



Our country, our future

NAME:..... STREAM:.....

SENIOR SIX

P530/1

BIOLOGY

PAPER 1

EXAM 5

FOR CONSULTATION CALL 0776802709

INSTRUCTIONS TO CANDIDATES:

- *Answer all questions in both sections A and B*
- *Answers to Section A questions must be written in the boxes provided*
- *Answers to Section B should be written in spaces provided.*
- *No additional sheets of paper should be inserted in this booklet.*

FOR EXAMINERS USE ONLY

Section	Marks
A (1 – 40)	
B 41	
42	
43	
44	
45	
46	
Total	

SECTION A

1. If an allele is present on the same locus of a pair of homologous chromosomes to express the phenotype, the allele is said to be
 - A. dominant
 - B. recessive
 - C. heterozygous
 - D. homozygous
2. The Mendelian F₂ 9:3:3:1 ratio is a ratio of
 - A. genotype in a cross of two parents that differ in one trait
 - B. genotypes in a cross of two parents that differ in two traits
 - C. phenotype in a cross of two parents that differ in one trait
 - D. phenotype in a cross of two parents that differ in two traits
3. Which of the following statements is correct?
 - A. codominance occurs when both alleles of a gene express themselves equally in the phenotype
 - B. Epistasis occurs when one gene suppresses the effect of another gene.
 - C. A dominant allele exerts its dominance on an alternative allele of the same gene
 - D. Dihybrid inheritance involves the transmission of two alleles independently on each other at the same time.
4. A color blind man is married to a woman who is a carrier of the disease. What are the chances of them having a color blind daughter?
 - A. 0%
 - B. 25%
 - C. 50%
 - D. 100%
5. There is a possibility that a male hemophiliac can transmit the sex-linked trait to
 - A. his son
 - B. his daughter
 - C. both his son and his daughter
 - D. his wife
6. A couple has two sons and two daughters but each belongs to a different blood group. The blood groups of this couple are:-

- A. A and B B. B and AB C. AB and O D. A and O

7. When *Drosophila* flies that are heterozygous for the size of the wing and body color were crossed with flies that have vestigial wings and ebony bodies, the F1 offspring that resulted were as follows:

- Normal wing grey body; 522,
- Vestigial wings grey body; 98,
- Normal wing ebony body; 104,
- Vestigial wing, ebony body; 486

The cross over value is

- A. 8% B. 9% C. 17% D. 20%

Four genes E, F, G and H are linked on the same chromosome and have the following cross over values between the genes

- E and F 38%
- E and G 26%
- F and H 16%
- G and H 4%

The correct sequence on the chromosome is

- A. EGHF B. EHGF C. FHGE D. GHFE**

9. Taxonomic families which are not closely related may be grouped together in a single

- A. Phylum
- B. order
- C. class
- D. Genus

10. Which of the following criteria could be used to determine how closely related two different organisms are?

- A. Developmental stages
- B. DNA hybridization
- C. Presence of homologous chromosomes
- D. Habitat preferences.

11. If respiratory enzymes of two different species show extensive similarity in their amino acid sequence, then it may be logical to conclude that they both

- A. belong to the same genus
- B. have the same genes which code for the respiratory enzymes
- C. are capable of interbreeding

- D. evolved from the same ancestor.
12. Which of the following is a characteristic of the viruses?
- A. they lack nucleic acid
 - B. Their metabolic activities are inhibited by antibiotics
 - C. they are facultative parasites
 - D. they have a protein coat called a capsid
13. Which of these phyla contains acoelomate, bilaterally symmetrical organism?
- A. annelida B. Nematoda C. Cnidaria D. Platyhelminthes
14. Which of the following characteristics distinguishes arachnids from other arthropods?
- A. possession of trachea for gaseous system
 - B. the body divided into three main body parts
 - C. possession of four pairs of walking legs
 - D. possession of silk glands
15. A group of individuals of the same species that may freely interbreed and live in a habitat at the same time is known as
- A. a biome B. population C. a community D. an ecosystem
16. Which of the following is **not** a correct explanation of an organism's niche?
- A. the functional role of an organism in its habitat
 - B. the physical area where and organism lives and grow
 - C. the way the organism utilizes the environmental resources
 - D. the area of the habitat it share with other organisms.
17. A relatively stable ecological community that is formed at the end of succession is called the
- A. pioneer community B. primary community
 - C. secondary community D. climax community
- 18 The relationship between gross primary production (GPP), net primary production (NPP) and heat loss through respiration (R) can be represented by the equation
- A. $GPP = NPP + P$ B. $GPP = NPP - R$
 - C. $NPP = GPP + R$ D. $NPP = GPP - R$

19. The figure 1 shows the gain and loss of energy between a leaf and atmosphere.

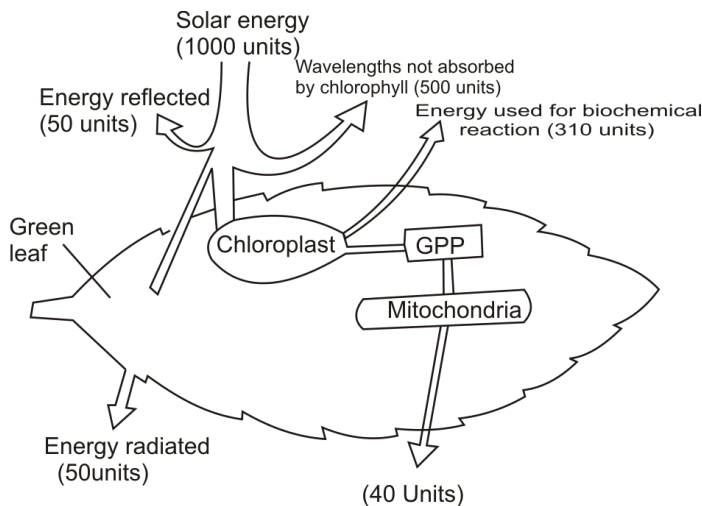


Fig. 1

The net primary production is

- A. 50 units B. 90 units C. 140 units D. 450 units

20. Which of the following statement is correct about a community?

- A. the different populations may freely interbreed and produce offsprings
- B. the members have similar morphological characteristics
- C. it consists of different populations living together in a particular location.
- D. it consists of similar populations living in different locations at different times.

21. Figure 2 shows the four patterns of populations.

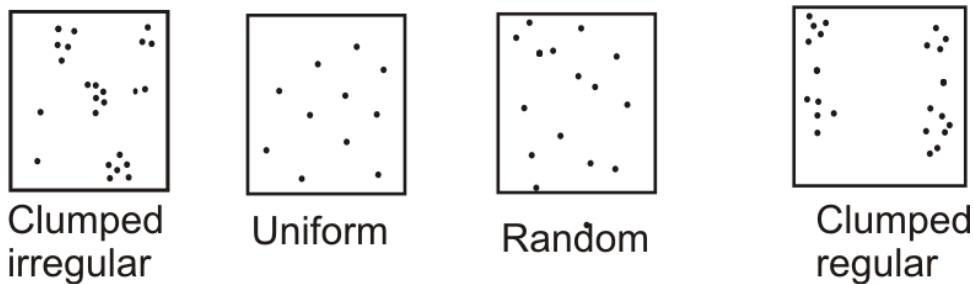


Figure 1

Which of the following occurs in homogenous environment?

- A. clumped regular B. Uniform
- C. Random D. clamped irregular

22. Humans affect the environment in the following ways

1. logging
2. combustion of fossil fuels
3. reforestation

4. harvesting of marine algae

5. intensive use of fertilizers

Which of these activities have led to a rise in the level of carbon dioxide in the atmosphere?

A. 1,2 and 3 B. 1,2 and 4 C. 1,3 and 4 D. 2, 3 and 5

23. Which of the following contributes most to human population growth in developing countries?

A. immigration

B. high mortality

C. high natality

D. increased food supply.

24. The competitive exclusion principle that coexisting species

A. may not occupy the same niche

B. cannot be of the same size

C. cannot be closely related

D. cannot feed on the same food.

25. A population's carrying capacity is

A. the number of individuals in the population

B. reached when there is a stable population

C. the value at which environmental resistance is lowest

D. the maximum number of individuals that can be supported by the available resources

26. Which of the following biomes has been increased by human activities?

A. Grassland

B. pine forest

C. Rain forest

D. Desert

27. The following data was obtained from a capture experiment to estimate the population of field mice.

Number of mice captured in the first sample = 80

Number of mice captured in the second sample = 112

Number of marked mice in the second sample = 16

The mice population is estimated to be

A. 176

B. 512

C. 560

D. 712

28. Figure 3 is a histogram showing the number of species of grass in a field

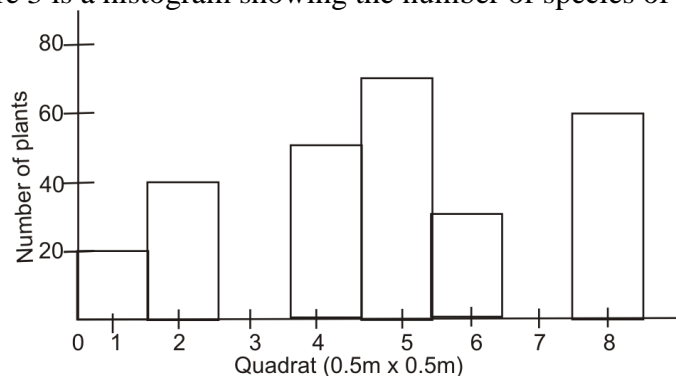


Fig. 3

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From the histogram the density and frequency of the grass species is

	Species density (m ²)	Frequency (%)
A.	35	75
B.	140	75
C.	187	60
d.	280	60

29. Which of the following is **not** true of environmental limiting factors?
- A. a limiting factor exert the same effect on an individual at all stages of its life
 - B. the tolerance range of an organism depends on limiting factor
 - C. An environmental factor, if present in constant and adequate amount will not act as a limiting factor.
 - D. If a particular environmental factor is not at its optimal value, the organism's tolerance to other factors will be reduced.
30. The quadrat method of sampling is not suitable to estimate the population of of
- A. lichen on a tree trunk
 - B. slow moving invertebrates
 - C. soil organisms
 - D. flying vertebrates

31. Figure 4 describes the population growth of an organism.

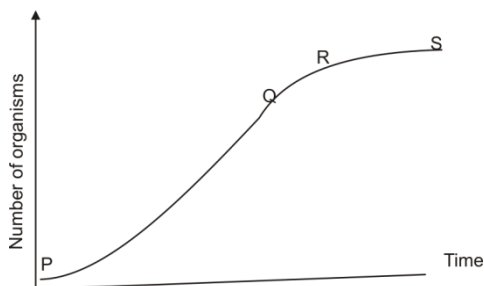


Figure 4

Which of the following statements is consistent with the information derived from the graph?

- A. the number of individuals of reproductive age is minimum at **P**
- B. the growth rate is minimum between **P** and **Q**
- C. No deaths or births occur between **R** and **S**

D. the growth rate is constant between **P** and **Q**

32. In hepatocytes, detoxification takes place in the

- A. mitochondria B. lysosomes
C. rough endoplasmic reticular D. smooth endoplasmic reticular

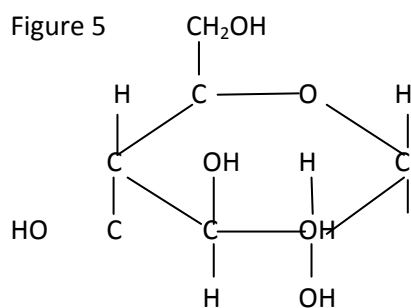
33. A plant tissue has the following characteristics

- (i) Consists of living cells
(ii) Cell walls are unevenly thickened with pectin, cellulose and hemicellulose
(iii) Cells are closely packed together with very small intercellular air spaces

The tissue is likely to be

- A. epidermis B. collenchyma C. sclerenchyma D. endodermis

34. Figure 5 shows the structure of a monosaccharide



Which of the following substances can be formed from the condensation of molecules of this monosaccharide?

- (i) maltose (ii) sucrose (iii) starch (iv) cellulose

- A. (i) and (iii) B. (ii) and (iii) C. (i), (ii) and (iii) D. (i), (iii) and (iv)

35. Figure 6. Shows the oxygen dissociation curves of four different animals; i.e., a pigeon, a rat, a human and a worm living in water logged soil;

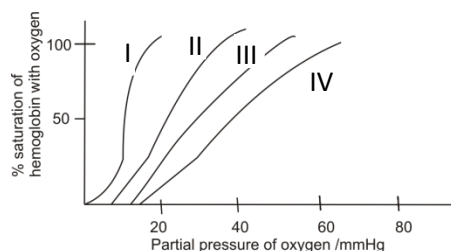
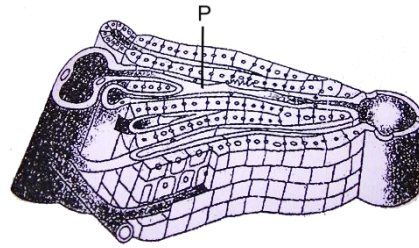


Fig. 6

Which of the curves represents the oxygen dissociation curve of a pigeon?

- A. I B. II C. III D. IV

36. Figure 7 shows the structure of part of a liver lobule



The function of the part labeled P is to carry

- A. bile to a branch of the bile duct
- B. blood into the branch of hepatic vein
- C. blood from hepatic vein to inferior vena cava
- D. blood into hepatic artery

37. Which of the following is not an adaptation by animal to seasonal changes?

- A. The activity of enzymes system is reduced in winter
- B. Thickening of an animal's fur in winter
- C. Decrease in body temperature in response to food scarcity
- D. Increased levels of adrenalin in high temperature

38. Figure 8 shows changes in population density with time. Which line represents carrying capacity of the environment?

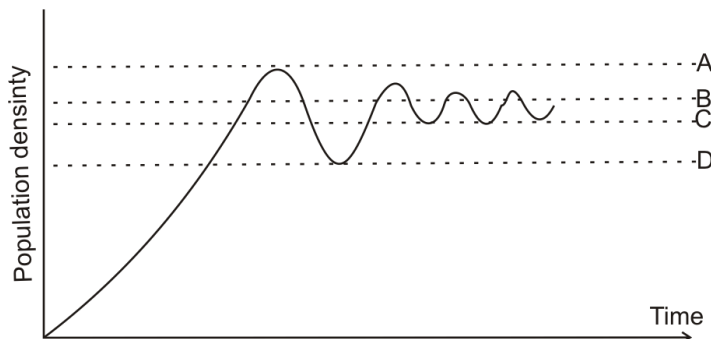


Figure 8

39. Figure 9 shows the varying amounts of carbohydrates formed or used up in a green plant at different concentration of carbon dioxide. Which label shows the compensation point?

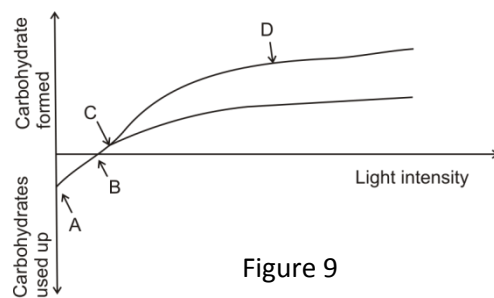


Figure 9

40. Which one of the following functions as a source during translocation in plants?

A. meristems B. Leaves C. Roots D. Fruits.

SECTION B (60MARKS)

41. Explain the reasons for the central position of the nucleus in most eukaryotic cells

(4marks)

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(b)(i) A continuous system of membranous channels is believed to connect the nucleus with the cell membrane. Name the organelles in this system. (03marks)

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(ii) State three ways the interrelation of functions among the organelles of this network is important to the life of the cell. (3marks)

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42. Bryophytes lack many of the features of vascular plants required for successful life.

(a) Explain the structures that have enabled bryophytes to survive on land. (4marks)

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(b) Explain why gymnosperms are considered to be better adapted for terrestrial life than ferns (3marks)

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(c) State **three** features that distinguish the angiosperms from the gymnosperm (3marks)

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43. Most herbivores eat grass which they do not have the ability to digest.

(a) Explain how herbivores are able to survive on grass as a food (4marks)

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(b) Most herbivores have large stomachs and long alimentary canals with very long small intestines. Explain the advantages of their having:

(i) Large stomachs (05 marks)

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(ii) Long small intestines (01mark)

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44. Given that Q_{10} is the ratio of biological activity at a particular temperature to the same activity at a temperature 10°C lower.

(a) If the metabolic rate of a young person is 9.3kJ per min at 10°C , determine metabolic rate at 20°C if Q_{10} is 2? (03 marks)

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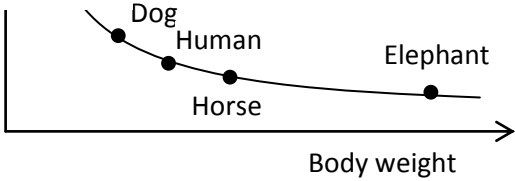
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(b) Figure 10 shows the relationship between the metabolic rate and body size in several mammals.

↑
● Shrew
Metabolic rate

Figure 10



(i) explain why the shrew has the highest metabolic rate (4marks)

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(ii) State the relationship between body size and metabolic rate as shown in the figure 10.

(1marks)

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(c) Explain why hibernation is of physiological advantage to the shrew in cold weather

(2marks)

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45. In domestic poultry the characters of the comb is controlled by two genes **R** for **rose** comb and **P** for **pea** comb. If the dominant allele **R** is present in the genotype with a dominant **P** then a **walnut** comb is produced. If an individual is homozygous recessive for both alleles a single comb is produced. If **R** is present without **P** in the genotype the phenotype of the comb rose whereas a **P** without **R** produces a pea comb.

(a) Determine the phenotypic ratio among the offspring of a cross between two birds whose genotype are **RrPp x Rrpp** (06marks).

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46. (a) (i) What is photorespiration?

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(ii) give two differences between photorespiration and cellular respiration (2marks)

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(b) Explain why photorespiration lowers photosynthetic output (2marks)

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(c) (i) How would the relative abundance of C₂ and C₄ plants vary in a region whose climate becomes hotter and drier. (3marks)

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(ii) State two differences in the metabolism of CO₂ between C₄ and CAM plants (2marks)

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End