



Dr. Bbosa Science

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PAPER 1: *UNEB 2007 guide*

Answer all questions

SECTION A

1. Which one of the following is a simple branched tubular gland?

- A. Brunner's glands
- B. Salivary gland
- C. Sweat gland
- D. Mammary gland

The answer is A

The glands presented in this case are of the following types;

Gland	Types of gland
• Brunner's gland	Simple branched tubular gland
• Salivary gland	Compound tubular gland
• Sweat gland	Coiled tubular gland
• Mammary gland	Compound saccular gland

2. Which one of the following activities does not contribute to global warming?

- A. Use of pesticides.
- B. Deforestation.
- C. Burning fossil fuels.
- D. Use of CFCs.

The answer is A

Light rays from the sun (short wavelength electromagnetic radiation) heat up the earth's surface. However, in the presence of high CO₂ concentration in the atmosphere, the heat rays (long wavelength electromagnetic radiation) given out by the earth are prevented from escaping by the CO₂.

This causes progressive rising in temperatures on the earth (global warming) any activity which increases CO₂ content in the atmosphere can cause global warming. These include; deforestation burning of fossil fuels.

However, use of CFCs destroys the ozone layer and allows heat energy to reach the earth directly from sun. This would also cause global warming.

Note: The use of pesticide only causes environment pollution but has no link to global warming.

3. The significance of etiolation to a germinating seed in the soil is that it

- A. leads to rapid elongation of the hypocotyl in monocotyledonous plants.
- B. allows maximum growth in length with minimum use of food reserves.
- C. allows the seedling to grow in the dark.
- D. ensures that leaves remain small to break through the soil.

The answer is B

Etiolation is a phenomenon which occurs when a seedling is allowed to grow in the dark and is characterized by;

- Yellowing of the leaves.
- Failure of growth/ increase in size of leaf.
- Increase in node –node length (stem elongation)

To a germination seed, etiolation allows maximum growth in length with minimum use of food reserves to allow the plant reach light.

4. Dioecious plants are rare in spite of having the advantages of cross pollination because

- A. anthers and stigmas mature at different times.
- B. the male and female plants are usually apart.
- C. half of the individuals do not produce seeds.
- D. only few agents of dispersal are involved.

The answer is C

In dioecious plants, only the female bearing plant produces seeds while the male plants are usually non-seed producing. As a result, the male plants are rare, leading to reduced chances of fertilization of the female, hence rarity of the species.

5. Which one of the following substances would be produced by plants under conditions of water stress?

- A. Indoleacetic acid.
- B. Ethene.
- C. Gibberellins.
- D. Abscisic acid.

The answer is D

Water stress is a situation in which a plant is liable to lose more water by transpiration than it can gain by absorption from the soil. If this situation continues, the stomata close rapidly as the leaves wilt thereby cutting down water loss to a minimum. This rapid response is brought about by the hormone Abscisic acid secreted by the cells in the wilted leaves.

6. Which one of the following does not lead to change in allele frequency of a population?

- A. Mutation
- B. Selection
- C. Sexual recombination
- D. Genetic drift.

The answer is C

According to the Hardy Weinberg principle, the allele frequency of a population remains constant provided that:

- Mutation do not occur
- Selection does not occur
- There is no chance disappearance of genes (genetic drift)

However, sexual recombination does not change the allele frequency of a population.

7. Birds learn to ignore a scare crow that is left in the same spot for a longtime. This type of behaviour is called

- A. habituation.
- B. associative learning.
- C. imprinting.
- D. conditioning.

The answer is A

Learning may be classified into five categories.

- Habituation , is a process by which an animals gradually ceases to respond to a stimulus if this is presented repeatedly in the same amount and fashion for a long time.
- Associative learning is when an animals learn to associate a particular response with a reward or punishment.
- Conditioning is when animals learns to respond to a previously non- stimulating stimulus as a result of it being presented repeatedly in pairs with a usual stimulus. For example, a dog learning to salivate at the sound of the bell.
- Trial and error learning, occur when an animal learns to associate a particular behavior with an unexpected reward. For example, a dog rewarded with food each time it jumps onto a chair eventually learns to jump onto that chair time it enters the room.
- Imprinting is a form of behavior in which younger animals learn to follow the parents right from the time they are born.
- Insight learning is the immediate comprehension and response to a new situation without trial and error. It involves mental reasoning (intelligence)

8. Mendelian expected probabilities of genotypes in a cross occur when

- A. small numbers of offspring are produced
- B. migrations occur in a population
- C. mutations arise.
- D. fertilization is random.

The answer is D

When fertilization is random, all alleles in the population are equally likely to occur in the offspring. This increases chances of obtaining typical Mendelian probabilities in the genotypes of the organisms.

Mutation migration and small population size causes biased selection for or against certain alleles. This makes the alleles of a population unequally likely to appear in the offspring.

9. Which one of the following is not correct about cells of a tissue? They

- A. have similar function.
- B. are of same origin.
- C. are of one type.
- D. have physical linkage.

The answer is C

A tissue is a group of physically linked and associated intracellular substances that are specialized for a particular function(s). The cells are of a common origin, but are not necessarily of one type e.g. blood tissue.

10. When a foetus receives antibodies from the mother through the placenta, it acquires.

- A. active immunity.
- B. long—term immunity.
- C. passive immunity.
- D. artificial immunity.

The answer is C

Reception of performed antibodies by an organism is called passive immunity. These antibodies can be injected directly in blood or cross the placenta to reach the foetus.

Note: Active immunity occurs when antigens are injected into the body of an organism and later the body develops its own antibodies against them.

11. Worker bees are

- A. sterile females developed from fertilized eggs.
- B. fertile males developed from unfertilized eggs.

C. sterile males developed from unfertilized eggs.

D. fertile females developed from unfertilized eggs.

The answer is A

In the honey bee colony there is a single fertile (the queen), several thousand sterile females (workers) and a few hundred males (drones). Fertilized eggs are diploid and develop into females while unfertilized eggs are haploid and develop into males. The type of food provided for female larvae determines whether they will become queens or workers. The food called royal jelly is fed to queens to make them fertile.

12. The process of changing the information on mRNA into formation of polypeptides is known as

A. transcription.

B. translation.

C. transduction.

D. transformation.

The answer is B

The process of changing information on mRNA into formation of polypeptides is called translation. This occurs in the cytoplasm of the cell.

Note:

- Transcription, is the process by which information (instruction) found in DNA is converted into a chains of base sequence in mRNA. It takes place in the nucleus of the cell.
- Transduction, refers to the process by which DNA is transferred from one bacterium to another by a microphage (bacteriophage or virus e.g. HIV)

- Transformation is the process by which bacteria DNA is changed as a result of direct uptake and incorporation of foreign DNA from its surrounding through the cell membrane.

13. Which one of the following is an essential feature for successful terrestrial life of flowering plants?

- A. Reduction of gametophyte to spores.
- B. Development of pollen tube to transfer male gametes.
- C. Possession of well-developed vascular system.
- D. Reduction of sporophyte to seeds.

The answer is B

The biggest problem with terrestrial life is desiccation

Development of pollen tube to transfer male gametes is therefore an essential feature for successful terrestrial life of flowering plants.

14. Which one of the following movements in fish is counteracted by the vertical horizontal!

- A. Rolling
- B. Backward drag
- C. Pitching
- D. Yawing

The answer is A

A fish is liable of three kinds ability: yawing, pitching and rolling.

⇒ Rolling is the rotation of the body about the longitudinal axis. It is counteracted by both the vertical and horizontal fins acting like the stabilizers on slips.

- ⇒ Yawing is the lateral deflection of the anterior part of the body resulting from the propulsive action of the tail. It is counteracted by the general massiveness of the head and the pressure of water against the side of the body and the vertical fins.
- ⇒ Pitching is the tendency for the nose to plunge vertically downwards. It is counteracted by dorso-ventral flattening of the body and the large flap-like horizontal fins.

15. During which transfer of energy is most energy lost in an ecosystem?

- A. Producers — primary consumers.
- B. Primary consumers — secondary consumers
- C. Secondary consumers — tertiary consumers
- D. Tertiary consumers — decomposers.

The answer is A

Highest energy loss during transfer in the ecosystem occurs from producers to primary consumers. This is because herbivores make less efficient use of their food. This is due to the fact that plants contain a high proportion of cellulose and sometimes wood which are relatively indigestible and, therefore, unavailable as energy source for most herbivores.

16. The role of oestrogen during birth is

- A. causing contraction of the uterine wall.
- B. increasing the sensitivity of the muscles to oxytocin.
- C. inhibiting the production of progesterone.
- D. promoting milk production in the mammary glands.

The answer is B

During birth, oestrogen increases the sensitivity of the uterine muscle of the contractile effect of oxytocin. It has no direct contractile effect on the uterus.

17. Which one of the following does **not** contribute to the movement of water from the root system to the leaves in a flowering plant?

- A. Root pressure.
- B. Cohesion forces.
- C. Transpiration pull.
- D. Atmospheric pressure.

The answer is D

Root pressure, cohesion force, and transpiration pull facilitate movement of water through the xylem vessels. Atmospheric pressure plays no role.

18. Arthropods have a lower visual acuity compared to vertebrates because

- A. the ommatidia are less sensitive than rods and cones.
- B. compound eyes contain fewer rods and cones.
- C. the ommatidia are big and only few are packed in an equal area.
- D. the ommatidia contain photochemical pigments which are less readily bleached.

The answer is C

Visual acuity of arthropods is lower than that of vertebrates. The ommatidia have a larger size than cones and so are few in number per unit comparable area. Thus, light from two close points fall on a single ommatidium and the points are perceived as one. The same light would fall on separate a cone which perceives them as two different points.

19. High carbon dioxide concentration in respiring tissues is important because it causes

- A. local vasodilation, allowing more blood into the tissues.
- B. low pH in the tissues leading to unloading of oxygen.

C. local vasoconstriction creating high blood pressure.

D. increased heartbeat.

The answer is B

Increased metabolic rate results in carbon dioxide building up in the muscle tissues. This combines with water to form carbonic acid that releases hydrogen ions, i.e. causes low pH in the tissue. The hydrogen ions stabilize deoxyhaemoglobin, thus leading to unloading of oxygen.

20. A major difference between respiration and burning is that

A. no heat is produced during respiration.

B. burning is a faster process.

C. burning is a chemical process.

D. chemical energy is stored in respiration.

The answer is D

Chemical energy released from respiration is stored in form of ATP but physical energy (heat) produced in burning cannot be stored.

Note: both respiration and burning produce heat energy, i.e. they are chemical and exothermic processes

21. Which one of the following is the main form of the photosynthetic product transported through the phloem?

A. Starch

B. Amino acid

C. Sucrose

D. Glucose

The answer is C

Most of the photosynthetic products are transported through the phloem in form of sucrose.

This is because it is relatively, highly water soluble and an efficient energy store, hence it does not take part in chemical reaction as it is being transported.

Note:

Glucose is highly reactive and this would result in some intermediate reactions as it is being transported.

Starch is insoluble in water so it cannot be transported in the phloem.

22. Which one of the following structures supplies oxygenated blood to the foetus?

- A. Umbilical cord.
- B. Umbilical vein.
- C. Placenta villi.
- D. Umbilical artery.

The answer is B

The blood rich oxygen and nutrients flows via the umbilical vein from the placenta to the fetus.

From the fetus, blood containing waste products carbon dioxide flows towards the placenta through an umbilical artery.

23. Which one of the following best describes basal metabolic rate?

- A. Average amount of energy produced by the body.
- B. Average amount of energy produced when at rest.
- C. Amount of energy produced by an average body.
- D. Amount of energy produced when all voluntary movements have ceased.

The answer is B or D

Basal metabolic rate (BMR) is the rate at which the minimum amount of energy required to maintain vital organ functions such as breathing, heart rate, temperature regulation, etc. is produced by the body while an organism is completely at rest or asleep.

Under these circumstance all voluntary movement ceases.

24. A property of cells in a multicellular organism is that they are

- A. small sized
- B. less functional.
- C. less specialized.
- D. dependent.

The answer is D

According to the organism theory, a multicellular organism consists of interdependent cells whose functions are dictated by the needs of the whole organism.

25. Which one of the following tissues has the least power of regeneration?

- A. Blood tissue.
- B. Epithelium tissue.
- C. Bone tissue.
- D. Nerve tissue.

The answer is D

Nerve tissue has the least power of regeneration in the body while epithelial tissues have the highest power of regeneration.

Note: cells in nerve tissue are not capable of dividing.

26. Which one of the following is likely to occur if a photosynthesizing plant was suddenly removed from light?

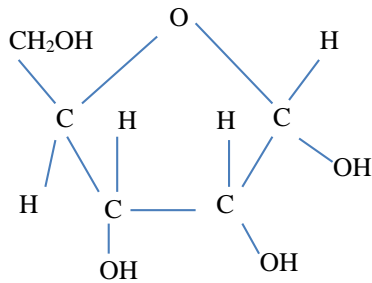
- A. Reduction in PGA
- B. Accumulation of PGAL.
- C. Accumulation of PGA.
- D. No change in amount of PGAL

The answer is C

When light is suddenly removed, a photosynthesizing plant only carries out light – independent stage of photosynthesis, fixing CO_2 to produce PGA. Because there is no light, ATP and NADPH_2 from the light- dependent stage are not available.

Since the reduction of PGA to PGAL requires ATP and NADPH_2 then this reaction will not take place. As a result, PGA accumulates.

27. Which one of the following molecules is represented in Figure 1?



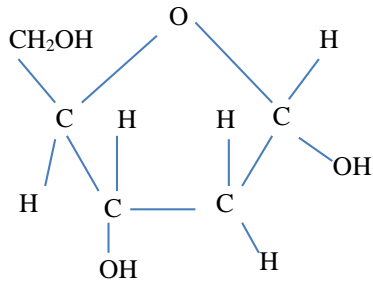
- A. Fatty acid
- B. Deoxyribose
- C. Glucose
- D. Ribose.

The answer is D

The carbon atom at position 2 of the pentose (5C-sugar) bear both H and OH groups and so it is ribose.

The carbon atom at position 2 lacked. Note: if the carbon atom at position 2 lacked an 'O' atom, the molecule then would have been deoxyribose. Thus.

Structure of deoxyribose



28. Establishing the genotype of an organism by crossing it with a homozygous recessive individual is carrying out a

- A. test cross.
- B. dihybrid cross
- C. back cross.
- D. monohybrid cross.

The answer is A

A test cross is carried out to establish the genotype of an organism exhibiting a dominant character. Thus by crossing it with a homozygous recessive individual.

29. In guinea pigs, the allele for rough coat (R) is dominant over one for smooth coat (r) and that for black coat (B) is dominant over one for white coat (b).

The alleles for coat type and colour are not linked. A cross between rough black guinea pig and rough white one produced 28 rough black, 31 rough white, 11 smooth black and 10 smooth white.

Which one of the following could be the genotype of the parents?

- A. RrBb x Rrbb
- B. RRBB x RRbb
- C. RRBb x Rrbb
- D. RrBB x Rrbb

The answer is A

30. Which one of the following is the reason why insects usually hatch rapidly into larvae?

- A. Eggs have little yolk.
- B. Hatching is controlled by external factors.
- C. It is a way of avoiding predators
- D. Due to excessive production of juvenile hormone.

The answer is A

Yolk is the nutrient storage of an embryo in the egg. Insects produce eggs with very little yolk that is not sufficient to nourish the embryo for a long time. Thus their eggs hatch rapidly into larvae which can feed themselves to maturity.

31. Higher concentration of some ions in the cell sap of some fresh water algae compared to the external water is due to

- A. diffusion.
- B. active transport.
- C. pinocytosis.
- D. osmosis.

The answer is B

The cell sap of the algae is hypertonic to the fresh water. Therefore, some ions are actively transported from the external water into the cell sap, leading to their higher concentration in the sap.

32. Mixing of oxygenated and deoxygenated blood in amphibians is minimized by

- A. rapid contraction of the ventricle.
- B. spongy nature of heart muscles.
- C. spiral valve in the truncus arteriosus.
- D. columnae carnae in the ventricular

The answer is C

- The heart of amphibians has two atria and one ventricle. Blood from the ventricle flows directly into truncus arteriosus from where it flows to vessels leading to the lungs and body.

- To prevent mixing of oxygenated with deoxygenated blood, the ventricle has several folds in its wall and the truncus (conus) arteriosus has a spiral valve that divides its lumen into two.

33. Which one of the following describes the state of the membrane during resting potential?

- A. Polarized.
- B. Neutral
- C. Depolarized
- D. Discharged.

The answer is A

At rest, the membrane of nerve cell is positively charged on the outside in relation to the inside.

Thus a positive pole exists on the outside and negative pole on the inside. The membrane in this is said to be polarized.

34. Which one of the following tissues would be stained deepest red by a dye that stains nucleic acid red?

- A. Sieve tube.
- B. Tracheid.
- C. Collenchyma.
- D. Cambium

The answer is D

Cells collenchyma and cambium tissues are living and nucleated. Being meristematic in nature, cambial cells are continually dividing and as such, they contain a larger amount of genetic material. Therefore, they contain more prominent nuclei compared to collenchyma cells. As a result, they would be stained deepest red by the dye.

Note:

- Tracheid are made up of dead cells.
- Sieve tubes of the phloem are up of living, non-nucleated cells called sieve elements.

35. In which one of the following parts of a chloroplast are water splitting enzymes mostly located?

- A. Stroma
- B. Intergrana
- C. Cytoplasm
- D. Grana

The answer is D

The splitting of water by light energy (photolysis) occurs in the thylakoid membrane of the grana in the chloroplast.

36. In which of the following may sporophytes contain haploid, diploid and triploid cell at some stage?

- A. Conifers.
- B. Mosses.
- C. Flowering plants.
- D. Ferns.

The answer is C

On flowering plant, the sporophyte may contain haploid cells (embryo sac,) diploid cells (embryo) and triploid cells (endosperm).

37. Compared to carbohydrates, fats have higher energy value because fats

- A. have long chain of fatty acids.
- B. have a higher proportion of hydrogen.
- C. are more compact in structure.
- D. have a high proportion of oxygen.

The answer is B

The energy of a food substance is amount of energy obtained when 1g of the substance is completely oxidized.

38. Which one of the following would delay flowering in a short day plant?

- A. Twelve hours of darkness.
- B. More than ten hours of light.
- C. Interruption of dark period with a flash of light.
- D. Less than twelve hours of darkness.

The answer is C

Short-day plants are actually long- night plants. If they are grown in short days but the long night is interrupted with a flash of light, flowering is prevented.

Note:

Long-day plants (short- night plants) will flower in short days if the long night is interrupted. Short dark interruption; however, do not cancel the effect of long days.

39. Which one of the following nitrogenous wastes is suitable for elimination by a fresh water fish?

- A. Urea
- B. Uric acid
- C. Ammonia
- D. Trimethylamine oxide

The answer is C

Ammonia is a very toxic nitrogenous waste that requires a lot of water for its dilution during excretion. In fresh water animals, water is readily available ammonia is the excretory product of choice.

40. Which one of the following is correct about the sympathetic nervous system?

- A. Nerve endings produce nor-adrenaline.
- B. Preganglionic fibres are long and postganglionic fibres are short,
- C. Nerve endings produce acetylcholine.
- D. Ganglia are embedded in the walls of the effector organs.

The answer is A

Most nerve endings in the sympathetic nervous system produce Noradrenalin. These nerves have short preganglionic fibers and long post-ganglionic fibers. Their ganglia are far away from the organs they innervate: they are found along the vertebral column (Para-vertebral ganglia).

SECTION B

41. Figure 2 show oxygen dissociation curves for haemoglobin of two animals, X and Y, living in different habitats.

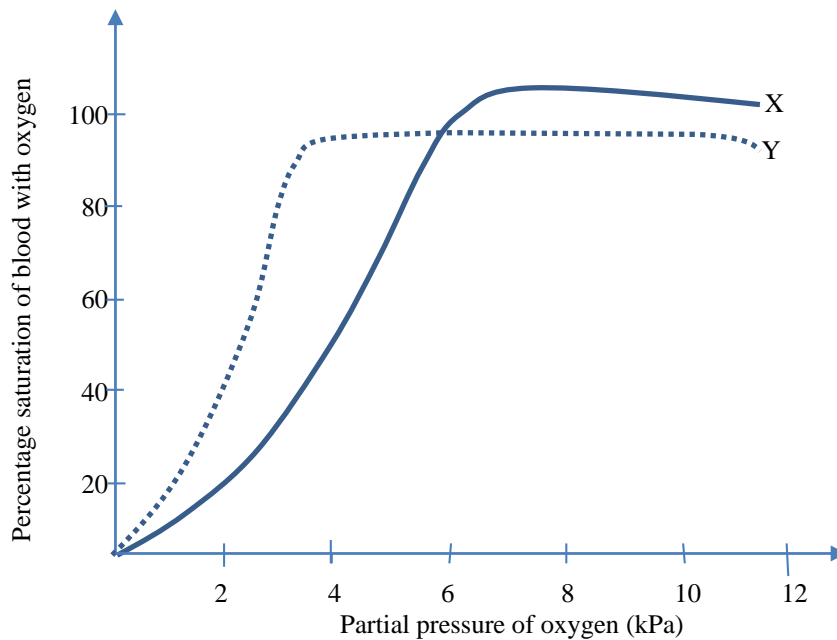


Fig. 1

(a) From the figure, state three differences in the behavior of haemoglobin of the two animals. (2marks)

(b) Has a lower affinity for oxygen.	Has a higher affinity for oxygen
(c) Has a lower rate of oxygen saturation	Has a higher rate of oxygen saturation
(d) Releases oxygen slowly at lower oxygen partial pressures	Releases oxygen rapidly at lower oxygen partial pressures.

Other:

X	y
Becomes fully saturated only at oxygen partial pressures greater than 8kpa	Becomes fully saturated only at oxygen partial pressures greater than 5kpa
Has a higher full saturation capacity (above 80%)	Has a lower full saturation capacity (about 80%)

(e) (i) Outline the characteristics of the haemoglobin of animals y. (3marks)

- Has a higher oxygen affinity
- Releases oxygen at low partial pressure
- Has a high rate of oxygen uptake at lower oxygen partial pressures

(ii).From characteristics in (b) (i) suggest the nature of the habitat in which animal y lives

(01mark)

Animal y live in a habitat with low oxygen partial pressures such as at high altitude.

(c). Human haemoglobin has a higher affinity for carbon monoxide than oxygen. What is the effect of the fact? (03marks)

In the haemoglobin molecule,, carbon monoxide readily replaces oxygen. It binds irreversibly with haemoglobin molecules and thus reduces oxygen carriage of the blood. As a result, the body tissues are deprived of oxygen leading to tissue death.

42. (a) Differentiate between respiratory quotient (RQ) and basal metabolic rate (BMR).

Respiratory quotient is the ratio of the volume of carbon dioxide given out to the volume of oxygen consumed when one mole of respiratory substrate is completely oxidized in the body.

Basal metabolic rate is the rate at which the minimum amount of energy needed to maintain vital processes of the body cells such as temperature regulation and breathing, is released when the body is completely at rest.

(b) Table 1 shows the respiratory quotients in germinating seeds under different treatments.

Table 1

Treatment	RQ
(i) 4hr soaking in water	6.0
(ii) 4hr soaking then 4 hour exposure to air	1.8
(iii) 4hr soaking then 24hr exposure to air	1.0

Explain the different respiratory quotients of the germinating seeds under the different treatments.

(i) 4hrs of soaking in water

When the seeds are not exposed to air, there is inadequate oxygen supply and absorption. The seeds respire anaerobically to produce carbon dioxide.

The volume of carbon dioxide released by the seeds in respiration far exceeds that of oxygen consumed and the RQ is greater than 1.0.

(ii) When the seeds are soaked in water, then 4hour exposure to air

The volume of oxygen absorbed by the seeds increases. Then, here is a combination of aerobic and anaerobic respiration occurring. However, the volume of carbon dioxide produced exceeds that of oxygen consumed and the RQ is still above 1.0. Anaerobic respiration is greater than aerobic respiration.

(iii) 4 hour soaking then 24hour exposure

The volume of oxygen absorbed is adequate for the plant to rely solely on aerobic respiration for its energy needs.

Since carbohydrates are the main energy substrate in the seed, complete respiration consumes the same volume oxygen as the volume of carbon dioxide produced and so the RQ is 1.0.

(c) Explain why the BMR varies with the age of the individual.

At rest, the energy requirements of the body vary with age to keep pace with the energy requirement at a particular age, BMR also varies with age.

43. Table 2 show the increase in size of a leaf of a plant with time.

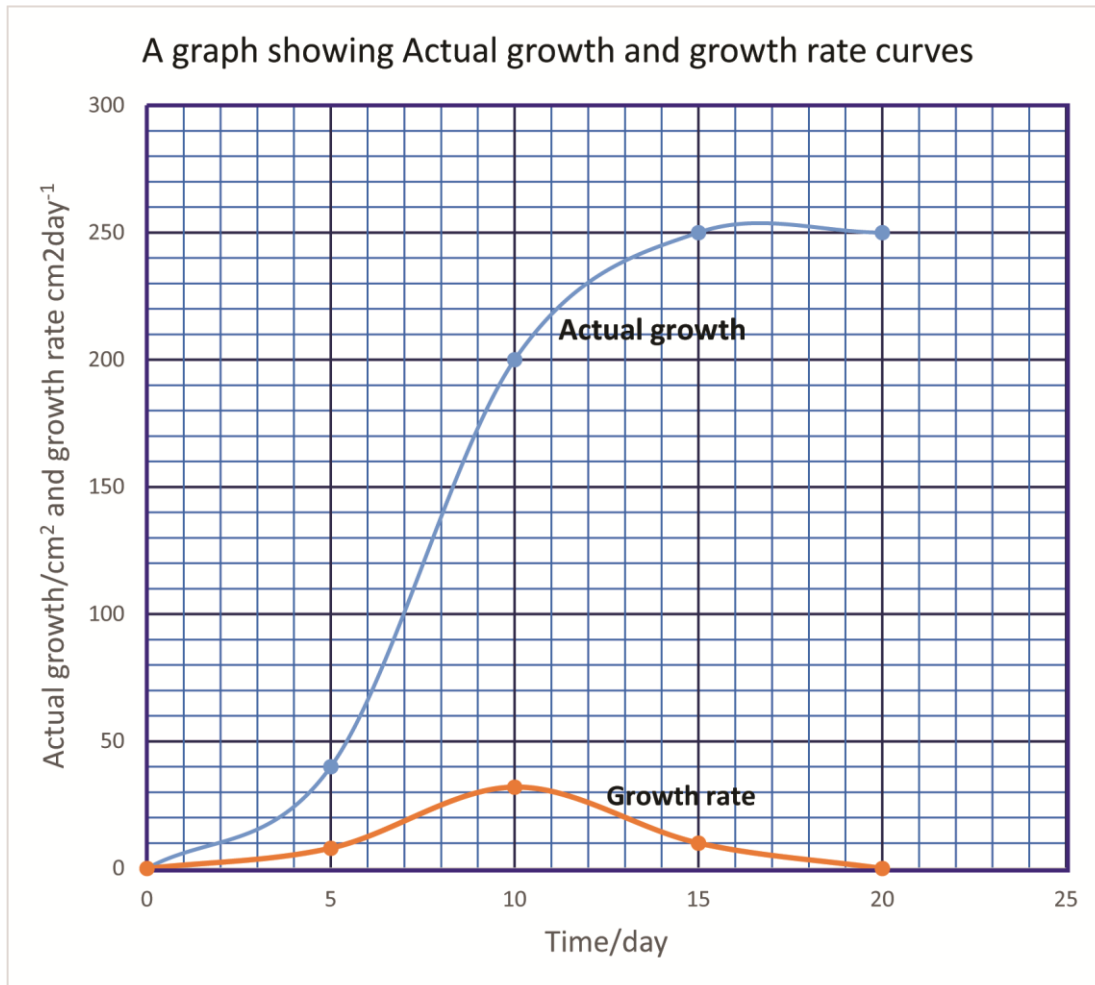
Table 2

Days	Area of leaf (cm ²)	Rates of growth (cm ² / day)
0	0	
5	40	
10	200	
15	250	
20	250	

(a) Complete the table by working out the growth rate at 5 days intervals

Days	Area of leaf (cm ²)	Rates of growth (cm ² / day)
0	0	
5	40	$\frac{40-0}{5} = 8$
10	200	$\frac{200-40}{5} = 32$
15	250	$\frac{250-200}{5} = 10$
20	250	$\frac{250-250}{5} = 0$

(b) In the space provided, plot actual growth and growth rate.



(c) State main differences between growth in plants and that in animals.

- Growth in plants is located in a few plant cells while in animals growth occurs in all body cells
- Growth in plants is unlimited while in animals it is limited
- Growth factors in plants are sensitive to light while in animals are not
- The secretion of growth factors in animals can be by nervous system absent in plants

(d) What are the limitations of measuring leaf as a way of measuring growth in a plant?

- It does not account for girth or volume

- Different parts of the plant may grow at different rates
- The method is not accurately measured using simple instrument
- Leaf growth is not uniform in all dimensions

44.(a) (i) Describe how the quadrat method can be used to determine species density.

- A square frame of metal /wood of side xm is placed randomly I an area on ground (quadrat) containing species to be identified and counted
- The number of species in the area enclosed is determined and recorded.
- The procedure is repeated randomly in n locations on the same piece of land. The total number of species counted is recorded; let it be N

Species density is then calculated from.

$$\text{Species density} = \frac{\text{population estimate}}{\text{total area of study}} = \frac{N}{nx^2} \text{ species /m}^2$$

(ii) State the advantage and disadvantage of the method.

Advantage s

- it is accurate
- it marks out a small area within which determination of the number of species present is easy.
- It gives a good sample size of immobile species.
- Can be used to compare different areas and species
- Provides an absolute measure of abundance

Disadvantage

- It is time consuming to count all individuals in sampled area
- It cannot be used to determine density of rapidly mobile/ flying species.

- It is very tiresome to count species in several small area in order to come up with a representative sample.

(b) Why is it important to estimate population size?

- To monitor population change
- To establish feeding relationship within a habitat
- To construct food chain, food web and pyramid of numbers
- To determine carrying capacity of a given habitat
- For proper planning of distribution of resources e.g. in human

(ii). In estimating the number of fish in a small lake, 625 fish were caught, marked and released, after one week, 290 fish caught and of these, 150 had been marked

What was the estimated size of fish population?

150 marked fish is contained in 290 fish

$$625 \text{ rked fish will be contained in total population} = \frac{625 \times 290}{150} = 3833 \text{ fish}$$

(iii) In using the method I b (ii) to estimate the population size of fish, state two assumption that were made.

- That fish mix randomly within the population.
- That organisms disperse randomly within the geographical area of the population.
- That change in the population size due to immigration, birth and deaths within the time of experiment are negligible.
- Time allowed is enough for random mixing
- Markings do not affect random mixing

45. (a) With reason, give example of animals which produce each of the following excretory products.

(i) Ammonia

Ammonia is highly toxic and very soluble and thus requires a lot of water for excretion; it is thus a suitable excretory product for fresh water aquatic animals such as bony fish, protozoa, cnidarians, Platyhelminthes that live in abundant water

(ii) uric acid

Uric acid is insoluble, nontoxic and requires minimal amount of water for excretion; it a suitable excretory product for terrestrial animals such as birds, reptile and insects

(b)State

(i) Why the pH of the fluid in a human body is kept constant

All metabolic reactions in the body are controlled y enzymes that work within narrow pH range

(ii) Three ways of keeping the pH in b(i) constant

- controlled elimination of H^+ ions and anions by the kidneys.
- Controlled rate of elimination of carbon dioxide from the body by breathing.
- Hydrogen ion buffering by plasma proteins in blood.

46. (a) What is displacement activity?

Displacement activity is when an animals, faced with conflicting situation, performs an act which is trivially irrelevant to the situation in order to release the tension developed thereof. for example, after being annoyed, a man bangs a table

(b) State the ecological importance of each of the following forms of behavior

(i) Territorial behavior

- Provide defense of an area in which organisms live against organisms of the same or different species.
- The mating pair of organisms of the same species and their offspring are well spaced to receive the available resources, e.g. food, space and shelter.
- The available resource is protected and shared amongst the population

Others:

- Actual fighting between organisms, which would be detrimental to the species is rare and replaced by mere threats.
- Intraspecific competition is reduced.
- It minimizes spread disease and parasites.
- Genes from strong organisms or the fittest are passed on to the next generation.

(ii) Courtship behavior

- It leads to rise levels of reproductive hormones
- It stimulates organisms to sexual activity.
- It tightens pair bonding between the mating pair.
- It synchronizes time to produce offspring in right seasons.
- It induces mating of individuals who accept each other.
- It synchronizes gonad development, enabling gametes to mature at the same time, this ensures that fertilization occurs when mating takes place.

(c) Give two ways in which animals avoid predation.

- Mimicry
- Camouflage.
- Keen eye-sight
- Adoption of nocturnal life
- Alarms
- Fast runner
- Glossy body surface
- Production of poisonous substance as is the case of toads and frogs
- Adoption of nocturnal life style
- Production of unpleasantly structure smelling substance that repel predators
- Possession of thorn- like structure on the body surface, making them unpleasant to predators e.g., the Hedgehog
- Possession of hard non palatable covering as in tortoises, beetles and snails