



Dr. Blosa Science

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Biology paper 1

Exam 1

2 HOURS 30 MINUTES

INSTRUCTIONS

- Answer all questions in sections **A** and **B** in the spaces provided on the question paper and any two questions from section **C**.
- Answer section **A** by writing the correct alternative **A,B,C** or **D** in the box on the right hand side of each question.

FOR EXAMINER'S USE ONLY		
Section	Marks	Examiner's Initials
A		
B	31	
	32	
	33	
C	No:	
	No:	
Total		

SECTION A(30 MARKS)

1. To which one of the following phyla does the earthworm belong?
A. Arthropoda
B. Choroata
C. Annelid
D. Nematode
2. During dry conditions the spirogyra reproduces sexually by
A. Budding
B. Conjugation
C. Fragmentation
D. Sporulation
3. Which one of the following statements about pure water is correct?
A. Has a high osmotic potential
B. Has a high solute potential
C. Has a low osmotic potential
D. Has a negative osmotic potential
4. The type of cells attacked mainly by the HIV virus in the human body are:-
A. Erythrocytes
B. Platelets
C. Leucocytes
D. Lymphocytes
5. The genes for inheritance of ABO blood groups are an example of
A. Lethal alleles
B. Multiple alleles
C. Codominant alleles
D. Dominant alleles
6. A dry fruit that splits along many lines of weakness is a:
A. Samara
B. Legume
C. Capsule
D. Caryopsis
7. The vitamin requires for good night vision is
A. Vitamin B
B. Vitamin A
C. Vitamin C
D. Vitamin D
8. Biological control of rats in a habitat would involve;
A. Clearing bushes
B. Use of rat poison
C. Use of rat poison
D. Breeding cats

9. Denitrifying bacteria change

- A. Ammonia into nitrates
- B. Nitrogen into nitrates
- C. Nitrates into free nitrogen
- D. Nitrites into nitrates

C

10. The highest amount of energy in a food chain is present in

- A. Decomposers
- B. Primary consumers
- C. Tertiary consumers
- D. Producers

B

11. Addition of humus to a sandy soil would

- A. Decrease soil mineral content
- B. Improve soil water retention
- C. Increase soil erosion
- D. Decrease capillarity of the soil

B

12. Secondary growth in a flowering plant is caused by;

- A. Cortex cells
- B. Xylem vessels
- C. Phloem cells
- D. Cambium cells

D

13. Which one of the following cell organelles would be largest in number in active muscle tissue?

- A. Mitochondria
- B. Ribosomes
- C. Golgi bodies
- D. Chloroplasts

A

Mitochondria provide energy to the muscle

14. The graph below shows the number of individuals varying with a given characteristic in a population.

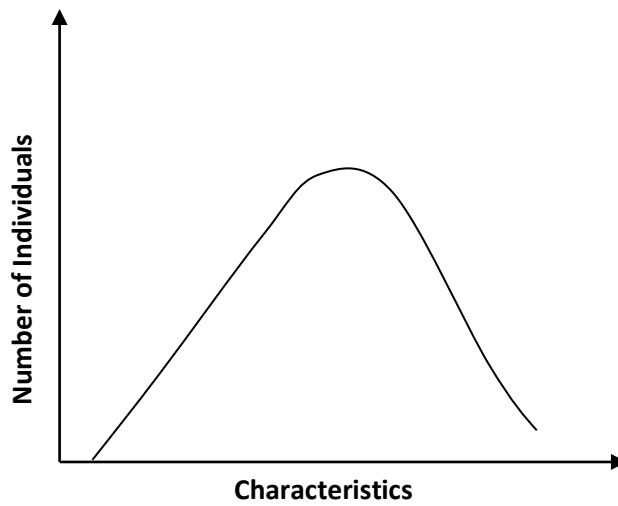


Figure 1

Which one of the following characteristics would produce the graph in figure 1 above?

- | | |
|-------------|----------------|
| A. Height | C. Blood group |
| B. Sex type | D. Albinism |

A

Height is an example of continuous variation

15. The part of a Bryophyllum plant leaf for vegetable propagation is the;

- | | |
|-----------|---------|
| A. Lamina | C. Bud |
| B. Notch | D. Apex |

B

16. Crossing over occurs during;

- | | |
|------------------------|-------------------------|
| A. Prophase of mitosis | C. Metaphase of mitosis |
| B. Prophase of meiosis | D. Metaphase of meiosis |

B

17. Which one of the following vertebrae has demi-facets?

- | | |
|----------------------|----------------------|
| A. Thoracic vertebra | C. Cervical vertebra |
| B. Lumbar vertebra | D. Atlas |

A

18. The excretory structures for an insect are;

- | | |
|-----------------------|---------------|
| A. Trachea | C. Tracheoles |
| B. Malpighian tubules | D. Spiracles |

B

19. Which of the following parts are for hearing and body posture?

- | |
|-----------------------------------|
| A. Cochlea and cerebellum |
| B. Cochlea and cerebrum |
| C. Eustachian tube and cerebrum |
| D. Eustachian tube and cerebellum |

A

20. The products of hydrolysis of lactose are;

- A. Sucrose and galactose
B. Glucose and galactose
C. Fructose and glucose
D. Fructose and sucrose

B

21. Which one of the following forms the pioneer community in primary succession?

- A. Grass
B. Lichen
C. Angiosperm
D. Moss

B

Primary succession begins with bear rock

22. The figure 2 below shows part of a plant



Figure 1

The best description for figure 2 is;

- A. Compound palmate
B. Compound bipinnate
C. Compound pinnate
D. Simple pinnate

C

23. Which one of the following limits growth in arthropods?

- A. Jointed legs
B. Segmented body
C. Endocoelomic fluid
D. Exoskeleton

D

24. The relationship between Rhizopus and bread (rotting) is described as

- A. Parasitic
B. Saprotrophic
C. Mutualistic
D. Commensalistic

B

25. The amount of light entering a light microscope stage is controlled by the: -

- A. Diaphragm
- B. Fine adjustment knob
- C. Coarse adjustment knob
- D. Mirror

A

26. Which one of the following human diseases is caused by a parasitic protozoan?

- A. Cholera
- B. Typhoid fever
- C. Malaria
- D. Influenza

C

27. A trait whose phenotype can only express itself once homozygous is said to be

- A. Dominant
- B. Codominant
- C. Recessive
- D. Lethal

C

28. Which one of the following is typical of insect pollinated flowers?

- A. Are large and inconspicuous
- B. Are small and conspicuous
- C. Have brightly colored petals and conspicuous
- D. Have dull colored petals and inconspicuous

C

29. A distinguishing feature of monocotyledonous plants is

- A. Leaf sheath and parallel venation
- B. Leaf sheath and network venation
- C. Solid petiole and parallel venation
- D. Solid petiole and network venation

A

30. The non-functional human appendix is an example of;

- A. Homologous structures
- B. Analogous structures
- C. Vestigial structures
- D. None of the above

C

SECTION B(40 MARKS)

31. The figure3 below represents the changes in the population of Tilapia fish in a pond over a period of 9 months. The pond is situated in a country with evenly distributed rainfall throughout the year.

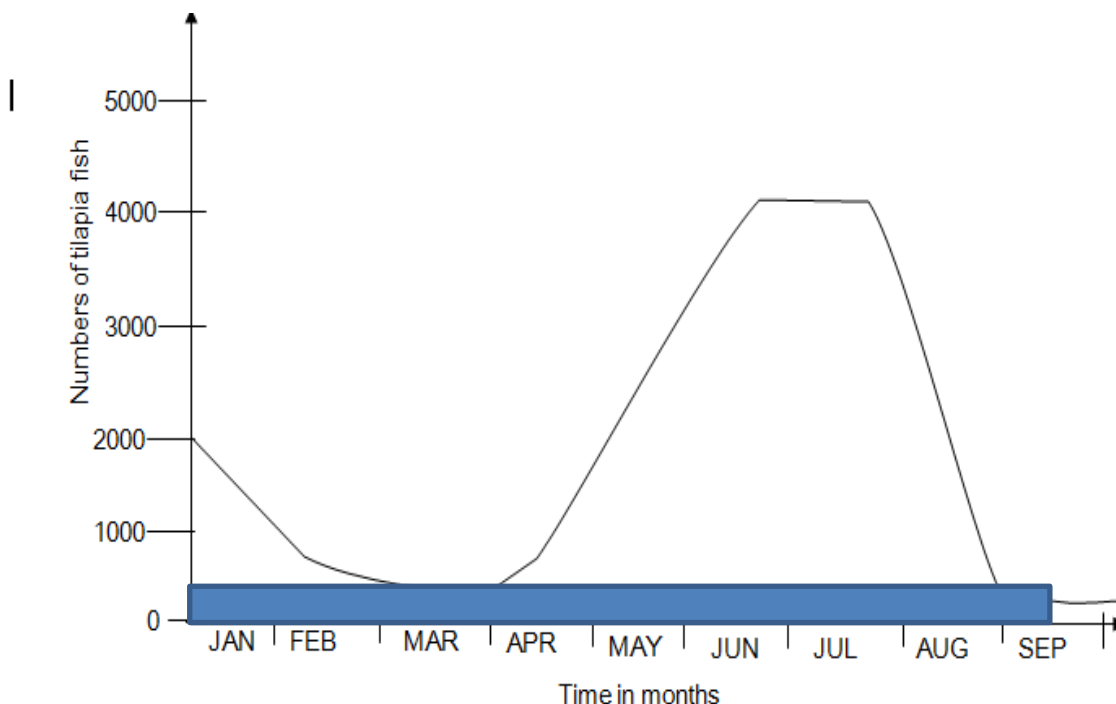


Figure 2

(a)(i) What times of the year affect the population of tilapia adversely from the graph and why. (4 marks)

February, March, September

Reason(s)

Probably eaten by predators or attacked by disease

(ii) What is the average number of tilapia fish between April and June?

(2 marks)

$$\text{Average} = \frac{1000+2500+3500}{3} = 2333$$

(b) Explain the changes in number of Tilapia fish in the pond during the periods

(i) January and February. (2 marks)

The number of fish decrease due to being eaten by predators

(ii) April and June (2 marks)

The number of fish increases because the number of predators decrease due to lack of food.

(iii) August and September (4 marks)

The number of fish decrease rapidly due to increase in the number of predators

(c)(i) Name one suitable method you could use to estimate the Tilapia population in the pond with a reason. (2 marks)

Method

Capture-recapture method

Reason

They mix randomly

They can easily be marked

(ii) How would you calculate the total population of tilapia fish in the above period? (2 marks)

Total number of fish = 2000 + 700 + 1000 + 2500 + 3500 + 3800 + 4200 + 2100 + 400 = 20200

(iii) State any two precautions taken to get accurate results in (c)(i) above.

(2 marks)

- Marks should be permanent during the period of study
- Marks should not affect uniform mixing of fish
- Time is allowed between capture and recapture to allow uniform mixture of fish,.

32. (a) What is meant by the term Endothermy? (2 marks)

It is physiological generation and regulation of body temperature by metabolic means

Or it is the ability of maintain body temperature by metabolic means

(b) How does an endotherm respond to a rise in body temperature?

(4 marks)

Metabolic rate reduces resulting in lowering of body temperature

(c) Explain the importance of each of the following structural features to animals living in cold zones of the world

(i) Thick fur (2 marks)

Insulates the body and reduces heat loss to the surrounding

(ii) Extremities reduced in size (2 marks)

Reduce body surface area thereby reducing heat loss to the surrounding

33. The figure below shows a longitudinal section through part of a plant to show its structure

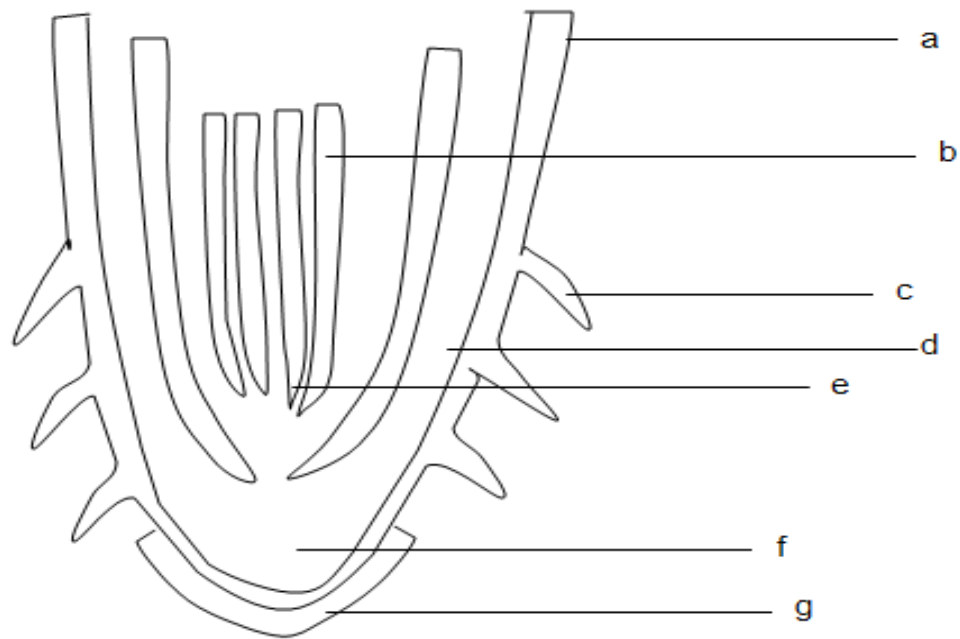


Figure 3

(a) (i) Name the parts labelled a-f.

a: *Epidermis*

b: *Phloem*

c: *Root hair*

d: *cortex*

e: *xylem*

f: *apical meristem*

(ii) Name the part from which figure 4 was obtained with a reason. (1 mark)

Part: young root,

Reason has root hair, and root cap

(b) State the functions of parts labeled e and f and g to the plant.

(3 marks)

e: conducts water to the stem

f: cell division leading to root elongation

g: Protects apical meristem

(c) How is part labeled C adapted for its function? (2 ½ marks)

- has thin epithelium to allow faster diffusion of water molecules

- has solute concentration higher than that of the soil to facilitate osmosis

- large number of mitochondria to facilitate absorption of minerals by active transport

- numerous to increase absorptive surface area.

SECTION C(30 MARKS)

Answer any two questions from this section.

- 34 a (i) What is transpiration pull? (2 marks)
Transpiration Pull is the biological force generated by plants to draw the water upwards from roots to leaves through xylem tissues
How does transpiration occur in a plant? (10 marks)
As the water is lost from the leaf surface by transpiration, more water molecules are pulled up due to the tendency of water molecules to remain joined (cohesion), and thus to produce a continuous column of water through the stem is called transpiration pull.
- b Explain the significance of transpiration to a plant (3 marks)
 - *helps in the conduction of water and minerals to different parts of the plants.*
 - *Loss of water in the leaves cools the plant*
 - *Enable the plant to lose excess water*
- 35 a How is soil air important to plants? (3 marks)
 - *Oxygen is used to breakdown soil organic residue to less poisonous products such as carbon dioxide. In absence of oxygen organic residues are broken to pollutants like methane and organic acids*
 - *Oxygen is used by microorganisms to oxidize nitrogen and sulphur into usable forms.*
 - *Soil oxygen is used by plant roots to respire.*
 - *Soil oxygen is used for respiration of microorganisms leading to oxidation of nitrogen and sulphur and recycling of nutrient,*
 - *Poor aeration results in the development of toxins and other injurious substances such as ferrous oxide, H₂S gas, CO₂ gas, ethylene, organic acids, etc., in the soil.*
 - *A deficiency of oxygen has been found to check the nutrient and water absorption by the plants*
 - *Insufficient aeration of soil leads to the development of some diseases like, wilt of*

gram and dieback of citrus and peach.

- b Describe an experiment to determine the percentage of air in a soil sample. (12 marks)

*Experiment to determine the percentage of air in the soil
A given volume of soil is placed in a measuring cylinder followed by a given volume of water. The mixture is stirred to a constant volume.*

Result

*Volume of the soil added to measuring cylinder = $a \text{ cm}^3$
Volume of water added to measuring cylinder = $b \text{ cm}^3$
Volume of soil and water after stirring = $c \text{ cm}^3$*

*Volume of air = $((a + b) - c)$
The percentage of air in the soil = $\frac{(a+b-c)}{a} \times 100\%$*

- 36 a (i) Distinguish between complete dominance and codominance. (2 marks)

In complete dominance, only one allele in the genotype is expressed in the phenotype. In codominance, both alleles in the genotype are seen in the phenotype as intermediate character

- (ii) State the laws of Heredity. (2 marks)

Mendel's first law of segregation states that an organism's characteristics are controlled by two genes (alleles) and only one can be carried by in a gamete.

Mendel's second law of Independent Assortment:

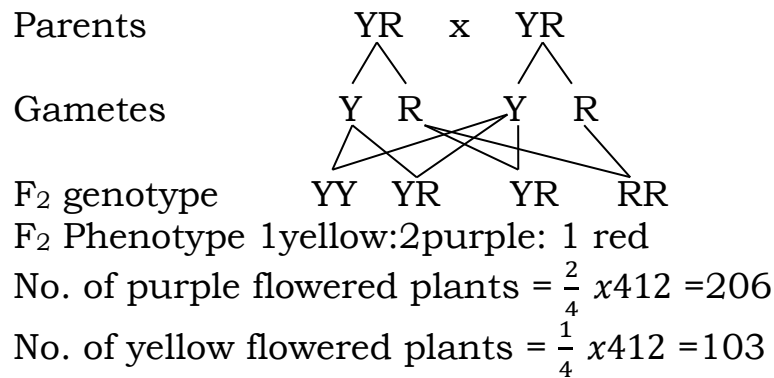
During the formation of gametes, alleles in a pair may combine with another allele from another pair randomly.

- b A breeding experiment between two heterozygous plants with purple flowers got from pure breeding plants for red flowers and yellow flowers produced 412 plants.

- (i) Why were all F_1 generation plants having purple flowers? (1 mark)

The alleles for red and yellow flowers are codominant

- (ii) How many of the F_2 generation plants had red flowers, purple flowers and yellow flowers? Show your working. (8 marks)



(iii) Give two modern applications of Genetics. (2 marks)

- Genetic engineering such as producing insulin
- DNA fingerprinting,
- diagnosis of diseases,
- genetic engineering,
- crop improvement,
- characterization of species,
- gene therapy
- genetic counseling
- studies of inheritance
-

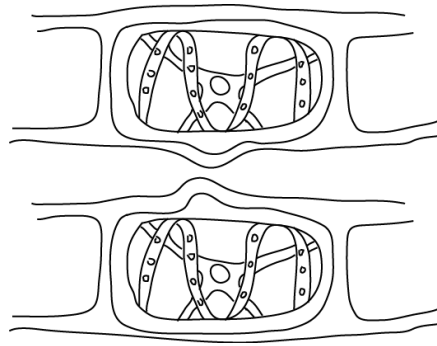
37 a State two characteristics of a spirogyra cell.

- has chlorophyll (2marks)
- has cell wall
- has cell membrane
- has a nucleus
- has prenyoids
- has cytoplasmic strands

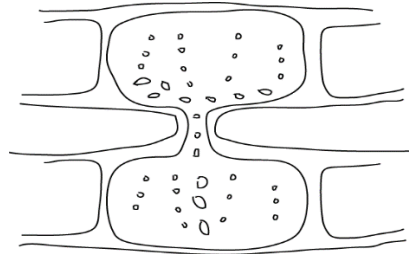
b Briefly describe sexual reproduction process in spirogyra. (13 marks)

Sexual reproduction by conjugation: it occurs as follows

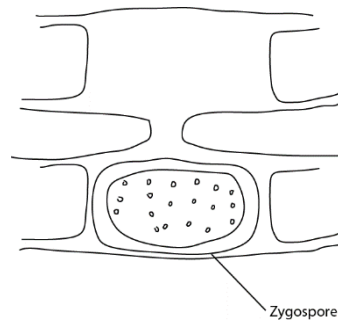
- (a) Two filaments lie side by side and outgrowths appear on the walls of the cell lying opposite each other



- (b) The outgrowth meet, touch each other, cell wall disappear so that a conjugation tube joining the two cells is formed.



- (c) The cytoplasm in each cell form into a mass of one gamete. The gamete of one cell passes through a conjugation tube and join that of the second filament forming a zygospore.



- (d) The zygospore can germinate into new algae when provided with good conditions.

****END****

Answers for objective

1	C	6	C	11	B	16	B	21	D	26	C
2	C	7	B	12	D	17	A	22	C	27	C
3	C	8	D	13	A	18	B	23	D	28	C
4	D	9	C	14	A	19	A	24	B	29	A
5	B	10	B	15	B	20	B	25	A	30	C