VISION GROUP

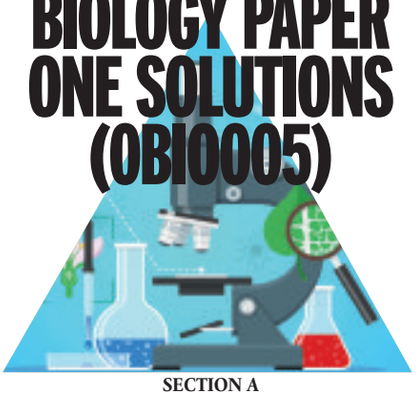
NATIONAL PRIDE • GLOBAL EXCELLENCE

HOME SCHOOLING MATERIAL

PASS O' LEVEL

BIOLOGY, PHYSICS & ENGLISH LANGUAGE

BIOLOGY PAPER ONE SOLUTIONS (0BIO005)



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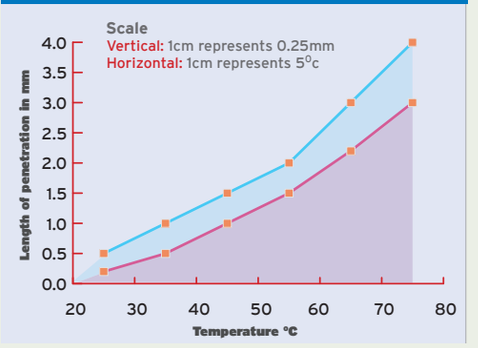
SECTION A

1. **C;** during transfusion, the antigen in the donor and the antibody in recipient are considered so that the antigen is not introduced into a body with its corresponding antibody.
2. **A;** in a pyramid, producers are at the bottom. The organisms at the higher trophic level are fewer than those at lower trophic levels.
3. **B;** apical meristem is found at the tips of root and shoot and causes an increase in height while lateral meristem is found in cambium and causes increase in girth.
4. **D;** in continuous variation, there is no clear cut difference between extremes of a character. Both continuous and discontinuous variation are forms of genetic variation.
5. **D;** the plant in the figure is a fern and ferns are pteridophytes.
6. **D;** all veins return blood to the heart (vena cava and pulmonary vein), while arteries carry blood away from the heart (aorta to the rest of the body and pulmonary artery to the lungs to pick oxygen).
7. **C;** the smaller the size of particles of soil, the smaller the space in between soil particles, providing little passages for water, hence retaining much water.
8. **C;** earlobes perform the function of collecting sound waves and directing them in the auditory canal.
9. **A;** the caterpillar is the most active and destructive form of a butterfly. It is a larval stage of butterfly.
10. **A;** all the offspring are heterozygous, having alleles for antigens A and B.
11. **A;** the shoot grows away from the pull of gravity as it causes more auxins to accumulate on the lower side of the shoot, hence growing faster than the other side.
12. **C;** when the mouth opens, the floor of the buccal cavity lowers and water enters in the mouth. Water moves from an area of high pressure to that of low pressure.
13. **D;** a single embryo results from an egg fertilised by a sperm. Identical twins result from an egg fertilised by a sperm, splitting into two. Note that an egg cannot be fertilised by two sperms.
14. **B;** carbon is only incorporated into plants from the atmosphere through photosynthesis.
15. **B;** the tail beats sideways repeatedly, generating a forward propulsive force for the fish.
16. **C;** Dendrons are formed due to fusion of dendrites. Axon conduct impulses away from the cell body.
17. **C;** only simple nutrients are used as building units of complex nutrients.
18. **A;** pupil reduces in size to allow little light inside the eye protecting retina.
19. **B;** only birds and mammals are chordates able to carry out internal fertilisation.
20. **A;** the figure shows chromosomes aligned at the equator of the spindle in pairs with their chromatids un-separated.
21. **B;** the pancreas detects changes in the blood glucose level and secrets insulin and glucagon in the homeostatic control of blood glucose level.
22. **A;** meiosis results in formation of gametes which are not formed in asexual reproduction.
23. **B;** the figure shows a cervical vertebra which is found in the neck region.
24. **A;** as outside the cytoplasm can mean the nucleus, leaving outside the body as the most correct alternative.
25. **B;** alternative D shows accumulation of resources at a specific site while B shows at specific sites.

SECTION B

25. (a) ,

A graph of variation in length of cube penetrated by potassium permanganate with temprature.



(b) — increase in temperature increases rate of movement of materials.
— The smaller the size of an object, the faster the speed of movement of materials in it.
— The larger the size of an object, the slower the speed of movement of materials in it.

(c) (i) Longer length penetrated by potassium permanganate in cube A than B at the same temperature. This because cube A has a smaller surface area to volume ratio than cube B, hence materials diffuse faster in it than in cube B.
(ii) Increase in temperature increases the distance of penetration of potassium permanganate in each cube. This is because increase in temperature increases the kinetic energy of materials, hence increasing their speed of movement.

(d) (i) B. The transport system would increase the speed of reception and removal of materials from distant cells.
(ii) It maintained a uniform temperature throughout each setup.

(e) — Fluctuation of temperature in each setup.
— Time difference in remove the cubes from the solution.

26. (a) (i) **Commensalism** is the association between organisms of different species in which one benefits but the other organism neither benefits nor is harmed while **parasitism** is an association between organisms of different species where one organism benefits and the other is harmed.
(ii) A parasite is an organism that benefits while a host an organism that is harmed in a parasitic relationship.

(b) (i) Malaria is caused by plasmodium.
(ii) Malaria is transmitted when a female anopheles mosquito feeds on an infected person, it obtains the plasmodium parasite that it later transfers in non-infected person when it bites him/her.

(c) — Destruction of breeding sites by clearing bushes near home.
— Spraying oil over stagnant water.
— Spraying using insecticide.
— Sleeping a treated mosquito net.
— Treatment using antimalarial drugs.

SECTION C

27. (a)(i) Plants produce little waste products, some of its waste products are reused in the body and most waste products are less toxic.
(ii) On cold days, no or little sweating occurs, leaving urination as the only means of excreting excess water from the body. Hence little water is reabsorbed from the glomerular filtrate.
(iii) To increase surface area for reabsorption of water such that little water is lost in urine, hence conserving water since it is difficult to access drinking water in deserts.

(b)(i) – Metabolic reactions are continuous, hence continuous supply of energy.
— Inhabits a wider habitat irrespective of the environmental temperature.
(ii) — Drinking hot fluids in humans.
— Bathing with hot water.
— Putting on heavy clothing.
— Burrowing in the soil.
— Cuddling or aggregating like in bats.
— Undergoing hibernation

28. (a) (i) Removes all starch in the leaves such that any starch found in the leaf is a confirmation of occurrence of photosynthesis during the experiment as it is the only way of forming starch.

(ii) With a potted plant, it can be carried and placed in the desired condition during an experiment unlike a plant firmly anchored into the ground.

(b) Title: An experiment to investigate the need for chlorophyll in photosynthesis.

Apparatus and materials
- A potted plant with variegated leaves,
- Beaker,
- Iodine solution,
- Boiling tube,
- White tile,
- Methylated spirit,
- Source of heat,
- Boiling tubes, forceps.

Procedure:
- Destarch a potted plant with variegated leaves by putting it in darkness for at least 24 hours.
- Expose the plant to sunlight for at least 5 hours.
- Detach a variegated leaf from the plant.
- Test the detached leaf for presence or absence of starch.

(a) Variegated leaf

(b) After testing for starch

Observation:
- Only green parts of the leaf changed to a blue colour.
- The non-green parts of the leaf changed to a yellow colour.

Conclusion:
Chlorophyll is necessary for photosynthesis to take place.

Explanation:
The green parts of the leaf have chlorophyll and therefore absorbed sunlight energy and carried out photosynthesis. The non-green parts of the leaf lack chlorophyll and therefore did not absorb sunlight energy hence did not carry out photosynthesis.

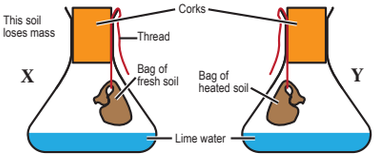
Thursday, June 11, 2020

PASS O'LEVEL

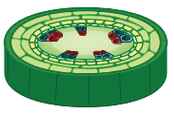
BIOLOGY PAPER ONE QUESTIONS (OBIO006)

SECTION A

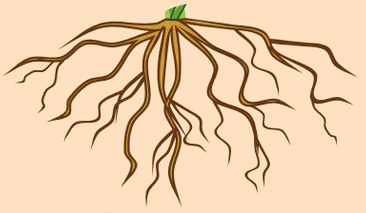
1. A biologist obtained 8000 F_2 offspring after crossing F_1 generation from a cross between rounded and wrinkle-seeded plants. If the allele for round seed is dominant and that for wrinkle seed is recessive, what was the number of round seeded plants obtained?
   A. 700. B. 600
   C. 200 D. 400
2. Which of the following pairs of factors favour occurrence of natural selection?
   A. Similarities among organisms and changes in the environment.
   B. Organism being best fit and a stable environment.
   C. Changes in the environment and variation among organisms.
   D. Stability of the environment and sexual reproduction.
3. **Figure 1** below shows an experiment to investigate the presence of microorganisms in soil. What observation was made after 2 hours?



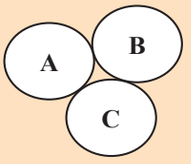
   A. Lime water in X remained colourless while that in Y turned milky.
   B. Lime water in both X and Y turned milky.
   C Lime water in X turned milky while that in Y remained colourless.
   D. Lime water in both X and Y remained colourless.
4. Which of the following best describes the function of umbilical cord? It;
   A. feeds the embryo with digested food substances
   B. transports nutrients and wastes to and from the embryo respectively
   C. removes waste products from the embryo to the mother's blood
   D. supplies oxygenated blood from the mother to the embryo
5. The method of movement of respiratory gases during gaseous exchange in amoeba is;
   A. diffusion B. osmosis
   C. active transport D. phagocytosis
6. Which of the following is the outer most layer of the human skin?
   A. Epidermis layer.
   B. Malphigian layer.
   C. Granular layer
   D. Cornified layer.
7. Which of the following characters is not a sex liked trait?
   A. Hemophilia. B. Intelligence.
   C. Colour blindness. D. Sickle cell anemia
8. Which of the following is the plant part whose cross section is shown in **figure 2** below?



   A. Monocotyledonous plant root
   B. Monocotyledonous plant stem
   C. Dicotyledonous plant root
   D. Dicotyledonous plant stem.
9. The importance of mitotic cell division in asexual reproduction is
   A. Formation of variation among the offspring.
   B. Offspring are identical to the parents.
   C. Ensure maintenance of chromosome number in gametes.
   D. Chromosomes in offspring are non-identical.
10. Which of the following is common to classes pisces, reptilian and mammalia? The organisms;
   A. are cold blooded
   B. use nostrils for breathing
   C. have scales
   D. carry out external fertilisation
11. The common elements in food nutrients are;
   I. Carbon II. Hydrogen
   III. Nitrogen IV. Oxygen
   Which of the nutrients are found in carbohydrates and proteins?
   A. (I), (II) and (III) B. (II), (IV) and (III)
   C. (IV), (II) and (I) D. (III), (IV) and (I)
12. Which food nutrients are transported by lymphatic system?
   A. Glucose B. Amino acids
   C. Glycerol D. Galactose
13. Which of the following is the reason for the stigma of wind pollinated flowers being feathery?
   A. Forms a net-like structure increasing surface area for trapping pollen many flying grains.
   B. Pollen grains are easily dislodge by the wind to another area.
   C. Attracts and reduces speed of wind causing pollen grains to land on the stigma.
   D. Produces a suction force that pulls pollen grains towards the stigma.
14. What is the type of root system shown in **figure 3** below?



   A. Tap root system.
   B. Adventitious root system
   C. Fibrous root system
   D. Stilt root system
15. Which of the following is the reason for the effect of high light intensity on the rate of photosynthesis?
   A. High rate of transpiration due to many opened stomata.
   B. Low rate of transpiration due to much vapour around the plant.
   C. High rate of transpiration due to high speed of movement of vapour.
   D. High rate of transpiration due to high rate of transpiration.
16. During an experiment to test a leaf for starch, why is the leaf boiled in alcohol? To;
   A. Kill the protoplasm B. Dissolve chlorophyll
   C. Soften the leaf. D. Make the leaf brittle.
17. The **figure 4** below shows adjacent cells of the same concentration



   What conclusion can be made on the movement of water among the cells?
   A. Water moves from A to B then to C.
   B. No net movement of water among the cells.
   C. Water moves from C to B and then to A.
   D. No movement of water between B and C.
18. The table below shows the weight of top soil removed from different types of ground in 15 years.

Type of ground	Weight of loss soil in kg
Virgin forest	0.5
Grass	51
Crops rotated	2386
Bare ground	166000

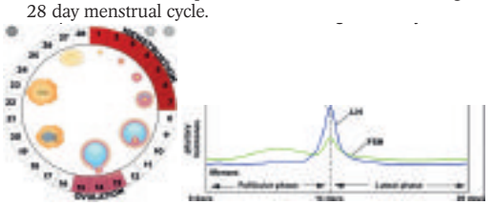
   Based on the information from the table, which of the following activities are very effective in controlling soil erosion?
   A. Mulching of garden
   B. Contour farming
   C. Afforestation
   D. Grass planting
19. Endosperm is formed by fusion of;
   A. pollen tube nucleus with an egg cell.
   B. a male nucleus with an egg cell.
   C. a male nucleus and polar nuclei.
   D. generative nucleus with polar nuclei.
20. Which of the following occur during effective stroke in active flight of birds? Pectoralis major...
   A. contract while pectoralis minor relax
   B. relax and pectoralis minor relax
   C. contract and pectoralis minor contract
   D. relax while pectoralis minor contract
21. Which of the following is the function of amniotic fluid in mammalian foetal development?
   A. Supplies nutrients to the foetus.
   B. Removes waste products from the foetus.
   C. Prevents shock from reaching the foetus.
   D. Maintains a suitable temperature for the foetus.
22. Transportation of manufactured food in plants occur in;
   A. Xylem B. Tracheid
   C. Vascular bundles D. Phloem
23. Which of the following shows the correct path of sound waves during hearing?
   A. Earlobe, eardrum, ossicles, round window, cochlea, oval window.
   B. Cochlea, auditory canal, ossicles, oval window, eardrum.
   C. Earlobe, auditory canal, eardrum, ossicles, oval window, cochlea
   D. Auditory canal, ossicles, eardrum, round window, cochlea.
24. Which of the following substances are excreted in mammalian urine?
   A. Heat, urea, water, uric acid.
   B. Urea, salts, glucose.
   C. Salts, water, uric acid.
   D. Urea, water, salts
25. To which class does the arthropod shown in **figure 5** below belong?

   A. Arachnida. B. Insecta.
   C. Crustacea. D. Diplopoda.
26. Anaerobic respiration in animals is more advantageous than anaerobic respiration in plants because in animals;
   A. lactic acid can be broken when oxygen is available unlike alcohol
   B. less energy is used than in plants
   C. more water is produced than in plants
   D. lactic acid is less toxic like alcohol in plants
27. Which of the following is a feature of plant cells?
   A. Consists of a wide cytoplasm.
   B. A large central vacuole present
   C. Nucleus are centrally located.
   D. Cell membrane encloses cell wall.
28. Which of the following is the best description of food nutrients absorbed in the mammalian ileum?
   A. Complex and soluble.
   B. Simple and soluble.
   C. Large and soluble.
   D. Small and soluble.
29. Which of the following exocrine gland controls the activities of ductless glands?
   A. Pituitary gland B. Hypothalamus
   C. Adrenal gland D. Parathyroid gland
30. Which type of meristem is shown in **figure 6** below?

   A. Lateral meristem
   B. Axillary meristem
   C. Intercalary meristem
   D. Apical meristem

SECTION B

31. **Figure 7** below shows variation on concentration of hormones and development and release of ovum during a 28 day menstrual cycle.



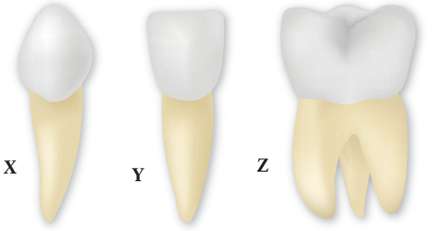
(a) Comment on the state of thickness of the uterine wall and give a reason for your comment from;

	State of thickness	Reason
1st to 7th day		
8th to 15th day		
16th to 25th day		

(b) With a reason, identify duration within which fertilisation can occur.
(c) Explain the changes in the concentration of
(i) Luteinising hormone (LH)
(ii) Follicle stimulating hormone (FSH)
(d) Discuss the role of corpus luteum in the early stages of pregnancy.
(e) Suggest the
(i) importance of sexual reproduction
(ii) Methods of birth control that also prevent acquiring sexually transmitted diseases.

32. During an experiment on germination, seeds from the same plant were separated into four sets A, B, C and D and treated as below.
A – Seeds were soaked in water for 24 hours.
B – Seeds were germinated for three days.
C – Seeds were germinated for germinated for 7 days.
(a) The three sets of seeds were then tested for starch and reducing sugars, suggest the set of seeds that had highest concentration of;
(i) starch.
(ii) reducing sugars.
(b) Explain your response in (a) above.
(c) Seeds of set D were soaked in water for 24 hours and planted. If the seeds failed to germinate after 10 days of planting suggest two
(i) Possible reasons for the failure of the seeds to germinate.
(ii) Ways of overcoming the reasons suggested in (c)(i) above.

33. **Figure 8** below shows structures of different types of mammalian teeth.



(a) Identify the type of teeth represented by the letters X, Y, and Z.
(b) Describe the structure of tooth Z.
(c) Giving a reason, suggest the function of each type of teeth.
(d) Suggest the number of each type of teeth in an adult human being.
(e) Outline oral care practices that ensure good oral hygiene.

SECTION C

34. (a) State the difference between movement and locomotion.
(b) Describe three types of joints and state their locations in the human body.
(c) State the importance of endoskeletons in mammals.
(d) State the adaptations of the hind limbs of a grasshopper for locomotion.

35. (a) Describe the life processes that occur in plants.
(b) State
(i) a difference between a seed and a fruit.
(ii) adaptations of seeds and fruits to animal dispersal.
(iii) advantages of seed and fruit dispersal.

36. (a) State the varieties of nerve cells and their direction of transmission of impulse.
(b) Describe the structure of a motor neurone.
(c) Describe the response that occurs in the body when a hand touches a got object.

37. (a)(i) List the components of soil and their functions.
(ii) Explain the arrangement of soil layers in the earth crust.
(b) Describe a test to determine the pH of a soil sample.

ENGLISH LANGUAGE SOLUTIONS (OENG005)

PAPER ONE

NARRATIVE COMPOSITION

For a narrative composition to score highly, it should bear the following items of merit:
(a) It should have a wide range of vocabulary and idioms.
(b) The following figurative language should be considerably applied.
- Similes.
- Metaphor.
- Hyperbole.
- Allusion.
- Idiom.
- humour /wit.
- Imagery, etc.

(c) It should use descriptive language to draw a mental picture.
(d) Variety of sentence structures, for example; Taking her hand, meticulously, they walked to the flower garden.
(e) Usage of direct speech to engage the reader
(f) Proper paragraphing
(g) Punchy or engaging (eye-catching) title head to evoke reader's interest
(h) Arouse reader's suspense by bringing the gist of the matter towards the end. (However, this is not a must for every composition).
(i) Correct spelling, punctuation, tenses and sentence construction are paramount.

See next publication for more guidelines on items of merit required for other composition types.

SAMPLE NARRATIVE COMPOSITION

QUESTION: Write a story with the title 'SAVED FROM THE CLAWS OF DEATH'.

TO HELL AND BACK

I am not with the slightest doubt that we all want to go to heaven but the means by which we must reach there is man's most loathsome and dreadful nightmare – death. Even a ninety-year-old will swear by his ancestors that he is not willing to give up his ghost to go to heaven despite the agonies of life and pangs of old age.

That Saturday, Irene woke up with the lark and did her chores at rocket speed. The sun, that seemed so bright, ushered in an exceptionally brilliant morning which forespoke the red-letter day that awaited Irene and her boon companions. The thought of the beach party in the evening lit up the candle in her heart and she smiled ear to ear in anxious anticipation of a party-hearty and unrestrained merriment.

She donned her crimson dress matched with a pair of comfortable scarlet shoes and black handbag. Being pretty much late, she had to be quick on the draw. Uber services came in handy and without further ado, she was on MV Kalangala seated as comfortable as an old shoe. She strapped her life jacket on her graceful self as not having it would be staring death in the face. The motor vessel was full of party animals from all walks of life. Much as she was a teetotaller, her colleagues were dipsomaniacs who insatiably gulped the demon drink like there was no tomorrow. One dandy acted philanthropic by offering free beer and wine to whoever cared to drink.

At the party, thunderous music was at its peak and people enjoyed and danced themselves lame. Lines of barbecue filled the party with bliss.

All was well until this son of Adam approached Irene. He was an Adonis by all standards. His looks could make the angels jealous.

"Hi gorgeous, I am Emma," he said in his baritone. His delicate flattery was music to Irene's ears.

"I am Irene," she uttered hesitantly. He used his looks to be a kleptomaniac of ladies' hearts.

He handed Irene a red rose which sent chills to the very depth of her soul. Taking her hand meticulously, they strolled around the flower gardens. He was in a flirtatious mood and so was Irene. She was drowned in a merry-go-round sea of enjoyment. They chatted, chased and caught each other, ate lollipops and really had an indelible moment.

When she opened her eyes, it was morning. She was in a dungeon, as desolate as a tomb! It was so silent you could hear a pin drop! She felt so slothful and indolent. Her arms and legs were tied on wooden pegs. That is when a grotesque sinister looking man entered. Irene's mouth had been gagged so she could not shout.

"Did you say the right or left hand?" the man asked on the phone. He untied her right hand and with a machete, he cut off her middle finger without any remorse! She writhed in excruciating pain! He wrapped it in a piece of barkcloth and stood outside. The voice at the other end of the phone sounded like that of Emma.

"Finish her off: She will alert the police," Emma said. I thought every breath would be my last! With the courage borne of desperation, I used my mutilated hand to dexterously untie myself. Still on his phone, I caught him unawares and kicked him in his groin. I took to my heels with him in close pursuit. I plunged myself into the boundless lake and swam. Unable to swim anymore, I lost consciousness. That is when fishermen ran to my rescue and gave me a kiss of life, saving my pathetic life.

Right now if you tell me about a beach party, I run away like there is a plague! I decided to hang up my boots with such events.

EDGAR MUTARYEBWA,
AUTHOR AND TEACHER

SARAH TUMWEBAZE,
ST MARY'S COLLEGE, KISUBI

PAPER TWO

1. SUMMARY WRITING

Expected points:

1. Keep us informed of the world affairs
2. Help to develop language skills of children.
3. Children can also learn to pronounce words accurately.
4. Provide the family with an opportunity to get together at leisure times.
5. We do less reading
6. Our writing skills are affected.
7. Young children may learn to speak
8. But not to write from television programmes.
9. Television programmes often spare viewers, especially the young ones, from pondering on opinions.
10. Will in turn handicap their ability to analyse facts.

Turn to page IV

From page III

Sample summary:
ADVANTAGES AND DISADVANTAGES OF OWNING A TELEVISION.

Television 1.keeps us informed of the world affairs. Every exposure to television programmes 2.helps to develop language skills of children. These children can also 3.learn to pronounce words accurately because of the standardised pronunciation in the programmes. In a family where both parents are working, the television 4.provides the family an opportunity to get together at leisure times. Disadvantages of watching television programmes are that 5.we do less reading and hence 6.our writing skills are affected. Young children may 7. learn to speak 8.but not to write from television programmes. Furthermore, television programmes often 9.spare viewers, especially the young ones, from pondering upon opinions presented before them which will in turn10. handicap their ability to analyse facts.

QUESTION 2.A

2.1. Because he is pursuing development/In pursuit of development.
2.2. Many species of wildlife are lost forever. Certain species are able to withstand the changes to the land while others simply vanish.
2.3. That for animals that he considers useful to him.
2.4. Directly or indirectly altering/changing it and hence Many species of wildlife are lost forever. Certain species are able to withstand the changes to the land while others simply vanish.
2.5. i) Animals man considers not be useful to him.
ii) Animals man considers to be useful to him.
iii) to prepare and use land for growing crops
iv) a stable state characterised by the cancellation of all forces by equal opposing forces/between development and preservation.
v) a system whereby each branch of an organisation can limit the powers of the other branches/man has created an imbalance in nature cycle.

3 (A)

3.1. The teacher of English was applauded by the students of form four for setting a rather easy English mock examination.
3.2. In no way are the parents and teachers accountable for the deteriorating of somewhat indolent students.
3.3. The scene of queer accidents has always been the Kanaaba awkward corner.
3.4. That she cannot take note of guidance given to her is strange.
OR Her not taking note of guidance given to her is strange.
3.5. To listen with understanding is to believe with an understanding heart.
3.6. No sooner had the bride and the bridegroom entered the hall than the dance started.
3.7. One of those passions that are never satisfied is ambition.
3.8. The stranger told the girl that he knew her and her mother.
3.9. Remember the enthusiasm of him who brought this movement so far.
OR Always remember the enthusiasm of him who brought this movement so far.
3.10. Your son is able to perform a lot better in the forth coming National examinations.

3B.

11.D	12.B	13.C	14.C	15.D
16.D	17.C	18.D	19.B	20.B

ENGLISH LANGUAGE QUESTIONS (OENG006)

PAPER TWO

1. Read the passage below and answer the question that follows.

Fisheries Resources Research Institute (FIRRI), an arm of the National Agricultural Research Organisation (NARO), is committed to the creation of a knowledgeable society through generation, dissemination and application of appropriate fishing technologies for sustainable fisheries development.

While the potential production of fish from the lakes and rivers is estimated to be 250,000 metric tonnes annually, it is hampered by various constraints, which the researchers are addressing. These include declining fish stocks and diversity of fish species due to excessive fishing efforts, use of destructive gear and methods, capturing immature fish and the introduction of exotics, pollution and degradation of fish habitat, as well as invasion by water hyacinth and other invasive weeds.

Inadequate information on the biology and ecology of the fish species, limited community participation and poor investment skills are additional constraints to optimal utilisation of the fisheries.

Under aquaculture, the constraints include non-availability of quality fish fry, poor technology for fish production, lack of affordable and locally available fish feeds, poor management practices, inadequate knowledge on control of pests and diseases, as well as inadequate data on the economy, feasibility of fish farming.

In the socio-economic programme, constraints include inadequate knowledge on the contribution of fisheries to the national economy, inadequate information on fish marketing systems and insufficient participation of the fisher folk in management of fisheries resources. In all the said systems, there is inadequate dissemination of information and limited application of research results, which FIRRI is addressing.

In its endeavor to disseminate its research results, FIRRI produces information packages containing technology, methods and advice to guide development and management of the fisheries of different aquatic systems and development of aquaculture.

A lot of information is available on regulation of fishing efforts, suitable fishing gear and methods, conservation of fish species divert, water quality and environment and management of wetlands et cetera. Under aquaculture, there exists information packages on site selection for fish farming, techniques for fish fry production, care and management of ponds and simple pond harvesting gear.

Source: The New Vision, Tuesday, 21st November, 2000

Question: In not more than 120 words, write a summary of the problems hampering development of the fisheries industry.

2A Read the following passage carefully and answer the questions that follow:

Alcohol has been defined as a disease, diagnosed when the ingestion of alcohol impairs an individual's normal status of functions in daily situations and relationships. It is not necessary to become an alcoholic in order to be adversely affected by a serious drinking problem. We need to determine who the drinkers are, why they drink and the effects of alcohol on a drinker's health.

Firstly, drinkers come from all levels of society. The typical drunkard today has been identified as a bright middle-management executive in his thirties, married and living with his family in a nice neighborhood. Drinkers all fall into one category. The first type is the normal drinker. He drinks occasionally only and for perfect, innocent and harmless reasons; he could stop for a long period of time and never miss it. The second type is the alcohol-dependant drinker. He drinks everyday and depends on alcohol more than he will admit. Having to do without alcohol is a very difficult and an unpleasant experience although he will argue vehemently that he will cut it out with no difficulty. During this stage, the individual usually becomes a very heavy drinker. The third type is the alcoholic. He has lost control over his drinking and one drink means another. Alcohol seriously interferes with every aspect of his life, even though he may not admit it.

Secondly, people drink for a variety of reasons. The reason for initial use of alcohol runs from experimental to rebellion. Drinking now is more socially acceptable than in the past, many people drink to be sociable. Others drink occasionally to relax at the end of a tiring day. The businessman often finds himself drinking at lunches, dinners and meetings to please his peers. Some drink because they enjoy the intoxicating effects of alcohol. Alcohol acts as a partial or total anaesthetic on the brain, depending on the amount in the blood. Moderate amounts help to reduce shyness and feelings of restraint and relax nervous tensions. Young people watch movie and television stars drink, and advertisement makes liquor appear normal accompaniments to having fun. Other people drink to gain relief from difficult situations or to escape from facing reality.

Thirdly, alcohol has many long-term effects on the drinker's health. As food, alcohol supplies calories only; one eight-ounce glass of beer or one-ounce drink of eighty-four (84) proof each contains about seventy calories. Thus, heavy drinking means extra calories in the diet. Prolonged drinking of alcohol causes the liver to become swollen with yellow fat. This often develops into a serious condition known as cirrhosis of the liver. After a long excessive use of alcohol, damage can occur in the form of neuropathy or delirium tremens. Delirium tremens is marked by hallucinations, severe tremor, insomnia and great exhaustion. Extreme cases of long lasing alcoholism may cause permanent brain damage and mental illness, requiring confinement in a psychiatric hospital. Another more direct effect of alcohol is on the heart muscle itself. Deaths related to alcohol have been cited as the fourth ranking public health problem in America, surpassed only by heart disease, cancer and mental disease.

Heavy drinkers may be people of any age from any social level, who drink for any number of reasons. Nevertheless, whatever the reason for drinking, long-term alcoholism can reduce a person's life span by as much as twelve years. The real cure of this problem is prevention only; through education.

PAPER ONE

SECTION A

This question is compulsory. (Use 180 to 200 words)

1. Assuming you are in your senior four vacation and you are applying for a part-time job in a supermarket in town. Write a curriculum vitae to accompany your application.

SECTION B

Choose one of the following topics and write a composition of 500 to 600 words.

2. Write a story ending: "…what began as a day of joy ended in a lot of sorrow."
3. "Streaming students according to their academic performance is not fair." Do you agree or not? Give reasons for your view.
4. Narrate an incident when you did something very good and how you were rewarded.
5. Describe someone that makes you happy.
6. How can the government curb down the current land conflicts in Uganda today?
7. Write a composition based on the proverb "One by one makes a bundle".

Questions:

2.1 Who according to the passage are heavy drinkers?
2.2 Enumerate the killer diseases as they are presented in the passage.
2.3 Mention any two reasons for which people take alcohol.
2.4 According to the passage, what is the real cure of alcohol as a disease?
2.5 Explain the meaning of the following words and expressions as they are used in the passage.
(i) impairs
(ii) adversely
(iii) vehemently
(iv) surpassed

2.B. Read the following passage. Then answer the questions and check your answers.

Most people can remember a phone number for up to thirty seconds. When this short amount of time elapses, however, the numbers are erased from the memory. How did the information get there in the first place? Information that makes its way to the short term memory (STM) does so via the sensory storage area. The brain has a filter which only allows stimuli that is of immediate interest to pass on to the STM, also known as the working memory.

There is much debate about the capacity and duration of the short term memory. The most accepted theory comes from George A. Miller, a cognitive psychologist who suggested that humans can remember approximately seven chunks of information. A

chunk is defined as a meaningful unit of information, such as a word or name rather than just a letter or number. Modern theorists suggest that one can increase the capacity of the short term memory by chunking, or classifying similar information together. By organising information, one can optimise the STM, and improve the chances of a memory being passed on to long term storage.

When making a conscious effort to memorise something, such as information for an examination, many people engage in "rote rehearsal". By repeating something over and over again, one is able to keep a memory alive. Unfortunately, this type of memory maintenance only succeeds if there are no interruptions. As soon as a person stops rehearsing the information, it has the tendency to disappear. When a pen and paper are not handy, people often attempt to remember a phone number by repeating it aloud. If the doorbell rings or the dog barks to come in before a person has the opportunity to make a phone call, he will likely forget the number instantly. Therefore, rote rehearsal is not an efficient way to pass information from the short term to long term memory. A better way is to practice "elaborate rehearsal." This involves assigning semantic meaning to a piece of information so that it can be filed along with other pre-existing long term memories.

Encoding information semantically also makes it more retrievable. Retrieving information can be done by recognition or recall. Humans can easily recall memories that are stored in the long term memory and used often; however, if a memory seems to be forgotten, it may eventually be retrieved by prompting. The more cues a person is given (such as pictures), the more likely a memory can be retrieved. This is why multiple choice tests are often used for subjects that require a lot of memorisation.

Questions:

1. According to the passage, how do memories get transferred to the STM?
   A. They revert from the long term memory.
   B. They are filtered from the sensory storage area.
   C. They get chunked when they enter the brain.
   D. They enter via the nervous system.
2. The word elapses in paragraph 1 is closest in meaning to:
   A. passes B. adds up
   C. appears D. continues
3. All of the following are mentioned as places in which memories are stored EXCEPT the:
   A. STM B. long term memory
   C. sensory storage area D. maintenance area
4. Why does the author mention a dog's bark?
   A. To give an example of a type of memory
   B. To provide a type of interruption
   C. To prove that dogs have better memories than humans
   D. To compare another sound that is loud like a doorbell
5. How do theorists believe a person can remember more information in a short time?
   A. By organising it B. By repeating it
   C. By giving it a name D. By drawing it
6. The author believes that rote rotation is:
   A. the best way to remember something
   B. more efficient than chunking
   C. ineffective in the long run
   D. an unnecessary interruption
7. The word it in the last paragraph refers to:
   A. encoding B. STM
   C. semantics D. information
8. The word elaborate in paragraph 3 is closest in meaning to:
   A. complex B. efficient
   C. pretty D. regular
9. The word cues in the passage is closest in meaning to
   A. questions B. clues
   C. images D. tests
10. The nearest word in meaning to this bold word "semantic"
    A. relating to the meaning of grammar
    B. relating to the meaning of
    C. relating to the meaning of something.
    D. relating to the meaning of someone.

3A. Re-write the following sentences according to the instructions without altering the meaning.

3.1 The police were accused of beating up the suspect. (Begin: The suspect alleged…)
3.2 Spectators were very few. (Use "hardly")
3.3 You are probably better at acting than you are at singing. (Use …as good as…)
3.4 "I am sorry I don't know where to find him. (Re-write in reported speech beginning: He apologised…)
3.5 Rice attracts children than it does adults. (Begin: Children…)
3.6 Gerald has something to do with that robbery. (Re-write as a question)
3.7 KCCA can boast that it has good roads. (Re-write omitting "that")
3.8 Rumour has it that a baby spoke after birth in Busoga. (Begin: It…)
3.9 I have never heard such annoying news before. (Begin: Never…
3.10 Disappear from here as soon as possible. (Put a question tag)

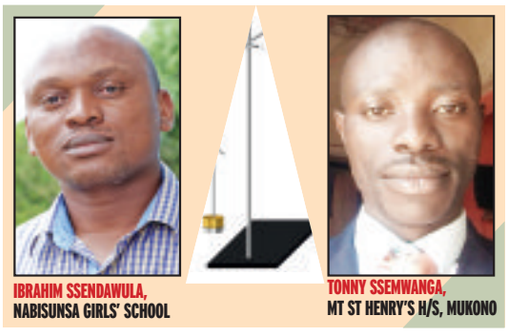
3B Choose the most correct alternative.

3.11 When I _____ their answers, I will let you know at once.
A. have received B. shall have received
C. will have received D. shall receive
3.12 He believes in ghosts, but I am convinced there is no _____ as a ghost.
A. such a thing B. such thing
C. such things D. such
3.13 I was with my two brothers when the thieves attacked the house. _____ were able to overpower them easily.
A. We three people B. The three of us
C. All the three of us D. The triple of us
3.14 This is a wonderful _____. It can print ten thousand copies of a book in about two hours.
A. instrument B. implement
C. machine D. machinery
3.15 Peter put the work aside when he went for lunch with _____ it up again in the afternoon.
A. an intention of taking B. an intention of taking
C. the intention of taking D. the intention to take
3.16 I would like to apply but I am not sure whether I am really _____.
A. legible B. eligible
C. illegible D. illicit
3.17 The Commissioner of Police said that their action had been highly _____.
A. recommended B. complimentary
C. commemorative D. commendable
3.18 The accident was not your fault in any way. You should not _____ about it.
A. nag B. fret
C. itch D. scratch
3.19 The manager _____ me that he would make sure that the mistake should not occur again.
A. ensured B. emphasised
C. secured D. assured
3.20 Sarah appeared in her _____.
A. best bibs and tuckers.
B. best bib and tucker.
C. best bibs and tucker.
D. best bib and tuckers.

PHYSICS PAPER ONE SOLUTIONS (OPHY005)

SECTION A

1. **A.** Black bodies are good absorbers and good radiators of heat while shinny surfaces are poor absorbers and poor radiators of heat.
2. **B.** Addition of impurities such as salt to water lowers its melting point but raises its boiling point.
3. **D.** $F = ma$
   $F = m\left(\frac{v-u}{5}\right)$
   $F = 3000\left(\frac{60-0}{5}\right)$
   $F = 36000$
4. **B.** **A displacement node** is a point of minimum displacement, while an **anti node** is a point of maximum displacement.
5. **C.** Absolute zero is the minimum temperature at which the molecules of substances have their lowest possible kinetic energy. In other words, its when all the heat has been removed from the substance.
6. **B.** $s = ut + \frac{1}{2}at^2$
   but $a = \frac{v-u}{t} = \frac{30-0}{10} = 3ms^2$
   $s = 0 \times 10 + \frac{1}{2} \times 10^2$
   $s = 150m$
7. **B.** A floating body displaces its own weight of the fluid in which it floats. This is in accordance to the law of flotation.
8. **B.** White light is split into its component colours by a process referred to as dispersion. However, dispersion is caused by **refraction** of white light by a prism or any other refracting medium.
9. **A.**
   $\text{Power} = \frac{\text{work done}}{\text{time}} = \frac{\text{force} \times \text{distance}}{\text{time}} = \text{force} \times \frac{\text{distance}}{\text{time}}$



IBRAHIM SSENDAWULA, NABISUNSA GIRLS' SCHOOL

TONNY SSEMWANGA, MT ST HENRY'S H/S, MUKONO

   $\text{Power} = \text{force} \times \text{velocity} \left(\text{since velocity} = \frac{\text{distance}}{\text{time}}\right)$
   $\text{Power} = 30 \times 20 = 600W$
10. **B.**
    $E = (R+r)$
    $21 = 3(6 + r)$
    $7 = 6 + r$
    $r = 7 - 6 = 1\ \Omega$
11. **D.** Electrons are negatively charged, so when they enter midway between two charged metal plates, they are deflected towards the positive plate. This is derived from the law of electrostatics which states that 'like charges repel while unlike charges attract'.
12. **A.** Eddy currents in a transformer are reduced by laminating its core.

Read about factors that reduce the efficiency of a transformer and ways in which they can be minimised.

13. **D.**
    $\text{Power} = \frac{\text{force} \times \text{distance}}{\text{time}} = \frac{\text{mgd}}{t} = \frac{10^4 \times 10 \times 40}{1} = 4.0 \times 10^6 W$
14. **C.** Resultant force = 50N - 30N = 20N towards the right.
    Note that the vertical forces acting on the particle are equal to each other, so they cancel out and we are left with only forces acting horizontally.
15. **C.** From Q = It, it can be seen that $I = \frac{Q}{t}$ which can be defined as the rate at which charge flows through the circuit. The units of current are amperes.
16. **D.** Cathode rays are streams of electrons moving at a high speed.

Read about properties of cathode rays.

17. **C.** **Wavelength** is defined as the distance between two successive crests.
    Note that the distance between a crest and trough is half the wavelength.
18. **C.** $Q = It = 6 \times 2 \times 60 = 720C$
19. **D.** Units of fundamental quantities include kilogram, seconds, metres, kelvin, candela, ampere and a mole.
20. **C.** **Vector quantities** are quantities that are defined by both magnitude and direction. These include weight, displacement, acceleration and others.

Read about scalar quantities.

21. **A.** From the principle of moments;
    sum of clockwise moments = 20x10x50x20 = 1000 N*m*
    Sum of anti clockwise moments 40 x 40 = 1600 N*m*.

    It can be seen that the sum of anti clockwise moments is greater than the sum of clockwise moments. So the system will turn in an anti clockwise direction.

Turn to page VI

From page V

22. **A.**

$n_g \sin i_g = n_a \sin i_g$

$1.5 \sin r = 1 \times \sin 30$

$r = \sin^{-1} \frac{\sin 30^\circ}{1.5}$

$r = 19.5^\circ$

23. **C.** The rate at which a gas diffuses through a partition include:
temperature of the gas
size of gas molecules
size of the partition

24. **B.** Magnetic fields run from the north pole to the south pole.

25. **C.** Image formed on the retina of the eye is inverted and real.

Read about the functions of the parts of the eye.

26. **B.** The X and Y- plates in a cathode ray oscilloscope make up the deflection system of the cathode ray oscilloscope (C.R.O)

Read about how the X and Y- plates deflect the beam and the functions of other parts of a C.R.O.

27. **D.** A magnet can be destroyed by:
(i) Heating it
(ii) connecting it to an alternating current and
(iii) Dropping it hard on a surface

28. **D.** Electrostatic field lines run from positive to negative charges.

29. **B.** From the principle of conservation of linear momentum,
Let m be the mass of the car and V the common velocity.

$m_1u_1 + m_2u_2 = (m_1 + m_2)\ V$

$4m + m \times 0 = (m+m)\ V$

$4m = 2mV$

$V = 2ms^{-1}$

30. **A.** Cyan = blue + green
Magenta = red + blue
Yellow = red + green
Cyan + blue and magenta + red = blue + green + blue + red + blue + red
blue + blue = blue, red + red = red
∴ Cyan + blue and magenta + red = blue + green + red = white light

Read about primary and complimentary colours.

31. **C.** From $P = IV \Rightarrow I = \frac{P}{V} = \frac{2640}{240} = 11A$

A fuse is a thin wire of low melting point which melts when the current exceeds a required value so as to break the circuit. It must be connected to the live wire. Its rating (value) must be slightly higher than the total current that passes through the circuit.

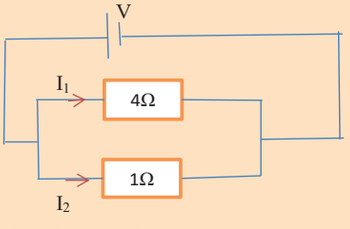
32. **B.** **Surface tension** is as a result of forces of attraction between molecules in the **surface** of a liquid. So, its a demonstration of cohesion forces since cohesion forces are forces of attraction between molecules of the same kind.

33 A.

Mass(g)	Time (minutes)
96	0
48	t
24	t
12	t
6	t
3	t

$5t = 4$
$t = 5/4 = 0.8$ minutes
Changing minutes to seconds gives $0.8 \times 60 = 48s$

34. **D.**



$V = I_1 R_1,\ V = I_2 R_2$
$V = 0.8 \times 4 = 3.2$
Also $V = 12 \times 1 = 3.2$
$\therefore I_2 = 3.2\ A$

35. **A.** White surfaces reflect all colours incident on them and red surfaces absorb all colours incident on them but reflect only red. Black surfaces absorb all colours incident on them.

36. **D.** When a stone is projected up, it has maximum potential energy at the highest point of its flight. At the highest point, it has zero kinetic energy since its said to be momentarily at rest.

37. **C.** When a crystal of copper sulphate is carefully put at the bottom of a beaker containing water, after some days it spreads through out the liquid. It spreads from a region of high concentration to a region of low concentration and such a process is referred to as **diffusion**.

38. **C.** Let the original mass be m

Mass left	Time (min)
m	0
½m	2
¼x	4
⅛m	8

So after 8 minutes, ⅛ of the original mass is left.

39. **C.** When a glass rod is rubbed with silk and then separated, the glass rod acquires a positive charge while the silk acquires an equal negative charge.

40. C. From Hooke' law, $F = ke$

$\frac{F_1}{e_1} = \frac{F_2}{e_2} \Rightarrow F_2 = \frac{F_1 x\ e_2}{e_1} = \frac{mg \times e_2}{e_1} = \frac{0.2 \times 10 \times 10 \times 6}{8} = 1.5N$

Read about experiment to verify Hooke's law.

SECTION B

41. (i) Resultant force, 10N – 6N = 4N towards the direction of the 10N force. (Or towards the right)

Note: *Resultant force is got by;*
- Either adding forces if they are acting in the same direction **OR**
- Subtracting forces if acting in opposite direction or
- Using Pythagoras theorem for forces acting perpendicular to each other.

Since force is a vector quantity, you are required to state both its magnitude and its direction.

(ii)

Given;	Using; $F = ma$
$F = 4N$ mass, m = 500g (change g to kg) a = ?	$4 = \frac{500}{1000} \times a$ $\Rightarrow a = \frac{4000}{500} = 8ms^{-2}$

(a) **Archimedes' principle** states that when a body in wholly or partially immersed in a fluid, it experiences an upthrust equal to the weight of fluid displaced.

Read about; Applications of Archimedes' principle which include; determination of relative density of a substance using the hydrometer, designing of ships and submarines, movement of a hot air balloon and others.

(b) Given;
Weight in air, $W_a = 30$ g
Weight in water, $W_w = 25$ g
Density = ?
From;
Relative density, $RD = \frac{W_a}{upthrust} = \frac{W_a}{W_a - W_w}$

Also, $RD = \frac{\text{density of a substance}}{\text{density of water}}$

$\Rightarrow$ Relative density = 6 x 1000
= 6000

43. (a) After some time, the bloating paper gets wet and eventually sinks to the bottom. However, the pin remains floating on the water

(b) The pin sinks to the bottom because surface tension on the surface of water is reduced by the addition of soap.

Read about; the origin of surface tension, its effects and factors that affect it.

44. (a) **Specific heat capacity of a substance** is the quantity of heat required to raise the temperature of a of 1kg mass of a substance by 1^0C or 1K.

(b) Given;
mass, m = 4kg
heat absorbed, Q = 38 kJ = 38 X 1000J
= 38000J
Temperature change, θ = 10° C
specific heat capacity, C = ?
Assuming no heat losses;
Heat absorbed by the iron = heat used to raise its temperature
$38000 = mc\theta$
$38000 = 4x\ C \times 10$
$\frac{38000}{40} = C$
$C = 9500 Jkg^{-1}K^{-1}$

Read about the experiments to determine specific heat capacity of solids and liquids.

45. **(a) During day time.**
Water is a poor conductor of heat and also has a high specific heat capacity. This implies that it requires a lot of heat to change its temperature by just 1K. However, land has a lower specific heat capacity compared to water, meaning that it requires a small quantity of heat to change its temperature by 1K. Therefore, water remains cooler during day time compared to the land.

During night time.
Because of the high specific heat capacity, water does not easily lose heat it gained during daytime, whereas land, with a lower specific heat capacity, loses heat easily. Therefore, since the sea retains its heat for a long time, it remains warmer at night as compared to land.

(b) Factors that affect rate of heat transfer along a metal bar include the;
- ✓ **Length of the conductor**
  The rate of heat flow decreases with increase in length.
- ✓ **Cross sectional area of the conductor**
  The greater the cross sectional area, the higher the rate of heat flow.
- ✓ **Nature of the material of the conductor**
  Different materials conduct heat differently. For example, if copper and iron rods of the same diameter and length are both placed in the bunsen burner flame, you will notice that the copper rod becomes hot faster than the iron rod. Therefore, copper is a better conductor of heat compared to iron.
- ✓ **Temperature difference between the ends of the conductor**
  The higher the temperature difference, the higher the rate of flow of heat by conduction.

Read about;
- ✓ factors that affect the rate of convection and radiation.
- ✓ **c**onduction in liquids and gases.

46. (a) **Focal length** of a converging lens is defined as the distance between the principal focus and optical centre of the lens.

(b) Given;
Focal length = 15 cm
Power of a lens = $\frac{1}{\textit{focal length in metres}}$

If focal length is given in units other than metres (m), then you have to first change them to metres (m), before substituting them in the formula for power.

focal length = 15cm = $\frac{15}{100} = 0.15$m

Power of a lens = $\frac{1}{\textit{focal length in metres}} = \frac{1}{0.15} = 6.67D$

Note: *Unlike in mechanics, where power expended is expressed in watts (W), power of optical instruments is expressed in dioptres (D) Power of converging lenses (convex) is positive since their focal lengths are expressed with a positive sign. On the contrary, the power of diverging lenses (concave) is negative since their focal length are expressed with a negative sign.*

(c) Properties of an image of a real object formed in a diverging lens Include;
- ✓ virtual
- ✓ Upright/erect
- ✓ Diminished

Read about;
- ✓ Definition of terms; optical centre, principal focus and principal axis of both the convex and concave lenses.
- ✓ Nature of images formed in a convex lens for different positions of the object.
- ✓ Experiments to determine the focal length of a convex lens.

47. (a) **A volt** is the potential difference between two points when one joule of work is required to move one coulomb of electricity from one point to another In a circuit.

(b) (i) First determine the effective resistance(R_p) of the resistors in parallel.

That is; $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{2} + \frac{1}{2} = \frac{2}{2} = 1\ \Omega$

$R_p = 1\ \Omega$

Alternatively, the effective resistance (R_p) of resistors can be determined by simply using;

$$Rp = \frac{product}{sum} = \frac{2\times2}{2+2} = \frac{4}{4} = 1\,\Omega$$

Note: *This formula is suitable only when the resistors in parallel being considered are two. If they are more than two, then use the method employed in the former formula. Then, finally determine the effective resistance for the whole circuit as shown below;*

The circuit can now be redrawn as shown below; it is now a series circuit.

Effective resistance; $R_{eff} = 1\,\Omega + 2\,\Omega = 3\,\Omega$.

iii)

Given;
V = 6V
R_{eff} = 3 Ω
I = ?
From; V = IR
6 = 1 x 3
$I = \frac{6}{3} = 2A$
∴ p.d across 2 Ω = I × R = 2 x 2
= 4 V

Note: The p.d souce (6V) is in series with the 2 Ω resistor. Therefore the total current that flows from the source is the equal to the current that passes through the 2 Ω resistor.

Alternatively;
P.d across 2Ω resistor $= \frac{R}{R_{eff}} \times V = \frac{2}{3} \times 6 = 4$ V

Note:
In this technique, you don't need to find the current. The formular only works for series circuits like the one below.

p.d across R_1, $V_1 = \frac{R_1}{R_1+R_2} \times V$

Similarly;

p.d across R_2, $V_2 = \frac{R_2}{R_1+R_2} \times V$

48. (a) **An echo** is a reflected sound.

(b) Given;
Time to echo = 1.5 seconds
Velocity of sound in water = 1500 ms^{-1}
Let distance between the echo sounder and the base of the water be x.
For an echo to be received, it has to cover **twice the distance** between the source and the reflecting surface.
From; speed = $\frac{distance}{time} = \frac{2x}{time}$

$$1500 = \frac{2x}{1.5}$$

$$1500 = \frac{2x}{1.5} \Rightarrow x = \frac{1500 \text{ x } 1.5}{2} = 1125\text{m}$$

Read about;
- ✓ reverberation and factors that affect the speed of sound.
- ✓ ultrasonic sounds

49 (a) **Atomic number** of an element is the number of protons in the nucleus of an atom.
Note: *For a neutral atom, the number of protons is equal to the number electrons.*

(b) An atom of an element can be represent as $^{A}_{Z}X$ where X is the element, A the atomic mass and Z the atomic number (number of protons)

So, the neon isotope given, $^{20}_{10}Ne$ has atomic mass = 20 and atomic number = 10
But atomic mass = number of protons (P) + number of neutrons (N)
20 = 10 + N
N = 20 - 10 = 10

(c) $^{60}_{70}C \longrightarrow {}^{A}_{Z}X + {}^{0}_{-1}e$ + gamma rays

60 = a + 0 ⇒ A = 60
70 = Z + 1 ⇒ Z = 70 + 1 = 71
Therefore, the balanced equation is;
$^{60}_{70}C \longrightarrow {}^{60}_{71}X + {}^{0}_{-1}e$ + gamma rays

While writing an equation, beta particle is represented by an electron.($^{0}_{-1}e$).

Read about the properties of all the radiation particles (alphas, beta and gamma rays) and their applications.

50 (a) **Boyle's law** states that the volume of a fixed mass of a gas at constant temperature is inversely proportional to its pressure.

Given:	From;
V_1 = 200 cm3	$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$
V_2 = 300 cm3	$\frac{75\times200}{T} = \frac{P_2\times300}{T}$
P_1 = 75 cmHg	$75\times200 = P_2\times300$
P_2=?	$P_2 = \frac{75\times200}{300}$
$T_1 = T_2$= T (constant temperature)	$P_2 = 50$ cmHg

Read about the experiment to verify Boyle's law and also try out other numerical questions.

PHYSICS PAPER TWO (0PHY006)

Acceleration due to gravity	= 10 ms^{-2}
Specific heat capacity of water	= 4200$JKg^{-1}K^{-1}$
Specific heat capacity of copper	= 400 $JKg^{-1}K^{-1}$
Specific latent heat of fusion of water	= 340000JKg^{-1}
Speed of sound in air	= 330 ms^{-1}
Density of water	= 1000 Kgm^{-3}.

1. (a) Define a joule.
(b)(i) What is meant by linear momentum?
(ii) State the law of conservation of linear momentum.
(c) A bullet of mass 50g is fired into a block of wood of mass 600g lying on a smooth horizontal surface. If the bullet and the wood move together with a speed of 40ms^{-1}. Calculate;
(i) the speed with which the bullet hit the wood.
(ii) the kinetic energy lost.
(d)State the energy changes involved in (c) above.

2. (a) Define the terms
(i) Diffusion.
(ii) Capillarity.

(b) (i) Explain what happens when a needle is placed carefully on a bloating paper on the surface of water.
(ii) What happens when soap is mixed with water in b(i) above?
(c) (i) Explain why mercury poured on a flat glass gathers itself into a globule but water poured on a glass surface flows.
(ii) State two advantages of mercury over alcohol as a thermometric liquid.
(d) (i) Define crystal cleavage.
(ii) State three characteristics of crystals.

3. (a)(i) Define specific heat capacity of a substance.
(ii) Describe an experiment used to determine the specific heat capacity of a solid using the method of mixtures.
(b) (i) Sketch a graph to show the variation of volume with temperature when ice at -5^{0}C is heated to about 10^{0}C.
(ii) Explain the features on the graph.
(c) A tightly corked glass bottle full of water is left for a long time in the refrigerator at a temperature less or equal to 0^{0}C. Explain what happens?
(d) Give any two reasons why water is preferred while cooling car engines.

4. (a) Define the following.
(i) potential difference.
(ii) internal resistance of a cell.
(b) Explain why the internal resistance of a primary cell is higher than that of a secondary cell.
(c) Describe a simple experiment to measure the internal resistance of a cell using a voltmeter, an ammeter, a standard resistor, a switch and connecting wires only.
(d) When a cell is connected across a 5Ω resistor, the p.d across it is 2V when the cell is connected across a 8Ω resistor, the p.d is 2.4V. Find the;
(i) internal resistance of the cell.
(ii) emf of the cell.

5. (a) Define the following terms as applied to lenses.
(i) Principal focus
(ii) Power of a lens.

(b) Describe an experiment used to determine the focal length of a convex lens using a plane mirror and an illuminated object.
(c) State two applications of convex lenses.
(d) An object of height 4cm is placed perpendicular on the principal axis at a distance of 60 cm from a convex lens of focal length 20 cm. by graphical construction, determine the;
(i) position of the image.
(ii) size of the image.

6. (a) Explain why soft iron is used for magnet keeper.
(b) In the diagrams in figure 1, a wire is wound to form the coils as shown below.

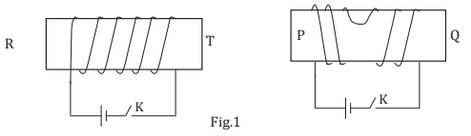


Fig.1

(i) Indicate on the diagrams the flow of current around and name the poles P, Q, R and T.
(ii) Explain how you decided which the North Pole is and which the South Pole is.
(c) State three ways that can be used to increase the strength of the electromagnet in (b) above.
(d) Given two pieces of metal one soft iron and the other steel, describe how you would find out which one is soft iron and which one is steel.

7. (a) Distinguish between thermionic emission and photoelectric emission.
(b) (i) With the aid of a diagram, describe the action of a discharge tube.
(ii) State two properties of cathode rays.
(c) Explain how X-rays are used to locate the broken part of a bone of a patient.
(d) When a counter was placed near a radioactive source of beta particles, the following rates of emission were obtained at the time shown in the table below.

Time(seconds)	0	5	10	15	20
Count rate(per second)	590	316	172	94	50

(i) Plot a graph of count rate against time.
(ii) Determine the half-life of the source.

8. (a) Define the terms;
(i) amplitude
(ii) wave length.
(b) With the aid of a diagram, show how a plane water wave is diffracted when it passes through;
(i) a small opening.
(ii) a slightly bigger opening.
(c) (i) Distinguish between longitudinal waves and transverse waves.
(ii) Give one example of each of the waves in c(i) above.
(d) State four properties of electromagnetic waves.
(e) The distance between two successive antinodes on a standing wave is 6cm. If the distance between the source of wave and reflector is 60 cm, find the;
(i) number of loops in the wave
(ii) wave length of the wave.

BIOLOGY, PHYSICS AND GENERAL PAPER TOMORROW