

SECTION A

1. Which type of soil has the following properties?
i) Light to cultivate ii) low water retention iii) low capillarity
A. Sandy loam
B. Loamy
C. Sandy
D. Clay C
2. The main function of the pinna in the mammalian ear is
A. Regulate pressure
B. Concentrate the sound waves into the middle ear
C. Transmit sound to the inner ear
D. Transmit sound waves to the middle ear. B
3. In the body temperature regulation, vasodilatation
A. Allows more blood to enter the skin capillary network
B. Allows more urine to be secreted into the bladder
C. Allows less sweat to be secreted by sweat glands
D. Decreases heat loss by radiation A
4. A homozygous red flowered plant is crossed with a heterozygous red flower. If red is dominant over white, what will be the phenotype of the offsprings?
A. All white
B. $\frac{1}{2}$ red and $\frac{1}{2}$ white
C. $\frac{3}{4}$ red and $\frac{1}{4}$ white
D. All red D
5. Which one of the following is not a characteristic of monocotyledons?
A. Parallel venation
B. Fibrous roots
C. Leaf sheath
D. Cork layer D
6. Which of the following causes artificial immunity?
A. Taking drugs that prevent the disease
B. Receiving antibiotic injections against the disease
C. Injection with a mild strain of the pathogen
D. Catching the disease and recovering from it C

7. The most typical characteristic feature of axis vertebra is the presence of:

- A. A Centrum
- B. Odontoid peg
- C. Demifacets
- D. Long ~~neural~~ ^{neural} spine

B

8. The rate of glomerular filtration is lowest in;

- A. Marine vertebrates
- B. Amphibians
- C. Mammals
- D. Fresh water animals

A

9. Primary growth in plants causes increase in?

- A. Length
- B. Number of branches
- C. Thickness
- D. Xylem thickness

A

10. Which one of the following is an adaptation to ensure effective gaseous exchange in organisms?

- A. Decreased surface area of organs involved
- B. Increased thickness of gas exchange surface
- C. Increased body size of organism
- D. Increase in concentration gradient of gas

D

11. Lactic acid is likely to accumulate

- A. When engaged in a vigorous exercise
- B. After breathing in excess carbon dioxide
- C. Deep sleep
- D. After consuming alcohol

A

12. $I \frac{0}{3}$ $C \frac{0}{1}$ $Pm \frac{3}{3}$ $M \frac{3}{3}$ is dental formula of

- A. Filter feeder
- B. Herbivores
- C. Omnivores
- D. Carnivores

B

13. In higher plants the male gametes fuse with

- A. Polar nuclei and egg nucleus
- B. Egg nucleus and synergids
- C. Secondary nucleus and eggs
- D. Polar nuclei and antipodals

A

14. Too much starch in the diet of a child is responsible for

- A. Pellagra
- B. Rickets
- C. Scurvy
- D. Marasmus

Mark transferred to
No. 31

15. What relationship exists between algae and fungus in Lichens?

- A. Parasitism
- B. Saprohytism
- C. Symbiosis
- D. Commensalisms

Saprophytism

commensalism

16. Which of the following is not a protozoa

- A. Filarial worm
- B. Schistosoma
- C. Plasmodium
- D. Amoeba

17. Reptiles are well adapted to living on land due to presence of

- A. Dry epidermal scales and egg membranes
- B. Lungs and egg membranes
- C. Shelled eggs and lungs
- D. Dry epidermal scales and gular crest

18. Which of the following fins provide a steering force in fish?

- A. Dorsal fin
- B. Caudal
- C. Pelvic
- D. Anal

19. Which of the following methods is used in collecting flying insects?

- A. Line transect
- B. Plankton net
- C. Quadrat
- D. Sweep net

20. Which of the following characteristics of feathers does not aid flight in birds?

- A. Being water proof
- B. Being large and broad
- C. Being light
- D. Being fluffed

21. Which of the following is described as sexual reproduction in spirogyra?

- A. Binary fission
- B. Conjugation
- C. Fragmentation
- D. Budding

B

22. Which of the following parts of a plant cell has a semi-permeable property?

- A. Cell membrane
- B. Nucleus
- C. Cell wall
- D. Protoplasm

A

23. Which of the following is true about wind ^{pollinated} flowers?

- A. Produce large and rough pollen grains
- B. Stigma and pollen grains are often sticky
- C. Filaments are flexible and anther loosely attached
- D. Produce scent

C

24. Which of the following processes increases amount of carbon dioxide in atmosphere?

- A. Photosynthesis
- B. Action nitrifying bacteria
- C. Action of fungi on dead organic matter
- D. Action of denitrifying bacteria

C

25. Which of the following is true about ^{Insecta} insect and not Arachinda?

- A. 3 ^{main} body divisions
- B. Joined appendages
- C. Exoskeleton
- D. Hairy bodies

^{Insecta}
Jointed appendages

A

26. Which of the following organs is responsible for removing excess glucose from blood?

- A. Spleen
- B. Liver
- C. Kidney
- D. Gall bladder

B

27. Osmosis is inhibited in?

- A. Dilute solutions separated by partially permeable membranes
- B. Concentrated solution separated by partially permeable membranes
- C. Living tissues
- D. Killed tissues

D

28. Which of the following fruits is a schizocarp?

- A. Passion
- B. Blackjack
- C. Desmodium
- D. Coconut

C

29. Which of the following is the intermediate host for pig-tape worm?

- A. Man
- B. Pig
- C. Cow
- D. Undercooked pork

A

30. Which of the following is the function of choroid of the mammalian eye

- A. Absorbs light and prevents total internal reflection
- B. Protects the delicate inner layers of the eye
- C. Transmits sensory impulses from the retina to the brain for interpretations
- D. Provides nutrients and oxygen to the cornea and eye lens

A

SECTION B

31. An experiment was carried out to investigate the effect of smearing jelly on the surfaces of the leaves, on rates of photosynthesis at different light intensities.

Results obtained were recorded as below:

Light intensity in (arbitrary units)	0.1	0.2	0.3	0.4	0.5
Rate of Photosynthesis in leaf A whose both surfaces were smeared.	10	14	16	20	20
Rate of Photosynthesis in leaf B whose upper surface was smeared	25	28	32	35	35
Rate of photosynthesis in leaf C whose under surface was smeared	20	21	25	28	28
Rate of Photosynthesis in leaf D whose both surfaces were not smeared with jelly	30	35	40	45	45

a) Plot the graphs to show how rate of photosynthesis vary in leaves A, B, C, and D at different light intensities (in arbitrary units)

b) How does smearing of jelly affect the rates of photosynthesis in leaves A, B, C, and D?

Leaf A

All stomata on upper and lower surface blocked. Preventing entry of carbon dioxide.
Hence the lowest rate of photosynthesis.

(7 1/2 marks)

8 1/2 mcs

(1 1/2 marks)

Leaf B

(1 1/2 marks)

Upper surface has few stomata, these are blocked; ✓

Most stomata are on the lower surface, these are open; ✓

Allowing in much CO₂ hence high rate of photosynthesis; ✓

Leaf C

(1 1/2 marks)

Lower surface with most stomata, blocked; ✓

Upper surface with few stomata open; ✓

Allowing in little CO₂ hence low rate of photosynthesis; ✓

Leaf D

(1 1/2 marks)

All stomata on lower and upper surface open; ✓

Very high uptake of CO₂; ✓

Allowing the highest rate of photosynthesis; ✓

- c) i) Give any one reason why the rate of photosynthesis at light intensities of 0.4 and 0.5 are the same? (1 mark)

Light is no longer the limiting factor; ✓

Or/Due to other limiting factors. ✓

- ii) What is the optimum light intensity for photosynthesis in leaves A, B, C, and D?

d) 0.4 ✓ arbitrary units. Give full marks even when units miss. How does each of the following adaptations influence photosynthetic rates? (1 mark)

- i) Numerous chloroplasts

High amount of light absorbed; leading to a high rate of photosynthesis; ✓

/store large amt of chlorophyll for maximum absorption of sunlight energy.

- ii) Large intercellular air spaces

High amount of carbon dioxide; absorbed leading to high rate of photosynthesis; ✓

/for gaseous exchange/circulation of air

- iii) Possession of thin transparent epidermis

- Easy diffusion of CO₂. (1 mark)

Allows much light to pass through; as it prevents desiccation; ✓

- iv) Network of vascular bundles

Transports water and mineral salts to the mesophyll cells; ✓

manufactured food from

/transports

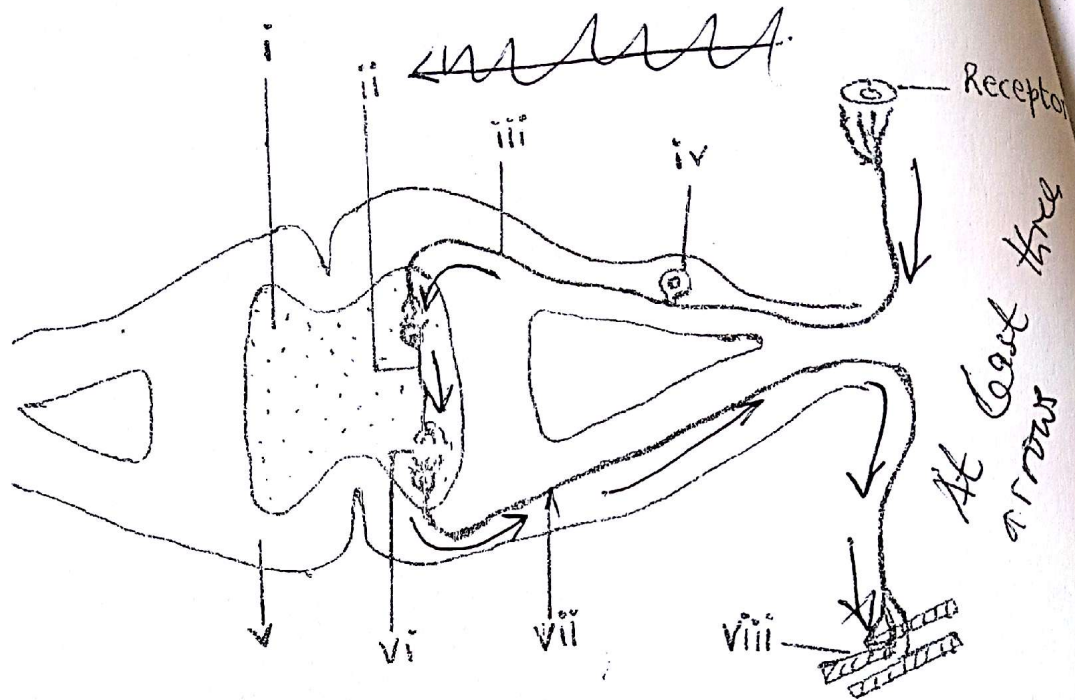
(2 marks)
Total = 2 1/2 mks

Max: 2 mks

answers must relate to the photosynthetic rate.

Transports manufactured food from the leaves;

32. a) The figure below shows part of the central nervous system and reflex arc.



a) Name the labeled parts.

(4 marks)

i) Grey matter ✓

ii) Relay neurone ✓

iii) Sensory neurone ✓

iv) Cell body ✓

v) White matter ✓

vi) Synapse ✓

vii) Motor neurone ✓

viii) Effector ✓

Muscle fibre

b)..... Draw arrows on the above diagram to show the direction of impulse flow. (1 mark)

c) Briefly describe how impulses are transmitted across part (vi).

(3 marks)

Presynaptic neurone/knob secretes neurotransmitter/acetylcholine;

It diffuses across the synapse;

It initiates an electrical impulse in the post synaptic neurone;

d) Give one example of a simple reflex action and its significance. (2 marks)

Removal of hand from hot object, protects hand from burning;

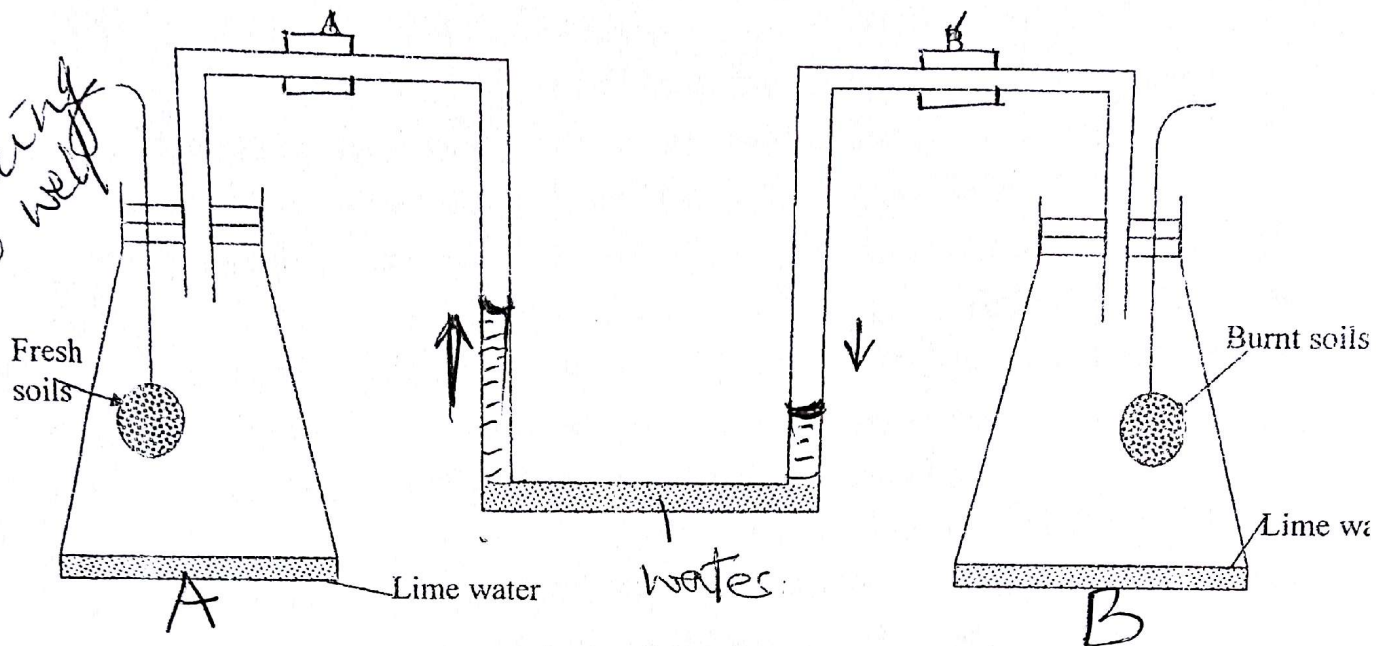
Blinking, Protects eye from injury;

Knee jerk, Protects ligaments from breaking;

(Anyone action and its significance)

1 = 10 marks

33. The setups below were done by students of S.2. Study the arrangement and answer the questions which follow:



a) i) What were these students investigating?

That soil contains living organisms which respire;

01 (2 marks)

ii) Why is lime water used in both flasks A and B?

To tests for carbon dioxide

(1 mark)

b) i) What would you observe if the experiments are left to continue for a few hours? Give reasons for your observations?

Lime water in flask A with fresh soil turns milky; due to CO₂ produced by respiring organisms;

(3 marks)

Lime water in flask B with baked soil remains clear/colorless; due to lack of CO₂;

because organism were dead;

change in the level of liquid in the tube

ii) Outline two uses of the components of soils being investigates above?

Soil aeration/ Nitrogen fixation;

Decomposition of organic matter; increasing fertility;

Making tunnels; increasing aeration; and water infiltration;

Some fix Nitrogen in the soil

die, decompose and add humus to soil

1 = 10 marks

SECTION C

Answer two questions only

(15 marks)

34. a) State the adaptations of the human skin for its functions.

- cornified layer of dead cells; *for* Protects the inner parts from entry of germs, water, some chemicals (0.2)
- Protects the body from desiccation, mechanical injury ✓
- Malpighian layer; pigmented/has melanin; protects the body from u.v. light; synthesizes vitamin D; (0.2)
- Sweat glands; Secrete sweat; excretion of water, salts; cools the body; ✓
- Sweat duct; Passage of sweat to the skin surface. ✓ *Have nerve endings, for sensitivity* (0.2)
- Sweat pore; outlet for sweat to the skin surface; ✓ *Receptors for; Pressure; heat, pain for detection and response* (0.2)
- Erector Pilli muscles; ✓ *Contract and relax adjusting the position of hair for temperature regulation*
- Sebaceous gland; Produce seba to nourish hair and skin; ✓ *Sebum*
- Hair; insulates the body against heat loss; Protects some parts of the body against mechanical injury; ✓
- Network of blood capillaries; Provide nutrients and oxygen to the skin; blood flows used in temperature regulations. ✓
- A dipose tissue/Fat layer; Food /fat/Energy storage; Insulates body against heat loss; ✓
- Cussions the body/Protects the body against mechanical injury; ✓

Adaptation = ½ MK

Function = ½ MK

Maximum 15 marks

35. a) What is excretion?

Excretion is the removal of metabolic waste products from the body of an organism; (2 marks)

b) Using named examples of excretory products, explain the importance of excretion. (7 marks)

- Removes carbon dioxide which is acidic and thus affects the pH of medium. *Carbon dioxide is acidic; affecting pH of enzyme reaction media;*
- Removes Excess water; Affects solute concentration; Size of cells; ✓
- Removes Heat; excess heat denatures enzymes; slowing down metabolism/reactions; ✓

Accept: Explanations linked to correct excretory product

Reject: (i) Explanations without a named excretory product

removes Urea; Is toxic; Affects pH; and Osmosis;
 removes Ammonia; Is toxic; Affects pH; affects enzyme reactions;
 removes Excess salts; Some are toxic; Affect Osmosis; Affect pH
 Uric acid; is toxic; affects pH.

(2 marks)
 max. 07 mks

1 mark @ = 7 marks

(i) State the role of the following parts of the human nephron:

(6 marks)

Glomerulus
 Glomerulus

Carries out ultra-filtration; small molecules come out of the blood; while cells and proteins remain in the capillary;

ii) Bowman's capsule

Collects the glomerular filtrate; which hence flows to the proximal convoluted tubules;

iii) Proximal convoluted tubule

Carries out selective re-absorption; of useful substances which are taken back into the blood stream; The wastes are left to flow down the loop of Henle;

1 mark for each role = 6 marks

15 mks



36. Briefly describe the role of each one of the following during gaseous exchange in bony fish.

a) The mouth of a Fish

(3 marks)

Opens; to allow water into the buccal cavity; during inhalation;
 It closes; to prevent water from coming out; during exhalation;

(ii) The buccal cavity

(5 marks)

During inhalation; the floor of the buccal cavity is lowered; Volume of the buccal cavity increases; pressure in the buccal cavity decreases; water is sucked into the buccal cavity;

During exhalation; the floor of the buccal cavity is raised; volume in the buccal cavity decreases; pressure increases; water is pushed from the buccal cavity into opercular cavity; passing over the gills;

b) Compare the process of inhalation with that of exhalation in man. (7 mks)

c) The opercular cavity of a Fish

Similarities

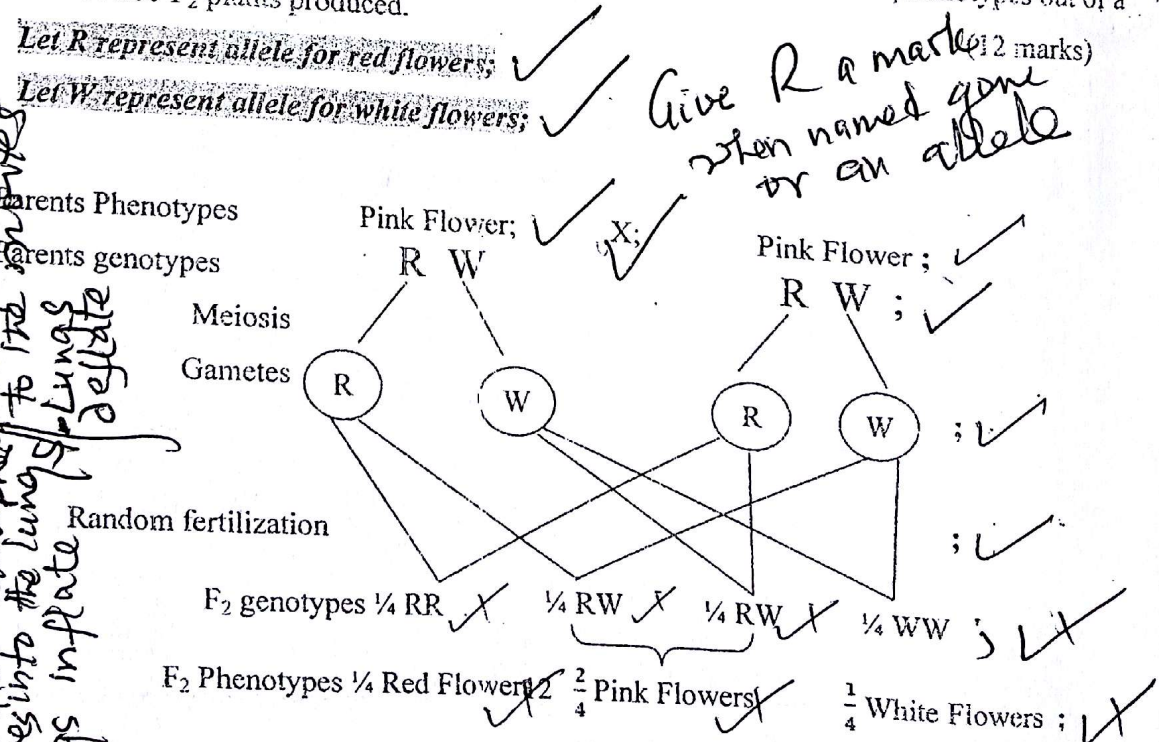
1. In both, there is movement of the rib-cage
2. Both involve changes in volume of pressure of thoracic

NB: Any 4 differences
 Vol. of thoracic cavity & pressure of it
 Air from atmosphere moves into the lungs
 Lungs inflate & deflate
 Vol. of thoracic cavity increases & pressure of it decreases
 Air from lungs goes to the atmosphere
 Lungs deflate & pressure of it increases

Intercoastal muscles
 Both involve contraction & relaxation of diaphragm
 Any 3 mm marks (1x3) = 3mks
 During inhalation; The walls of the opercular cavity are drawn outwards; volume increases; Pressure decreases; water is sucked from the buccal cavity into the opercular cavity; flowing over the gills;
 During exhalation the walls of the opercular cavity are drawn inwards; volume decreases; pressure increases; opercular valve opens; water is pushed through the opercular valve to the outside;
 d) The gills of Fish (2 marks)
 As water passes over the gills carbon dioxide diffuses out of the gills; while oxygen diffuses into the gills; The blood capillaries transport oxygen away from the gills; maintaining a high diffusion gradient;

1/2 mark for each
 Maximum = 15 marks

7. A cross between pure breeds of red and white snap dragon flowers produces pink flowered plants in the F₁.
 a) Explain the absence of red and white flowers in the F₁. (3 marks)
 The allele for red and white flowers exhibit incomplete dominance. They partially express themselves in the phenotype of a heterozygote. Producing Pink colour.
 b) Using suitable symbols, work out the number of plants of the different phenotypes out of a total of 200 F₂ plants produced.



NB: Repeat: If symbols are not defined, i.e. put a '1' for Capital and another one for one letter is not circled by separate

Award a mark: If gametes are not circled by separate

Working: ✓ or

Final answer: ✓ or

Number of plants with red flowers

$$= \frac{1}{4} \times 200 = 50 \text{ plants}$$

NB:

Number of plant with pink flowers

$$= \frac{2}{4} \times 200 = 100 \text{ plants}$$

$$\frac{2}{4} \times 200 = 100 \text{ plants}$$

Total = 14 1/2 MKS
Max = 12 MKS

Number of plants with white flowers

$$= \frac{1}{4} \times 200 = 50 \text{ plants}$$

1 mark for each = 12 marks marks

Total = 15 marks

END

Alternatively:
Punnett square

	$\textcircled{R}$	$\textcircled{W}$
$\textcircled{R}$	RR	RW
$\textcircled{W}$	RW	WW

15 MKS

Phenotype 1/4 red flowers

2/4 pink 1/4 white