

Self Access Learning Activities

for

Student Empowerment

(With the curtesy of Provincial Department of Education – Uva)

Science

**Bilingual Education Branch**

Ministry of Education

2010

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## Message from the Hon Minister of Education

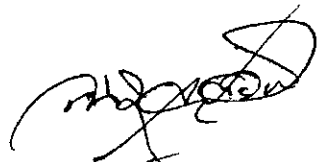
We, the proud Sri Lankans of the 21<sup>st</sup> century now experience a revival in all spheres of society. Successful implementation of the novel and innovative concepts of 'Mahinda Chinthana' is instrumental in bringing about this change.

Measures taken to uplift the quality of Education are numerous in this regard. One of such constructive measures is to declare year 2010 to be the year of English and ICT. English as a life skill; a programme to strengthen and promote Sri Lankan English has been unique among those strategies.

Bilingual Education programme implemented successfully in 601 schools all over the island too is supportive in improving the standard of English language. Good grades obtained by the Bilingual learners at G.C.E. (O/L) examination are an indicator that signifies this remarkable process.

In order to sustain this achievement further, an effective intervention is necessary. This self Access package translated into English by the Bilingual Education Branch of the Ministry of Education, in this regard, is a praiseworthy attempt.

I wish the Bilingual Education Branch success in all future endeavors.



Bandula Gunawardhana

Minister of Education

Ministry of Education

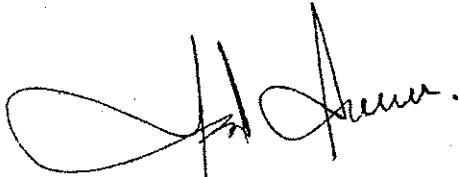
30<sup>th</sup> July 2010

## Message from the Secretary- Ministry of Education

We strongly believe that all learners are talented and creative. The teacher task therefore, is to design learning events for the pupils to blossom in a promising way. The role played by Self Learning packages, in this case is of vital importance.

Learner autonomy or learner independence has been an essential factor in lifelong education. Self Access packages of this nature ensure learner independence.

This includes activities concerning challenging subjects like Mathematics and Science where Self Access materials are rare. I thank Bilingual Education Branch of the Ministry of Education for undertaking and fulfilling this timely important task of translating the Sinhala material prepared in the Uva Province.



Sunil S. Sirisena

Secretary

Ministry of Education

30<sup>th</sup> July 2010

## **Message from the Additional Secretary**

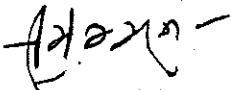
### **(Education Quality Development)**

The Bilingual Education Branch of the Ministry of Education as I am well aware has taken a lot of measures to ensure the sustainability of Bilingual Education.

Preparing “Self Access Learning Activities for Student Empowerment – Science” with the curtesy of Provincial Department of Education, Uva is one of such commendable and admirable initiative under taken by the Bilingual Education Branch.

This collective effort bear witness to the excellent capability of the Branch in managing human and physical resources to the maximum for the betterment of Bilingual Education.

It is the duty of the principals and teachers to make use of this Self Access packages in their respective schools. Authorities at administrative section should see that this Self Access package be utilized properly in the system. I wish Bilingual Education Branch success in all future plans.



H. U. Premathilake

Additional Secretary

Education Quality Development

Ministry of Education

30<sup>th</sup> July 2010

## **Message from Director of Education (Bilingual Education)**

The Bilingual Branch of the Ministry of Education has launched a lot of initiatives to bring about the qualitative improvement in the teaching learning process of bilingual education. “Self access learning activities for student empowerment” is one remarkable example for this constructive attempt.

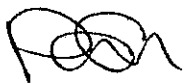
“Self access learning activities for student empowerment - Science” is a collaborative work done to scaffold the bilingual learner. It is also a resource book for the teachers to guide their learners.

This resource book was initially designed by the team of resource persons in Uva province to be utilized in the province. The bilingual branch realizing the value of this work made an intervention in making it available to all bilingual teachers and pupils concerned in the island translating it into English. We modified, revised and updated the content of this book when we felt it was necessary.

This, I believe, will be a solution to the dearth of quality materials in the learning teaching process of bilingual education. Teachers and various others who wish the progress of bilingual education can make ventures of this nature in their respective provinces.

I extend our gratitude to all officers and the resource persons in the Uva province for allowing us to make use of this book for a wider pupil population.

I also extend my heartfelt gratitude to all those who supported us in making this effort a success including the World Bank, Director of Education (Planning) and Deputy Director of Education (Planning) in the Ministry of Education.



Priyatha Nanayakkara

Director of Education (Bilingual Education)

Ministry of Education

30<sup>th</sup> July, 2010

## Resource Team

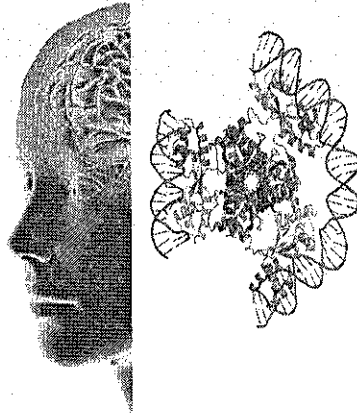
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# Biology

1. The main organ of the blood circulatory system is  
(1) Lung                      (2) Heart                      (3) Kidney                      (4) Liver
  
2. Select the appropriate answer which describes the “Double circulation” of the blood circulatory system  
(1) Circulation of blood from right ventricle to lungs and then to left ventricle through pulmonary veins.  
(2) Blood reaching the right auricle from the left ventricle through aorta after circulating through the body.  
(3) Transportation of blood twice through the heart during one complete circulation.  
(4) Blood reaching the liver from the digestive system through the hepatic portal vein.
  
3. A child with a wounded leg complained about a pain of his groin. His mother told him that, “It was a swelling of the lymph nodes (lymphadenitis)” Which of the following system is subjected to this infection?  
(1) Blood circulatory system  
(2) Skeletal system  
(3) Lymphatic system  
(4) Muscular system
  
4. Which situation, out of the four situations given below, requires a Coronary By-Pass surgery  
(1) When the number of white blood cells is increased.  
(2) When the coronary arteries are blocked due to deposition of cholesterol.  
(3) When cholesterol is deposited in veins which carry blood away from the heart.  
(4) When the pressure increased in the aorta which begins from the left ventricle.

5. Following are some reasons which cause defects in the respiratory system due to smoking.
- A - Deposition of substances like tar in alveoli.
- B - Reduction of the gas exchange in alveoli due to increase of Carbon Monoxide percentage in blood.
- C - Improper exchange of gasses in lungs due to various chemicals in cigarette smoke.

Correct statement/s is/are,

- (1) A only. (2) A and B only.
- (3) B and C only. (4) All of the above.
6. The respiratory system helps in excretion as well as in respiration. The excretory product of the respiratory system is,
- (1) Oxygen (2) Carbon monoxide
- (3) Carbon dioxide (4) Urea
7. What is the structural adaptation of the small intestine for efficient absorption?
- (1) Presence of villus. (2) Presence of the appendix.
- (3) Thick walls. (4) Presence of connective tissues.
8. Kidney patients are advised to minimize the consumption of protein rich food. What do you think is the reason for this?
- (1) Kidneys have to function excessively to remove the waste products of protein digestion
- (2) Kidney is the organ which is responsible for removing Nitrogenous wastes
- (3) Protein rich food is the cause for formation of stones in the bladder
- (4) Difficulties in digestion of proteins in food

9. Hookworm disease is one of the common worm diseases in Sri Lanka. The larvae of the hook worm enters the body through,

- (1) mouth (2) respiratory track  
(3) piercing the skin of hands or feet. (4) mouth and respiratory track

10. Nowadays, swine flu is a widely spreading disease all over the world. Which system is affected by this disease?

- (1) Digestive system (2) Respiratory system  
(3) Blood circulatory system (4) Excretory system

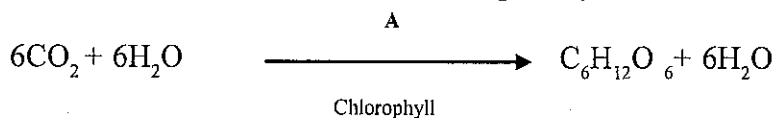
11. Which is the biological process in plant leaves that release Oxygen as a by-product?

- (1) Transpiration (2) Photosynthesis  
(3) Respiration (4) Ascent of sap

12. Organic food which is produced in plant leaves and transported through the phloem as,

- (1) Glucose (2) Starch.  
(3) Sucrose (4) Maltose

13. Given below is the balanced equation for photosynthesis



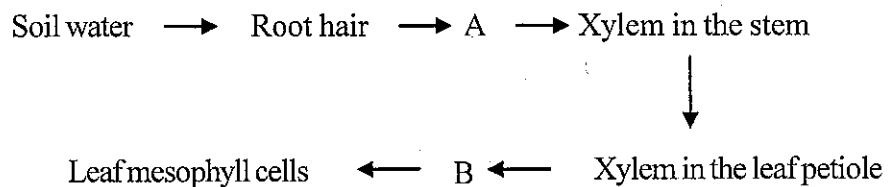
“A” indicates,

- (1) solar energy. (2) wind energy.  
(3) electrical energy. (4) kinetic energy

14. A chemical solution used to identify starch produced in a plant leaf is,
- (1) Sodium chloride (2) Potassium permanganate  
 (3) Copper sulphate (4) Iodine

15. The process of entering water into a root hair is,
- (1) osmosis. (2) active absorption.  
 (3) diffusion. (4) evaporation.

16. Study the flow diagramme and select the most suitable word for 'A' and 'B' Xylem in the leaf petiole



A	B
(1.) Stomata	Leaf
(2.) Leaf	Xylem in veins
(3.) Xylem in roots	Xylem in veins
(4.) Xylem in veins	Xylem in roots

17. Features of a certain cell in the human body are given below.
- A) - No nuclei      B) - Bi - concave in shape      C) - Transports oxygen

The cell would be a,

- (1) white blood cell. (2) red blood cell.  
 (3) platelet. (4) epidermal cell.

18. The blood coagulates when it comes out from blood vessels. But, it never coagulates inside the vessels. The reason for this is,

- (1) absence of necessary factors.
- (2) it is not a requirement to coagulate inside the blood vessel.
- (3) availability of a factor necessary for coagulation in platelets.
- (4) non of the above.

19. The diagram given below shows a process that takes place at night in a plant grown in a wet area. The process is,



- (1) transpiration
- (2) absorption
- (3) guttation
- (4) osmosis

20. The component of blood that transports excretory products to the excretory organs and heat produced by liver and muscles throughout the body is,

- (1) red blood cell
- (2) platelet
- (3) plasma
- (4) nucleus

21. From the followings, select the type of cells in plant leaves without chlorophyll.

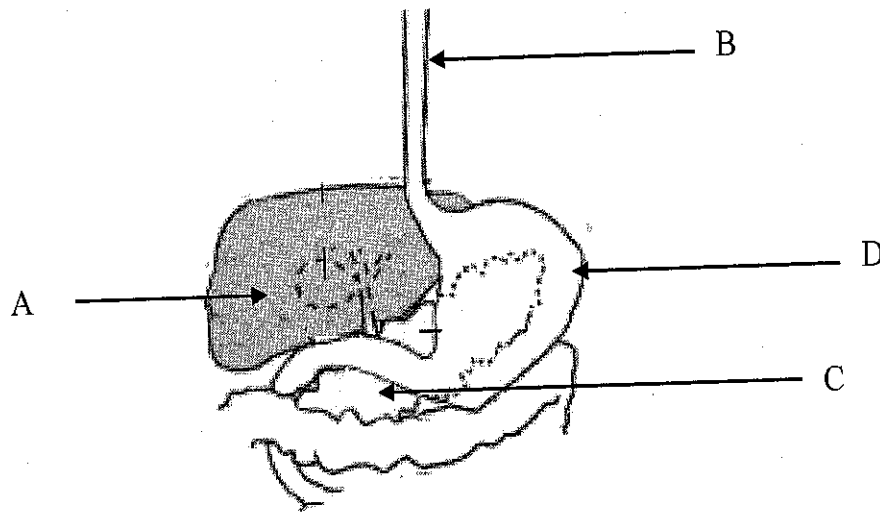
- (1) palisade cells
- (2) spongy mesophyll cells
- (3) guard cells
- (4) epidermal cells



26. Which is the correct order of organizational levels of living organisms?
- (1). Cell → Tissue → Organ → System → Organism  
(2). Cell → Organ → Tissue → System → Organism  
(3). Organ → Cell → Tissue → System → Organism  
(4). Tissue → Organ → Cell → System → Organism
27. What is the special type of cells found in coconut shells and date seeds?
- (1) Pallisade cells (2) Paranchyma cells  
(3) Scleroids cells (4) Collenchyma cells
28. The tissue that transports water in plants is,
- (1) Xylem (2) Phloem  
(3) Xylem and Phloem (4) Parenchyma
29. The group of cells that contributes to have photosynthesis is
- (1). upper epidermal cells, palisade cells, spongy parenchyma cells  
(2). palisade cells, guard cells, epidermal cells  
(3). guard cells, spongy parenchyma cells, palisade cells  
(4). epidermal cells, palisade cells, guard cells
30. Which is the correct statement that describes cardiac muscles and skeletal muscles?
- (1). Cardiac muscles are voluntary and skeletal muscles are involuntary  
(2). Cardiac muscles are involuntary and skeletal muscles are voluntary  
(3). Both cardiac and skeletal muscles are voluntary  
(4). Both cardiac and skeletal muscles are involuntary



Answer the questions 31, 32, and 33 using the following diagram that shows a part of digestive system.



31. Organs labeled as "A" and "C" is,
- (1). Liver and small intestine.
  - (2). Liver and large intestine
  - (3). Liver and duodenum
  - (4). Liver and pancreases
32. In which organ that iron get deposited after decaying red blood cells,
- (1). A
  - (2). B
  - (3). C
  - (4). D
33. Diabetes occurs due to the deficiency of a certain hormone produced in the organ "C". What would be the hormone?
- (1). Gastrin
  - (2). Thyroxin
  - (3). Estrogen
  - (4). Insulin
34. Which is the mineral that delays the coagulation of blood out of the four minerals given below?
- (1). Iron
  - (2). Calcium
  - (3). Sodium
  - (4). Magnesium

35. Select the correct statement about smooth muscles?
- (1). Smooth muscles do not have cross striations.
  - (2). Smooth muscles are branched.
  - (3). Smooth muscle cells contain several nuclei.
  - (4). Smooth muscles act involuntary
36. Red patches appeared on Hema's skin after consuming pineapple. A blood test done to the victim revealed that it was an allergic condition.
- What is the type of cells excess in blood in an allergic condition?
- (1). Neutrophils
  - (2). Eosinophils
  - (3). Basophiles
  - (4). Lymphocytes
37. Which of the following disease can be cured by transfusion of platelets?
- (1). Leukemia
  - (2). Typhoid fever
  - (3). Dengue hemorrhage
  - (4). Thalacemia
38. The main groups of living organisms is,
- (1) plants, animals, micro-organisms
  - (2). animals, micro-organisms, Algae
  - (3). plants, animals, protozoa
  - (4). plants, bacteria, virus

39. Most suitable criterion for the classification of mango, jak, cycus, fern and *sinhala- sapu/tamil-senpaham* is ,
- (1). with seeds /without seeds
  - (2). flowering / non Flowering
  - (3). monocot/ dicot
  - (4). gymnosperm/ angiosperms
40. A plant which grows in a moist environment and bears spores on the lower surface of the leaf is,
- (1). Bread fruit
  - (2). Croton
  - (3). Arecanut
  - (4). Ferns
41. The phylem that the bee belongs to is,
- (1). Coelenterata.
  - (2). Annelida.
  - (3). Arthropoda.
  - (4). Mollusca.
42. Sometimes people die due to the high environmental temperature in countries like India. However, serpents can survive under the same condition. The reason for this is,
- (1). people are cold blooded and serpents are warm blooded
  - (2). people are warm blooded and serpents are cold blooded
  - (3). people have hairy skin and serpents have scaled skin
  - (4). people are land animals and serpents can live on land as well as in water.
43. The toad is classified as an amphibian. The reason for this is that,
- (1). it lives in both aquatic and land environment.
  - (2). some stages of its life cycle are aquatic
  - (3).it lays eggs while living in water.
  - (4).it lays eggs while living on land.

44. When observing a fish tank a student noticed air bubbles coming from an organ of a fish close to its eyes. This organ could be,

- (1). lungs                      (2). gills                      (3). skin                      (4). mouth

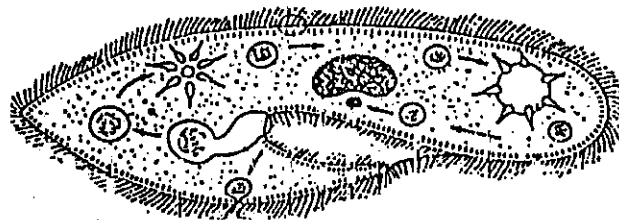
45. Select the group of animals with four chambers in their heart.

- (1). Mammals and Aves                      (2). Reptiles and Amphibians  
(3). Pisces and Reptiles                      (4). Aves and Amphibians

46. A group of bacteria which helps the digestion of food while living in human elementary canal is.

- (1). *Bacillus tuberculosis*                      (2). *Clostridium*  
(3). *Diplococcus*                      (4) *Lacto bacillus*

47. A group of students observed living organisms in water through a light microscope. Following diagram shows one of the organisms that they observed.



What is the group that this organism belongs to?

- (1).Bacteria                      (2).Fungi                      (3).Virus                      (4).Protozoa

48. Which of the following is a set of bacterial diseases?

- (1) Dysentery, Cholera, Tetanus  
(2) Chicken pox, Measles, AIDS  
(3) Leukemia, Diabetics, Cancer  
(4) *sinhala*-Aluham/*tamil*-Thamal, Dandruff, Warts

49. A black colored fungus has been formed on a piece of stale bread. This fungus could be,  
(1). Mushroom      (2). *Penecillium*      (3). *Mucor*      (4). Basidiomycetes
50. The correct scientific name for the cat is given below. Find the correct binominal nomenclature  
(1). *Felis Domestica*      (2). *FELIS DOMESTICA*  
(3). *felis Domestica*      (5). *Felis domestica*
51. Which part of the brain detects temperature changes in blood?  
(1). Cerebellum      (2). Cerebral hemispheres  
(3). Hypothalamus      (3). Medulla
52. What set of words given below represents the correct set of sensory organs?  
(1). eye, ear, lung, tongue, skin.  
(2). eye, ear, nose, tongue, skin.  
(3). eye, ear, heart, tongue, lung.  
(4). eye, ear, kidney, tongue, liver.
53. Coordination is known as the controlling and regulating the functions of organs in the body responding to the changes of internal and external environment. What are the two systems that help coordination?  
(1). respiratory system and digestive system.  
(2). respiratory system and nervous system.  
(3). nervous system and endocrine system.  
(4). respiratory system and endocrine system.

54. A person lost his balance after an accident. Which part of the ear can be damaged in the accident?
- (1). Eustachian tube (2). Ear ossicles  
(3). Tympanic membrane (4). Semi circular canals
55. Human skin consists of epidermis, dermis and endodermis. The layer/s that is/are sensitive to pain, pressure, heat and cold is/ are,
- (1). endodermis (2). epidermis  
(3). dermis (4). all the three layers
56. Which is the artificial propagation method of plants that can be used to obtain a large number of plantlets within a short period?
- (1). Stem cutting (2). Layering  
(3). Tissue culture (4). Grafting
57. Water, wind and animals are three agents of pollination. An adaptation of a flower to wind pollination is,
- (1). presence of a nectarines and hairy sticky stigma.  
(2). presence of colorful petals and hairy sticky stigma.  
(3). releasing a large number of pollens at once.  
(4). producing a large number of light weight pollen and presence of sticky stigma
58. Human eye is composed of sclerotic layer, choroid and retina. The layer which consists of rod cells and cone cells is,
- (1). sclerotic layer (2). choroid and retina  
(3). retina (4). sclerotic layer and retina

59. Auxins are hormones that regulate the growth of plants. What causes the bending of plant shoots toward the direction of sun light?
- (1). Auxin concentration increases in the cells at opposite side of the shoot where sun light falls.
  - (2). Auxin concentration increases in the cells at the same side of the shoot where sunlight falls.
  - (3). Auxin concentration decreases in the cells at opposite side of the shoot where sun light falls.
  - (4). Auxin concentration decreases in the cells at the same side of the shoot where sun light falls.
60. A farmer has added Calcium carbide near the root zone of well grown pineapple plants. What will happen to the plantation as a result of this?
- (1). Flowering takes place at the same time in the whole plantation due to the addition of Calcium irons to the soil from Calcium carbide.
  - (2). Flowering takes place at the same time in the whole plantation because Calcium carbide is an artificial hormone.
  - (3). Flowering is stimulated by the Acetylene gas produced as a result of the reaction of Calcium carbide with water.
  - (4). Acetylene produced by the reaction of Calcium carbide with water acts as a weedicide.
61. Transmission of physical and mental characteristics from parents to children is called as heredity. Which of the followings is not a hereditary factor?
- |                                 |                       |
|---------------------------------|-----------------------|
| (1). Ability to roll the tongue | (2). Right-handedness |
| (3). Syndactyly                 | (4). Malnutrition     |

62. Which part of the cell is responsible for the transmission of these inherited characteristics?
- (1). Mitochondria (2). Chromosomes  
(3). Lysosomes (4). Golgi apparatus
63. Marriages between blood relatives can cause hereditary diseases. An example for such a disease in Sri Lanka is,
- (1). Thalacemia. (2). Night blindness.  
(3). Pneumonia. (4). Hepatitis.
64. A person died as a result of continuous bleeding (hemorrhage) in a minor wound of his leg. What disease caused this?
- (1). Leukaemia (2). Thalacemia  
(3). Haemophilia (4). Sickle cell anemia
65. 5000 years old human skeleton was found from Matara area. It is a,
- (1). non-decayed fossil (2). decayed part of humus  
(3). non-decayed human body (4). a living fossil
66. A frog lays thousands of eggs at a time. Which part of Darwin's theory describes this phenomenon?
- (1). Breeding (2). Over production  
(3). Spontaneous generation (4). Theory of use and disuse



67. There were a large number of jack seedlings growing under a jack tree. Only a few plants could survive after a few months. What answer shows the sequential order of Darwin's natural selection theory related to this phenomenon?

- (1). Over production → Struggle for existence → Variations → Survival of the fittest
- (2). Variations → Struggle for existence → Over production → Survival of the fittest
- (3). Struggle for existence → Over production → Variations → Survival of the fittest
- (4). Variations → Struggle for existence → Survival of the fittest → Over production

68. Toddy is produced when coconut water is exposed to air. Select the correct balanced chemical equation that describes this reaction.

- (1).  $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
- (2).  $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow \text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$
- (3).  $\text{C}_6\text{H}_5\text{OH} + \text{O}_2 \rightarrow \text{CH}_3\text{COOH} + \text{H}_2\text{O}$
- (4).  $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$

69. Symbiotic bacteria living in root nodules of Legume plants can fix atmospheric Nitrogen. The group of bacteria responsible for Nitrogen fixation is,

- (1). *Rhizobium*
- (2). *Acetobactor*
- (3). *Lactobacillus*
- (4). *E.coli*

70. A cross between the red variety and white variety of *Mirabilis* (*sinhala*- Hendirikka/*tamil*- nalu mani poo) produced a plant generation with pink flowers only. This phenomenon is known as,

- (1). gene linkage
- (2). incomplete dominance
- (3). gene mutation
- (4). all of the above

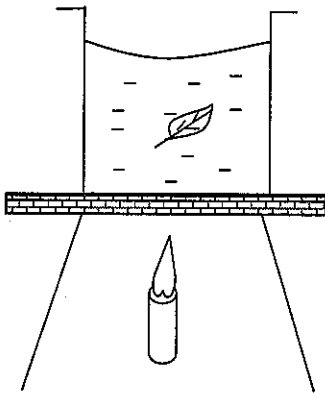
71. The number of organisms belonging to a same species, living in a specific area in a given period of time, is known as,
- (1). species (2). community  
(3). population (4). Biosphere
72. Food webs and food chains explain the food relationships among living organisms in the environment. The incorrect statement about a food chain is,
- (1). only 10% of energy flows from lower tropic level to a higher tropic level.  
(2). the first link is always a green plant  
(3). the maximum number of links of food chain is limited to 4 or 5  
(4). concentration of heavy metals decrease gradually along a food chain
73. The adverse effect caused by the accumulation of industrial wastes, agro chemicals and garbage in water sources is known as,
- (1). Green house effect (2). Eutrophication  
(3). conservation (4). Industrialization
74. The group of living organisms living in root nodules and contributes to the Nitrogen cycle of leguminous plants belongs to,
- (1). Virus (2). Bacteria  
(3). Fungi (4). Protozoa





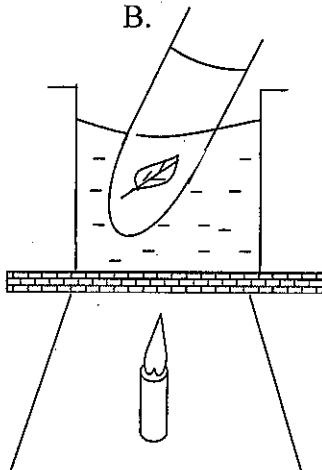
### Structured Essay

A.



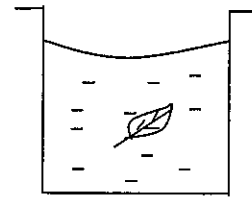
Boiling the leaf in water

B.



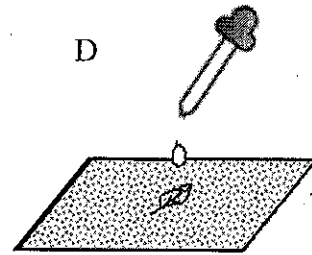
Boiling the leaf in alcohol  
(in a water bath)

C.



Washing the leaf in water

D



Adding Iodine

1. (i) Above diagrams show the steps of an experiment done by a student to identify whether the starch is produced in a leaf. Give reasons for the above steps.

**Steps**

**Reason**

A .....

B .....

C .....

D .....

- (ii). When boiling the leaf in alcohol,

a. what are the observations that the student could make?

.....

b. Give reasons for the observations you mentioned above.

.....

(iii) In step D, what could he observe if starch was present in the leaf?

.....

(iv) Name another liquid that can be used instead of alcohol in step B

.....

(v) The grass which was covered with some wooden planks for several days became yellowish.

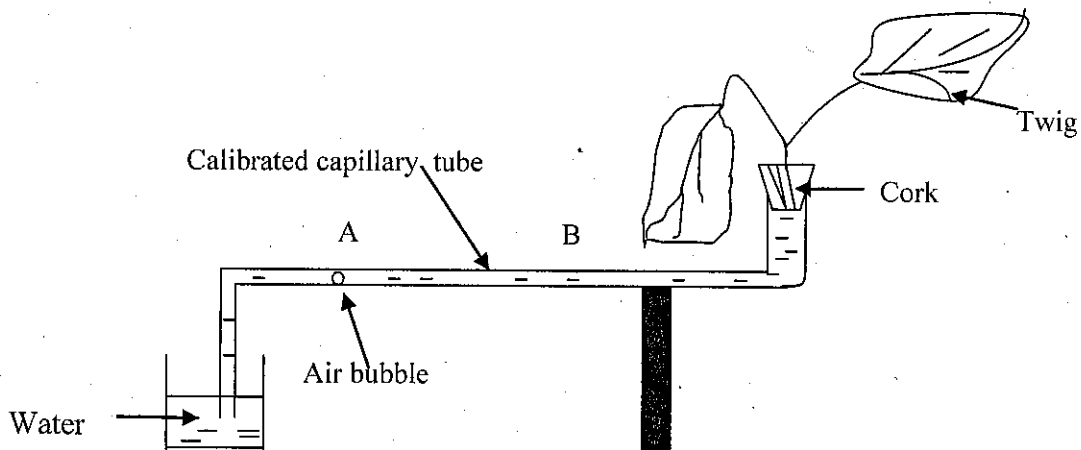
(a). Explain the scientific reason for turning the grass yellow .

.....

(b). What is the external factor that should be provided to make the grass green again.

.....

2. Following is a set-up made to measure the rate of transpiration



(i) What is the name of the apparatus given above?

.....

(ii) What is the step that should be followed when cutting the twig?

.....

(iii) Give the reason for the step you mentioned.

.....

(iv) Calculate the rate of transpiration, if the distance from A to B is 9 cm and the time that the air bubble takes to move from A to B is 3 minutes.

.....

(v) What is the reason for using a capillary tube in the above apparatus?

.....

(vi) This experiment is based on two hypotheses. What are they?

a.....

b.....

(vii) Mention two factors that should be considered when preparing the apparatus to make this experiment a success.

a.....

b.....

(viii) State one difficulty you may face when preparing this set up.

.....

(ix) The air bubble takes less time to move from A to B, when it is kept outside exposed to the sunlight than keeping inside a room. Give the reason for the above difference.

.....

3. (i) The blood circulatory system consists of arteries, veins and capillaries. Write two structural differences between arteries and veins.

(a) .....

(b) .....

(ii) Which component of blood is checked during the blood test for Dengue?

.....

(iii) (a) Mechanical digestion and the chemical digestion of food take place in the buccal cavity. Teeth help in mechanical digestion. Name the type of teeth which helps in tearing flesh.

.....

(b) Saliva is involved in chemical digestion. Name the enzyme present in saliva.

.....

(c) Write the equation in words for the chemical digestion inside the buccal cavity.

.....

(iv) (a) Name two lung related diseases.

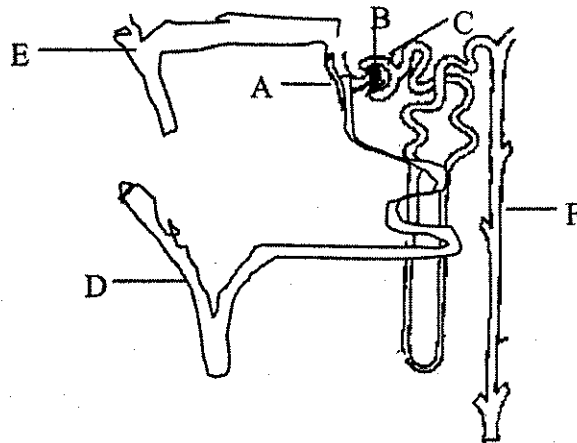
1.....

2.....

(b) Write the causal agent for one of the above mentioned diseases.

.....

4. (a) Following diagram indicates a human nephron. Name the parts from A to F.



A .....

B .....

C .....

D .....

E .....

F .....



(b) Some substances enter into C when blood flows through B while some do not.

Write two substances for each.

Substances that enter

1. .... 2. ....

Substances that does not enter

1. .... 2. ....

(c). Stones in the urinary bladder are formed due to crystallization of a certain compound. This compound is formed by an element and an acid. Name them.

Element .....

Acid .....

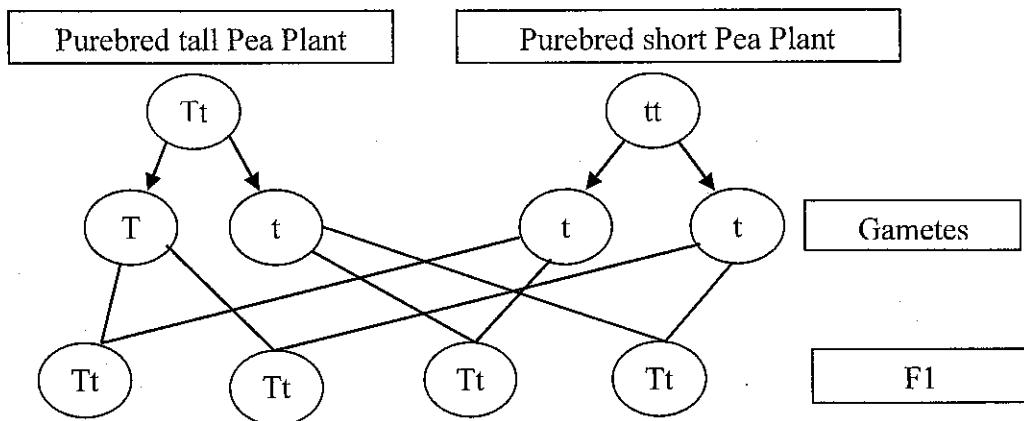
Compound .....

(d). Write 2 good health habits that should be followed to prevent the formation of stones in the bladder.

1.....

2.....

5.



The given illustration represents the genotype of F<sub>1</sub> generation obtained by Mendel through cross pollination of purebred tall plants and purebred short plants.

- (i) Write 2 reasons to select pea plants for the above experiment.

.....  
.....

- (ii) Define the term “purebred”

.....  
.....

- (iii) State the genotype of  $F_1$  generation.

.....  
.....

- (iv) Write the phenotype of  $F_1$  generation

.....

- (v) Mention the recessive and dominant characters of the above plant

Dominant character.....

Recessive character .....

- (vi) Why is the above experiment called Mendel’s Monohybrid Test”?

.....  
.....

- (vii) What is the ratio between tall: short in  $F_2$  generation, when the pollination takes place among of  $F_1$  generation.

.....  
.....

- (viii)Mention what molecules in the cells of pea plants transfer characters from generation to generation.

.....

(ix) Name the nitrogenous bases found in that molecule.

.....  
.....

(x) (i) What do you mean by gene linkage?

.....  
.....  
.....

(ii) State two gene related hereditary diseases of man.

.....  
.....

6. A team of scouts explored the *Yala* sanctuary for two days.

(i) Name two sources from where they can get information about *Yala* when they plan the journey .

.....

(ii) They carried a prism binocular, a compass, and bottles of water, a radio, a mobile phone and a camera.

(a) Write three advantages of using the prism binocular than the telescope to observe the sanctuary.

- 1.....
- 2.....
- 3.....

(b) One lens of a pair of spectacles worn by a student with a long sighted defect was thrown away by an accident. It was mentioned that there is a risk of fire if this lenses is not found.

(i). Draw the ray diagram to illustrate this scientific phenomenon.



(ii) What is long – sightedness?

.....

(c). A white colour substance was found deposited in a vessel where tank (*sinhala* Wewa /*tamil*-Kulam) water was boiled.

(i) What formed the white colour substance here?

.....  
.....

(ii) What is the name and the formula of the chemical deposited at the bottom of the vessel?

Chemical name .....

Formula.....

(d) They observed thorny shrubs in this sanctuary. Write two adaptations of these type of plants.

1.....

2.....

(e) Name three types of forests found in Sri Lanka.

(i)..... (ii)..... (iii).....

(f) The radio they had brought did not give clear sound.

(i) What is the wave type of the radio wave?

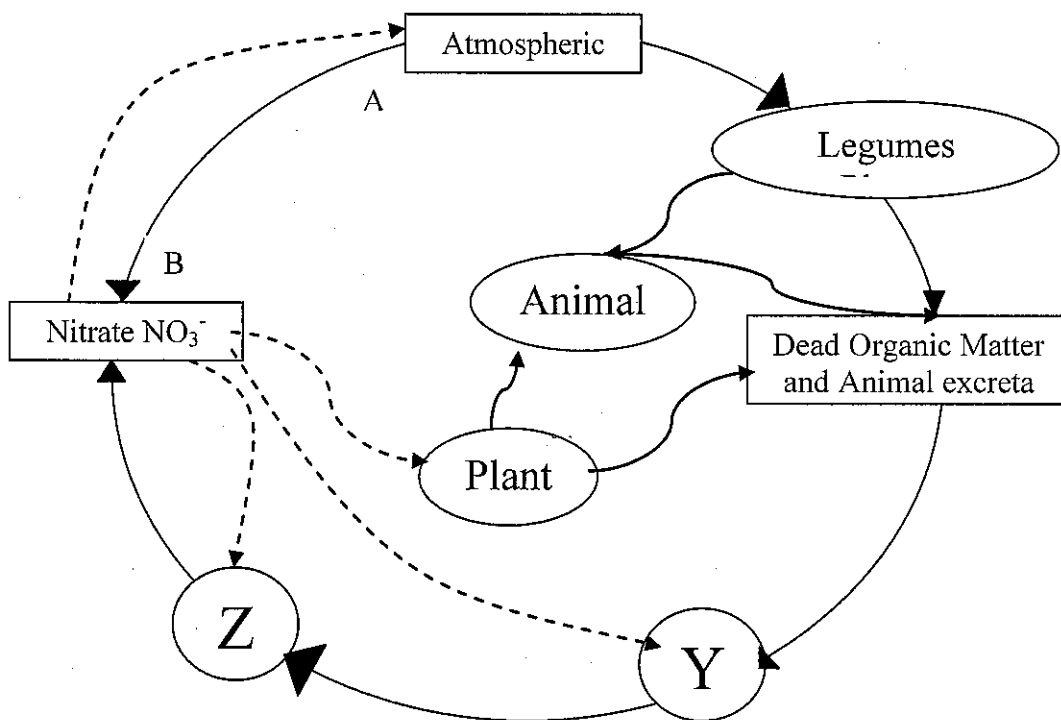
.....

(ii) Write two features of a radio wave.

1.....

2.....

(7)



(i) The arrow AB indicates one of the ways that the earth gets atmospheric  $\text{N}_2$ . What is the name of this process?

.....

(ii) Nitrate ( $\text{NO}_3^-$ )  $\xrightarrow{\text{a}}$  atmospheric  $\text{N}_2$

Name the group of organisms represented by "a"

.....

(iii) What would be Y and Z?

Y..... Z.....

(iv) Name two Nitrogenous compounds found in the cow's body.

a..... b.....

(v) Name the group of micro-organisms which converts Z  $\longrightarrow$  Nitrate ( $\text{NO}_3^-$ )

.....

(vi) Write two ways how plants absorb Nitrogen from soil.

(a)..... (b).....

(vii) What is the process of converting Nitrate found in soil into atmospheric  $\text{N}_2$ ?

.....

(viii) How is Nitrogen which is absorbed by plants returned to the soil?

.....

(ix) Write one way of how humans contribute to the Nitrogen cycle.

.....

8. Teacher asked Ruwani to prepare a slide to observe the structure of a plant cell.

(i) Write two plant tissues which can be used to prepare a specimen slide.

1..... 2.....

(ii) Write 4 main correct steps, she has to take in preparing the slide.

1..... 2.....

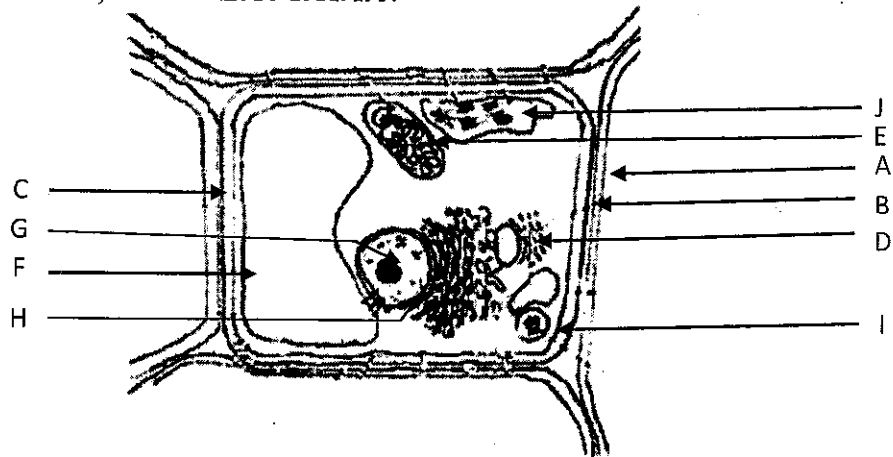
3..... 4.....

(iii) Name the parts of the cell that can be seen in the tissue.

1..... 2.....

3..... 4.....

(iv) The diagram given below shows a plant cell under an electron microscope. Label the organelles A, B, C, D, E, F, G, H, I, J.



A..... B..... C.....  
 D..... E..... F.....  
 G..... H..... I.....  
 J.....

(v) State the function of each organelle mentioned below.

Organelle	Function
D	.....
G	.....
H	.....
I	.....
J	.....

(vi) Name two organelles that cannot be found in animal cells, when compared with plant cells.

1. ....
2. ....

(vii) Name a tissue that can be used in the classroom to observe an animal cell.

.....

(viii) Ruwani's friends say that she looks like her grandmother. Which organelle helps to have this similarity?

.....

(ix) Write two living and two non-living parts of a cell.

Living 1..... 2.....

Non living 1..... 2.....

9. What is the purpose of giving saline to a person with excessive bleeding?

.....

(ii). State 3 substances which transport through blood.

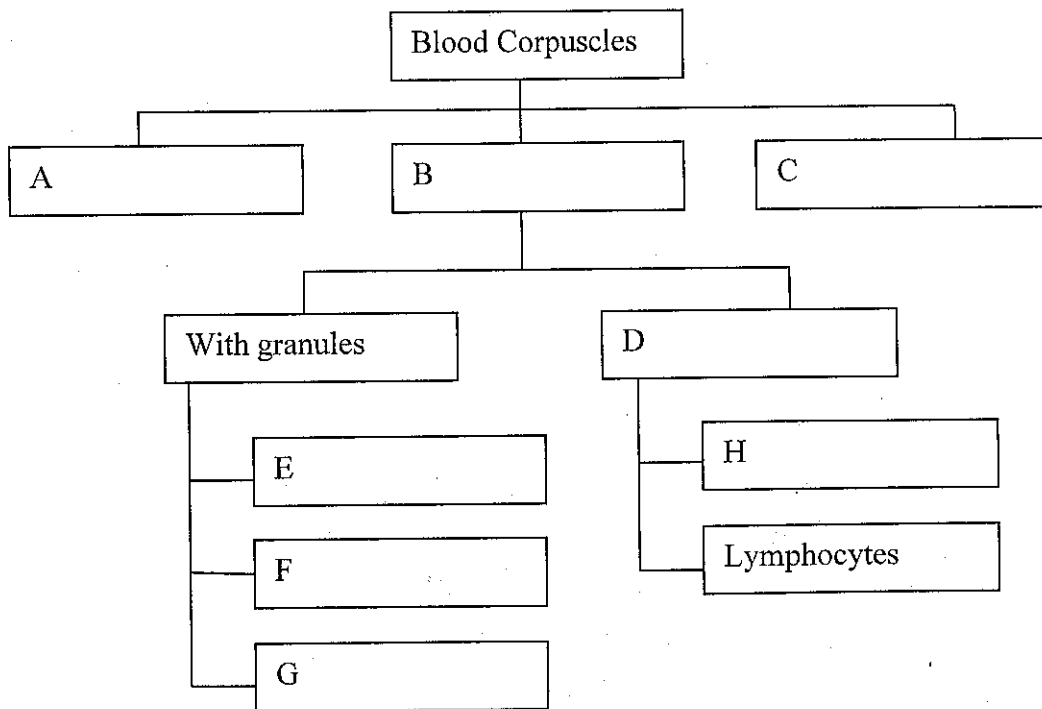
1.....

2.....

3.....

(iii) 45% of blood is corpuscles and the rest is blood plasma.

**Complete the following flow diagram**





(iv) Cells mentioned in the cage “A” do not have nuclei. Which chemical in these cells help in obtaining oxygen?

.....

(v) In white blood corpuscles, there are amoeboid cells which travel easily to infected places in the body.

(a) Name those particular white blood cells.

.....

(b) What is the function of them?

.....

(vi) Which type of white blood cells increase the permeability of capillary walls?

.....

(vii) Bufo pain (*sinhala-kuddeti/tamil-neri poduthal*) occurs in groin when there is a wound in foot.

(1) What is Bufo pain? .....

(2) What causes the Bufo pain? .....

(viii) The ratio between red blood cells and white blood cells of a healthy person is 600 : 1, If this ratio changes into 100 : 1, it is a symptom of a disease. What is the disease?

.....

(ix) Name two vectors of dengue hemorrhage?

(1) ..... (2) .....

(x) What is the causal organism of this disease?

.....

(xi) Give three steps to prevent spreading of this disease.

1. ....

2. ....

3. ....

10.A

Upul was hospitalized due to an accident. Doctor prescribed him a blood transfusion.

(i) What is blood transfusion?

.....

(ii) State two factors that should be considered in blood transfusion?

.....

.....

(iii) Mention four requirements that a blood donor should have.

1.....

2.....

3.....

4.....

(iv) Name the scientist who classified blood into four groups as A, B, AB and O.

.....

(v) If the blood group of a donor is 'A', name the blood group of possible recipients of 'A'

.....

(vi) Explain the following terms related to blood transfusion.

a. Universal donor .....

b. Universal recipient .....

10. B

Water is an essential component for biological activities of plant.

(i) State three ways that plants emit water.

1.....

2.....

3.....

(viii) Represent the path of water from soil to stomata by using a flow diagram.

.....

(ix) State four differences between transpiration and guttation.

1.....

2.....

3.....

4.....

(x) Name two plants in which guttation occurs.

1.....

2.....

(xi) Draw a diagram to show the structure of lower epidermis of a leaf when observed through a microscope and name the parts of the structure in which transpiration occur mostly.

.....

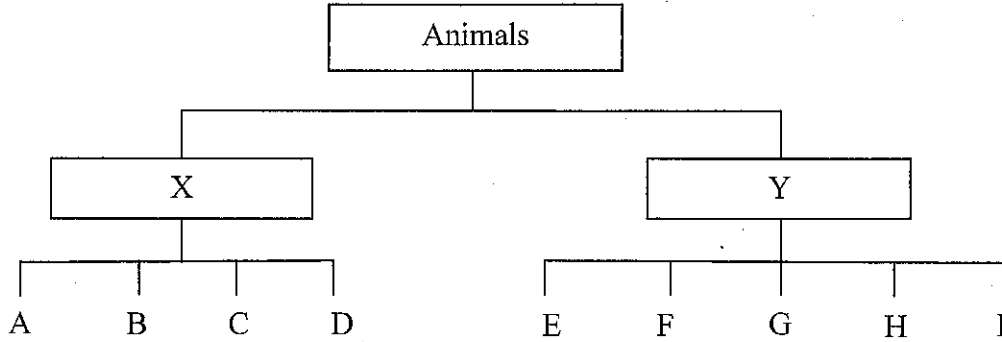
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.....

11. (A).

(a) Write a criterion used in animal classification.

(b) Complete the following chart using the given criteria.



A – Some animals are attached to a substratum and they possess tentacles at the free end.

Some of them are bell and umbrella shaped. They live free in water.

B – Bodies are segmented internally and externally.

C - Possess segmented appendages and mouth parts adapted for piercing and sucking.

D – Bodies are not segmented and the visceral mass is in a shell.

11 (B).

(i) Give examples for E, F, G, H, I?

.....

(ii) To which class do the bat and whale belong?

.....

(iii) Write a specific characteristic of vertebrates.

.....

12. A. Most of the countries today face global environmental crisis. Green house effect, Acid rains, and Depletion of Ozone Layer are some of the serious problems. Hence, they have to find solution for these problems.

(i.) What is green house effect?

(ii.) Write the main gas and other two gasses that cause green house effect.

(iii.) Write two adverse effects of green house effect.

(iv.) Write two gases cause acid rains.

(v.) What are the human activities cause to emit gases mentioned in (iv)?

(vi.) Which environmental crises can be avoided by banning the use of C.F.C (Choloro Fluro Carbon) in refrigerators and air conditions?

B. Degradation of bio diversity is a global issue. Therefore, our country also should follow bio diversity conservation methods. These methods are in-situ and ex-situ conservation.

(i.) Explain in-situ conservation and ex-situ conservation.

.....

(ii.) Name 2 ecosystems in our country conserved under in-situ conservation.

.....

(iii.) Write 3 methods of ex-situ conservation.

.....

(iv.) Write two conventions formed to protect migratory species.

.....

(v.) What is the convention related to prohibition of trading rare species?

.....

(vi.) What is your contribution to ex-situ conservation as a student?

.....

13. You are an active adolescent with creative and logical thinking.

(A) (i) What is the accepted age range of an adolescent?

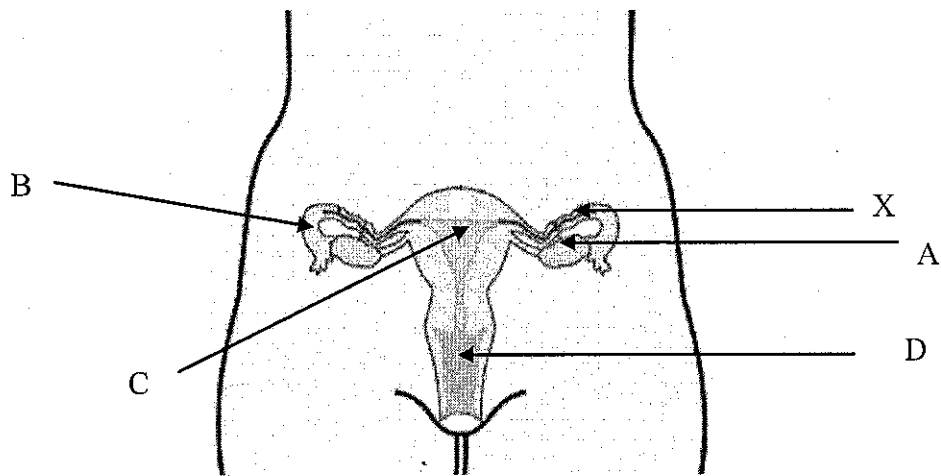
.....

(ii) Write primary sexual characteristics and secondary sexual characteristics?

.....

.....

(ii) State two differences between girls and boys when they reach adolescent age.



(iv) The above diagram shows the female reproductive system.

Name the parts A, B, C and D and state their functions.

A..... B.....

C..... D.....

(v) What is the purpose of blocking the place 'X' in the diagram?

.....

(vi) Testis of male reproductive system is located outside the abdomen. What is the reason

for this?

.....

(vii) Write hormones related to male and female reproductive systems.

Male .....

Female .....

(viii) Name 3 sexually transmitted diseases.

1 .....

2 .....

3 .....

(B) (i) Name the place where fertilization occur in the female reproductive system.

.....

(ii) What is the fertilized ovum called?

.....

(iii) What happens to the unfertilized ovum?

.....

(iv) Name the part that connects the developing embryo to the 'C'.

.....

(v) What is the path through which the delivery occurs?

.....

(vi) What is meant by the attaining puberty of a girl?

.....

(vii) Explain briefly how the identical twins are formed.

.....

(viii) Give the number of days that a healthy fetus develops inside the human womb.

.....

(ix) Name a test done to identify the pregnancy.

.....

14. In a pond ecosystem, species that are endemic to the pond can be seen.

(A) (i). State two living and non-living components seen in a pond.

Living

Non-living

1..... 1 .....

2..... 2 .....

(ii). Write a food chain with 3 links in the above ecosystem.

.....

(iii). Eutrophication is a natural phenomenon which may occur if the pond is in an agricultural land.

a. Explain the process of eutrophication scientifically.

.....

(B). (i) Mention the chemical formula of following gases which are produced in eutrophication.

a. Hydrogen sulphide .....

b. Ammonia .....

c. Methane .....

(ii) Calculate the relative molecular mass of the following gases.

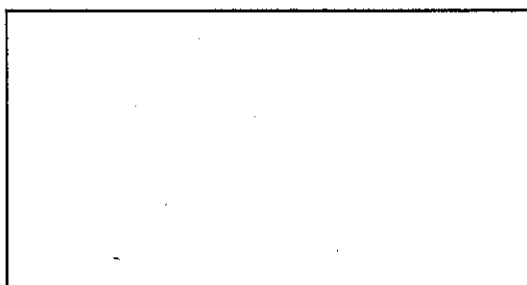
(H=1, S=32, N=14, C=12)

a- Hydrogen sulfide .....

b- Ammonia .....

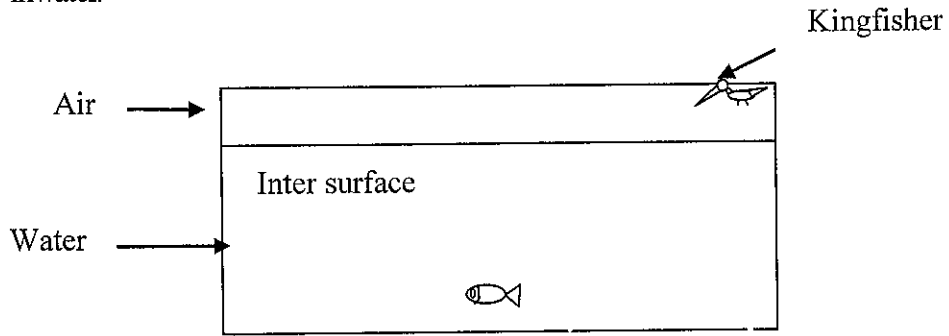
c. Methane .....

(iii) Draw the Louis structure for methane





(C). (i) Draw the ray diagram to show how a king fisher on a tree near the pond sees the fish in water.



(ii) a - Mark the real depth and the apparent depth on the ray diagram and construct a formula for refractive index using the real depth and the apparent depth.

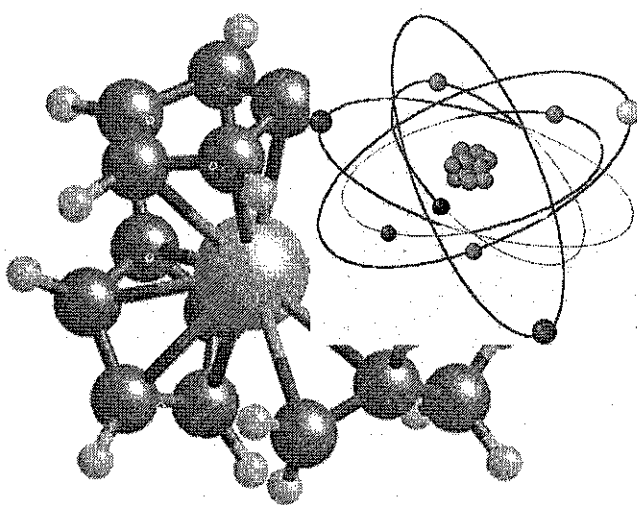
.....

(iii) A fall of a fruit on water forms a wave on the surface of the water.

a - What is the type of wave formed?

.....

b - Draw a suitable diagram to show the vibration of water particles.



# Chemistry

1. Cell is the basic building unit of organisms. What is the building unit of solids, liquids and gases?

- |               |              |
|---------------|--------------|
| (1) Elements  | (2) Atoms    |
| (3) Molecules | (4) Electron |

2. The nucleus of an atom consists of protons and neutrons. Electrons are revolving around the nucleus in the energy levels. The number of protons in the nucleus of an atom is equal to,

- |   |  |
|---|--|
| (1) atomic number.                        | (2) number of neutrons in the nucleus. |
| (3) number of electrons in energy levels. | (4) number of nucleons in a nucleus.   |

3. The atomic numbers of element Neon and Chlorine are 18 and 19 respectively. According to their electronic configurations, what is the maximum number of electrons at the second energy level of these elements?

- |       |       |
|-------|-------|
| (1) 2 | (2) 8 |
| (3) 7 | (4) 9 |

4. You have been given the following data about a neutral atom.

- Mass number of the atom
- Number of protons in nucleus of the atom

Which of the following can be obtained from the given data?

- (1) Number of electron in energy levels.
- (2) Number of neutrons in the nucleus of the atom.
- (3) Atomic number of the atom
- (4) All of the above.

5. The atomic number and mass number of Aluminum can be denoted as  ${}_{13}^{26}\text{Al}$ .  
Number of neutrons present in the nucleus is,
- (1) 13 (2) 14  
(3) 24 (4) 40
6. The chemical formula of Lead nitrate is  $\text{Pb}(\text{NO}_3)_2$ . What is the valence of Lead?
- (1) 2 (2) 3  
(3) 5 (4) 6
7. An atom achieves the noble gas configuration by losing or gaining electrons. The set of elements that can achieve noble gas configuration by gaining electrons is,
- (1) He, Ne, Ar (2) Ne, Cl, Na  
(3) Cl, O, N (4) Al, Ca, Na
8. A covalent bond is formed by sharing electrons among atoms. Which is the compound with covalent bonds?
- (1) NaCl (2) MgO  
(3)  $\text{Ca}(\text{OH})_2$  (4)  $\text{H}_2\text{O}$
9. Condis is an antiseptic chemical compound. The chemical formula of Condis is,
- (1) NaCl (2)  $\text{Mg}(\text{OH})_2$   
(3)  $\text{KNO}_3$  (4)  $\text{KMnO}_4$
10. Chemical formula of Copper sulphate (*sinhala*-Palmanikkam/*tamil*-Thurusu) is  $\text{CuSO}_4$ . The component elements in Copper sulphate are,
- (1) Copper, Sodium, Oxygen (2) Calcium, Sulphur, Oxygen  
(3) Copper, Sulphur, Oxygen (4) Chlorine, Sodium, Oxygen

Answer the questions from 11- 17 by using following information.

Atomic mole is the value of the atomic mass in grams. An atomic mole contains  $6.022 \times 10^{23}$  of atoms. Relative atomic mass of some elements is given below.

<b>C=12, O=16, H=1, Ca=40, Na=14</b>
--------------------------------------

11. The mass of 2 moles of Carbon atom is,
- (1) 6 g (2) 12 g  
(3) 24 g (4) 144 g
12. The relative molecular mass of Ammonia gas ( $\text{NH}_3$ ) is,
- (1) 4 (2) 17  
(3) 34 (4) 170
13. How many atomic moles are there in 400 g of Calcium?
- (1) 10 (2) 20  
(3) 30 (4) 40
14. The correct value of the molecular mass of Oxygen is,
- (1) 16 kg mol<sup>-1</sup> (2) 0.016 kg mol<sup>-1</sup>  
(3) 0.16 kg mol<sup>-1</sup> (4) 0.0016 kg mol<sup>-1</sup>
15. The chemical formula of limestone is  $\text{CaCO}_3$ . How many grams are there in 0.5 mol of  $\text{CaCO}_3$ ?
- (1) 40 (2) 50  
(3) 80 (4) 100
16. Number of atoms in 24 grams of Carbon is,
- (1)  $6.022 \times 10^{23}$  (2)  $6.022 \times 10^{23} \times 24$   
(3)  $2 \times 6.022 \times 10^{23}$  (4)  $\frac{6.022 \times 10^{23}}{1000}$



22. Aqueous solutions of ionic compounds conduct electricity while covalent compounds do not. Which of the following that does not conduct electricity?
- (1)  $\text{H}_2\text{O}$  (2)  $\text{CaCl}_2$   
(3)  $\text{NaCl}$  (4)  $\text{KOH}$
23. Sulphuric acid is known as battery acid and its chemical formula is  $\text{H}_2\text{SO}_4$ . Which answer shows the correct molecular mass of  $\text{H}_2\text{SO}_4$ ? (H=1, S=32, O=16)
- (1)  $0.098 \text{ g mol}^{-1}$  (2)  $98 \text{ g mol}^{-1}$   
(3)  $0.098 \text{ kg mol}^{-1}$  (4)  $98 \text{ kg mol}^{-1}$

**Question No 24 and 25 are based on following data.**

Electronic configurations of some elements are given below.

- 1) A = 2, 8, 8  
2) B = 2, 8, 7  
3) C = 2, 8, 2  
4) D = 2, 8, 1

24. The element which forms an ion with a single negative charge is,
- (1) A (2) B  
(3) C (4) D
25. To which group does the element "C" belongs?
- (1) Group i (2) Group ii  
(3) Group iii (4) Group iv
26. Doctors prescribe Milk of magnesia to reduce the acidity in the stomach. Approximate pH value of Milk of magnesia is ,
- (1) 1 (2) 4  
(3) 7 (4) 10

27. What colour change do you expect, when saliva is tested with litmus?
- (1) Blue litmus turns Red. (2) Red litmus turns Blue  
(3) No colour change in blue litmus. (4) No colour change in Red litmus.
28. Government promotes clay pots for cooking purpose instead of Aluminum utensil. Which of the following chemical compound in food will react with Aluminum?
- (1) Basic compounds (2) Acidic Compounds  
(3) Compounds with Fluoride (4) Compounds with Arsenic
29. To minimize the harmful effects of wasp bites due to venom, substances like lime and vinegar are applied. What type of chemical is found in wasp venom?
- (1) Acid (2) Base  
(3) Salt (4) Non of the above
30. Which substance turns the anhydrous Copper sulphate into blue when small amount of water, lime water, vinegar and kerosene were added separately to anhydrous Copper sulphate?
- (1) Water (2) Lime water  
(3) Vinegar (4) Kerosene
31. The flame of Sodium is yellow. Its atomic number is 11. Number of energy levels of this element is,
- (1) 1 (2) 2  
(3) 3 (4) 4
32. The melting point of an element is the temperature at which its solid state turns into liquid state. The boiling point of an element is the temperature at which its liquid state turns into gaseous state. In the periodic table, which group belongs the elements with highest melting points and boiling points?
- (1) Group I (2) Group II  
(3) Group IV (4) Group V



33. The number of electrons in the last energy level and the valency of an element are expressed by its group number in the periodic table. What is the chemical formula of the compound formed by Mg and Cl?

- (1)  $MgCl_2$  (2)  $MgCl$   
(3)  $Mg_2Cl$  (4)  $Mg_3Cl$

34. At first, periodic table was prepared based on the atomic mass of the elements. The scientist who put forward this theory is,

- (1) Newland (2) Dimitri Mendaleev  
(3) Ernest Rutherford (4) J.J. Thompson

**Question No.35 to 38 are based on the table given below. (Elements are not given in standard symbols)**

Element	A	B	C	D	E	F	G	H
Atomic Number	8	10	11	13	17	18	19	20

35. The element with the largest atomic radius is,

- (1) A (2) B  
(3) D (4) G

36. Number of elements having metallic properties in the table is,

- (1) 1 (2) 2  
(3) 3 (4) 4

37. Noble gas elements in the table are,

- (1) B and C (2) C and D  
(3) A and B (4) B and F

38. The chemical formula of the compound formed by element A and D is,

- (1)  $D_3A_2$  (2)  $D_2A_3$   
(3) DA (4)  $DA_2$

39. Select the metal in liquid state at room temperature.

- (1) Magnesium (2) Aluminium  
(3) Mercury (4) Iron

40. A metal reacts vigorously with water and is stored in liquid hydrocarbons. This metal is,

- (1) Magnesium (2) Sodium  
(3) Aluminium (4) Iron

41. When Magnesium is heated in air, it burns with a bright flame and forms a white colored oxide.

Balanced chemical equation for this reaction is,

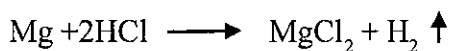
- (1)  $Mg_{(s)} + O_{(g)} \longrightarrow MgO_{(s)}$   
(2)  $2Mg_{(s)} + O_2 \longrightarrow MgO_{(s)}$   
(3)  $2Mg_{(s)} + O_2 \longrightarrow 2MgO_{(s)}$   
(4)  $2Mg_{(s)} + O_2 \longrightarrow 2MgO_{(s)}$

42. A greenish yellow colored gas is filled in a gas jar. When red colored petals, put into the jar, they were bleached. This gas is,

- (1) Hydrogen (2) Nitrogen  
(3) Chlorine (4) Helium

43. Nimal woke up in the morning complaining about a stomach ache. His mother gave him two tablets of Milk of magnesia and he was relieved. That relief was due to,
- (1) a neutralizing reaction
  - (2) Milk of magnesia being a pain killer.
  - (3) stomach worms being killed by Milk of magnesia
  - (4) none of the above.
44. Certain element gives out Hydrogen gas reacting with acids and bases and produces metalloid oxides. It forms compounds with giant molecular structures. This element is,
- (1) Sodium
  - (2) Hydrogen
  - (3) Silicon
  - (4) Argon
45. A white washed wall which was light in colour became brighter next day. The possible reason for this change is,
- (1) evaporation of water
  - (2) Lime reacting with atmospheric Carbon dioxide
  - (3) Lime reacting with atmospheric oxygen.
  - (4) Lime reacting with atmospheric water vapor
46. A non metallic element exists as a form of valuable mineral. On the other hand, it is a cheaper form of substance found in kitchen. The element is,
- (1) Sulphur
  - (2) Carbon
  - (3) Phosphorous
  - (4) Iodine

47. Given below is a chemical reaction.

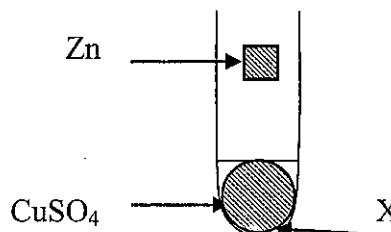


It belongs to a,

- (1) synthesis reaction
- (2) decomposition reaction
- (3) single displacement reaction
- (4) double displacement reaction

48. Given below is an apparatus prepared to observe the reaction of Zinc with Copper sulphate solution. The precipitate 'X' is,

- (1)  $\text{ZnSO}_4$
- (2) Zn
- (3)  $\text{CuSO}_4$
- (4) Cu

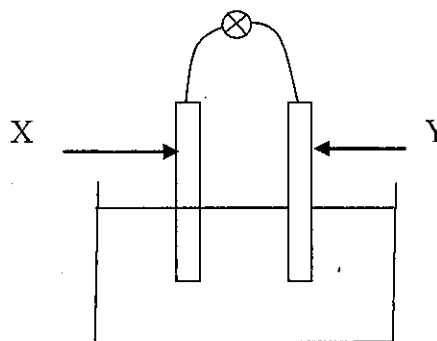


49. Which one of the following is a balanced chemical equation?

- (1)  $\text{Mg} + \text{O}_2 \longrightarrow \text{MgO}$
- (2)  $\text{H}_2\text{O}_2 \longrightarrow \text{H}_2\text{O} + \text{O}_2$
- (3)  $\text{Zn} + \text{H}_2\text{SO}_4 \longrightarrow \text{ZnSO}_4 + \text{H}_2$
- (4)  $\text{Mg} + \text{H}_2\text{O} \longrightarrow \text{Mg}(\text{OH})_2 + \text{H}_2$

50. The setup below is a simple voltaic cell constructed by a group of students. Two metal plates 'X' and 'Y' represent,

- (1) 'X' - Zn, 'Y' - Zn
- (2) 'X' - Cu, 'Y' - Zn
- (3) 'X' - Zn, 'Y' - Cu
- (4) 'X' - Cu, 'Y' - Cu



51. Evolving of gas bubbles was observed at plate 'X' of the above set-up. This gas is

- (1) Oxygen
- (2) Nitrogen
- (3) Carbon dioxide
- (4) Hydrogen

52. The positive and negative terminals of a dry cell are respectively,

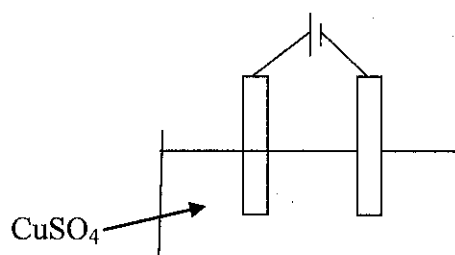
- (1) Carbon rod and Zinc case
- (2) Copper cap and Carbon rod
- (3) Zinc case and Carbon rod
- (4) Carbon rod and Copper plate

53. Common salt is known as Sodium chloride ( $\text{NaCl}$ ). An aqueous solution of  $\text{NaCl}$  contains,

- (1)  $\text{Na}^+$  and  $\text{OH}^-$  ions.
- (2)  $\text{Cl}^-$  and  $\text{H}^+$  ions.
- (3)  $\text{Na}^+$  and  $\text{Cl}^-$  ions.
- (4)  $\text{Na}^+$ ,  $\text{Cl}^-$  and  $\text{H}^+$ ,  $\text{OH}^-$  ions

54. The given set-up is used in plating Copper on an iron key. According to this set-up the electrolyte, the anode and the cathode respectively are,

- (1)  $\text{CuSO}_4$  solution, Iron key and Copper plate.
- (2) Iron key,  $\text{CuSO}_4$  solution, Copper plate
- (3)  $\text{CuSO}_4$  solution, Copper plate, Iron key.
- (4) Copper plate,  $\text{CuSO}_4$  solution, Iron key.

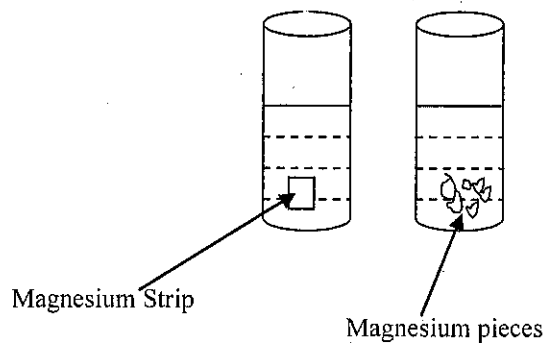


55. Select the group of metals extracted by electrolysis of fused solutions.

- (1) (1) Na, K, Zn, Cu
- (2) Na, K, Al, Zn
- (3) Al, Zn, Fe, Pb
- (4) Na, K, Ca, Mg

56. This is a set-up made to identify the factors that affect the rate of a reaction. Which factor that affects the rate of reaction?

- (1) Temperature
- (2) Catalyst
- (3) Concentration of reactants
- (4) Physical nature of the reactants.



57. The ignition temperatures of some fuel are given below.

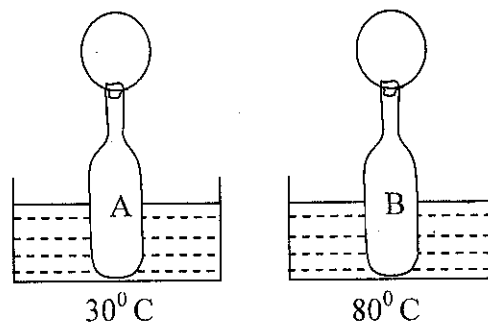
Fuel	Ignition temperature
Ethyl alcohol	79.9° C
Hydrogen	580.0° C
Petrol	49.0° C
kerosene	295.0° C

The fuel that catches fire immediately is,

- (1) Hydrogen
  - (2) Petrol
  - (3) Kerosene
  - (4) Ethyl alcohol
58. The Holon extinguisher is most suitable to extinguish a fire caused by,
- (1) petrol
  - (2) fire wood
  - (3) paints
  - (4) electricity
59. Matter is anything that has a mass and occupies space. The three states of the matter are,
- (1) mass, volume, temperature
  - (2) temperature, pressure, volume
  - (3) solid, liquid, gas
  - (4) length, width, height

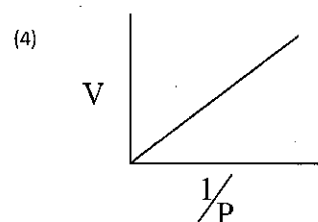
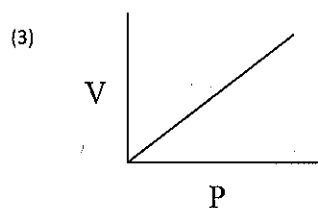
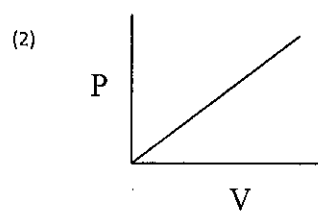
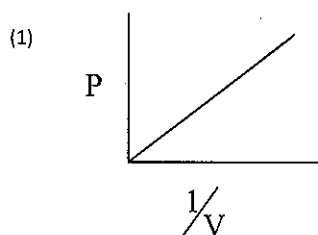
60. A unique characteristic of a gas is,
- (1) having a shape
  - (2) having a definite volume
  - (3) having a mass
  - (4) the ability of being compressed

61. As shown in the figure two balloons of the same size are fixed into two bottles of the same size. Bottle 'A' is immersed in water at  $30^{\circ}\text{C}$ , while bottle 'B' at  $80^{\circ}\text{C}$ . What is the conclusion that can be made from this experiment?



- (1) The volume of a fixed mass of a gas increases, when its temperature increases.
  - (2) The volume of a fixed mass of a gas decreases, when its temperature increases.
  - (3) There is no relationship between the temperature and volume of a fixed mass of a gas.
  - (4) It is difficult to come to a definite conclusion.
62. Two conditions controlled by the students in the above experiment are,
- (1) temperature and volume
  - (2) pressure and mass
  - (3) temperature and pressure
  - (4) pressure and volume
63. If the pressure of a fixed mass of gas is 50 Hgcm and its volume is  $500\text{ cm}^3$ . What is the volume of the gas when its pressure is increased up to 100 Hgcm while the temperature is kept constant?
- (1)  $250\text{ cm}^3$
  - (2)  $300\text{ cm}^3$
  - (3)  $500\text{ cm}^3$
  - (4)  $750\text{ cm}^3$

64. Boyle's law states that the volume of a fixed mass of a gas is inversely proportional to the pressure when the temperature is constant. The correct graphical representation is,



65. An example for a homogenous solution is,

- (1) salt solution  
(2) quick lime dissolved in water  
(3) mixture of sand and iron fillings  
(4) water with iron fillings

66. Which of the following liquid is more suitable to dissolve a piece of Styrofoam?

- (1) kerosene  
(2) petrol  
(3) water  
(4) coconut oil

67. Jak latex (jak glue) dissolves in kerosene oil but not in water. The reason is,

- (1) Jak latex is a nonpolar solute and kerosene oil is a nonpolar solvent.  
(2) Jak latex is a polar solute and kerosene oil is a polar solvent.  
(3) Jak latex is a polar solute and kerosene oil is a nonpolar solvent.  
(4) None of the above.

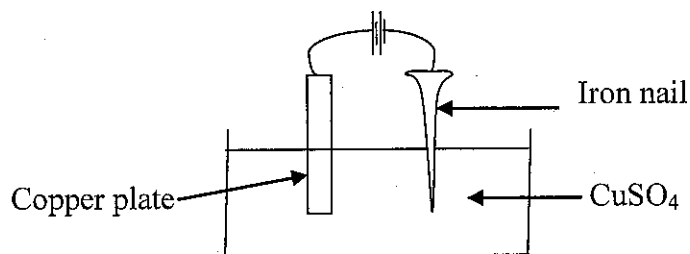
68. Select the factors that affect the solubility, when preparing solutions.

- (1) temperature, nature of solvent, molecular nature of the solute  
(2) temperature, mass of the solvent, molecular nature of the solvent  
(3) pressure, nature of the solvent, nature of the solute  
(4) temperature, pressure, volume

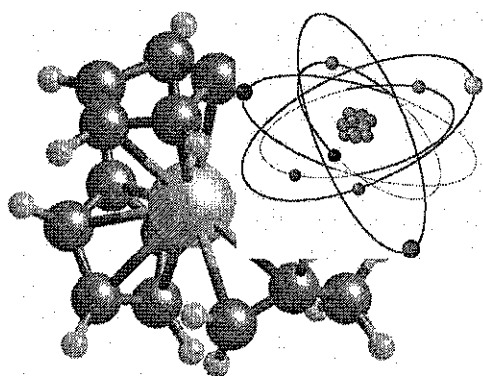


69. Quick lime is produced by heating lime stone and coral. The main constituent of them is  $\text{CaCO}_3$ . The chemical formula of the main product when heating  $\text{CaCO}_3$  is,
- (1)  $\text{Ca(OH)}_2$  (2)  $\text{CaO}$   
(3)  $\text{CaCO}_3$  (4)  $\text{Ca(HCO}_3)_2$
70. Bleaching powder is used in both textile and paper industries to remove colours. Bleaching powder is produced by,
- (1) passing  $\text{Cl}_2$  gas through slaked lime.  
(2) passing  $\text{Cl}_2$  gas through quick lime.  
(3) passing  $\text{Cl}_2$  gas through limestone.  
(4) passing  $\text{Cl}_2$  gas through Calcium bicarbonate.
71. The main byproduct of salt industry is used in the manufacture of cement. What is this compound?
- (1)  $\text{MgCO}_3$  (2)  $\text{Na}_2\text{CO}_3$   
(3) Gypsum (4) Plaster of Paris
72. Acetylene is produced by reacting Calcium carbide with water. Acetylene gas is used ,
- (1) in stimulating ripening of fruits.  
(2) as a fuel in aircrafts.  
(3) in manufacturing fertilizer.  
(4) in corrosion of iron.
73. Vulcanization of rubber is done to avoid unfavorable properties when producing high quality rubber. Which of the following is done in vulcanizing rubber?
- (1) Adding Chlorine to rubber (2) Adding Sulphur to rubber  
(3) Adding Oxygen to rubber (4) Adding Carbon to rubber.

74. A set-up of an apparatus to apply Copper on an iron nail is given in the following diagram. If Zn has to be plated on the iron nail, which of the followings can be used as anode and electrolyte respectively,



- (1) Sn and  $\text{CuSO}_4$
  - (2) Zn and  $\text{ZnSO}_4$
  - (3) Fe and  $\text{ZnSO}_4$
  - (4) Zn and  $\text{CuSO}_4$
75. Which of the following chemical equation represents an industry which uses Hydrogen gas?
- (1)  $\text{H}_2\text{O} + \text{CO}_2 \longrightarrow \text{H}_2\text{CO}_3$
  - (2)  $\text{Ca}(\text{OH})_2 + \text{CO}_2 \longrightarrow \text{CaCO}_3 + \text{H}_2\text{O}$
  - (3)  $\text{N}_2 + 3\text{H}_2 \longrightarrow 2\text{NH}_3$
  - (4)  $2\text{H}_2\text{O} + \text{O}_2 \longrightarrow 2\text{H}_2\text{O}$



# **Chemistry Structured Essay**

## **Part I**

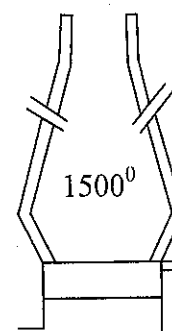
1. Metals are used for various needs of man. Certain metals occur in nature in free state as the metal itself. Some other metals occur in combination with other elements. Extraction of metal from a metallic compound is known as metal extraction. The method of extraction of metal from a compound varies according to the place where metals are in the activity series.

(a)

- i. Write the forms of ores in which the following metals occur in nature and their chemical compound.
  - a) Sodium
  - b) Iron
  - c) Lead
  - d) Copper
- ii. Write the steps of extracting Aluminum from its ore.
- iii. Explain why Sodium does not occur as an element while gold occurs.
- iv. What type of method of metal extraction can be used to extract the following metals that exist in the middle of the periodic table.  
Zn, Fe, Pb, Cu.

(b) A figure of the blast furnace used in iron extraction is given below. Use this to answer the following questions.

- i. What are the raw materials added?
- ii. What is the temperature to be maintained inside the furnace?
- iii. Write the chemical compound that causes reduction of the chemical containing iron.

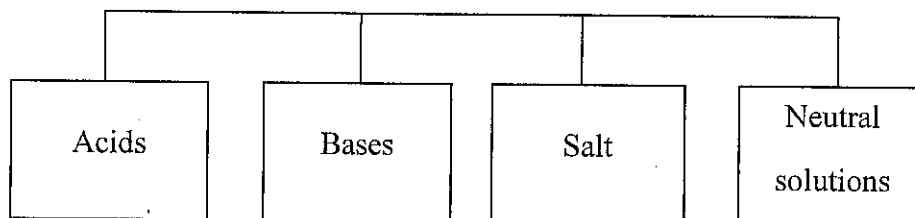


- (c) i. Write the balanced chemical equation for the above reaction.
- ii. What is the chemical compound known as metal slag?
- iii. Which property of metal slag and liquefied iron is used in the extraction of iron from metal slag?

2. Common salt, vinegar, lime water, Milk of magnesia, lime juice, sugar, Caustic soda, kerosene, baking powder and water are some of the chemicals used in day to day activities.

These compounds can be categorized as below.

- i. Fill out the blanks using these examples.



e.g. 1 ..... 1 ..... 1 ..... 1 .....

2 ..... 2 ..... 2 ..... 2 .....

- ii.

- (a). Name two strong acids available in the laboratory.
- (b). Write the chemical equation between Magnesium and one of the acids mentioned in (a).
- (c). Write observations that you can make in the above reaction.

- iii. Copper sulphate is a coloured salt available in the laboratory.

1. Write the balanced chemical equation of reaction between Zn and  $\text{CuSO}_4$ .
2. Write two observations you expect in the above reaction.
3. What type of a reaction is it?
4. Write down the chemical formula of hydrated Copper sulphate.

- 3.

- i. "Acidic food should not be cooked in Aluminum vessels and Aluminum vessels should not be washed with soap". Explain this statement scientifically.

- ii. When an acid and a base react with each other a salt and water are formed. Complete and balance the given chemical equations.
- 1)  $\text{NaOH} + \text{HCl} \longrightarrow$
- 2)  $\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \longrightarrow$
- iii. Name the type of the above reactions.
- iv. How do you identify concentrated Hydrochloric acid available in the laboratory? (Other than the use of litmus paper)
- v. Write two instances when Hydrochloric acid is used in day to day activities?
- vi. pH indicator can be used to identify the acids and bases. State relevant pH ranges of acids and bases.
- vii. Indicators are used to identify the acids and bases. What is an 'Indicator'?
4. (A) A group of students are assigned to conduct experiments to identify acids and bases. The labels of the bottles of acids and bases in the laboratory were faded away. Following are the substances/chemicals given in the relevant activity sheet.
- NaOH solution, Sulphuric acid solution, Potassium permanganate ( $\text{KMnO}_4$ ), Copper sulphate ( $\text{CuSO}_4$ ) solution, Diluted Acetic acid, pH papers, litmus papers, Phenolphthalein solution
- i. Name two solutions with colours.
- ii. Name two colorless solutions.
- iii. Explain how you identify the acids and bases, using the given substances only.
- iv. Categorize given substances into acids and bases.
- v. (a) Suggest a suitable method to differentiate diluted Sulphuric acid and Acetic acid solution using the provided substances only.
- (b) Write the steps of the above process.
- vi. Write the balanced equation for the reaction between Sodium hydroxide and diluted Sulphuric acid. Name the type of the above reaction.
- vii. Name the substance which is used to produce Oxygen gas.

- viii. Name two indicators out of the given substances. Name another indicator which is not mentioned in the list.
- ix. Write the substance that can be used to identify water.
- x. Name two substances with pH 7.
5. (A). Minerals are homogenous and have a definite chemical composition. Minerals such as gems, graphite, silica, mineral sand and lime stone are found in abundance in Sri Lanka.
- In addition to lime stone, name two other raw materials used to produce quick lime.
  - Quick lime is produced by heating lime stone. Write the balanced chemical equation for this reaction.
  - Name three instances where quicklime is used in our everyday life.
  - Name two disadvantages of the traditional lime kiln in Sri Lanka.
  - Write four environmental factors necessary to establish a saltern,
  - What is the disease that can be prevented by using iodized salt?
  - Nitrogen gas can be industrially produced. Name the method.
  - Write down three advantages of Nitrogen gas.
- (B) In Sri Lanka, plants are used as raw materials in various industries such as making vinegar, cinnamon oil, rubber, sugar, etc.
- Draw a flow chart to illustrate the steps in production of cinnamon oil.
  - What is the instrument used to measure the concentration of rubber latex.
  - Write two differences between an ordinary Hydrometer and the above mentioned instrument.
  - What causes the bad smell around a rubber factory?
  - Why is it necessary to add chemicals such as Formaldehyde and Ammonia into rubber latex, before being transported to the factory?

6. i. Give an example for a reaction with low rate and a reaction with high rate that takes place in the environment.
- a. low rate of reaction.....
  - b. high rate of reaction.....
- ii. There are some definite observations to confirm that a chemical reaction has taken place. Write two such observations.
- iii. Mention four factors that affect the rate of reaction.
- iv. The following experiment was done by a student to identify factors that affects the rate of reaction.
- Two similar set-ups were arranged by using pieces of Zinc (Zn), Sulphuric acid ( $H_2SO_4$ ) two test tubes. The two test tubes were heated up to  $30^\circ C$  and  $80^\circ C$  respectively.
- a. State an observation made in this experiment.
  - b. Which factor affects the rate of reaction examined in the experiment?
  - c. Name two factors that should be kept constant in this experiment.
  - d. Write the balanced chemical equation for the reaction of Zn with  $H_2SO_4$ .
- v. Nickel was used to increase the rate of production of margarine. Total amount of Nickel could be obtained at the end of the process. What was the purpose of using Nickel in this process?
- vi. Mention a substance used to increase the rate of reaction in the production of Ammonia using Nitrogen and Hydrogen.

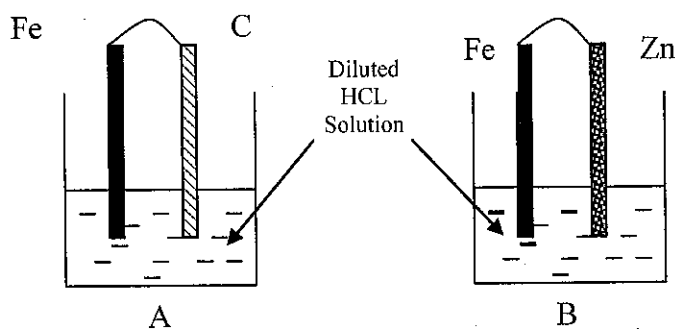
7. Some elements in the Periodic table are given below. English letters mentioned in the table are not the standard symbols of these elements. Answer the questions using this table.

Atomic No	N-2	N-1	N	N+1	N+2	N+3	N+4	N+5
Elements	A	B	C	D	E	F	G	H

- i. These elements belong to the second and the third periods. Separate them and write accordingly.



- ii. Element 'F' forms monovalent cation, while element 'E' doesn't react with most of the other elements. These elements belong to two different groups. Name them.
  - iii. Name two elements with valency 2.
  - iv. What are the non metallic elements that exist as amorphous form with high melting point and boiling point?
  - v. 'C' and 'G' react to form a compound. Write the balanced chemical equation for this reaction.
8. Sunil found that a few pieces of iron that were kept outside turned reddish brown. He thought that iron was corroded. Then he did further experiments on corrosion of iron and prevention of corrosion.
- i. What did he mean by the corrosion of Iron?
  - ii. Write the ionic equation for the above.
  - iii. Is this an oxidation reaction or a reduction reaction?
  - iv. What would be the observation if an iron nail immersed in an Agar medium which contains diluted Hydrochloric acid (HCl) and Potassium fericyanide ( $K_3Fe(CN)_6$ ).
  - v. Write the balanced chemical equation for the above reaction.



- vi. Sunil arranged the above set-ups A and B and observed it after half an hour. What could be observed at Iron plates in both set-ups?
- vii. Explain the reason for the above observation.
- viii. Cathode protection is done by applying some metals over an iron. Name two such metals.
- ix. Iron corrodes rapidly in coastal areas as well as when exposed to the rain water. Do you agree with the above statement? Explain.

- x. Metal Zinc (Zn) and Tin (Sn) can be applied on iron to prevent from rusting. Explain this scientifically.
  - xi. Name three other methods to prevent corrosion of metals.
9. Rocks, sand, water and air are some of the resources found abundantly in nature. These resource are essential for the survival of living beings. Presence of air plays an important role and changes of composition of air greatly affects the living organisms.
- i. Name three prominent gasses in the atmosphere.
  - ii. Mention three main gasses that cause air pollution.
  - iii. Name a gas causes acid rains from the gases mentioned in (ii).
  - iv. Write two human activities that release unfavorable gasses to the environment.
  - v. Name an useful gas which is collected at recycling the organic waste materials.
  - vi. a. Name an unfavorable gas released from refrigerators, air conditioners and perfumes.  
b. Write two unfavorable impact of these gases.
  - vii. a. Write three methods that can be used to minimize the change of the composition of the environment.  
b. State the lowest pH value that should be in the drinking water.
  - viii. High concentration of heavy metals is one of the main factors which determine the quality of water. Name three such heavy metals.
  - ix. Name two ions that affect the density of water.
  - x. Carbon dioxide dissolves in water and form Carbonic acid. Write the chemical formula for this reaction.
  - xi. Clay soil is very important for the growth of crops like paddy. Name two ions present in the clay soil.

10. Many chemical reactions are used in different industries. They can be categorized as follows.

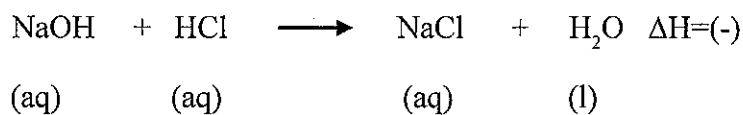
- Formation of new compounds by the combination of elements or compounds. (Synthesis reaction)
- Decomposition of complex compounds into simple compounds or elements. (decomposition reaction)
- Displacement of an element or radical of a compound. (Single displacement)
- Formation of new compounds by interchanging the relevant radical in the reactions. (Double displacement reactants)

**Answer following.**

- When Sarath got down from the bus he observed a substance on his hand which is grey in colour. His sister said that it was Aluminum oxide ( $\text{Al}_2\text{O}_3$ ).
  - Write the balanced chemical equation for the formation of Aluminum oxide when Aluminum reacts with oxygen.
  - Which type of the above chemical reaction does this reaction belong to?
- Cooking utensils and electrical cables are made of Aluminum. Write the properties of Aluminum to be used for the above purposes separately.
- Both metals and alloys are used in our day to day needs. What is the advantage of using an alloy instead of pure metals?
- Brass is an alloy. What are the two elements of brass?
- “Pure gold is not used in making jewelries.” Explain why?
- What is the metal which can be added to overcome this problem?
- Explain the reason to use metals like gold (Au) and Platinum (Pt) in making jewelry.
- Gold can be applied on other metallic ornaments by electroplating. What is the electrolyte used here?

11. A student added some vinegar on a piece of egg shell and observed that it dissolved in vinegar evolving a gas while producing a hissing sound. .
- What should be done to identify this gas?
  - Write an observation that can be done here?
  - Write the balanced chemical equation relevant to the above reaction?
  - Draw a diagram of a suitable set-up in preparing the above mentioned gas in the laboratory.
  - Calcium carbonate ( $\text{CaCO}_3$ ) is the chemical compound found in egg shells. Name two other substances in the environment containing Calcium carbonate.
  - By giving chemical equations where necessary, write the main steps of preparing slaked lime ( $\text{Ca(OH)}_2$ ) from Calcium carbonate ( $\text{CaCO}_3$ ) as the raw material.
  - Write five uses of slaked lime except making *Sinhala*-Bulath vita/*tamil*-vettrili kuru
  - Packets of slaked lime available in the market turned pink colour due to the addition of turmeric. Explain the reason for the above colour change.
12. i. A student who observed the flame of a candle carefully and identified the regions of it.
- What makes yellow and blue regions in the same flame? Explain this phenomenon.
  - Which element do you think are the components of wax according to the above observation?
- Petrol is a fuel and its chemical formula is  $\text{C}_8\text{H}_8$ . Write the balanced chemical equation for the combustion of petrol.
  - Soda acid fire extinguisher is used to extinguish fire. Sulphuric is one of the chemical compounds in it. Name the other chemical compound?
  - Write the balanced chemical equation takes place during the function of the Soda acid fire extinguisher.
  - Give two differences between complete combustion and incomplete combustion.

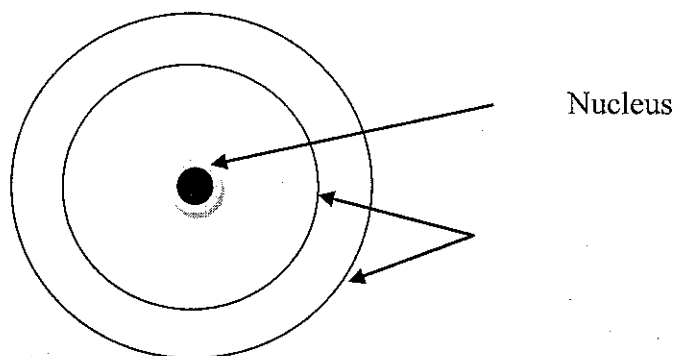
13. i. What is meant by endothermic reactions and exothermic reactions?  
ii. Give example for each.  
iii. Write the balanced chemical equation for the reaction mentioned in (ii).  
iv. Answer the questions 'a' and 'b' using the following equation.



- a. What is denoted by 'aq' and 'l'?
- b. What is represented by  $\Delta\text{H}=(-)$ ?
14. Explain the following scientifically.
- Sodium (Na) is stored in kerosene.
  - Gold exist as a metal in nature.
  - Hydrogen peroxide is stored in brown coloured bottles.
  - Water is not used to extinguish an oil fire.
  - The iron goods in coastal areas rust quickly.
  - Plantains are smoked to stimulate ripening.
  - A yellow flame is seen in the combustion of fire wood. While a blue flame is seen in the combustion of LP gas.
  - It feels cool when water is added to urea while it feels hot when water is added to quick lime.
  - A green colour substance can be seen on brass lamps when oil is kept for a long period of time.
  - Patients who are suffering from gastritis are advised to chew tablets instead of swallowing.

## Part II

- (1) (i). An atomic model is given below.



Complete the above atomic model to represent an element with the atomic number 6 using electrons (e), protons (p) and neutrons (n).

- (ii). Complete the following table.

Sub atomic particle	Scientist discovered	Charge	Mass
electron	.....	negative	.....
.....	Ernest Rutherford	.....	.....
neutron	.....	.....	$1.6750 \times 10^{-27}$ kg

- (2)



(A)

(B)

(C)

The standard symbols of Carbon, Magnesium and Chlorine are given in A, B and C respectively.

Answer the following.

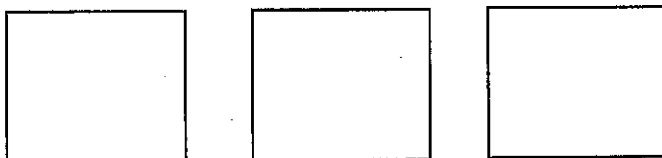
- (i) The atomic mass of A is .....
- (ii) The number of protons in A is .....
- (iii) The atomic number of A is .....

- (iv) The electronic configuration of A is .....
- (v) The number of neutrons in B is .....
- (vi) The number of nucleons in B is .....
- (vii) The number of electron in C is.....
- (viii) The number of neutron in C is .....
- (ix) Give two advantages of using standard symbols for elements.
  - (1) .....
  - (2) .....
- (x) Write standard symbols for the following elements.
  - (1) Hydrogen .....
  - (2) Fluorine .....
  - (3) Sodium .....
  - (3) Mercury .....

(3) The table given below contains information about some elements.

Element	A	B	C	D	E	F
Atomic number	2	6	10	16	6	6
Mass number	4	12	20	32	13	14
Electronic configuration						

- (i) Write the electronic configuration of the above elements in relevant cages.
- (ii) Draw the atomic structure of B, E and F.



- (iii) Write one similarity and one dissimilarity between B and E.

Similarity: .....

Dissimilarity: .....

- (iv) What is the specific name for the elements of this nature?
- (v) Write two such elements given in the table.
- (vi) What is the number of electrons in the outermost energy level of C and D?
- (vii) Name the elements with the maximum number of electrons in the outermost energy level.
- (viii) How many electrons that D should obtain in order to gain noble gas configuration?
- (ix) What is the valency of D?
- (x) Complete the following table.

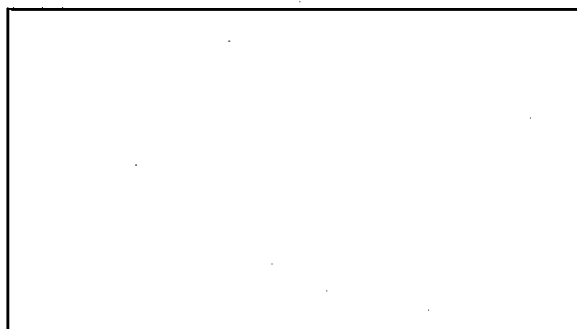
Element	Electronic Configuration	The number of electrons in the outermost energy level.	The number of electrons either obtained or emitted to form noble gas configuration	Valency	Nature of ion
Na					
H					
Mg					
C					
Cl					
O					



- (i) The electronic configuration of atom K is .....
- (ii) The electronic configuration of ion  $\text{K}^+$  is .....
- (iii) The electronic configuration of ion  $\text{Cl}^-$  is .....



(iv) Draw the formation of bond between K and Cl using the Lewis structure.



(v) In which ratio K and Cl atoms are found when forming the above bond?

(vi) The chemical formula of Potassium chloride is .....

(vii) (a) The chemical formula of the compound formed by Al and Cl is .....

(b) The chemical formula of the compound formed by Mg and Cl is .....

(viii) What is the type of bond in the above? .....

(5) (a) The table given below shows the nature of charges of ions and radicals.

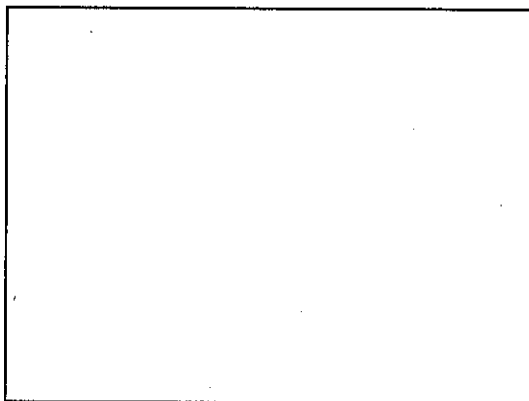
Complete the following table.

Ion	Radical	formula	Name of the compound
Ca <sup>2+</sup>	CO <sub>3</sub> <sup>2-</sup>	CaCO <sub>3</sub>	
Li <sup>+</sup>	HCO <sub>3</sub> <sup>-</sup>		
H <sup>+</sup>	SO <sub>4</sub> <sup>2-</sup>		
K <sup>+</sup>	NO <sub>3</sub> <sup>-</sup>		
Mg <sup>2+</sup>	OH <sup>-</sup>		Magnesium hydroxide
Al <sup>3+</sup>	OCl <sub>3</sub> <sup>-</sup>		

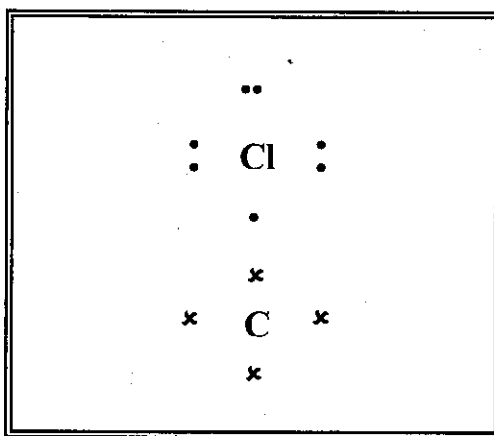
(b) Answer the questions using information given above.

(i) What is type of the bond formed by sharing electrons to get the noble gas configuration?

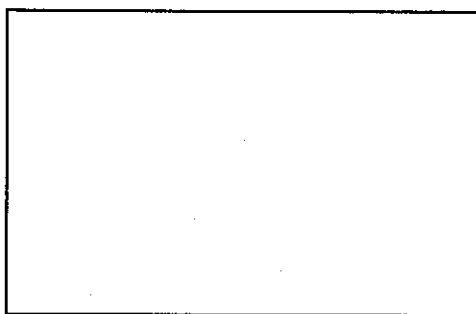
(ii) The atomic number of Cl is 17. Draw the molecular structure of  $\text{Cl}_2$  using the Lewis structure.



(iii) An incomplete diagram of the bond between C and Cl is given below. Complete it.



(iv) Draw the covalent bond of  $\text{NH}_3$  with dots and crosses.



(v) (a) Write an example for ,

(i) an ionic bond .....

(ii) a covalent bond .....

(b) Complete the table given below

	Covalent Compound	Ionic Compound
i) Behavior of electrons in forming bonds		
ii) Electrical conductivity		
iii) Melting point		
iv) State of matter in room temperature		

(6) (i) Write the chemical formula of the following compound and find the relative molecular mass of them in the table.

C=12, H=1, O=16, Al=27, S=32, Na=23, Ca=40, N=14, K=39, Cl=35.5

Compound	Chemical formula	Relative molecular mass
1) Sodium hydroxide		
2) Aluminum sulphate		
3) Calcium bicarbonate		
4) Urea		
5) Glucose		
6) Ethyl alcohol		

ii) State the molecular mass and the number of moles of each compound given in the table.

Formula of the Compound	Mass given	Molecular mass	Number of moles
CO <sub>2</sub>	132 g		
Al <sub>2</sub> O <sub>3</sub>	51g		
CO(NH <sub>2</sub> ) <sub>2</sub>	240 g		
C <sub>6</sub> H <sub>2</sub> O <sub>6</sub>	171g		
H <sub>2</sub> O	72 g		

(7) (a) Answer the questions using the table given below. (Given symbols are not standard symbols)

Element	A	B	C	D	E
Melting point °C	-259	3600	-218	-189	63
Boiling Point °C	-253	4800	-183	-186	766
Density kg m <sup>-3</sup>	0.071	2.25	1.14	1.66	0.87

i) Name two elements in gaseous state.

i.....

ii.....

ii) Name two elements in solid state.

i.....

ii.....

iii) Name a solid element which floats on water at room temperature.

.....

(b) The electronic configuration of X is 2, 7

- i) The group number of the element X is .....
- ii) The period number of the element X is.....
- iii) Valency of the element X is.....
- iv) Write the chemical formula of the compound formed by X with element Mg.  
.....

(8) The information given below is not represented with standard symbols. Use the information given in the table to answer the questions.

Element	A	B	C	D
Atomic number	11	12	14	17

- i) Write the element with the highest atomic radius.  
.....
- ii) Write the element with the highest capability of accepting electrons.  
.....
- iii) Name the non metallic element which is in solid state at room temperature.  
.....
- iv) What is the element with the highest melting point?  
.....
- v) What is the metalloid?  
.....

- (9) (a) The types of chemical reactions are given below. Write two examples for each type in the cages

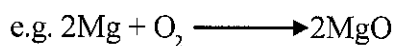
### Types of Chemical Reactions

Combination reactions	Single displacement reactions	Double displacement reactions	Decomposition reactions
..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....

- (b) Complete the following table according to the above types of reactions. One example is given.

Number	Name of reactants	Symbols of reactants	Names of the products	Symbols of products
e.g. 1	Magnesium Oxygen	Mg, O <sub>2</sub>	Magnesium oxide	Mg O
2				
3				
4				
5				
6				
7				
8				
9				
10				

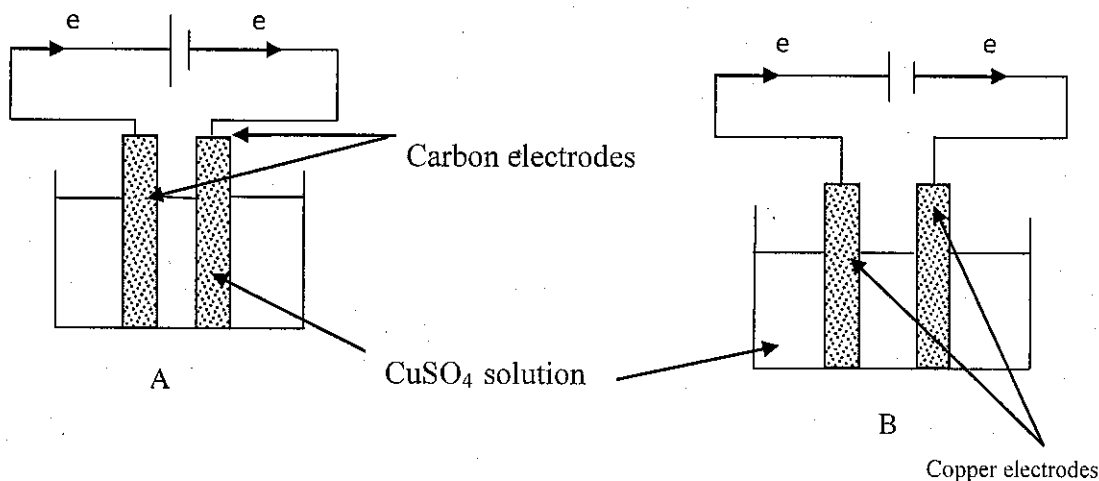
(c) Write balanced equations for the above chemical reactions.



- 1) ..... 2).....  
 3) ..... 4) .....  
 5) ..... 6).....  
 7) ..... 8).....  
 9) ..... 10).....

(10) The chemical reactions can be done by passing electricity through certain aqueous solutions and molten liquids. This property is made use of in various instances.

A and B are two set-ups showing electrolysis of solution of Copper sulphate using Carbon electrode and Copper electrode respectively. Answer the questions using given data.



- i) Name the ions of the solution in the set-up A.
- ii) Divide the ions as negative and positive.  
 Positives ion .....  
 Negative ion .....
- iii) Name the electrolyte .....

iv) The above solutions are made by dissolving Copper sulphate crystals in water.

Write the nature of the bonds of following.

1. Copper sulphate .....

2. Water .....

v) Write the observations near the anode and cathode in the solution of set-up B.

Anode .....

Cathode .....

vi) Write the chemical reaction takes place at cathode in set-up B.

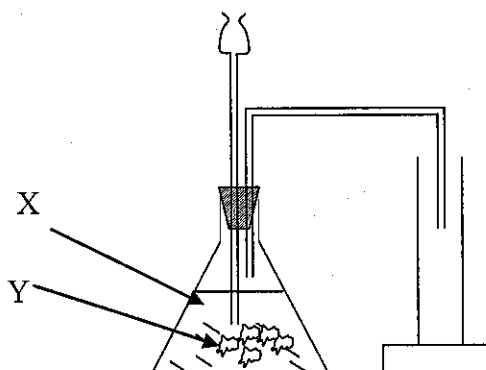
vii) Name the electrode where the reduction takes place.

viii) A Solution of  $\text{AgNO}_3$  is used in electroplating of silver. Name the metals used as anode and cathode.

ix) What is the method of extraction used for metals in the highest level of activity series?

x) What is the reason for using the above method?

(11) The following set-up is used to produce a gas which is involved in photosynthesis. The percentage of this gas is 0.03 in atmosphere. This gas is released to atmosphere as a byproduct from most of the industries and combustion as well.





(i) Name X and Y

X .....

Y .....

(ii) Write two errors occur when preparing this set-up.

1 .....

2 .....

(iii) What is the reason to use this method for collecting this gas?

(iv) Mention two physical properties of this gas.

1 .....

2 .....

(v) What would be the observation when sending this gas through lime water?

.....

(vi) Write two harmful effects of releasing this gas excessively to atmosphere.

.....

(vii) Write the chemical formula of the compound used to obtain lime water?

.....

(viii) What is the observation when sending the gas through lime water for a long period of time?

.....

(ix) Give the reason for the above observation?

.....

12. The temperature, pressure, volume and quantity of mass determine the behavior of a gas.

The diagram shows heating of a test tube containing air with use of a Bunsen burner.



(i) What are the observations? Write the reason/reasons for your answer.

.....

(ii) What are the changes that can be observed in the volume of a constant mass of air at the following situations.

a. When the temperature increases. ....

b. When the pressure increases. ....

(iii) Most of the substances consist of two or more constituents. These are known as mixtures. Name the type of mixtures of the following.

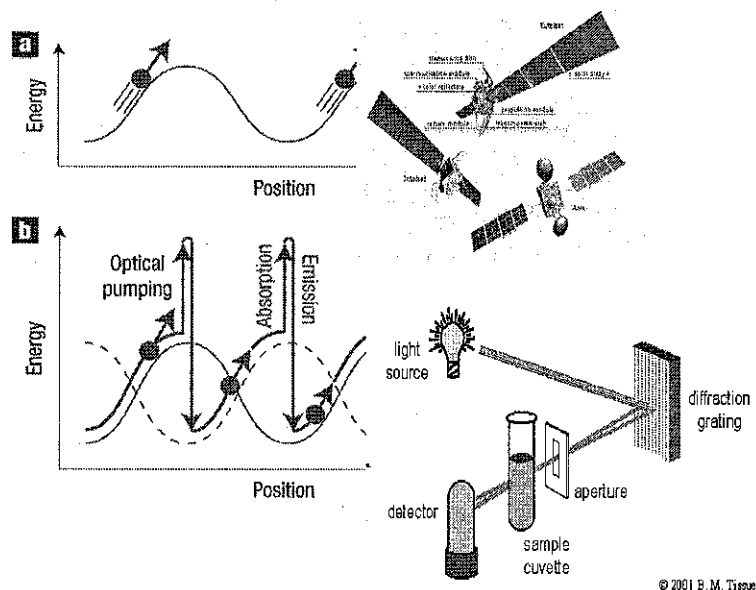
a. Sugar solution

b. Chalk powder and water.

c. Copper sulphate solution

d. Mixture of iron and Sulphur powder

e. Polarized Carbonic solution.



# Physics

1. What is the correct symbol of a plane mirror from the following diagrams?



(1)



(2)

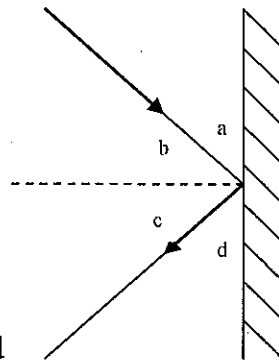


(3)



(4)

2. What is the incident angle given in the following ray diagram?



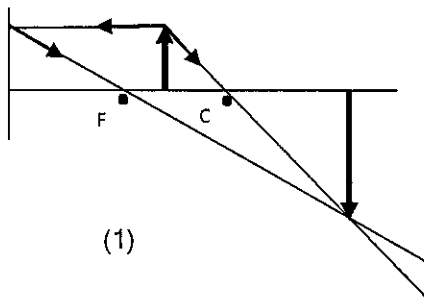
(1) a

(2) b

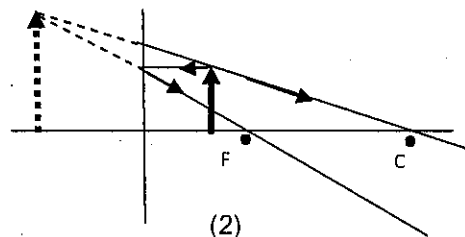
(3) c

(4) d

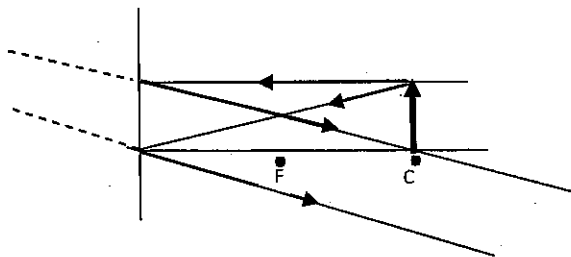
3. What is the correct ray diagram which shows the image of the object which stands in front of a concave mirror?



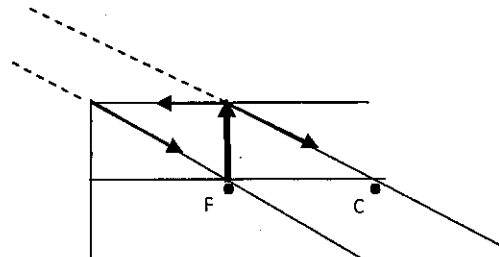
(1)



(2)



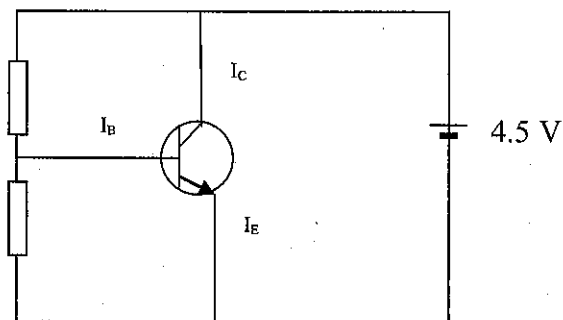
(3)



(4)

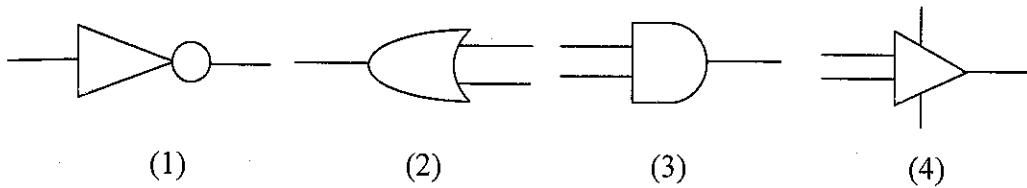
4. The below diagram shows how Amal observes a coin which was put into a glass of water. What would be the observation made by Amal?
- (1) Coin could not be seen
  - (2) Coin would be seen smaller in size
  - (3) Coin would be seen larger in size
  - (4) Only part of coin could be seen
5. What is the correct sequence of the components of a house wiring circuit?
- (1) Electric meter – Service fuse- Main switch- Trip switch
  - (2) Service Fuse- Electric meter – Main switch- -Trip switch
  - (3) Service fuse – Electric meter- Trip switch- Main switch
  - (4) Service fuse- Trip switch- Electric meter-Main switch
6. The following set-up was arranged to study the heating effect of electricity. What is the change to be done to speed up the reading of the thermometer?
- (1) Increase the number of cells
  - (2) Increase the turns of the coil
  - (3) Increase the period of time of providing the electricity
  - (4) All the above
7. The diluted acidified water decomposed into Oxygen and Hydrogen gases at electrolysis. What is the ratio of gases evolved?
- (1) 1:4                      (2) 1:3                      (3) 1:2                      (4) 1:1

8. A student wound an iron nail with an insulated Copper wire and connected to a dry cell. He kept some paper clips closer to the iron nail and observed the attraction of paper clips. What change he should do to attract more clips?
- (1) Increase the number of dry cells  
(2) Increase the number of turns  
(3) Increase the soft iron core  
(4) All the above
9. Transformers are used in day to day life in usage of electricity. There are 1500 turns in a primary coil of a step down transformer. The output was 12 V when connected to 240 V voltage supply. What is the number of turns in the secondary coil?
- (1) 25                      (2) 50                      (3) 75                      (4) 750
10. What is the group of the element to be doped with Silicon or Germanium to make a n-type semi conductor?
- (1) II                      (2) III                      (3) IV                      (4) V
11. Given below is a simple electronic circuit with a bulb that automatically illuminates with the night fall. What current is the most important current in the process, out of the currents given?



- (1)  $I_B$                       (2)  $I_C$                       (3)  $I_E$                       (4) I
12. What is the device should be applied for smoothing output current of a fully rectify circuit which use to convert alternative current to direct current?
- (1) Diode                      (2) Capacitor  
(3) Transistor                      (4) Resistor

13. Logic gates are important devices in Digital Electronic Science. What is the symbol of AND gate?



14. What is the appliance with a high storage capacity and electronic circuits with semi conductors

(1) Compact Disc      (2) Audio cassette      (3) Floppy disk      (4) Memory chip

15. What is the standard unit (SI) for acceleration?

(1)  $\text{m s}^{-2}$       (2)  $\text{m s}^{-1}$       (3)  $\text{m/s}^{-1}$       (4)  $\text{m/s}$

16. What is the vector quantity?

(1) Speed      (2) Distance      (3) Time      (4) Force

17. There are 3 electric posts (A, B and C) with 30 m distance, connected with a horizontal wire. Find the displacement when a squirrel moved on the wire from post B to the post C and moved to the opposite direction passing 10 m away from B to the direction of post A?

(1) 70 m      (2) 10 m      (3) -10 m      (4) 40 m

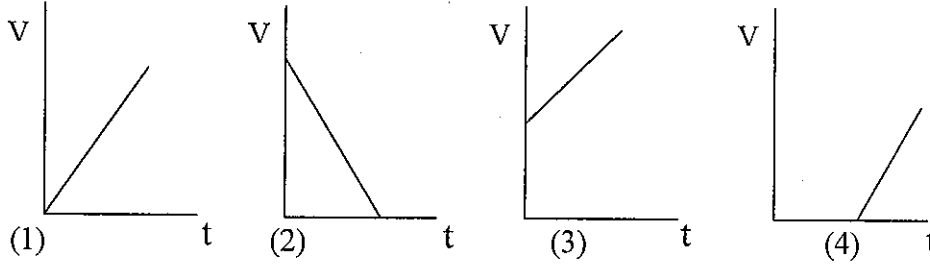
18. A coconut fell on to the ground with a velocity of  $10 \text{ m s}^{-1}$ . From what height did the coconut fall down? ( $g=10 \text{ m s}^{-2}$ )

(1) 2 m      (2) 5 m      (3) 10 m      (4) 100 m

19. The mass of a trolley kept at rest on a smooth horizontal plane is 5 kg. What is the force which should be applied to get an acceleration of  $3 \text{ m s}^{-2}$ ?

(1) 3 N      (2) 5 N      (3) 15 N      (4) 45 N

20. Which of the following graph shows the correct velocity–time graph for an object falling freely in the gravity?



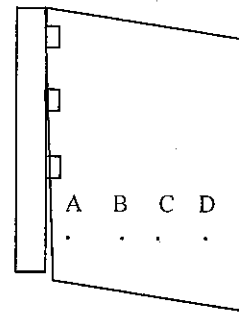
21. **Statement** : A hydrometer sinks more deeper in a diluted salt solution than in a concentrated salt solution.

**Reason** : Density of a diluted solution is less than density of a concentrated solution

Select the correct answer which shows the correct relationship between the statement and the reason?

- (1) Statement is correct and reason is incorrect  
(2) The reason explains the statement  
(3) Both statement and reason are incorrect  
(4) The reason is correct but does not relevant to the statement
22. Given bellow is a door with points A, B, C and D. What is the place that minimum force to be applied to close the door?

- (1) A (2) B (3) C (4) D



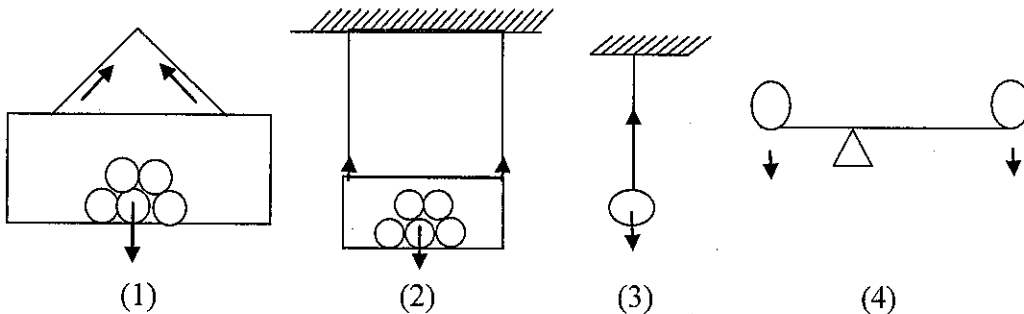
23. The friction of machinery parts has to be decreased or increased in day to day activities. What is the method to be applied to increase the friction in such situations?

- (1) Applying oil or grease  
(2) Making grooves  
(3) Applying ball bearing and roller bearing  
(4) Smoothing the surface



24. What is the height of the Mercury column at sea level in a Mercury barometer?  
 (1) 760 mm      (2) 766 mm      (3) 1000 mm      (4) 1360 mm

25. Which diagram shows the system of unbalanced forces?



26. A flute with 30 cm column of air produces a sound of 100 Hz frequency. What is the frequency of the sound produced by a half a length of that column of air?  
 (1) 50 Hz      (2) 100 Hz      (3) 200 Hz      (4) 100x30 Hz

27. Which of the following is not a characteristic of an electromagnetic wave?

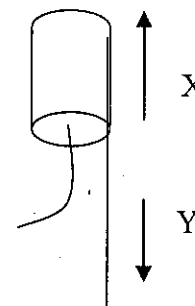
- (1) A medium is not necessary for transmission  
 (2) Shows electric and magnetic properties  
 (3) A kind of transverse wave  
 (4) Velocity at a vacuum is  $3 \times 10^8 \text{ m s}^{-1}$

28. An object with 5 N weight shows 3.5 N weight when immerse in a liquid. What is the upthrust on the object?

- (1) 8.5 N      (2) 3.5 N      (3) 1.5 N      (4) 1 N

29. The figure shows a movement of a sky rocket. Select the correct statement about X and Y.

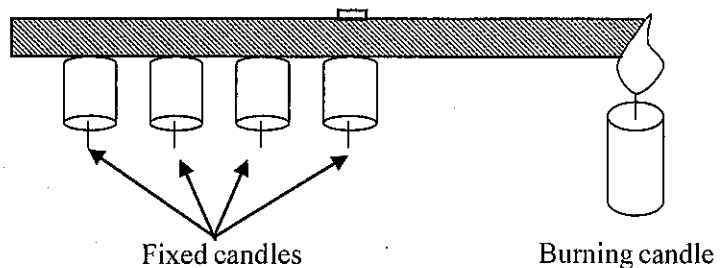
- (1) X - action      Y - reaction  
 (2) X - reaction      Y - action  
 (3) X - action      Y - action  
 (4) Y - reaction      Y - reaction



30. What is the SI unit for work?  
(1) N (2) J (3) m (4) W
31. An object with 10 N was lifted to a wall of 2 m height, by using 6 m long inclined plane. What is the potential energy gained by the object?  
(1) 200 J (2) 60 J (3) 20 J (4) 12 J
32. Which of the following shows a second class lever?  
(a) Wheelbarrow (b) Nut Cracker  
(c) Pair of scissors (d) Claw hammer  
(1) a and b only  
(2) a and c only  
(3) a and d only  
(4) b and c only
33. What is the amount of heat necessary to increase the temperature of a 4.5 kg mass of Copper block from 30°C to 70°C? (The specific heat capacity of Copper is  $400 \text{ J kg}^{-1} \text{ }^\circ\text{C}^{-1}$ )  
(1) 7.2 J (2) 72 J (3) 720 J (4) 72000 J

34. The figure shows a set-up which shows transmission of heat energy through a Copper rod. What is the type of heat transmission of the given Copper rod?

- (1) Conduction  
(2) Convection  
(3) Radiation  
(4) Reflection



35. What is the value for 37°C in the Kelvin scale?  
(1) 273 K (2) 300 K (3) 310 K (4) 473 K

36. What are the charges obtained by the silk cloth and glass rod respectively, when glass rod rubbed with a silk cloth?
- (1) Positive and negative (2) Negative and positive  
(3) Positive and positive (4) Negative and negative
37. What is the standard unit for voltage?
- (1) Ampere (2) Volt (3) Watt (4) Ohm
38. What is the equivalent resistance of  $4 \Omega$ ,  $12 \Omega$ , and  $6 \Omega$  when connected in parallel?
- (1)  $8 \Omega$  (2)  $4 \Omega$  (3)  $2 \Omega$  (4)  $0.5 \Omega$
39.  $2 \Omega$ ,  $4 \Omega$ , and  $6 \Omega$  resistors are connected in a series with  $6 \text{ V}$  supply. What is the current flowing through the resistors?
- (1)  $0.5 \text{ A}$  (2)  $1 \text{ A}$  (3)  $1.5 \text{ A}$  (4)  $2 \text{ A}$
40. What are the components needed to make a simple electric circuit?
- (1) Dry cell, Switch, Bulb and Wires  
(2) Bulb, Capacitor, Resistor and Wires  
(3) Resistor, Switch, Capacitor and Wires  
(4) Bulb, Switch, Capacitor and Wires
41. Factors affect on capacity of a capacitor are,
- a) common area of two plates.  
b) distance between two plates.  
c) thickness of two plates.  
d) nature of dielectric substances.
- Which of the following is correct?
- (1) a and b only  
(2) a, b and c only  
(3) a, b and d only  
(4) a, c and d only

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42. What is the unit for the rate of flow of electric charges?
- 1) Ohm                      (2) Farad                      (3) Coulomb                      (4) Ampere
43. Colour band of a resistor contains blue, green and red. Silver indicates the tolerance value. The range of the value of the resistor is, (blue=6, green=5, red=2, silver=10%)
- 1) 5850  $\Omega$  - 7150  $\Omega$                       (3) 4850  $\Omega$  - 5550  $\Omega$   
 2) 3850  $\Omega$  - 4550  $\Omega$                       (4) 2850  $\Omega$  - 3550  $\Omega$
44. Select the most suitable heating device with the minimum energy wastage, when heat equal amount of water in similar size vessels?
- (1) Hearth with three stones  
 (2) Modified clay hearth  
 (3) L.P. gas cooker  
 (4) Immersion heater
45. A car along a horizontal path stops its engine at the base of the mountain and moves towards the top.
- What is the statement that best explains the potential energy and kinetic energy of the car at the base of the mountain?
- (1) Kinetic energy increases while potential energy decreases  
 (2) Kinetic energy decreases while potential energy increase  
 (3) Both kinetic and potential energy are decrease  
 (4) Both kinetic and potential energy are increase
46. Height of a waterfall is 21 m. Specific heat of water is  $4.2 \times 10^3 \text{ J kg}^{-1} \text{ }^\circ\text{C}^{-1}$ . The maximum temperature difference between the water at the top of the water fall and the bottom is,
- (1) 0.0026  $^\circ\text{C}$                       (2) 0.005  $^\circ\text{C}$                       (3) 0.02  $^\circ\text{C}$                       (4) 0.05  $^\circ\text{C}$

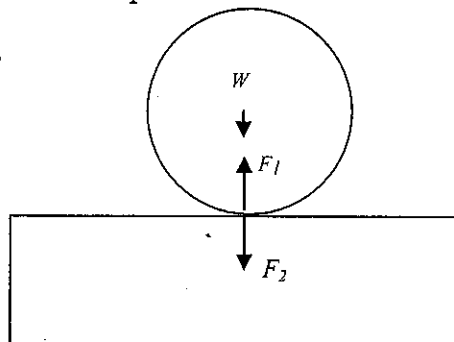
47. What is the amount of heat energy generated in a hot plate ( $52.9 \Omega$ ,  $230 \text{ V}$ ) connected to a main electric supply for 3 minutes?

- (1) 100 kJ                      (2) 150 kJ                      (3) 180 kJ                      (4) 200 kJ

48. What change can be seen when a negatively charged rod brings nearer to a positively charged Gold leaf electroscope.

- (1) Further divergence of the gold leaf.  
(2) The divergence of the gold leaf increases and reduces again.  
(3) No change occurs in the divergence of the gold leaf.  
(4) The diverged gold leaf move closer and diverge again.

49. A sphere with the weight of ' $W$ ' is kept on a smooth horizontal surface. A few forces acting on it is shown in the diagram.



Consider the following relationships about the forces acting on the sphere.

- (a)  $F_1 = W$     (b)  $W = F_2$                       (c)  $F_2 = F_1$

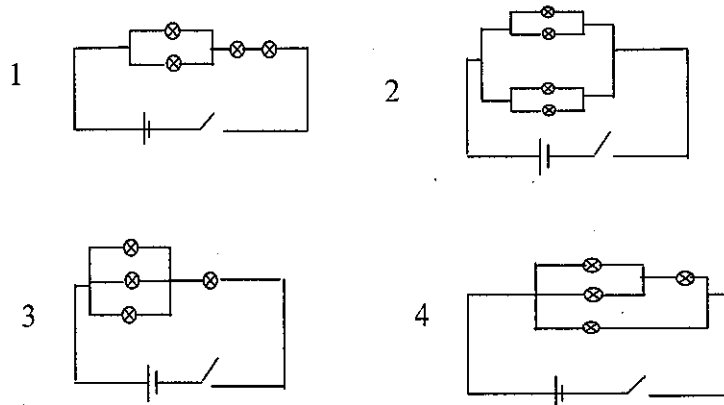
Select the suitable relationships complies with the Newton's third law.

- (1) (a) only                                      (3) (c) only  
(2) (b) only                                      (4) (a) and (c) only

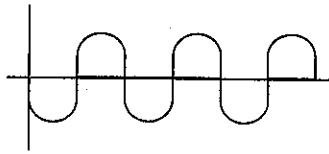
50. What is the energy transformation when lifting a metal bar using a crane with a combustion engine?

- (1) Chemical energy to kinetic energy  
(2) Chemical energy to potential energy  
(3) Kinetic energy to potential energy  
(4) Potential energy to kinetic energy

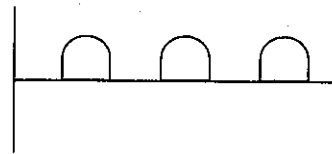
51. What does affect to reduce the efficiency of a machine?
- (1) Applying ball bearings
  - (2) Applying grease
  - (3) Smoothing the surface
  - (4) Incomplete combustion of fuel
52. The freezing part of a refrigerator is located in the top. If that part is changed to locate on the bottom, what could be expected?
- (1) Conventional current flows properly
  - (2) Whole refrigerator become cold, highly
  - (3) The temperature of the upper part increases than the lower part
  - (4) Any change could not be identified in the refrigeration
53. Below diagram shows four electric circuits with identical bulbs connected to a dry cell of similar voltage. Select the circuit with similar brightness in all bulbs.



54. The output current and the input current of an electronic appliance are shown as follows. What can be the electronic appliance?



Input signal



Output signal

- (1) Transistor  
 (2) Capacitor  
 (3) Diode  
 (4) Resistor
55. What is the characteristic of a sound that helps to identify the difference between the same note produced by the guitar and a violin?
- (1) Quality of sound  
 (2) Amplitude  
 (3) Frequency  
 (4) Pitch
56. What is the symbol of the rectifier diode?



(1)



(2)



(3)

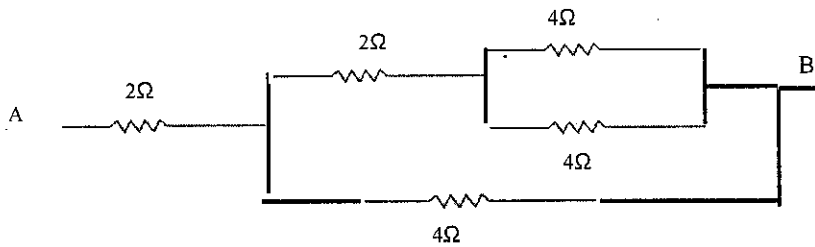


(4)

57. Select the appliance which is not used in the house wiring circuit?
- (1) Main switch  
 (2) Trip switch  
 (3) Transformer  
 (4) Fuse

58. Select the appliance which stores electricity in the same form.
- (1) Thermo couple
  - (2) Ni-Fe cell
  - (3) Diode
  - (4) Capacitor

59. Find the equivalent –resistance in the given electric circuit.



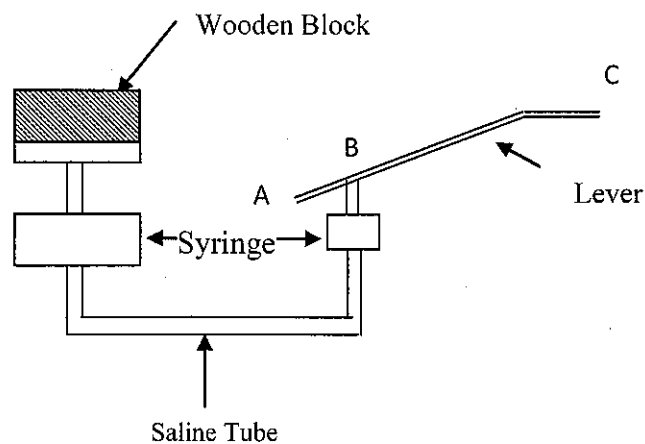
- (1)  $2\Omega$
  - (2)  $4\Omega$
  - (3)  $6\Omega$
  - (4) 10
60. A heater (600 W) is immersed in 500g of water for a minutes. Calculate the efficiency of the heater if the temperature is increased by  $12^\circ\text{C}$ .
- (1) 30%
  - (2) 35%
  - (3) 60%
  - (4) 70%



### Essay Type Questions

- 01 Suranga decided to find reasons to get a high cost electricity bill in this month when compared to the previous month.
- Write two actions could be used to reduce the electricity bill without reducing the electricity usage.
  - What is the unit use to measure domestic consumption of electricity?
  - Name a suitable type of electric bulb which uses electricity economically?
  - Write two advantages of using the bulb mentioned in the part (iii).
  - Write a disadvantage of using the bulb mentioned in the part (iii).
  - Write two disadvantages of filament bulbs.
  - Find the amount of energy consumption when using 5 bulbs (100 W) for two hours.
  - Write two renewable energy sources.
  - Write two factors affect to increase the energy consumption of a country.
  - Write two advantages and two disadvantages of using coal power to produce electricity in Sri Lanka

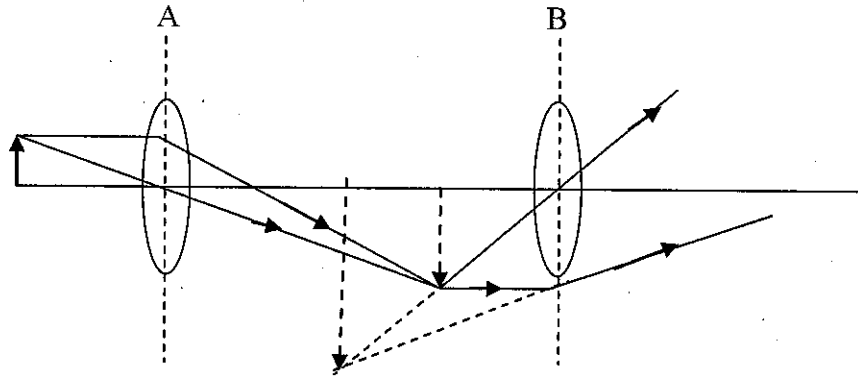
02.



The above diagram shows a simple hydraulic jack prepared by a student for an exhibition at the school.

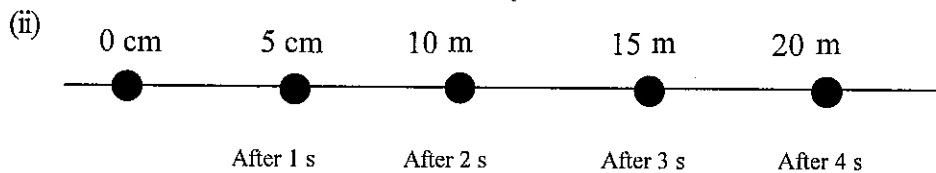
- i. Write the letters used for fulcrum, load and effort respectively
  - ii. What is the class of lever used above?
  - iii. A wooden block can be lifted by applying a force of 2 N on the end of the piston (C), when the area of cross sections of small syringe and the large syringe are  $0.0004 \text{ m}^2$  and  $0.0012 \text{ m}^2$  respectively.
    - a) Calculate the pressure exerting by the piston of the smaller syringe on the fluid.
    - b) Find the force applied on the large syringe.
  - iv. Find the mass of the wooden block, if there is no friction force between syringe and piston ( $g = 10 \text{ m s}^{-2}$ )
  - v. Write a change that can be done to reduce the effort than 2 N, when lifted the above wooden block.
  - vi. Write two instances that hydraulic jack is used in day to day life
3. A Red bulb was lit up in the bottom of pond with a water fall in the courtyard. The bottom of the pond and the wall nearby were illuminated by the light of the bulb.
- (i) (a) What is the phenomenon that causes to illuminate the bottom of the pond in red colour.
    - (b) Draw a ray diagram to show the above phenomenon.
  - (ii) What will be the change of the location of the bulb when observing over the pond.
  - (iii) Draw a ray diagram to show the above location of the bulb.
  - (iv) A glass block is placed on a petal of a flower. Find the height of the glass block if the petal appears 5 cm above the real position. The refractive index of glass relative to air is 1.5.

- (v) The ray diagram given below is the image of a minute object that was observed by a compound microscope.



Name the eye piece and the objective using the given letters A and B.

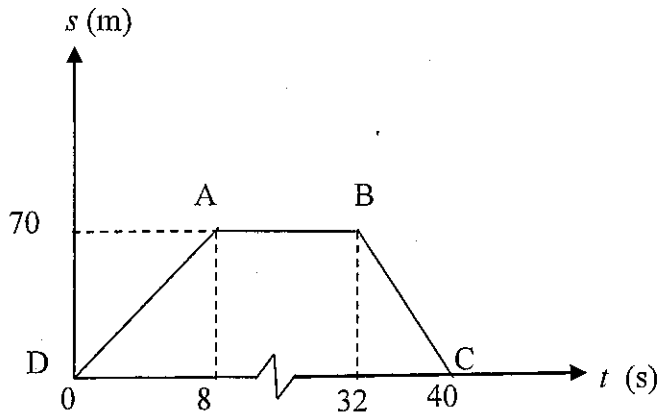
- (a) What is the position of the specimen to be placed when adjusting?  
(b) Write three properties of the final image.
4. (i) Following diagram shows the positions of the motion of Anil in a running event.



Find following according to the above information.

- (a) Anil's displacement after 1 s.  
(b) Anil's velocity during the first second.  
(c) Anil's velocity during the fourth second.  
(d) Anil's velocity during 4 s.  
(e) What is the type of this motion?

(iii) Following is a displacement–time graph.



Find following according to the above information.

- The maximum displacement after 8 s.
- What is the type of the movement during the first 8 s?
- What is the type of the movement during the 8 s - 32 s?
- What is the type of the movement during the 32 s - 40 s?
- What is the distance traveled by the object?
- What is the displacement of the object after 40 s?

5. The table given below shows the way of changing the velocity in first 12 seconds of a train that was traveled in a straight line.

Time(s)	0	1	2	3	4	5	6	7	8	9	10	11	12
Velocity( $\text{m s}^{-1}$ )	0	3	6	9	12	12	12	10	8	6	4	2	0

- Draw a velocity-time graph for the above motion.
- What is the acceleration of the train until it comes to uniform velocity?
- Calculate the force exerted by the engine to gain the above acceleration, if the mass of the train is 50000 kg.

- (d) What is the period of time, the train traveled with the uniform velocity?
- (e) Calculate the deceleration of the train.
- (f) Find the force applied for the above deceleration.
- (g) Explain the reason for the push forward of passengers and the goods at deceleration of the train.
- (h) Calculate the total distance traveled by the train in kilometers.

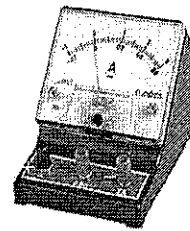
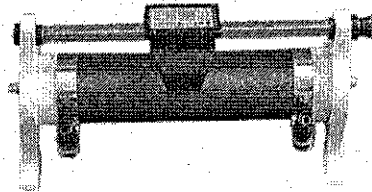
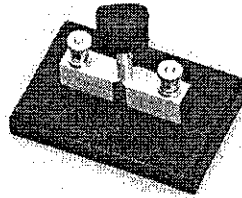
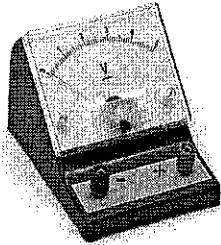
6. Following table shows the displacement-time data of a car moving along a straight path.

Time(s)	0	1	2	3	4	5	6	7	8	9	10
Displacement(m)	0	40	80	120	160	160	160	160	160	80	0

- (a) Draw a displacement-time graph for the above motion.
  - (b) Find the uniform velocity of the car during first four seconds.
  - (c) Calculate the acceleration force required by the engine to get  $2 \text{ ms}^{-2}$  acceleration, if the mass of the car is 750 kg.
  - (d) What will be the force applied by the engine if 50 N resistance force is exerted against the motion of the car.
  - (e) What is the displacement of the car after 10 seconds?
  - (f) What is the mean velocity of the car during 8 s - 10 s?
7. A man jumps from a stationary helicopter during an aviation display. The parachute was opened after falling 50 m from the helicopter.
- (i) What is the velocity of the man, just before jumping from the helicopter?
  - (ii) What is the velocity of the man, when the parachute is opened? ( $g = 10 \text{ m s}^{-2}$ )

- (iii) What is the time taken, when the parachute is open?
  - (iv) If the landing velocity is zero and the deceleration of the man after opening the parachute is  $5 \text{ m s}^{-2}$ , what is the height to the place of the opening the parachute from the earth?
  - (v) A rubber ball which is attached to the Hydrogen balloon goes up. The balloon is blasted, when it gets  $5 \text{ m s}^{-1}$  velocity.
    - (a) Explain the type of the motion of the rubber ball after the blast.
    - (b) What is the velocity of the ball after 2 s of the blast?
    - (c) Calculate the landing velocity of the ball, if the height to the place of the blast is 50 m.  
( $g = 10 \text{ m s}^{-2}$ )
8. The coil of the electric heater is insulated well by placing Nichrome or Tungsten coil of wire in present. Then it is well covered with metal covering.
- (i) What are the elements present in the Nichrome?
  - (ii) Name the materials used to insulate the above equipment.
  - (iii) There are L, N and E marks on the three pin plug. Write the meaning of each letter denoted and state the places where each terminal is fixed.
  - (iv) A bimetallic strip is used in the modern immersion heater to control the heat
    - a. State the metals/alloys used to make the bimetallic strip.
    - b. Which terminal of the plug must be connected with the bimetallic strip?
    - c. Calculate the amount of heat generated by the immersion heater during 5 minutes, if the heater is connected to  $80 \Omega$  (240 V) supply.
  - (v) The most suitable plug base to connect the immersion heater is 15 A. Give reasons.
  - (vi) Name electrical equipment that can be used to obtain electricity from 5 A plug base.

9. Following are some tools use to set up an experiment to find the relationship between electric current and the voltage.



- (i) Draw a diagram to show the method of connecting these tools in the above mentioned experiment.
- (ii) It is not suitable to close the switch for a long time. Explain why?

(iii) Following table shows readings in 4 different instances.

Instance	Current (A)	Voltage (V)
1	0.3	1.5
2	0.4	2.0
3	0.5	2.5
4	0.6	3.0

Draw a graph using these readings.

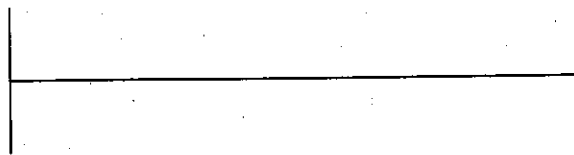
- Find the resistance using the graph.
- What is the law that can be proved by this experiment?

(iv) Answer following if water is boiling with the use of a immersion heater (1000 W, 230 V)

- Calculate the amount of heat generated within 2 minutes, when immersion heater gets maximum voltage and current.
- Find the current flows through the heater.
- Write three properties of metals use to make the coil of the immersion heater.

10. In 2004, the Tsunami destroyed about 40000 human lives and large number of buildings and other properties in Sri Lanka.

- Name the type of the Tsunami waves.
- Draw a graph to show how the Tsunami waves reached to the sea shore.





(iii) Write two types of electro magnetic waves and mention a use for each.

**Wave**

**Use**

a. ....

.....

b. ....

.....

(iv) Echo and re-bounce can be seen in a sound wave.

a. Write a disadvantage of an echo.

b. Write an instance that uses echo.

(v) A student experienced the echo of his clap after 3 seconds as a result of bouncing the sound on a hill close by. Find the distance between the hill and the student, if the velocity of the sound is  $330 \text{ m s}^{-1}$ .

(vi) Write two types of changes that could be adopted to increase the pitch of the sound of a musical instrument with stretched strings.

(vii) Animals such as dogs and cats can hear sounds even with 30000 Hz. Explain why?

(viii) Calculate the velocity of the sound when a tuning fork with the frequency of 512 Hz is vibrated in the air. Use wave length of the air as 0.65 m.

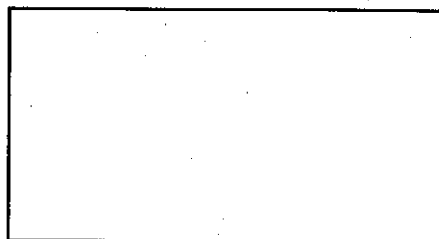
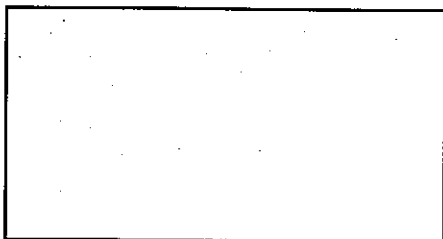
11. Pattern of a wave can be observed when vibrate a slinky in following instances.

(i) Vibrating a slinky downwards which hanging vertically

(ii) Vibrating a slinky either sides when tied to a fixed place.

a. Name the waves in both instances.

b. Draw the types of waves in these instances and label them.



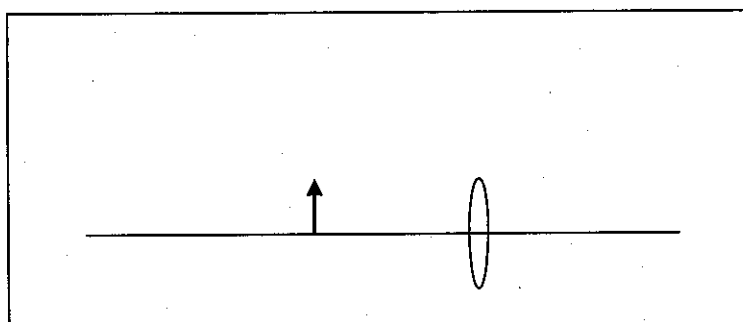
c. Write two properties of following

- Electro magnetic waves.
- Mechanical waves.

(iii) Find the velocity of the wave when a slinky produces 9 waves within 3 seconds and the total wave length is 18 m.

12. Hand lenses are used in magnifying minute creatures.

(i) Draw a ray diagram when a hand lens is use as a magnifying lens.



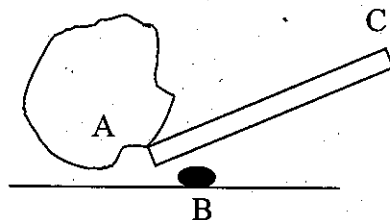
(ii) Write two properties of the image formed.

(iii) Different images can be obtained by changing the position of a candle which has lit in front of convex lens. Complete the following table.

Position of the candle	Properties of the image formed on the screen.	Position of the image
between F and 2 F		
on 2 F		
away from 2 F		

- (iv) A spectrum of colour could be observed as a result of reflecting sunlight on surface of water.
- Write the sequence of colours in the spectrum of light
  - Name the colours with maximum and minimum deviation.
  - Refraction is one of the reasons in forming rainbows. Name the other reason.
  - What is the reason for the shiny appearance of polished gems?
  - Name the two main reasons for total internal reflection.
  - The volume of an air bubble increases when it reaches to the surface from the bottom of a pond. Explain why?
  - Calculate the pressure acting on an air bubble in water which is at 2 m depth from the surface. (Density of water is  $1000 \text{ kg m}^{-3}$ ,  $g = 10 \text{ m s}^{-2}$ )

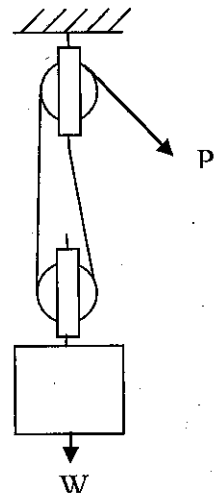
13. Following is an example for a lever.



- Label A, B and C.
- Propose a method to reduce the effort.
- Name the type of the lever.
- Name two other types of levers and give one example for each.
- Calculate the mechanical advantage if the mass of the stone is 150 kg and applied force is 500 N.

(vi) Following diagram shows a simple machine use to lift goods.

- a. What is the type of this simple machine?
- b. What is the distance that load moves up when effort moves 1 m down?
- c. Calculate the power of the machine when it lifts 500 N load up to 20 m within 10 seconds. Write the assumption used in the calculation.

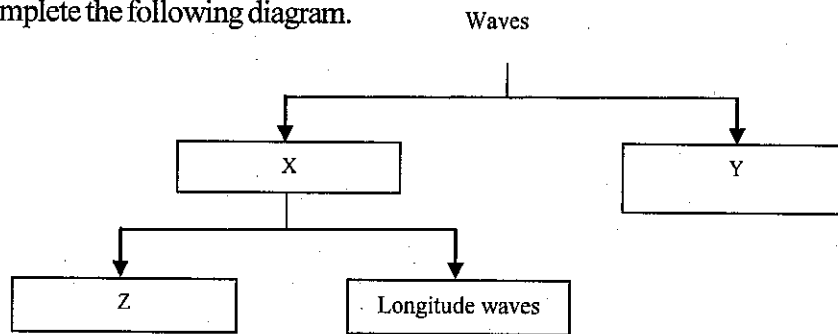


14. Sprinkling of water can be observed when a polythene bag filled with water is pierced using a pin.

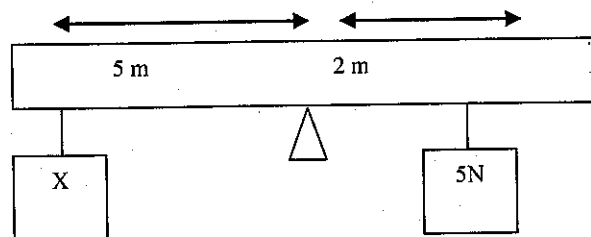
- (i) Write the property of liquid pressure matches with the above incidence.
- (ii) A tube of saline filled with water can be used to level walls in constructions when two ends keep vertically. What is the property of liquid pressure matches with this incidence?
- (iii) What is the height of the Mercury column of a barometer at sea level.?
- (iv) Write the equation to calculate the pressure of the base of a Mercury column with height of 'h'.
- (v) Write observations of a Mercury column of a barometer at following instances.
  - a. When the Mercury tube of the barometer lifted slightly.
  - b. When the Mercury tube of the barometer slanted slightly.
- (vi) Give reasons for your answer.
- (vii) A piece of metal floats on Mercury. Explain scientifically.
- (viii) What is the instrument use to find the density of milk in testing of milk?
- (ix) Write materials and method of preparing such instrument.

15. Most of the energy types in the nature transmit as waves. Among these waves some needs a medium to transmit while other does not.

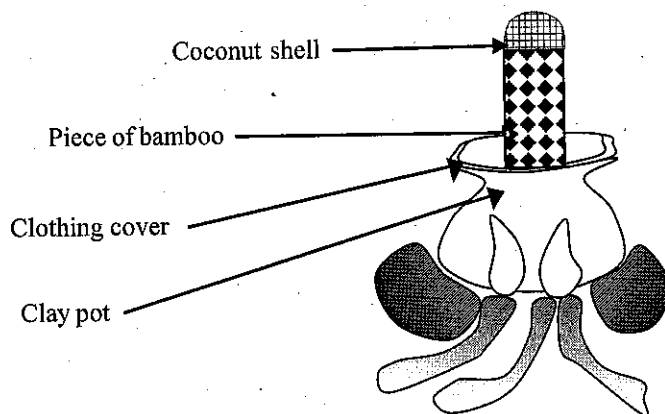
(i) Complete the following diagram.



- (ii) Give one example for the energy type 'Z'.
- (iii) What is the special feature of the energy type 'X'?
- (iv) Write two features of energy type 'Y'
- (v) Light can be seen prior to the thundering at lightening. Explain why?
16. (A) Bats find its flying routes with help of the sound waves produced by it self.
- (i) Sound waves transmit as.....waves.
- (ii) Bats produce sound waves more than the frequency of 20000 Hz. What is the name of such sound waves?
- (iii) A piece of stone fell into a pond made a wave with 20 crests. Find the frequency of the wave, if the wave reached to the bank of the pond after 20 seconds.
- (B) A woman with 50 kg weight sat on a swing. Also swing consists with 2 parallel strings.
- (i) Find the force applied on a string.
- (ii) Find the kinetic energy when swings with a velocity of  $10 \text{ ms}^{-1}$ .
- (iii) What is the maximum height the swing reaches, if  $g=10 \text{ ms}^{-1}$ .
- (iv) What is the value of 'X' at the equilibrium?

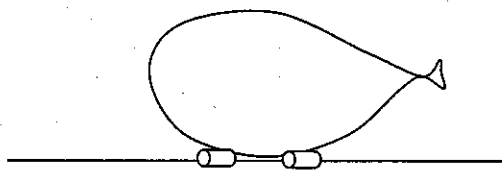


- (v) The force applied on the metal tube which fixed to the spanner at unfixing the nails of a tyre. Explain the method of doing this work more easily.
- (vi) Two forces are applied at the opening and closing of a tap. Write two properties of these forces.
- (vii) Name the forces applied at the opening and closing of a tap.
- (viii) Name two other instances where these forces are applying.
- (ix) Following shows cooking 'pittu' with use of a traditional utensil.



- a. What is the advantage of using an Aluminum pot instead of a clay pot?
- b. What is the disadvantage of putting more water to the pot?
- c. Name methods of heat loss.
- d. Propose a method to minimize the heat loss.
- e. Calculate the amount of heat needed to boil 2 kg of water in the pot. Temperature of the water in the pot is  $25^{\circ}\text{C}$  and Specific heat capacity of water is  $4200 \text{ J / kg}^{\circ}\text{C}$
- f. Heat needed to boil the water is 10% of the heat produced by burning fire wood. Find the heat loss.

17. Following diagram shows the way of placing a balloon filled with Hydrogen on a cable.



- (i) Explain the movement of the balloon when loosening the knot of the balloon.
- (ii) Draw the position of the balloon if it is filled by blowing air instead of filling Hydrogen.
- (iii) Write the law used in the movement of the balloon.
- (iv) Movement of balloon is reduced by the friction. Write a suitable method to minimize the friction.