued to straddle the lazy business. There was always that chance in a thousand.

The receptionist glared at him. "A job! A man scolded and turned to glare at his companion. "How are you like the idea of a job at this factory on this hot day? Then he turned to Dona as he laughed. "What are your qualifications?" Dona felt like getting up and leaving. But he didn't.

"I have a university degree, Bachelor of Science."

The receptionist glared at him. "Ah, you university types! He turned and spread his hands out for his comrade in comrade despairs. This one is the twentieth since this morning."

He turned to Dona.

"When we have jobs, my man, we advertise in the papers and people apply. It's the civilized way we do things around here. You don't just barge in here and..."

But Dona didn't take kindly to rape, didn't wait to hear any more. He sprang to his feet and marched out of the cubicle.

From Baltimore (Shepard by N Kadnoy)

Questions

1. Name the places that Dona went in search of a job.
2. Why do you think the tycoon at Dona's first stopping point told him that there was no need for two watchmen?
3. Explain how Dona got into the traffic section you can even get to grow a fat stomach. What did the gatekeeper imply by such a statement?
4. How can the receptionist at the soft-drink factory look so mean and formidable to Dona? With an example from the passage show how Dona went for his assessment of the receptionist.
5. Explain the following expressions as used in the passage:
   A) just had... (iii) job hunts
   B) capability

2B. Read the following passage carefully and answer all the questions that follow.

Before setting off from Noaibhi Police Barracks, Nyero had told me to be very careful when crossing streets. But how could one take care? In battles, you can protect yourself against your enemies. But how could one protect oneself against these numerous wheeled killers? If you did not want to die, you must not cross any street.

Nyero was a Kamba child-born and raised there. Perhaps he even knew some of the motorists and cyclists. Perhaps some of his friends lived there. He knew his mother. He slipped across the street, and it was as if vehicles had slowed down for him to pass. I felt confined and helpless like a woman whose hut was engulfed in flames. I waited until the flow of vehicles had momentarily become a trickle, then I shot myself across the street; the kind of running you might see when a hunter is chasing a wounded edible rat. An old bus came at me as if I had killed the driver's twin brother. I braked in the middle of the street and jumped back like a waterfall breaking through the reed. I crashed tout of an atom who was standing on the pavement. The white man fell on his back, and the buttons of his trousers broke, and his head gear flew some distance away. My loin-cloth came apart and the three thousand shillings in notes I had tied on my loin-cloth scattered and I immediately bent down to gather them.

The policemen swooped down on me like sitting vultures, examining the atom had died dead. One held my left hand, great tears of misery with my wears loin-cloth. They said looked things in some other language and Nyero appeared to be translating to me what they were saying but I could not hear a word. A large crowd quickly gathered and they were shouting: "Who's this man?" But they never said anything. They were men dressed in respectable-looking suits, carrying small leather briefcases in their hands. They stood there looking at me as if they had nothing else better to do than to stand there making so much noise in broad daylight! There was an old man straining his skinny neck to catch a glimpse of a young man from the village. When our eyes met, he emitted a shrill cry! A white man stood there trembling all over, she was so excited and really exploiting the policemen's infection with my dressing up. I could not hear anything not only because of the noises produced by that silly crowd; there was also a drum pounding in my head!

The white man stood there panting, blood. He held his mores with his left hand, and brushed the blood from his bony face with the back of his right hand. His moustache was full of blood and he looked like a shot dead before it had licked the blood of his kill from around its mouth. I fairly heard Nyero say that we were supposed to go to the police station.

(From Nairobi by Okor Obiri with minor changes)

Answer the questions below by selecting the best of the four choices given. State the letter of your choice by putting a ring around it.

1. "If you did not want to do, you must not cross any street" means:
   A. If you don't cross the street you will never die.
   B. You should cross the street when you want to die.
   C. Crossing the street is extremely dangerous and can cause your death.
   D. You should not come anywhere near any street.

2. "It was as if vehicles had slowed down for him to pass" implies that Nyero seemed to be:
   A. well-known and respected
   B. familiar with crossing streets
   C. the police inspector
   D. a fast runner

3. The story teller knocked the Asian down because he:
   A. was confirmed by too much noise
   B. feared being knocked down by a bus
   C. was being chased by a man with an edible rat
   D. wanted to reach his friend quickly

4. The writer thought the woman was trembling with excitement because
   A. the policeman had interfered with the story teller's dressing up
   B. the old man had emitted a shrill cry
   C. the honk on the treasons of the Asian had fallen off
   D. the story teller had knocked down the Asian.

5. The most possible reason why the story teller is taken to the police station is that:
   A. he had stolen the Asian's money
   B. he was seen knocking the Asian and picking money that was suspected to be the Asian's
   C. his loin-cloth came apart and scattered on the ground
   D. he was disorderly.

2A. Write each item 3.1 to 3.10 according to the instructions. Do not change the original meaning of the sentence.

3.1. When the choir master raised his hands, the children shouted.

3.2. In spite of all his confidence, he failed to win many votes.

3.3. He was disappointed, but he failed to answer the third riddle.

3.4. Use these sentence.

3.5. If anybody comes, what they are looking for is (Use: might...)

3.6. Which door would I open? My enemies would be watching.

3.7. She is living a lonely life.

3.8. We appreciate your presence at our wedding.

3.9. Nobody will ever stop her, (Complete with the right question tag)

3.10. I managed to control my anger. (Rewrite using "succeeded"

3.8. Complete the sentences 3.1.1 to 3.2.0 with the most suitable answer among the given alternatives. Put a ring O around your chosen answer.

3.11. She is nearly the in the class.
   A. smartest
   B. smart
   C. more smart
   D. before

3.12. I do not remember we last ate chicken.
   A. since
   B. when
   C. as
   D. before

3.13. It is difficult to what problems.
   A. cope with
   B. cope with
   C. cope
   D. cope in

3.14. Somwho was standing the twins.
   A. around
   B. beside
   C. between
   D. between

3.15. Someone supposed the police about the theft.
   A. to tell
   B. telling
   C. to hear
   D. tell

3.16. My application was turned down. The underlined expression means
   A. turning
   B. reversed
   C. rejected
   D. wound

3.17. Little... (Complete the sentence)
   A. did we
   B. we did
   C. we didn't
   D. didn't

3.18. I need to go to town,...
   A. do I?
   B. do we?
   C. did I?
   D. don't I?

3.19. If you work hard, you will not succeed.
   A. If
   B. Had
   C. Unless
   D. as

3.20. I was lonely... (Complete the sentence)
   A. but
   B. it was
   C. so
   D. as
1. (a) Chemical energy to electrical energy.
When the positive and negative terminals are connected so that electrons (electrically) can flow between them (usually by a wire), chemical reactions occur at the electrodes. These reactions release excess electrons at the anode, which flow to the cathode.

Given:
- mass, m = 50 kg
- distance, d = 60 steps × 30 = 18m
- power = work done = force × distance = mg × d
t = time taken

(b) Efficiency is defined as the ratio of the work output to work input expressed as a percentage.

(c) Steps to be followed.
- Make three holes A, B, and C at the edges of the irregular object, far away from each other.
- Suspend the object on a string from one of the holes, say A.
- Suspend the plumbline through the same hole.
- After the plumbline settles, trace the path of the plumbline by marking a line on the object.
- Repeat the experiment with the object hung at B and C.
- The point at which all the lines cross is the centre of gravity of the irregular body.

2. (a) Examples of a physical change.
- Physical changes involve states of matter and energy.
- No new substance is created during a physical change, although the matter takes a different form. The size, shape, and color of matter may change. Physical changes occur when substances are mixed but don’t chemically react.

Examples include:
- Melting of a substance
- Boiling of a liquid such as water
- Sublimation of dry ice
- Crushing of a rock
- Mixing sand and water
- Dissolving sugar and water, etc.

Given:
- Volume V₁ = 25 cm³
- Temperature, T₁ = 273 + 17°C = 290K
- Volume V₂ = V₁
- Temperature, T₂ = 273 + 60°C = 333 K
- Using V₁ = V₂ = V
- T₁ = T₂
- V₁ = V₂ = V
- T₁ = T₂ = 55 + 333 = 28.7 m³

(b) Specific latent heat of fusion is the quantity of heat required to change the state of a substance from solid to liquid at constant temperature.

3. (a) The teachers.

- Tomato Ssemwanga
- Mary Ssemwanga

(b) (ii) Experiment to determine the specific latent heat of fusion of ice.
- Specific latent heat of fusion of ice can be determined by two methods. These include:
  - the method of mixtures and
  - the electrical method.
- We are going to discuss the electrical method you will be required to read about the method of mixtures.

Steps to be followed.
- Place an electric heater of known power, P, in the water bath.
- Pack small pieces of dry ice around the electric heater.
- Switch on the heater for a known time, t.
- Determine the mass, m, of the water collected in the beaker from the formula below:

\[ \text{Mass of water} = \frac{m \times P}{t} \]

- (d) Given:
  - Mass of ice, mi = 50 g = 0.05kg
  - Initial temp. o = 20°C
  - Final temp. o = 0°C

4. (a) Primary colours are colours that cannot be obtained by mixing any other colours.
- (b) Examples include: Red, Green, Blue
- Secondary colours are obtained by mixing any two primary colours.
- Example: Yellow, Magenta, Cyan (Phocian Blue)
(ii) **Virtual image** is an image that cannot be formed on a screen since it is formed by imaginary intersection of light rays.

**Read about complementary colours.**

**Differences between a real image and a virtual image.**

<table>
<thead>
<tr>
<th>Real image</th>
<th>Virtual image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light arises from an object and converges to a certain point</td>
<td>Light arising from an object appears to diverge from a certain point</td>
</tr>
<tr>
<td>Can be captured on screen as it is the result of actual intersection of ray of light</td>
<td>It cannot be captured on a screen as it is the imaginary intersection of ray of light</td>
</tr>
<tr>
<td>The images are inverted</td>
<td>The images are erect</td>
</tr>
</tbody>
</table>

**5. (a) (i)** Amplitude is the maximum displacement of a vibrating particle from its equilibrium position.

- Light intensity as you approach the end of the room.
- The point where the sound intensity is maximum.

- (b) Experiment to determine the speed of sound in air by the resonance method.

- An apparatus as shown in the figure above.

- Place a vibrating tuning fork of known frequency, / above the resonant tube.

- Gently lower the resonance tube until a loud sound is heard. This is the position of the 1st resonance.

- Measure the length \( L \) of the air column at which this occurs.

- \( L = \frac{c}{f} \) (i) where \( c \) is the speed of sound in air.

- Raise the resonance tube until a loud sound is heard. This is the position of the 2nd resonance.

- Measure the length \( L_2 \) at which it occurs.

- \( 2L = \frac{c}{f} \) (ii)

- Subtract equation (i) from (ii) to eliminate \( c \).

- \( L - L_2 = \frac{c}{2f} \) (iii)

- \( \frac{c}{2} = f(L - L_2) \) (iv)

- **Determination of the speed of sound in air**

- **Given:**
  - Distance, \( d = 500m \)
  - Time for echo, \( t = 5 \) seconds

- **Solution:**
  - \( c = \frac{d}{t} = \frac{500m}{5s} = 100m/s \)

- **(b) The speed of sound in air depends on:**
  - Temperature: Increase in temperature increases the speed of sound. The sound travels faster in hot air than in cold air.
  - Wind: Speed of sound is increased if sound travels in the same direction as wind.

- **(c) Determination of the speed of sound using a radio wave:**

- **(d) Wavelength of a radio wave that transmits at 5MHz is given:**

- **Frequency, \( f = 5 \) MHz = \( 5 \times 10^6 \) Hz

- **Speed of the radio wave:**

- **(e) Draw a sketch diagram to show how circular waves are reflected from a plane reflector.**

- **Examples of primary cells include:**
  - plant cells
  - animal cells

- **Examples of secondary cells include:**
  - Lead acid accumulator
  - Alkaline accumulator (e.g., Nickel – cadmium cell; NiCd cell, Nickel – iron cell – NIFe cell)

- **(ii) Defects in a simple cell and how they can be minimised.**

- **Polarisation is the formation of hydrogen bubbles on the copper plate.** The hydrogen bubbles that are given off insulate the anode from the electrolyte, which reduces the voltage of the cell.

- **How to minimise the defect:**
  - Use of a depolarising agent like potassium dichromate or manganese dioxide (MnO₂).

- **Regeneration of the cell:**

- **(a) A kilowatt hour is the electrical energy used by a rate of working of 1000 watts for one hour.**

- **OR:** It is the quantity of electrical energy converted into other forms of energy by a device of power 1000 watts in one hour.

- **Cost of electricity:**

- **Given:**
  - Power = 750W
  - Time = 5 hours
  - \( 0.75 = 5 \times 4 = 20 \) hrs

- **Number of units (kWh) = 0.75 × 5 × 4 = 7500**

- **A 1.5V cell is connected to resistors as shown in figure 1 below:**

- **(i) The circuit has simplified to a series combination.**

- **(ii) Current through the 3Ω resistor.**

- **(iii) The circuit has simplified to a series combination.**

- **(iv) Uniform velocity is the constant rate of change of displacement.**

- **(v) Velocity-time graph for a stone thrown vertically upwards.**

- **(vi) The stone reaches the starting point with the same velocity as the one it was projected with. However, the velocity is in the opposite direction, that is to say 'negative velocity'.**

- **Turn to page VIII**
PASS O'LEVEL

BIOLOGY, PHYSICS AND GENERAL PAPER TOMORROW

PHYSICS PAPER ONE QUESTIONS (OPHY009)

Use the following constants where necessary
- Acceleration due to gravity, g = 10m/s²
- Specific heat capacity of copper = 0.406kJ/kg°C
- Specific heat capacity of water = 4.209kJ/kg°C
- Specific latent heat of fusion of water = 334000kJ/kg
- Speed of sound in air = 343m/s
- Velocity of electromagnetic waves = 3.0 x 10⁸ m/s
- Take density of mercury = 135600g/cm³

SECTION A

1. Which of the following is a derived quantity?
   A. Momentum
   B. Length
   C. Mass
   D. Temperature

2. Which of the following is an S.I. unit of electromotive force?
   A. Ampere
   B. Volt
   C. Ohm
   D. Newton

3. Body A of mass 50kg moving at a velocity of 20ms⁻¹ collides with stationary body B of mass 10kg. After collision the bodies move together with a common velocity of 10ms⁻¹. Determine the value of X.
   A. 50 x 20 = 50
   B. 500 x 20 = 10
   C. 50 x 20 = 50
   D. 50 x 20 = 10

4. Which of the following is used to change heat energy to electrical energy?
   A. Electric motor
   B. Heater
   C. Dynamo
   D. Thermocouple

5. When brass spool is to be silver-plated, the most suitable setup is:
   - Electrolyte
   - Positive electrode
   - Negative electrode
   A. Distilled water Spool Silver
   B. Distilled water Spool Silver
   C. Salt solution Spool Silver
   D. Salt solution Silver Spool

6. In figure 1 below, XY is at right angles to the magnetic field.

   In what direction will XY move when switch k is closed?
   A. Upwards
   B. Downwards
   C. Towards W
   D. Towards S

7. Which of the following reactions shows the process of fusion?
   A. \( \frac{U}{2} \rightarrow \frac{C}{1} + \frac{C}{1} + \frac{K}{1} + \frac{e}{1} \)
   B. \( \frac{U}{2} \rightarrow \frac{C}{1} + \frac{C}{1} + \frac{K}{1} + \frac{e}{1} \)
   C. III only
   D. II only

8. Which of the following velocity-time graphs below shows an object moving with constant velocity?

9. Convert 36m³/s to m³/s putting your answer in scientific notation.
   A. 3.6 x 10³
   B. 3.6 x 10³
   C. 3.6 x 10³
   D. 3.6 x 10³

10. The figure 2 below shows a presentation of a transverse wave.

   Determine the wave length of the wave.
   A. 5cm
   B. 4cm
   C. 6cm
   D. 8cm

11. For two resistors R₁ and R₂ connected in parallel and whose combination is in series with R₃, the effective resistance, R in the whole circuit is given by:
   A. \( R = \frac{R_1 x R_2}{R_1 + R_2} \)
   B. \( R = \frac{R_1 x R_2}{R_1 + R_2} \)
   C. \( R = \frac{R_1 x R_2}{R_1 + R_2} \)
   D. \( R = \frac{R_1 x R_2}{R_1 + R_2} \)

12. For forces of 6N, 12N and 40N act on a body as shown in the figure 3 below.

   Determine the magnitude of the resultant forces.
   A. 5N
   B. 18N
   C. 18N
   D. 2N

13. Determine the amount of heat required to raise the temperature of water mass 3kg by 55°C.
   A. 1760J
   B. 1760J
   C. 7392J
   D. 7392J

More questions and answers next week