

Biology II

Date: 23/June/2022

Period: 8H30' - 11H30'



END OF TERM III EXAMINATIONS

LEVEL: Advanced Level S5

COMBINATIONS

MATHS-CHEMISTRY BIOLOGY: MCB
PHYSICS CHEMISTRY BIOLOGY: PCB
BIOLOGY CHEMISTRY GEOGRAPHY: BCG

DURATION: 3 Hours

MARKS:

..... / 100

INSTRUCTIONS

This paper consists of **three** sections: **A and B**.

Section A: Attempt **all** questions. (70 marks)

Section B: Attempt **three** questions. (30 marks)

Section A: answer all question**(70 Marks)**

1) Explain the following:

(a) Predation

(2 marks)

(b) Parasitism

(2 marks)

2) Starch in the diet is digested by the enzymes amylase and then maltase to form glucose. Glucose must be absorbed into the body so that it can be used by cells as substrate for respiration. The glucose is absorbed from the exchange surface of the small intestine into the epithelial cells that line it. This absorption occurs partly by diffusion.

a) Glucose molecules mostly diffuse into the cells through the pores in the proteins that span the phospholipid bilayer. Why do they not pass easily in the phospholipid layer? **(2 marks)**

b) State the two changes to the structure of plasma membranes that would increase the rate at which glucose diffuses into a cell. **(2 marks)**

3) The base composition of the DNA of various organisms. The relative numbers of the bases adenine (A), cytosine (C), guanine (G) and thymine (T) of three of these organisms are shown in the table. **(8 Marks)**

Organism(tissue)	Relative numbers of bases			
	A	C	G	T
Ox(spleen)	27.9	20.8	22.7	27.3
Ox(thymus)	28.2	21.2	21.5	27.8
Yeast	31.3	17.1	18.7	32.9
Virus with single-stranded DNA	24.3	18.2	24.5	32.3

Explain why:

a) the relative numbers of each base in ox spleen and thymus are the same, within experimental error.

b) the relative numbers of each base in yeast are different from those in ox spleen or thymus.

c) the relative numbers of the bases A and T, or of C and G, are similar in ox and yeast.

d) in the virus, the relative numbers of A and T, and of C and G, are not similar.

4) Compare the DNA in eukaryotic cells with the DNA in prokaryotic cells. **(4 marks)**

5) What are the role of mitosis **(2 Marks)**

6) Distinguish between mitosis and meiosis. **(4 marks)**

7) Which of the following cell activities can not be carried out by a red blood cell? In each case, briefly justify your answer:

a) Protein synthesis. **(2 maks)**

b) Lipid synthesis. **(2 maks)**

c) Cell division. **(2 maks)**

d) Active transport. **(2 maks)**

8) a) Name three molecules involved in carbon dioxide fixation. **(3 marks)**

b) What is the role of NADPH in the Calvin cycle? **(2 marks)**

9) Describe photosynthesis as a redox process. **(3marks)**

10) Compare the mechanism of translocation with that of transpiration. **(6 marks)**

11) Explain the four features of a good gas exchange surface in animals. **(4 marks)**

12) How are lungs adapted for gas exchange. **(4 marks)**

13) What are the dangerous components of tobacco smoke? **(4 marks)**

14) What are the components of control mechanism system. **(4 marks)**

15) Explain why:

i. Muscle cells do not have receptors for insulin. **(2 marks)**

ii. There are second messengers for insulin and glucagon. **(2 marks)**

iii. Insulin and glucagon have different second messengers. **(2 marks)**

Section B: Attempt any 3 questions only

(30 Marks)

16) Write an account on the flow hypothesis of translocation of sugar in phloem. **(10 Marks)**

17) Describe how the human body controls temperature. **(10 Marks)**

18) Using suitable examples, describe how new plants are formed by asexual reproduction **(10 Marks)**

19) A brown cow was crossed (mated) with a white bull. All the F generation were neither brown nor white. Such individuals are said to be roan. **(10 Marks)**

a) Using B to represent the gene for brown colour and W to represent the gene for white colour, work out the genotypes of F1 offspring

b) If the calves were interbred, determine the phenotypic and genotypic ratios of offspring

c) suggest a reason why the F1 were all roan.

20) a) Using appropriate symbols show how sex is determined in human

(4 Marks)

b) Read- green colour blindness is a defect caused by a recessive gene on X-chromosome. What could be the phenotype of the offspring when a normal woman marries a colour blind man. Show your working **(6 Marks)**

End !!!!

Biology marking schemes

Date: ... / ... /2022

Period:



END OF TERM III EXAMINATIONS

GRADE / LEVEL: **Advanced Level S5**

COMBINATIONS **MATHS-CHEMISTRY BIOLOGY: MCB**
PHYSICS CHEMISTRY BIOLOGY: PCB
BIOLOGY CHEMISTRY GEOGRAPHY: BCG

DURATION: **3 Hours**

MARKS: **..... / 100**

INSTRUCTIONS

This paper consists of **three** sections: **A and B.**

Section A: Attempt **all** questions. **(70 marks)**

Section B: Attempt **three** questions. **(30 marks)**

Section A: answer all question

(70 Marks)

1) Explain the following:

(a) Predation

2 marks

(b) Parasitism

2 marks

Answer

Predation is an interaction between species in which one species (predator) uses another species as food (prey). It can be divided into: Carnivory, parasitism, cannibalism, herbivory. Predation prevents a single species from becoming dominant; it also either increases or decreases species' richness; and it acts as a source of natural selection.

(b) Parasitism is a relationship between two organisms where one benefits and the other is harmed. The two types of parasitism are: Ectoparasite and endoparasite. A social parasite is a parasite that takes advantage of the interaction of other organisms. Parasitism alters the behaviour and morphology of their hosts; it promotes coexistence in biodiversity; it affects the keystone species and modifies the structure of ecosystem.

2) Starch in the diet is digested by the enzymes amylase and then maltase to form glucose. Glucose must be absorbed into the body so that it can be used by cells as substrate for respiration. The glucose is absorbed from the exchange surface of the small intestine into the epithelial cells that line it. This absorption occurs partly by diffusion.

a) Glucose molecules mostly diffuse into the cells through the pores in the proteins that span the phospholipid bilayer. Why do they not pass easily in the phospholipid layer? **2 marks**

b) State the two changes to the structure of plasma membranes that would increase the rate at which glucose diffuses into a cell. **2 marks**

Answer

a) Because only lipid-soluble substances diffuse across the phospholipid bilayer easily. Water soluble ones such as glucose diffuse only very slowly. **2 marks**

b) It could increase its surface area with microvilli or have more proteins with pores that span the phospholipid bilayer.

3) The base composition of the DNA of various organisms. The relative numbers of the bases adenine (A), cytosine (C), guanine (G) and thymine (T) of three of these organisms are shown in the table. **(8 Marks)**

Organism(tissue)	Relative numbers of bases			
	A	C	G	T

Ox(spleen)	27.9	20.8	22.7	27.3
Ox(thymus)	28.2	21.2	21.5	27.8
Yeast	31.3	17.1	18.7	32.9
Virus with single-stranded DNA	24.3	18.2	24.5	32.3

Explain why:

- the relative numbers of each base in ox spleen and thymus are the same, within experimental error. **(2 marks)**
- the relative numbers of each base in yeast are different from those in ox spleen or thymus . **(2 marks)**
- the relative numbers of the bases A and T, or of C and G, are similar in ox and yeast. **(2 marks)**
- in the virus, the relative numbers of A and T, and of C and G, are not similar. **(2 marks)**

Answer

- the DNA in the spleen and thymus of the same organism is the same; the same genes are present in both organs; **(2 marks)**
 - the DNA in different species is different; different genes are present; **(2 marks)**
 - DNA has double helix / is double stranded; the numbers of A and T, and of C and G, are similar because A pairs with T and C pairs with G; **(2 marks)**
 - the DNA is single stranded; no base pairing occurs; **(2 marks)**
- 4) Compare the DNA in eukaryotic cells with the DNA in prokaryotic cells.

4 marks

Answer

Similarities

- Nucleotide structure is identical;
- Nucleotides joined by phosphodiester bond;
- Deoxyribose joined to phosphate (in sugar, phosphate backbone);
- DNA in mitochondria / chloroplasts same / similar (structure) to DNA in prokaryotes;

Differences

- Eukaryotic DNA is longer; prokaryotic DNA is shorter

- Eukaryotic DNA contain introns, prokaryotic DNA does not;
- Eukaryotic DNA is linear, prokaryotic DNA is circular;
- Eukaryotic DNA is associated with / bound to protein / histones, prokaryotic DNA is not;

5) What are the role of mitosis **(2 Marks)**

Answer

Growth

Asexual reproduction

Repair damaged tissues/ cells

6) Distinguish between mitosis and meiosis. **6 marks**

Answer

6Marks	
Differences of mitosis and meiosis	
Mitosis	Meiosis
One division completes the process	Two divisions are required to complete the process
One diploid cell produces two diploid cells	One diploid cell produces four haploid cells
Homologous chromosomes do not cross-over	Homologous chromosomes cross-over in prophase I.
Daughter cells have the same genetic information as the parent cell.	Daughter cells are genetically different from the parent cell.
Mitosis occurs body cells	Meiosis occurs in sex cells
Mitosis results in growth, the replacement of worn-out cells, and the repair of damage.	Meiosis is necessary for sexual reproduction

7) Which of the following cell activities can not be carried out by a red blood cell? In each case, briefly justify your answer:

- a) Protein synthesis. **(2 maks)**
- b) Lipid synthesis. **(2 maks)**
- c) Cell division. **(2 maks)**
- d) Active transport. **(2 maks)**

Answer

a) Protein synthesis: No, there is no DNA, so no mRNA can be transcribed. **(2 maks)**

b) Cell division: No, there are no chromosomes, so mitosis can not occur, nor are there centrosomes for spindle formation. **(2 maks)**

c) Lipid synthesis: No, this occurs on the smooth endoplasmic reticulum and there is none. **(2 maks)**

d) Active transport: yes. This occurs across the cell surface membrane, and can be fuelled by ATP produced by anaerobic respiration. **(2 maks)**

8) A) Name three molecules involved in carbon dioxide fixation. **(3 marks)**

b) What is the role of NADPH in the Calvin cycle? (2 marks)

Answer

a) ribulose biphosphate, ribulose biphosphate carboxylase(rubisco) and glycerate 3-phosphate. **3 marks**

b) NADPH is a reducing agent (it donates hydrogen to GP, reducing it to GALP, a triose phosphate). **2 marks**

9) Describe photosynthesis as a redox process. **(3marks)**

Answer

During photosynthesis, light energy is captured and converted to the chemical energy of carbohydrates; hydrogens from water are used to reduce carbon, and oxygen derived from water becomes oxidized, forming molecular oxygen.

3marks

10) Compare the mechanism of translocation with that of transpiration. (6 marks)

Answer

Translocation is an active process that loads sugars in at one end of the phloem and decreases the water potential. This means that water enters the phloem by osmosis and increases the hydrostatic pressure. The water moves from a region of high hydrostatic pressure to a region of low hydrostatic pressure, carrying the dissolved sugars with it.

Transpiration is driven by evaporation of water from the leaf surface. This reduces the hydrostatic pressure of the water at the top of the plant, creating tension that allows water to be pulled up the plant. This is aided by cohesion between water molecules. **6 marks**

11) Explain the four features of a good gas exchange surface in animals. (4 marks)

Answer

A good gas exchange surface must be

- ✓ Short distance, to increase the rate of diffusion
- ✓ Large surface to allow many molecules to pass at once
- ✓ Good blood supply to bring CO₂ and transport oxygen
- ✓ Great concentration gradient to increase diffusion

4 marks

12) How are lungs adapted for gas exchange. **4 marks**

Answer

Adaptations of lungs for gas exchange:

- ✓ Have numerous air-filled sacs called alveoli which provide a large surface area for gaseous exchange.
- ✓ The alveoli of the lungs are well ventilated.
- ✓ The walls of alveoli of the lungs are highly vascularized.
- ✓ The inner walls of alveoli are kept moist all the time to facilitate diffusion.

13) What are the dangerous components of tobacco smoke? **(4 marks)**

Answer

The most damaging components of tobacco smoke are:

- (i) **Tar** is the collective term describing toxins produced by smoking cigarettes and the coating they place on the lungs. Tar is sticky and brown, and stains teeth, fingernails and lung tissue. Tar contains the carcinogen benzo(a) pyrene. When inhaled, these toxins form a particulate matter that coats lungs much the same way that soot from

log fires coats chimneys. But unlike chimneys, which are made of stone or brick, human lungs are made of thin, delicate tissue not intended for toxic smoke intake.

(ii) **Nicotine** is the addictive drug in tobacco smoke that causes smokers to continue to smoke and affects the brain activity.

14) What are the components of control mechanism system. **(4 marks)**

Answer

The control system consists of the following elements:

- ✓ Stimulus
- ✓ Receptor
- ✓ Controller
- ✓ Effector

15) Explain why:

- i. Muscle cells do not have receptors for insulin. **(2 marks)**
- ii. There are second messengers for insulin and glucagon. **(2 marks)**
- iii. Insulin and glucagon have different second messengers. **(2 marks)**

Answer

- i. Muscle cells need their glycogen stores to provide glucose for respiration; there is no point in them releasing glucose into the circulation. **(2 marks)**
- ii. Insulin and glucagon are proteins that cannot cross the cell surface membranes of their target cells. There needs to be another substance (a second messenger) to transmit their message throughout the cytoplasm. **(2 marks)**
- iii.** Insulin and glucagon both have liver cells as their target cells. If they had the same second messenger, they would both have the same effect, rather than having opposite effects on glycogen, for example.

SECTION B: 30 Marks

16) Write an account on the flow hypothesis of translocation of sugar in phloem. **(10 Marks)**

Answer

The pressure gradient exists between the source, where the sugar is loaded into phloem, and the sink, where the sugar is removed from phloem.

At the source, the dissolved sucrose is moved from a leaf's mesophyll cells, where it was manufactured, into the companion cells, which load it into the sieve tube elements of phloem. This loading occurs by active transport, a process that requires adenosine triphosphate (ATP) The ATP supplies energy to pump protons out of the sieve tube elements, producing a proton gradient that drives the uptake of sugar through specific channels by the co-transport of protons back into the sieve tube .

The sugar therefore accumulates in the sieve tube element. The increase in dissolved sugars in the sieve tube element at the source—a concentration that is 2 to 3 times as great as in surrounding cells—decreases (makes more negative) the water potential of that cell. As a result, water moves by osmosis from the xylem cells into the sieve tubes, increasing the turgor pressure (hydrostatic pressure) inside them. Thus, phloem loading at the source occurs as follows:

- ✓ Proton pump moves H₊ out of sieve tube element
- ✓ sugar is actively transported into sieve tube element
- ✓ water diffuses from xylem into sieve tube element
- ✓ turgor pressure increases within sieve tube

At its destination (the sink), sugar is unloaded by various mechanisms, both active and passive, from the sieve tube elements.

With the loss of sugar, the water potential in the sieve tube elements at the sink increases (becomes less negative). Therefore, water moves out of the sieve tubes by osmosis and into surrounding cells where the water potential is more negative. Most of this water diffuses back to the xylem to be transported upward. This water movement decreases the turgor pressure inside the sieve tubes at the sink.

Thus, phloem unloading at the sink proceeds as follows:

- ✓ Sugar is transported out of sieve tube element
- ✓ Water diffuses out of sieve tube element and into xylem
- ✓ Turgor pressure decreases within sieve tube

The pressure–flow hypothesis explains the movement of dissolved sugar in phloem by means of a pressure gradient. The difference in sugar concentrations between the source and the sink causes translocation in phloem as water and dissolved sugar flow along the pressure gradient. This pressure gradient pushes the sugar solution through phloem much as water is forced through a hose.

The actual translocation of dissolved sugar in phloem does not require metabolic energy. However, the loading of sugar at the source and the active unloading of sugar at the sink require energy derived from ATP to move the sugar across cell membranes by active transport.

17) Describe how the human body controls temperature. **(10 Marks)**

Answer

Changes in body temperature are detected by hypothalamus. When the body temperature drops below normal:

The surface blood vessels constrict (vasoconstriction) the blood from the surface is diverted to the deeper layers. Since little blood flows near the skin less heat is lost by radiation and convection.

The hair stands up right by contraction of the erector pili muscles. Air is trapped in the spaces between the hairs. The trapped air acts as an insulation and reduces the loss of heat from the body. The metabolic rate increases which results in production of more heat, leading to an increase in body temperature.

Shivering occurs this is the spasmodic contraction of muscles, which produce heat thereby raising the body temperature. Sweat production decreases or increases. This reduces loss of heat by evaporation.

When the body temperature rises above normal:

Vasodilation occurs i.e. the blood vessels at the skin surface dilate and more blood is brought to the surface. Some of the excess heat is lost by convection and radiation, hence the body temperature drops.

The hair lies flat against the surface of the skin by relaxation of the erector pili muscles. The air space between the hairs decreases so that little or no air is trapped. This decreases insulation and so heat is lost by radiation and convection more easily.

Sweat production decreases when sweat evaporates, it absorbs high latent heat of vaporisation from the body. The body thus cools.

The metabolic rate decreases and less heat is produced hence the body temperature is lowered.

18) Using suitable examples, describe how new plants are formed by asexual reproduction **(10 Marks)**

Answer

New plants are formed by the following forms of asexual reproduction.

Binary fission

On this process an organism divides into two identical daughter cells each cell formed is capable of existing as an independent organism. Eg bacteria reproduce easily by this method.

Spore formation

This form of asexual reproduction occurs by means of reproductive cells called spores. The spores are detached from parents and are dispersed by wind, water or animal. When conditions are suitable the spores germinate into new individuals. Example it takes place in fungi such as Rhizopus and Mucor.

Budding:

In this type of asexual reproduction, a new plant is produced as an outgrowth (bud) of the parent, and is later released as an independent, identical copy of the parent for example it takes place in yeast.

Vegetative reproduction / propagation:

In this form of asexual reproduction, part of the plant (bud) grows, becomes detached and develops into a new self-supporting individual.

Example bulbs, corms, rhizomes, tubers, runner suckers.

Example of such plants include onions, tulip bulbs, iris (use rhizomes) potato (use stem tubers)

19) A brown cow was crossed (mated) with a white bull. All the F generation were neither brown nor white. Such individuals are said to be roan. **(10 Marks)**

a) Using B to represent the gene for brown colour and W to represent the gene for white colour, work out the genotypes of F1 offspring (4 Marks)

b) If the calves were interbred, determine the phenotypic and genotypic ratios of offspring (4 Marks)

c) suggest a reasons why the F1 were all roan.
 (2 Marks)

Answer

a) Parents White bull

x

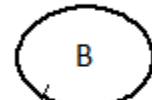
Brown cow

Genotypes

WW

BB

Gametes



F1 Genotype

BW

Roan

b) F1 Surfed

Roan

X

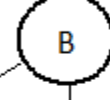
Roan

Parents

BW

BW

Gametes



BB

BW

BW

WW

Brown

Roan

White

Ratios

1

:

2

:

1

C) Non of the genes for brown or white shows dominance over the other
 ie incomplete dominance

20) a) Using appropriate symbols show how Sex is determined in human

(4 Marks)

b) Read- green colour blindness is a defect caused by a recessive gene on X-chromosome

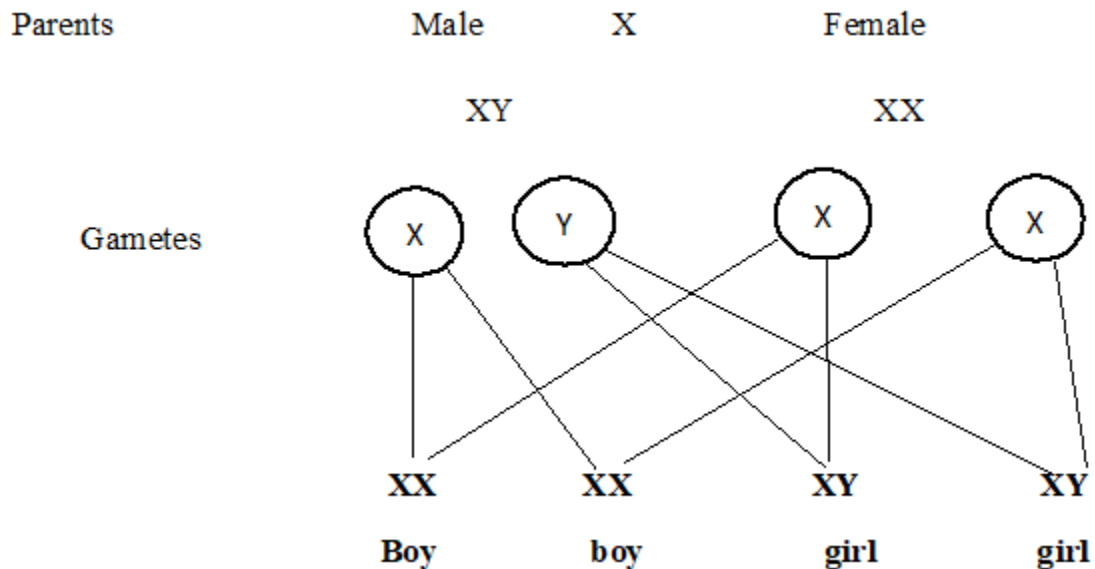
What could be the phenotype of the offspring when a normal woman marries a colour blind man. Show your working **(6 Marks)**

Answer

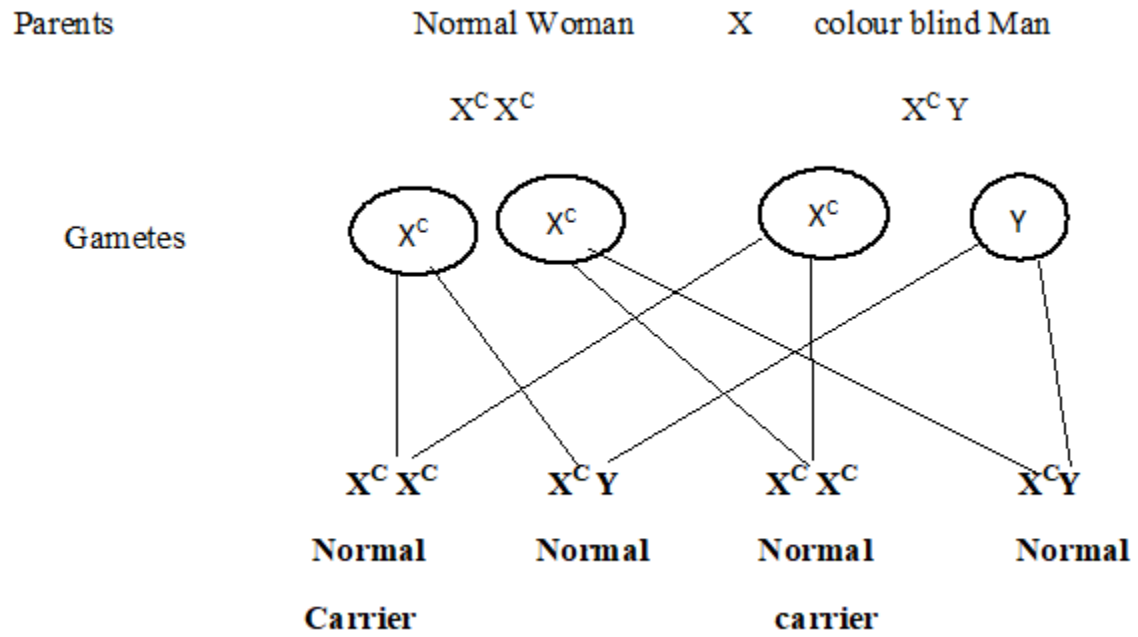
a) Human body cell contain 46 chromosomes ie 23 pairs of homologous chromosomes. One of these pair is called the sex chromosome and these are the X and Y chromosomes. The female has X chromosome and therefore has genotype of XX.

The male has both X and Y and therefore has genotype of XY.

Determining sex



Let C represent the allele for normal vision and c represent the allele for colour blindness.



END

BIOLOGY

Practical

Date: 30/June/2022

Period: 8H30'-10H00'



END OF TERM III EXAMINATIONS

LEVEL: Senior five

COMBINATIONS: MATHS-CHEMISTRY BIOLOGY: MCB
PHYSICS CHEMISTRY BIOLOGY: PCB
BIOLOGY CHEMISTRY GEOGRAPH: BCG

DURATION: 1:30 Hour

MARKS:

..... /15

INSTRUCTIONS

1. This question is compulsory
2. Don't open this question paper until you are told to do so`.
3. Read each question carefully before answering it.
4. Use only a **blue** or black **pen**

Requirement

1. Specimen X is a mature cockroach
2. Hand lens (These can be borrowed from neighboring school in case of shortage)

- 1) You are provided with specimen X which is an animal. Observe this specimen carefully and answer the questions.
- a) i) Suggest the habitat in which the specimen would live **(2 Marks)**
 - ii) Name the features on the body of the specimen which enable the specimen move easily in the habitat you have suggested. **(3 Marks)**
 - b) Draw a labelled drawing of the anterior view of the head of the specimen. **(10 Marks)**
(Use a hand lens)

End !!!!

Biology Practical senior two marking schemes

Advanced instruction

Requirement

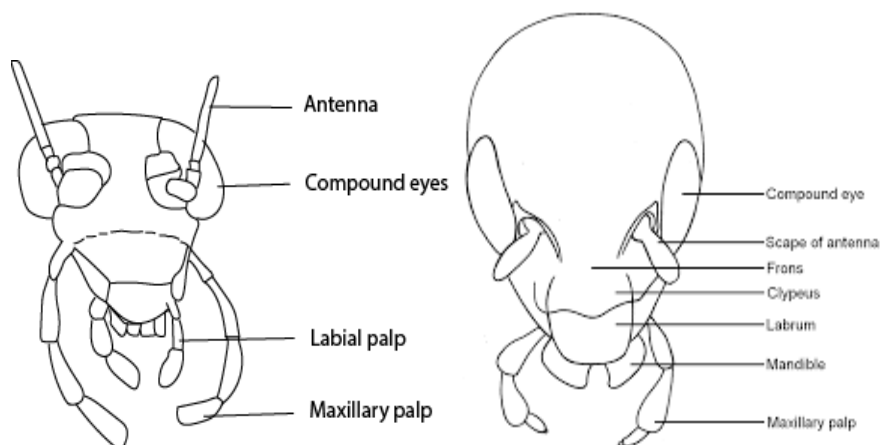
1. Specimen X is a mature cockroach
2. Hand lens (These can be borrowed from neighboring school in case of shortage)

Time: 1:30 Min

- 1) You are provided with specimen X which is an animal. Observe this specimen carefully and answer the questions.
 - a) i) Suggest the habitat in which the specimen would live **(2 Marks)**
ii) Name the features on the body of the specimen which enable the specimen move easily in the habitat you have suggested. **(3 Marks)**
 - b) Draw a labelled drawing of the anterior view of the head of the specimen. **(10 Marks)**
(Use a hand lens)

Expected Answers

- a) i) Dark and warn places (crevices)
ii) It has a flattened body to easily pass through cracks
It has three pairs of legs which are joined for flexibility during movement
It has glandular pads to prevent slipping during forward movement
It has smooth surface for swift movement
Its body is segmented for flexibility during movement.
Its hind legs are long for quick movement
Its legs are Z- shaped for easy jumping
A labelled drawing of the anterior view of the head of specimen



End !!!!

BIOLOGY

Alternative to practical

Date: 30/June/2022

Period: 8H30'-10H00'



END OF TERM III EXAMINATIONS

LEVEL:

Senior five

COMBINATIONS:

MATHS-CHEMISTRY BIOLOGY: MCB

PHYSICS CHEMISTRY BIOLOGY: PCB

BIOLOGY CHEMISTRY GEOGRAPH: BCG

DURATION:

1H:30 Min

MARKS:

..... /15

INSTRUCTIONS

1. This questions is compulsory
2. Don't open this question paper until you are told to do so`.
3. Read each question carefully before answering it.
4. Use only a **blue** or black **pen**

- 1) The table below shows the results obtained from an investigation carried out on a fresh water plant. The plant was placed under water which had its carbon dioxide varied as the number of bubbles of oxygen evolved per minute by the plant, was observed and recorded. The experiment was carried out under sunlight

Carbon dioxide concentration (percentage by volumes)	Number of oxygen bubbles per minute
0.00	0
0.02	04
0.08	20
0.14	24
0.18	24

- a) What was the aim of the experiment? **(1 Mark)**
- b) Plot the graph to represent the information in the table **(4 Mark)**
- c) Using the information, explain the observations
- i) At CO_2 concentration of 0.00 **(3 Mark)**
- ii) Between the CO_2 concentration of 0.02 and 0.18 **(5 Mark)**
- d) Suggest an explanation for when would be observed in the experiment if the
- i) CO_2 concentration was increased to 0.20 **(1 Mark)**
- ii) Temperature was lowered to 50°C **(1 Mark)**

End !!!!

BIOLOGY Marki schemes

Alternative to practical

Date: ... / ... /2022

Period:



END OF TERM III EXAMINATIONS

LEVEL: Senior five

COMBINATIONS: MATHS-CHEMISTRY BIOLOGY: MCB
PHYSICS CHEMISTRY BIOLOGY: PCB
BIOLOGY CHEMISTRY GEOGRAPH: BCG

DURATION: 1:30 Hour

MARKS:

..... /20

INSTRUCTIONS

1. This question is compulsory
2. Don't open this question paper until you are told to do so`.
3. Read each question carefully before answering it.
4. Use only a **blue** or black **pen**

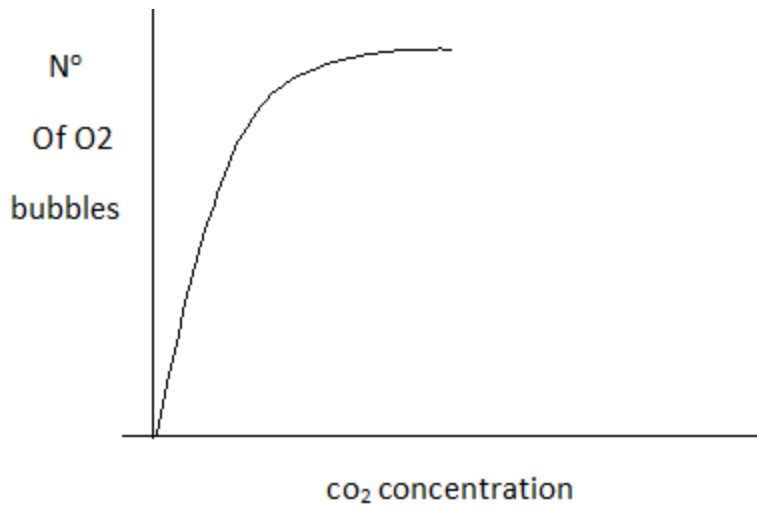
- 1) The table below shows the results obtained from an investigation carried out on a fresh water plant. The plant was placed under water which had its carbon dioxide varied as the number of bubbles of oxygen evolved per minute by the plant, was observed and recorded.
The experiment was carried out under sunlight

Carbon dioxide concentration (percentage by volumes)	Number of oxygen bubbles per minute
0.00	0
0.02	04
0.08	20
0.14	24
0.18	24

- a) What was the aim of the experiment? **(1 Mark)**
- b) Plot the graph to represent the information in the table **(6 Mark)**
- c) Using the information, explain the observations
- i) At CO_2 concentration of 0.00 **(3 Mark)**
- ii) Between the CO_2 concentration of 0.02 and 0.18 **(8 Mark)**
- d) Suggest an explanation for when would be observed in the experiment if the
- i) CO_2 concentration was increased to 0.20 **(1 Mark)**
- ii) Temperature was lowered to 50°C **(1 Mark)**

Answer

- a) To investigate the effect of varying CO_2 on the rate of photosynthesis.
- b) Variation of number of bubbles of O_2 bubbles per minute with CO_2 concentration.



- c) i) no O₂ bubbles produced, indicating that P_hs does not take place. This is because CO₂ is a raw material therefore in the absence of CO₂ P_hs does not take place. Hence O₂ a by product of the process is not produced
- iii) The number of O₂ bubbles produced per minute increases rapidly and then becomes constant. This is because at low CO₂ concentration, CO₂ is the thing factor of P_hs. Therefore the rate of P_hs, as indicated by the rate of O₂ production, increases with increase in CO₂ concentration. At 0.14% CO₂ concentration is optimum and therefore any further increase in the concentration of CO₂ does not increase the rate of P_hs. The rate of P_hs is then added by other factors such as temperature and light intensity.
- d) i) there would be no further increase in the number of oxygen bubbles produced per minute because CO₂ is no longer the thing factor of P_hs.
- iii) There would be a drastic fall in number of oxygen bubbles produced per minute because low temperatures inactivate the enzymes involved in P_hs.

End !!!!