Royal College - Colombo 07
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Grade 10 – Third Term Test – 2023 (February 2024)
10 ශ්‍රේණිය - තෙවන වාර පරීක්ෂණය - 2023 (2024 පෙබරවාරි)

කාලය : පැය 3
Time: 3 hour

Science II
විද්‍යාව II

34	E	II

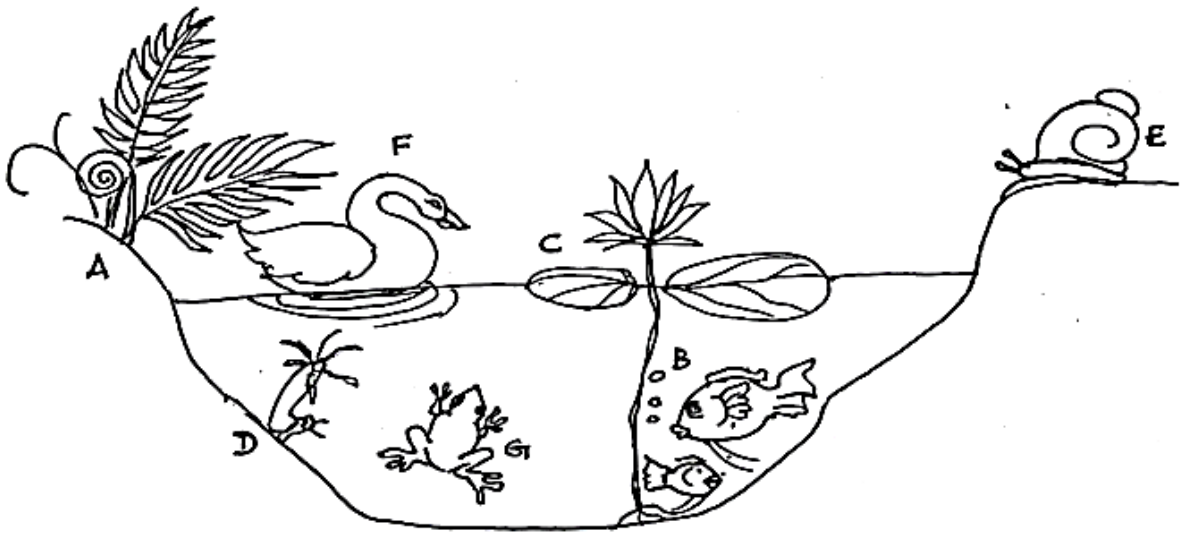
Name: - ..... *class: -*..... *Index no: -* .....

Instructions:-

- Answer all questions in part A in the space provided.
- Answer only three questions out of the five questions given in part B.
- Attach the answer scripts of part A and B together and hand over.

Part A

(1) A)



A transverse section of a fresh water pond is given in the above figure.

I. Name the domain to which all the organisms given in the figure belongs.

..... (01 mark)

II. Name the phyla of organisms D and E.

D .....

E..... (02 marks)

III. Name the phylum that includes only aquatic organisms, but can't see in the above figure

..... (01 mark)

IV. Write a main difference between the plants A and C

..... (01 mark)

V. Write one major difference between the skin nature of G and F.

G	F
…….	……..

(01 mark)

VI. Write two adaptations of organism B to live in aquatic environments.

1) .....

2) ..... (02 marks)

VII. Name a substance that have dissolved in pond water. .....

..... (01 mark)

VIII. Which property of water helps the above substance to dissolve in water? ..... (01 mark)

IX. Name two types of bonds that can be observed in water molecule.

1) .....

2) ..... (01 mark)

X. Which bond type you mentioned above keeps the water at the bottom of the pond in liquid state without freezing even in winter?

..... (01 mark)

B) The duck on the water surface can float due to the equilibrium of forces acting on it.

I. Copy down the figure of duck in the pond to your answer script and mark the forces acting on it.

(01 mark)

II. Which type of forces are in equilibrium in the above figure? .....

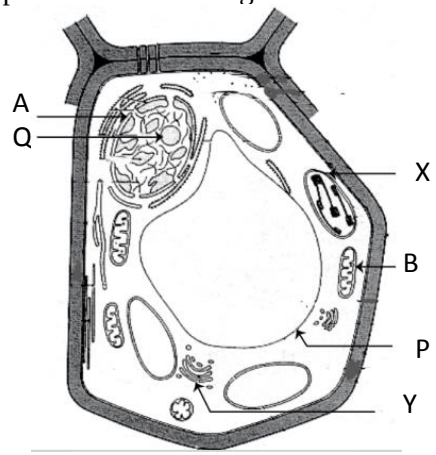
..... (01 mark)

III. What is the resultant force acting on the duck if the mass of the duck is 750g ?

..... (01 mark)

(15 marks)

(2) A) Electron microscopic view of a cell is given in the following figure.



I. Considering the features of the above cell state whether this is an animal cell or plant cell

..... (01 mark)

II. Give two reasons for your answer.

1) .....

2) ..... (02 marks)

III. What is the organelle named as X in this cell?

..... (01 mark)

IV. Name the function of X ..... (01 mark)

V. Name two organelles out of A, B, P, Q, X and Y which are visible only under electron microscope

. ..... (01 mark)

B) One of the main functions of the organelle named as Q is inheritance.

I. State the other function of the organelle Q.

..... (01 mark)

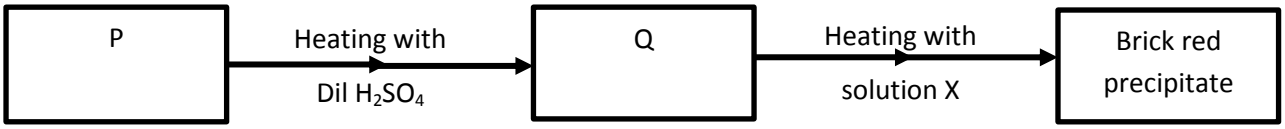
II. Name the letter of the organelle which act as the power house of the cell ?

..... (01 mark)

III. Name an excretory material produced in above organelle.

..... (01 mark)

C) Study the given chart which represents a test to identify a certain bio molecule in food, to answer the questions given below.



I. Name the biomolecules represented by letter P and Q

P .....

Q ..... (02 marks)

II. To which main category of organic compound that P and Q both can be included?

..... (01 mark)

III. Name the solution X

..... (01 mark)

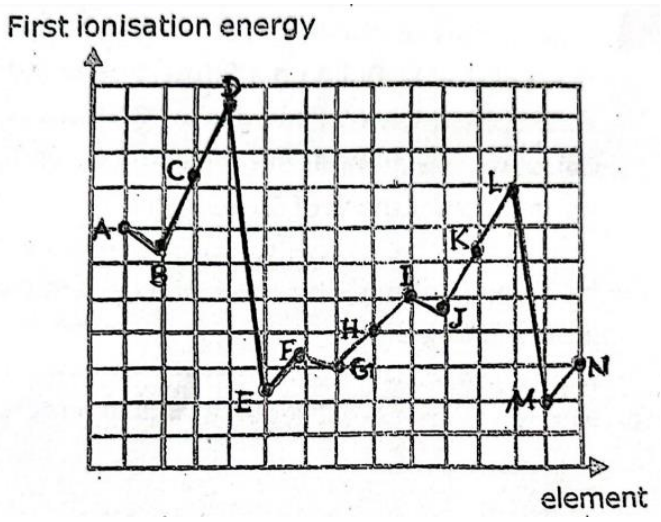
IV. Write one instance where substance Q is important in animal body and plant body separately.

Animal body.....

Plant body .....(02 marks)

(15 marks)

(3) A) The variation of the first ionization energy of some consecutive elements is given below. The symbols are not standard symbols. Write answers using the given symbols.



I. Define what is first ionization energy. .....

.....

.....

..... (01 mark)

II. If the element C belongs to the second period,

a. Identify the elements A and D

A .....

D ..... (01 mark)

b. Name another element that has similar properties as D.

..... (01 mark)

III. What is the element represented as M in the above graph.

M..... (01 mark)

IV. Write a special property of M you observed according to the graph

..... (01 mark)

V. Name a chemical feature that gained by element M due to the property you named above in question (IV)

..... (01 mark)

B) A section of a periodic table is given below.

							Y
Q			R		S		
						X	
	P						

I. Write the electronic configuration of element P

..... (01 mark)

II. Write the symbol of noble gas in above table.

..... (01 mark)

III. Name the most electronegative element in the above table

..... (01 mark)

IV. Write the formula of the compound formed between P and X

..... (01 mark)

C) Mole is the unit of measuring the amount of substances.

I. Calculate the number of moles in 36g of Magnesium (Relative molecular mass of Mg is 24)

.....

.....(02 marks)

II. Relative atomic mass of a certain element is 40, calculate the amount of atoms in 80 g of the above element.....

..... (02 marks)

III. If the relative molecular mass of Oxygen is 32, calculate the atoms in 32g of it.

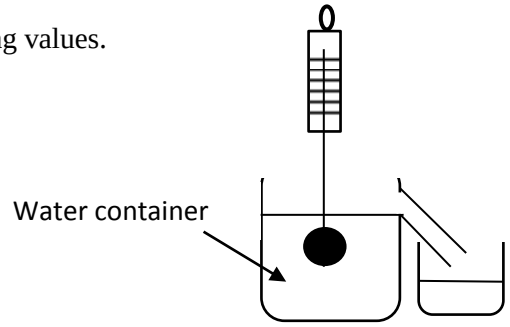
.....

..... (01 mark)

(15 marks)

(4) A) The diagram shows how a metallic sphere is hung in a Newton balance and that sphere is submerged in an overflow vessel containing fresh water.
(density of water = 1000 kgm^{-3}/1gcm^{-3})

I. If the volume of water overflowed is 150 cm^3 when the metallic sphere is submerged in water calculate following values.



a. What is the mass of fresh water displaced?

.....

.....(02 marks)

b. What is the weight of this volume of water?

..... (01 mark)

c. What is the upthrust created on the metallic sphere by water?

..... (01 mark)

II. If the water in the overflow vessel is replaced by sea water and the metal sphere is submerged again, state whether the following measurements get decreased, increased or no change relative to the previous value.

a. The overflowed volume of sea water.

.....

b. The reading of newton balance.

.....

c. Upthrust created by sea water.

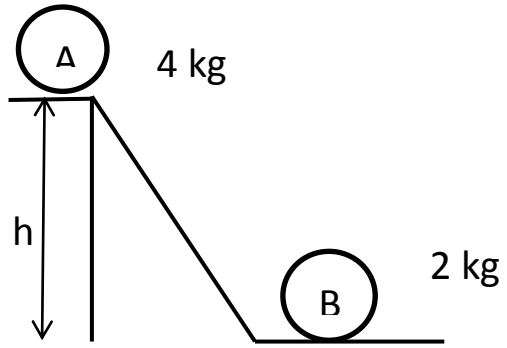
.....(03 marks)

d. Write the law which is used to find the above value.

.....

..... (01 mark)

B) A sphere with a mass of 4 kg (A) is placed on the top of an inclined plane. It rolled along the plane and hits with sphere of mass 1kg (B). (Inclined plane has no friction)



I. Find the kinetic energy of A at the bottom of the inclined plane if its velocity is 20 ms^{-1} at the bottom.

.....(02 marks)

II. Calculate the potential energy of A at the top of the inclined plane.

..... (01 mark)

III. If half of the kinetic energy of the sphere A is transferred to the sphere B, calculate the kinetic energy of sphere B when A hits B. ..... (02 marks)

IV. Calculate the moment of B when A hits B. .....

.....

.....

..... (02 marks)

(15 marks)

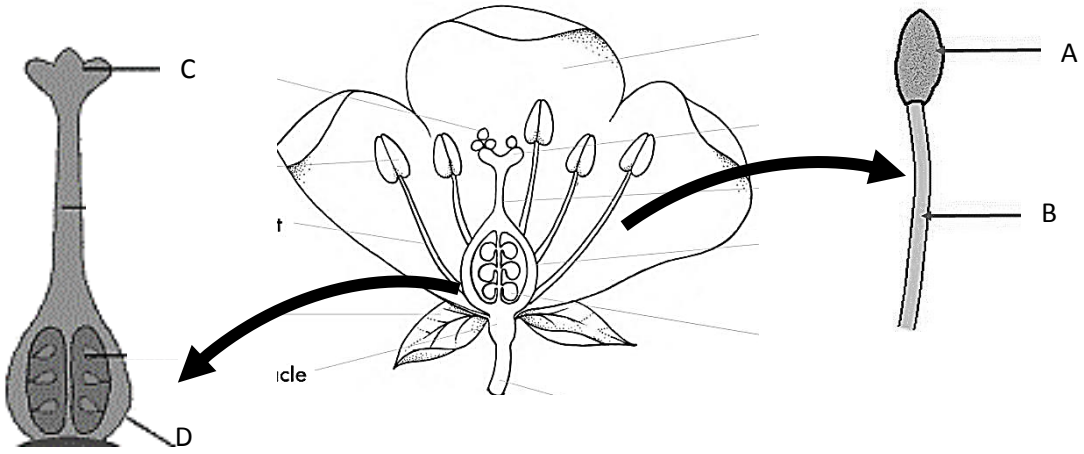
Grade 10 – Science - Essay

(5) A) Reproduction is a biological process that maintains the continuity of life. Living organisms conduct the reproduction in two methods.

I. What are the two methods of reproduction found in flowering plants? (02 marks)

II. Write down one difference between the above two methods. (01 mark)

III. Following diagram illustrates the structure of a flower.

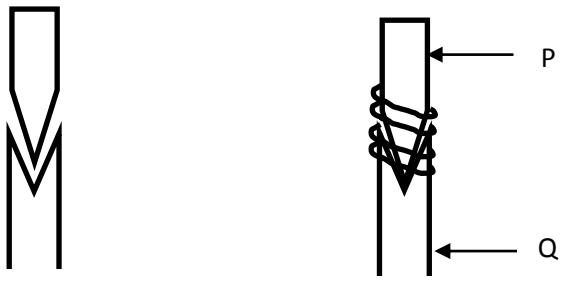


a. Name A, B, C and D parts. (04 marks)

b. What is meant by pollination? (02 marks)

c. Some plants show adaptations to promote cross pollination. Give two such adaptations. (02 marks)

B) Grafting is a method used to propagate plants with desired characteristics. Following diagrams illustrate a method used for it.



I. Name P and Q parts. (02 marks)

II. What is the method of grafting given by the above diagram? (01 mark)

III. Name the plant tissue that connects the two plant parts together in grafting? (01 mark)

IV. Grafting tapes/ polythene tapes are used to wrap the grafted part from bottom to top. What is the reason for it? (01 mark)

V. Write down one disadvantage of grafting? (01 mark)

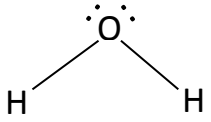
C) Pure bred tall plants were cross pollinated with pure bred short plants in the experiments to study the inheritance of height of Garden Pea plants.

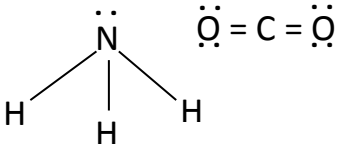
I. Write down the phenotypes and genotypes of F_1 generation. (02 marks)

II. Write down a non-inherited characteristic in the humans. (01 mark)

(20 marks)

(6) A) Following are the Lewis structures of some covalent molecules.





I. Out of the above compounds name the compound/ compounds which is/ are liquid at room temperature. (01 mark)

II. Name the compound/ compounds which is/ are gases at room temperature. (02 marks)

III. When NH_3 is dissolved / reacted in water NH_4OH is formed. When CO_2 is reacted/ dissolved in water H_2CO_3 is formed under special conditions.

a. Write down balanced chemical equations for the above two reactions. (02 marks)

b. What is the type of chemical reaction that the above reactions show? (01 mark)

IV. Draw the dot cross diagrams of CH_4 and Cl_2 molecules.

IV. Following chemical reaction is used to prepare CO_2 gas in the lab.

$CaCO_{3(s)} + \quad Y_{(aq)} \rightarrow \quad CaCl_{2(aq)} \quad + \quad H_2O_{(l)} \; + \quad CO_{2(g)}$

a. Write down a suitable substance that can be used as Y. (01 mark)

b. Write down one method used to collect CO_2 gas. (01 mark)

B) Atoms and molecules are very tiny particles which are invisible to the human eye. But, scientists have developed to measure their mass using instruments.

I. What do you mean by relative molecular mass? (02 marks)

II. Following chemical equation illustrates the photosynthesis.

$$CO_2 + H_2O \xrightarrow[\text{Sunlight}]{\text{Chlorophyll}} C_6H_{12}O_6 + O_2$$

a. Rewrite the equation by balancing it . (02 marks)

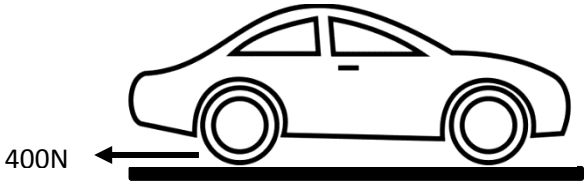
b. Calculate the molar mass of glucose. (02 marks)

c. Calculate the mass of glucose formed when 22g of CO_2 is reacted completely with H_2O (H=1, C=12, O=16) (03 marks)

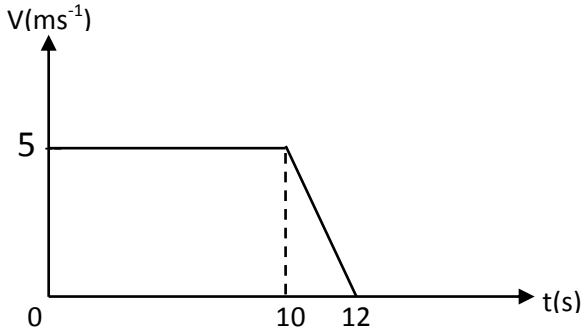
III. Write one method of increasing the reaction rate of above reaction. (01mark)

(20 marks)

(7)A) Following diagram illustrates a car moving along a horizontal road. Mass of the car is 800kg and the frictional force acting backward is 400 N at one point.

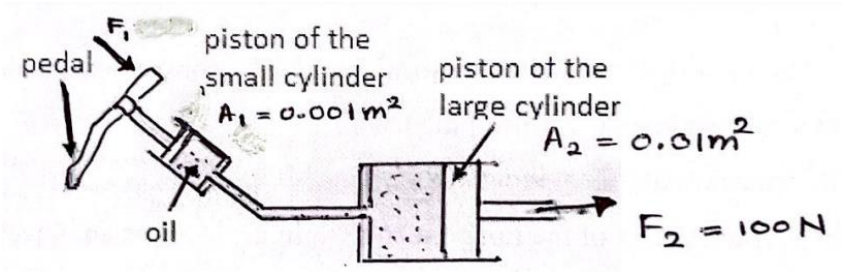


I. Velocity time graph for the motion of the above car is given below.



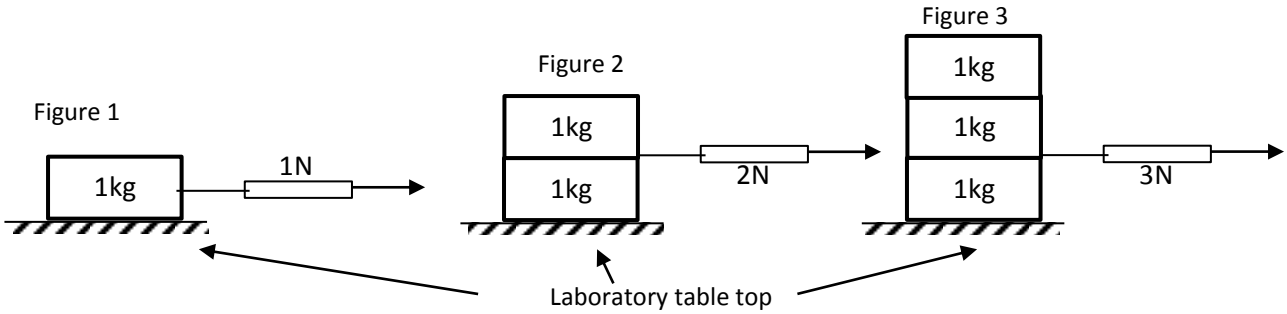
a. What is the nature of motion of the car from 0s to 10s? (01 mark)
b. Calculate the distance travelled by the car during that time interval. (02 marks)
c. What is the value of the force exerted by the engine during the above time period? (01 mark)
d. Mention the Newton's law that explain the above reason. (write down the law) (01 mark)
e. Calculate the unbalanced force applied on the car from 10s to 12s. (02 marks)

II. Following diagram illustrates the structure of the hydraulic brake system of the above car.



a. Calculate the force exerted on brake pads. (02 marks)
b. What is the advantage of using the above system in vehicle brake system? (01 mark)

B) A group of grade ten students has conducted the following experiments to find a relationship of a certain factor on the limiting frictional force.



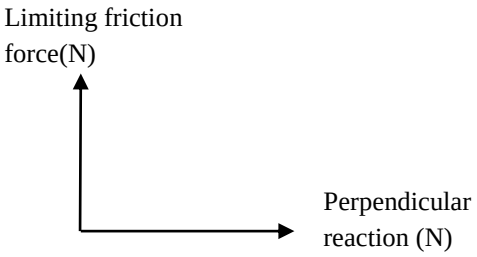
I. Out of the factors affecting the limiting frictional force, which factor is experimented by the above students? (01 mark)
II. During the experiment which factor that affects the limiting frictional force is kept constant? (01 mark)

III. Copy the following table to your answer script and fill in the blanks.

Figure	Mass of the objects (Kg)	Perpendicular reaction (N)	Limiting frictional force (N)
1	1kg	.....	1N
2	2kg	.....	2N
3	3kg	.....	3N

(03 marks)

IV. Draw a graph to show the relationship between perpendicular reaction (N) and limiting frictional force (N), using the above readings.



(03 marks)

V. What is the relationship between the above two factors you identified? (02 marks)

(20 marks)

(8) A) Chemical substances are involved to form the living bodies. Out of 120 elements around 25 elements involve to form them.

I. What is the most abundant element in living bodies? (01 mark)

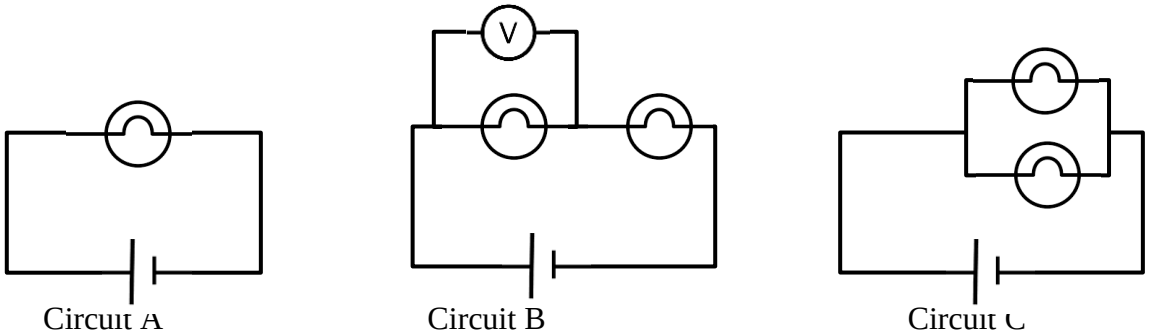
II. Name two biomolecules which have arranged as polymers in living bodies. (02 marks)

III. Carbohydrate is a major type of compound in living bodies.
   a. What elements form the carbohydrates? (01 mark)
   b. Write down a special characteristic in all carbohydrates. (01 mark)

IV. Nucleic acids are the type of compounds involved in inheritance.
   a. What are the two types of nucleic acids? (02 marks)
   b. Write down a difference between them. (01 mark)

V. What mineral/ minerals deficiency causes the following illnesses?
   a. Anemia
   b. Osteoporosis (02 marks)

B) Following are three electric circuits prepared by a group of grade ten students. Bulbs are identical to each other and the cells are identical.



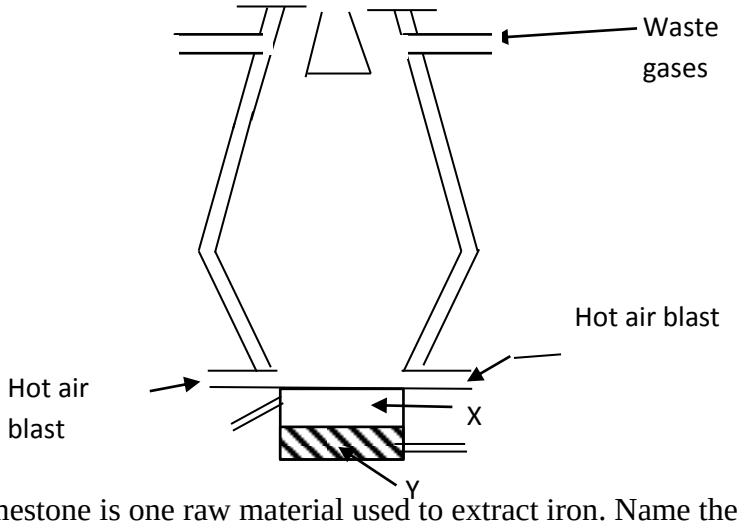
Circuit A Circuit B Circuit C

Voltage difference of one dry cell is 1.5 V and the resistance of a bulb is 2 Ω.

I. Calculate the current flow in the circuit A. (02 marks)
II. Calculate the voltmeter reading in the circuit B. (02 marks)
III. Find the equivalent resistance of the bulbs in circuit C. (02 marks)
IV. Arrange the circuits to the descending order of the brightness of their bulbs. (02 marks)
V. Write down 2 factors affecting the resistance of a conductor (02 marks)

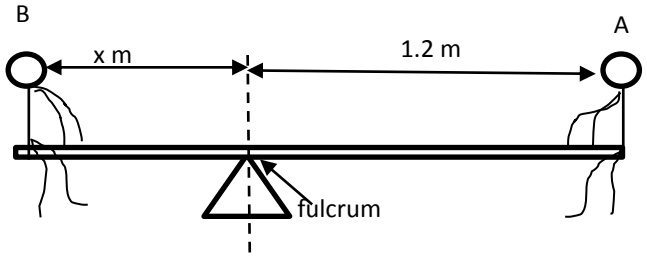
(20 marks)

(9)A) Following diagram illustrates an apparatus used to extract iron.



I. Limestone is one raw material used to extract iron. Name the other raw materials (02 marks)
II. Write down two chemical reactions take place in the blast furnace that prepares CO_2 gas. (02 marks)
III. Name X and Y substances. (02 marks)
IV. How do you call the above method used to extract iron? (01 mark)
V. Name the reducing agent used in the iron extraction. (01 mark)
VI. Explain the reason for the use of limestone in the above process. (02 marks)

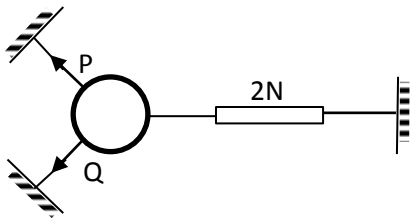
B) Two children are seated at opposite end of a see-saw as shown in the following diagram.



Mass of child A is 30 kg and mass of child B is 25 kg

I. Find the weight of child A. (02 marks)
II. Find the weight of child B. (01 mark)
III. Calculate the value of X. (02 marks)
IV. What is the total reaction force applied on the fulcrum? (01 mark)

C) A metal ring was at equilibrium as in the following manner.



I. What is the value of the resultant force of P and Q forces? (01 mark)
II. Write down one condition to be satisfied for the above equilibrium. (01 mark)
III. Write two applications in day to day life of the above instance. (02 marks)

(20 marks)