

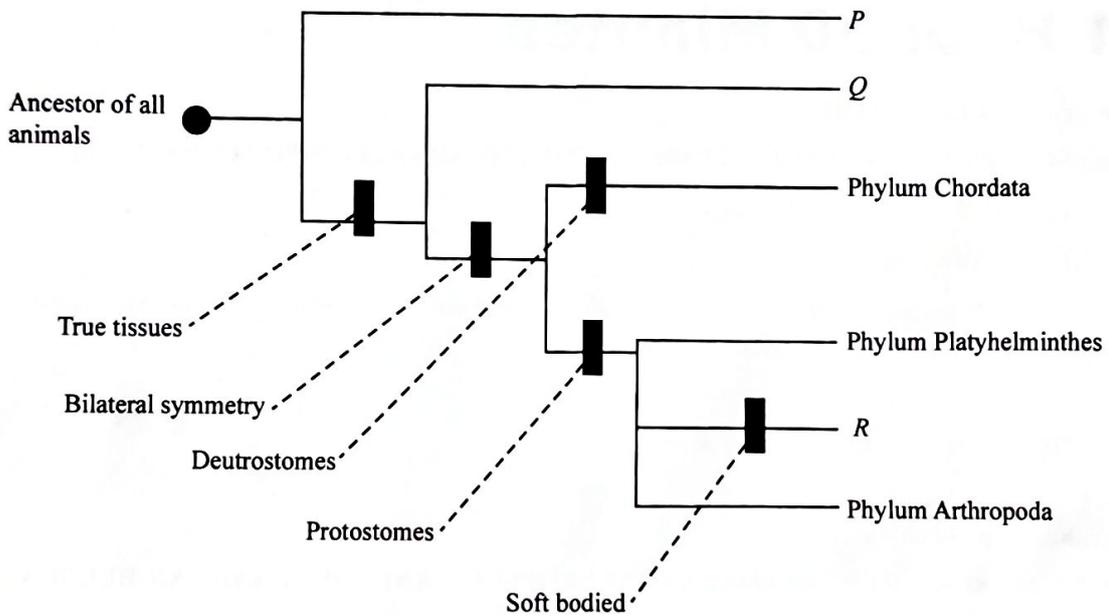


**Section A [15 marks]**

*Answer all questions.*

*Indicate the correct answer on the Multiple-choice Answer Sheet provided.*

- 1 Which is **not** true about the concept of species?
- A The most inclusive taxa in the taxonomic hierarchy.
  - B The characteristics include distinct structure and behaviour.
  - C A population which are capable of interbreeding to produce fertile offsprings.
  - D Occasionally, two organisms which are genetically closely related can interbreed to produce infertile offsprings.
- 2 The comparison between morphological characteristics and its development is shown in the animal phylogenetic tree below.



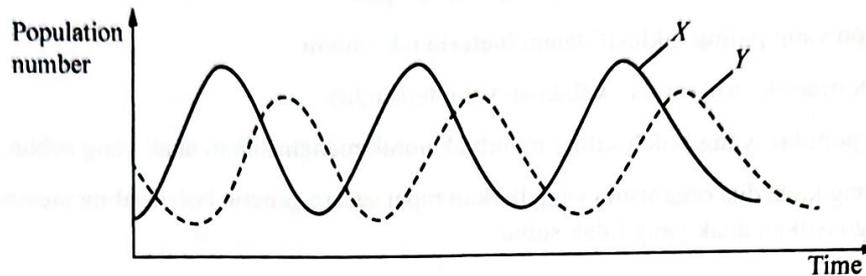
Which phyla are represented by *P*, *Q* and *R*?

	<i>P</i>	<i>Q</i>	<i>R</i>
A	Porifera	Mollusca	Cnidaria
B	Cnidaria	Porifera	Mollusca
C	Porifera	Cnidaria	Mollusca
D	Cnidaria	Mollusca	Porifera

- 3 Which is **not** the main abiotic factor to determine the distribution of communities in a deep fresh water lake?

- A The depth of water
- B The distance from the water's edge
- C The degree of light penetration
- D The sedimentation rate

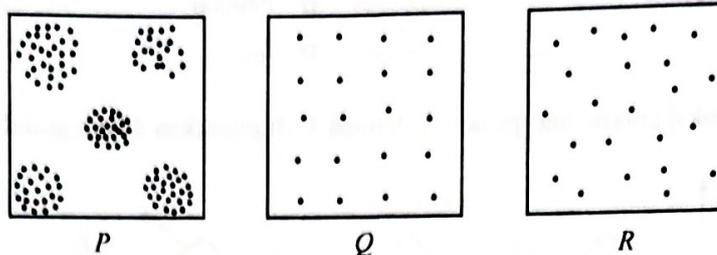
- 4 Which is the available form of chemical element to producers in sulphur cycle?
- A Organic compound                      B Solid  
C Gas    D Ion
- 5 A type of interaction between two species, *X* and *Y*, is shown in the graph below.



Which animals correspond correctly to *X* and *Y*?

- | <i>X</i> | <i>Y</i> |
|----------|----------|
| A Flea   | Dog      |
| B Tiger  | Deer     |
| C Shark  | Remora   |
| D Rat    | Owl      |
- 6 Which is an example of a disruptive selection?
- A A farmer chooses to breed goats that weigh more than 50 kg only.  
B The survival of the black and white rabbits after a certain period in the population of black, white and grey rabbits.  
C The population size of the intermediate coloured oyster is bigger due to heavy predation of the light and dark coloured oysters.  
D In England, the light coloured moths are frequently found in the rural areas whereas the dark coloured moths are found in the industrial areas.
- 7 Which are the reasons for the occurrence of genetic drift in a population?
- I Probability of the mutation to occur is very low.  
II The presence of a certain allele in a few individuals.  
III A small number of individuals contribute to the gene pool.  
IV Genes in a few individuals are constantly being eliminated.
- A I and III                      B I and IV                      C II and III                      D II and IV

8 The distribution patterns, *P*, *Q* and *R*, of organisms are shown in the diagram below.



Which are true about *P*, *Q* and *R*?

	<i>P</i>	<i>Q</i>	<i>R</i>
A	Due to an even nutrient distribution	Due to consistent environmental factors	Due to patchy resources
B	Due to patchy resources	Due to an even nutrient distribution	Due to consistent environmental factors
C	Due to patchy resources	Due to consistent environmental factors	Due to an even nutrient distribution
D	Due to an even nutrient distribution	Due to patchy resources	Due to consistent environmental factors

9 A cross between a mutant white-eyed male and a wild red-eyed female *Drosophila* produces all red-eyed  $F_1$  progeny. The cross between the  $F_1$  resulted in all the females and half of the males with red eyes, while another half of the males with white eyes. Which statements are true about the crosses?

- I There is no corresponding locus on the Y chromosome.
- II The colour of the eye is controlled by the gene of the male.
- III All the female progeny carry the mutant gene from the male parent.
- IV The gene that is responsible for the eye colour is located on the X chromosome.

A I and II                      B I and IV                      C II and III                      D III and IV

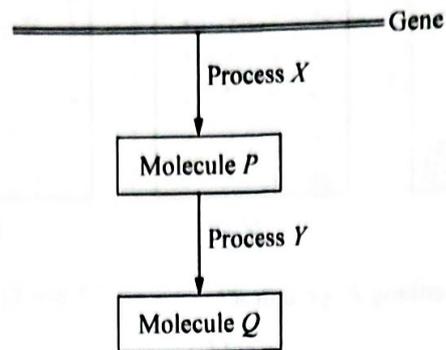
10 Which statement is **not** true about DNA replication?

- A The newly formed DNA is called *c*DNA.
- B The lagging strands are synthesised discontinuously.
- C The synthesis of the leading and lagging strands.
- D The helicase unwinds the DNA double helix at the replication fork.

11 Which is true about the repressor in the regulation of lactose operon?

- A Binds to the operator when the lactose is present
- B Produced only when the lactose is present
- C Prevents the transcription of structural genes
- D A component of the operon

12 The processes  $X$  and  $Y$  which are involved in gene expression is shown in the schematic diagram below.



Which are true about the above schematic diagram?

- I  $P$  is RNA
- II  $Q$  is protein
- III  $X$  is replication
- IV  $Y$  is transcription

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

13 Which is true about duplication as a chromosomal mutation?

- A When a segment of a chromosome detaches, the segment then transfers to a non-homologous chromosome.
- B When a segment of a chromosome detaches, the segment rotates  $180^\circ$ , then reattaches at the same location.
- C When a segment of a chromosome detaches, the segment then fuses itself to its homologous chromosome.
- D When a segment of a chromosome detaches, the segment then reattaches at the same location.

14 The wild-type of *E. coli* is cultured in a medium containing glucose and then the culture is transferred to a medium containing only lactose as the carbon source. Which event takes place during the experiment?

- A The *lac* operon is repressed.
- B The *E. coli* stops dividing.
- C The repressor protein binds to the operator gene.
- D  $\beta$ -Galactosidase, permease and transacetylase are produced.

15 Which are true about amniocentesis?

- I Lowers the risk of miscarriage
- II Shortens the period to obtain result
- III Needle is inserted through the cervix
- IV Cells are cultured before the analysis is done

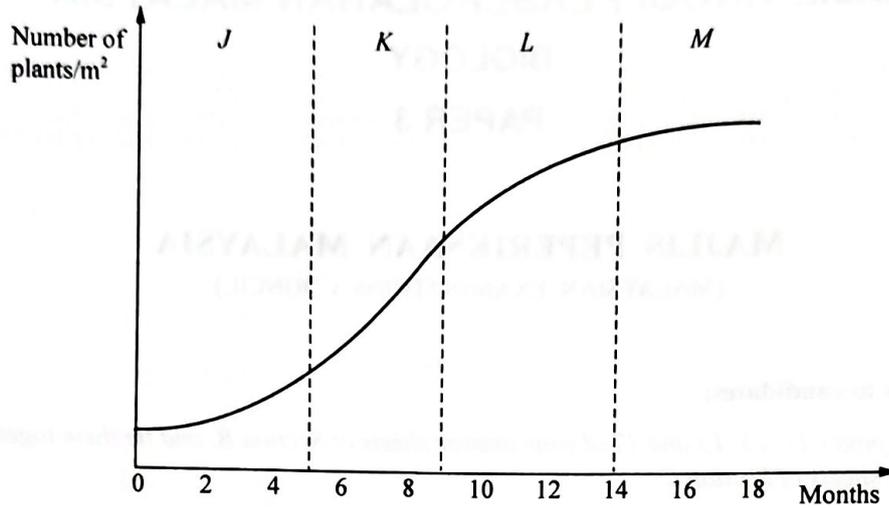
- A I and III      B I and IV      C II and III      D II and IV

Section B [15 marks]

Answer all questions.

Write the answers in the spaces provided.

16 The results of a study on the population of *Mimosa pudica* conducted in an abandoned soccer field using quadrat sampling technique are shown in the graph below.



(a) (i) Name the phases *J* and *L*. [2]

Phase *J*: .....

Phase *L*: .....

(ii) Describe a factor that contributes to the growth of the population at each phase in (a)(i). [2]

Phase *J*: .....

Phase *L*: .....

(b) At which phase the carrying capacity occurs? [1]

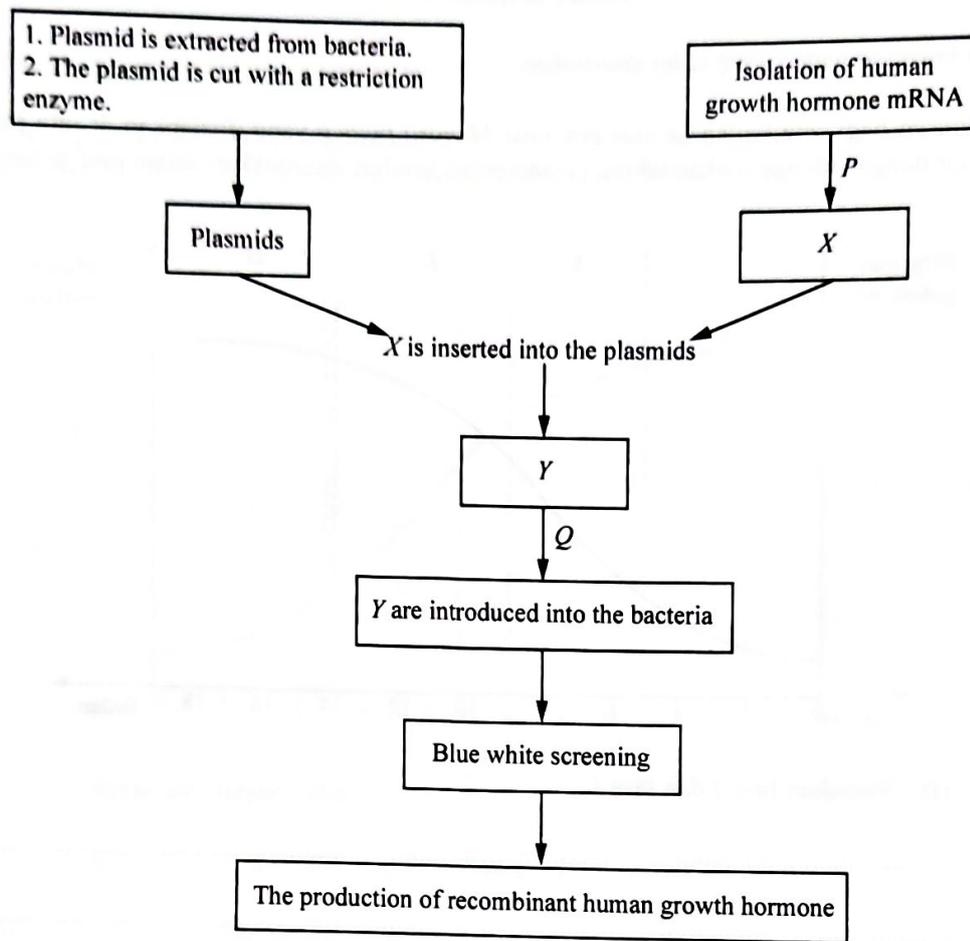
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(c) State two factors that contribute to the growth of the population at phase *K*. [2]

.....

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17 The processes involved in the production of human growth hormone using genetic engineering technique are shown in the schematic diagram below.



(a) (i) Name *P* and *Q*.

[2]

*P*: .....

*Q*: .....

(ii) Identify *X* and *Y*.

[2]

*X*: .....

*Y*: .....

(b) Name the enzyme involved during the insertion of *X* into the plasmids.

[1]

(c) Name the chemical used in the blue white screening and state its function. [2]

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(d) State the application of recombinant human growth hormone in medical science. [1]

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## Section C [30 marks]

Answer two questions only.

You may answer all the questions, but only the first two answers will be marked. Write the answers on the answer sheets provided. Begin each answer on a new page of the answer sheet.

- 18 (a) Describe different levels of biodiversity in Malaysia. [6]  
(b) Describe the roles of National Park in sustaining the biodiversity in Malaysia with regards to maintaining the sustainability of the ecosystem and biological resources, and social benefits. [9]
- 19 (a) Describe the geographical, ecological and behavioural isolating mechanisms that contribute to speciation in organisms. [8]  
(b) Describe polyploidy in plants. [7]
- 20 (a) In pea plant, purple is the dominant trait while white is the recessive trait for the colour of the flower. Explain a suitable procedure of crossing the plants to determine the genotypes of the purple flower. [7]  
(b) Explain how gene mutation occurs and its consequences with regards to sickle cell anemia. [8]