Index Number :

Sri Lankan Biology Olympaid 2012

~~Answer Sheet~~
Marking Scheme

Please handover this part to the Invigilator.
Only Part A is allowed to move out of the examination hall.

Part A - Multiple Choice Questions

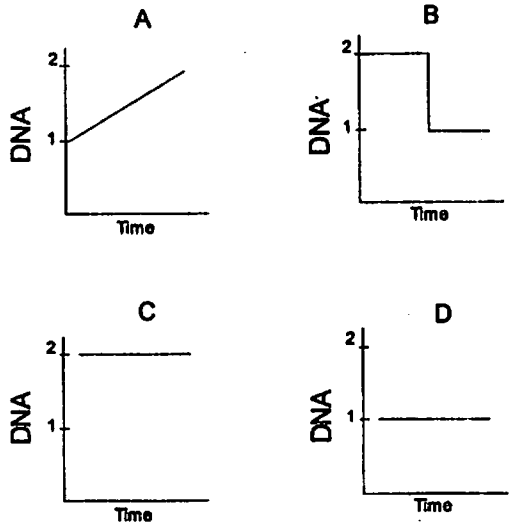
Mark the correct response with a cross (x)

1.	(1)	⊗	(3)	(4)	(5)	21.	(1)	⊗	(3)	(4)	(5)
2.	(1)	(2)	⊗	(4)	(5)	22.	(1)	(2)	(3)	(4)	⊗
3.	(1)	(2)	⊗	(4)	(5)	23.	(1)	(2)	(3)	⊗	(5)
4.	(1)	(2)	(3)	⊗	(5)	24.	⊗	(2)	(3)	(4)	(5)
5.	⊗	(2)	(3)	(4)	(5)	25.	(1)	(2)	(3)	(4)	⊗
6.	(1)	⊗	(3)	(4)	(5)	26.	(1)	(2)	(3)	(4)	⊗
7.	(1)	(2)	(3)	⊗	(5)	27.	⊗	(2)	(3)	(4)	(5)
8.	(1)	(2)	(3)	⊗	(5)	28.	(1)	(2)	(3)	⊗	(5)
9.	(1)	(2)	(3)	⊗	(5)	29.	(1)	(2)	⊗	(4)	(5)
10.	(1)	⊗	(3)	(4)	(5)	30.	(1)	(2)	⊗	(4)	(5)
11.	⊗	(2)	(3)	(4)	(5)	31.	(1)	(2)	(3)	(4)	⊗
12.	(1)	(2)	⊗	(4)	(5)	32.	(1)	(2)	⊗	(4)	(5)
13.	(1)	(2)	(3)	(4)	⊗	33.	(1)	(2)	⊗	(4)	(5)
14.	(1)	(2)	(3)	⊗	(5)	34.	(1)	(2)	(3)	(4)	⊗
15.	(1)	⊗	(3)	(4)	(5)	35.	(1)	(2)	(3)	⊗	(5)
16.	(1)	(2)	⊗	(4)	(5)	36.	(1)	⊗	(3)	(4)	(5)
17.	(1)	(2)	⊗	(4)	(5)	37.	(1)	(2)	(3)	⊗	(5)
18.	⊗	(2)	(3)	(4)	(5)	38.	(1)	⊗	(3)	(4)	(5)
19.	(1)	(2)	⊗	(4)	(5)	39.	(1)	(2)	(3)	(4)	⊗
20.	(1)	⊗	(3)	(4)	(5)	40.	(1)	(2)	⊗	(4)	(5)

Part B – Short Answer Questions

Please answer in the spaces provided. Please use given letters, numbers or symbols only.

(1) Diagrams A,B,C and D given below represents how the amount of DNA in a cell changes at four different stages of the cell cycle. Indicate whether each of the following statements is correct or incorrect using ✓ or x marks.



1. Diagram A represents G1 phase of cell cycle.	×
2. Diagram B represents mitosis.	✓
3. Stage shown in C is commonly observed in root tips.	✓
4. Metabolic activities of the cell do not take place in stage shown by D.	×
5. Some cells remain constantly in stage C.	✓

1 × 5

5

(2) Indicate whether each of the following statements is correct or incorrect using ✓ or x marks.

1. Respiratory oxidation of carbohydrates, fats and oils and proteins takes place through Krebs cycle.	✓
2. Fats and oils are more efficient energy storage substances than carbohydrates and proteins	✓
3. Acetyl coenzyme A is an intermediate in the oxidation of carbohydrates as well as fats and oils	✓
4. Pyruvate is an important end product of carbohydrate break down outside mitochondria	✓
5. Substrate level phosphorylation of carbohydrates takes place outside mitochondria	✓

2 × 5

10

(3) Given below are some enzymes labeled A–F. Select the appropriate enzyme that fits the descriptions 1-6. by putting ✓ mark in the appropirate cage.

Enzyme	1. Produce O_2	2. Produce CO_2	3. Produce maltose	4. Produce galactose	5. Produce glycerol	6. Uses CO_2
1. Amylase			✓			
2. Lactase				✓		
3. Catalase	✓					
4. Pyruvate decarboxylase		✓				
5. Lipase					✓	
6. PEP carboxylase						✓

1 × 6
Each row

(6)

(4) Given below are some features labeled 1-9 associated with Protista. Select features that are present in each of the Phyla by putting a ✓ mark in the appropriate cage.

Feature	Rhizopoda	Phaeophyta	Chlorophyta
1. Food stored as starch			✓
2. Manitol present in cells		✓	
3. No cell walls	✓		
4. Alginic acid present		✓	
5. No flagella or cilia	✓		
6. Flagellated cells may be produced		✓	✓
7. No food storage	✓		
8. Chlorophyll c present		✓	
9. Chlorophyll b present			✓

2 × 3
Each coloumn

(6)

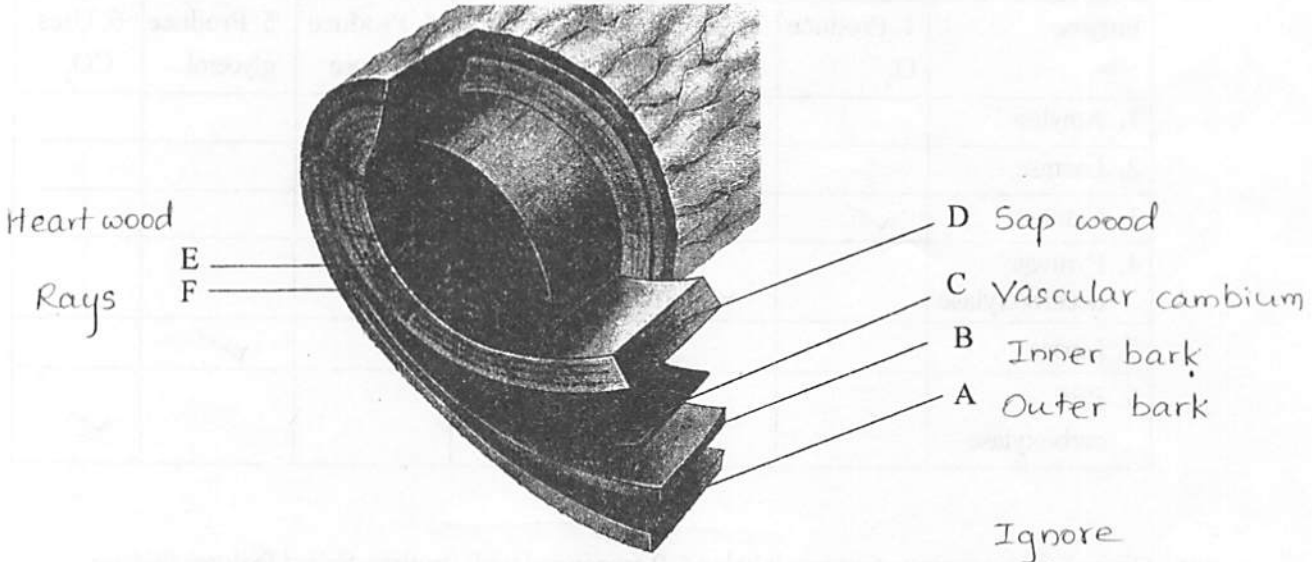
(5) Some locomotory structures found among organisms and few taxa are given in the following table. Indicate which of these locomotory structures are used by mature organisms of a particular taxon by putting a ✓ mark in the relevant cage.

Locomotory structure	Mollusca	Chlorophyta	Rhizopoda	Ciliophora
1. Flagella		✓		
2. Cilia				✓
3. Pseudopodia			✓	
4. Muscles	✓			
5. Parapodia				

1 × 4
Each coloumn

(4)

(6) Answer questions based on this cross section of a secondary stem of a tree. Put ✓ mark to indicate presence of a features in each of the labeled structures.



Ignore

	A	B	C	D	E	F
1. Most cells are dead	✓			✓	Any	Any
2. Water conducting cells				✓	Any	Any
3. Suberized cells	✓					
4. Lignified cells.		✓		✓	Any	Any
5. Cells divide by mitosis			✓		Any	Any

1×6
Each column
(6)

(7) Fill the following table on the characteristics of C3 and C4 plants.
Compared with C3 plants indicate whether C4 Plants have higher (↑) lower (↓) or similar (=) rates with respect to following characteristics. Put mark ↑ ↓ or = in the following boxes.

1. Photorespiration rate	↓
2. Maximum light intensity for photosynthesis	↑
3. Productivity	↑
4. Number of CO2 acceptors	↑
5. Oxygen concentration in leaf mesophyll cells	=

1×5
(5)

(8) Select two correct functions of each the following structures from the list given below, and write two appropriate letters in the table.

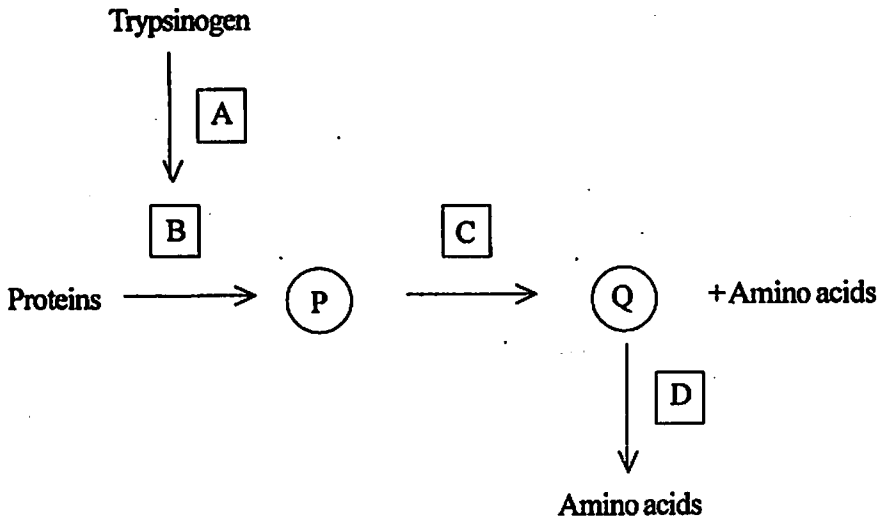
Functions

a. Excretion b. Protection c. Temperature regulation
d water proofing e. Storage f. Endocrine functions

Structures	Functions	
	1	2
1. Sweat glands	a	c
2. Sebaceous glands	b	d
3. Epidermis of the skin	b	d

1 × 6
(6)

(9) (a) Process of digestion of proteins in man is shown in the following flow chart. The boxes indicate enzymes and circles indicate intermediate compounds.



Select the correct compound/ Enzyme by putting a ✓ mark in the appropriate cage.

Compound/ enzyme	A	B	C	D	P	Q
1. Amino peptidase			✓			
2. Dipeptidase				✓		
3. Dipeptide						✓
4. Enterokinase	✓					
5. Small polypeptides					✓	
6. Trypsin		✓				

1 × 6
Each coloumn
(6)

(b) Select digestive juice containing these enzymes by putting a ✓ mark in the appropriate cage.

Digestive juice	A	B	C	D
1. Gastric juice				
2. Pancreatic juice		✓		
3. Intestinal juice	✓		✓	✓

0.5 × 4
Each coloumn
(2)

(10) Five vitamins and three activities of man for which vitamins are required are given in the following table. When a vitamin is required for a particular activity indicate it by putting a ✓ mark in the relevant cage.

Activity	Vitamin A	Vitamin B_2	Vitamin B_1	Vitamin B_6	Biotin
1. Maintenance of healthy eyes	✓	✓			
2. Carbohydrate metabolism			✓		✓
3. Fat metabolism				✓	✓

1 × 5
Each coloumn
(5)

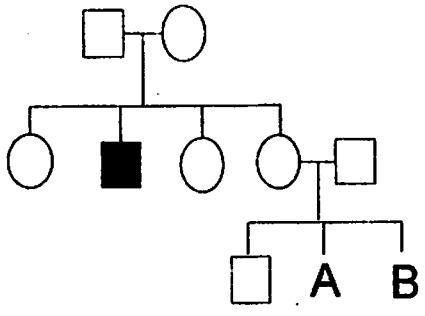
(11) Indicate whether the following statements regarding the human reproductive system are correct or incorrect by putting against it a ✓ mark or X mark respectively.

1. Testosterone in secreted by sertoli cells, which are also known as interstitial cells	×
2. During spermatogenesis, the 1st meiotic division takes place in spermatogonia and 2nd meiotic division takes place in secondary sperm cells	×
3. Acrosome in a modified peroxysome	×
4. Cowper's glands are located anterior to the rectum on either side of urethra at the level of prostate gland.	×
5. In the ovary, mature ovarian follicles are located in the cortex and immature follicles are located in the medulla	×
6. Lining of the vagina contains numerous epidermal glands in the adult women	×

1 × 6

6

(12) The diagram given below shows a pedigree of a family with a haemophiliac man. Indicate whether each of the following statements is correct or incorrect using ✓ or X marks respectively.



1. If the person labeled as A is a male probability of him being a haemophiliac is 0.5	×
2. If the person labeled as B is a female probability of she being a carrier is 0.25	✓
3. If the person labeled as B is a female, she may get a haemophiliac son after the marriage with a healthy man	✓
4. Neither A nor B may carry haemophiliac allele	×
5. Haemophiliac male shown in the pedigree may have got the haemophiliac allele from his father	×

1 × 5

5

(13) The nucleotide sequence of a part of a gene is represented below. Note that sequence of only one of the two strands is shown. mRNA and the protein synthesized by this gene are also given below the DNA. Nucleotide sequence of a mutant form of the gene also given.

DNA.... 5'..... ATG GCT GGC AAT CAA CTA TAT TAT... 3'

mRNA.... 5'..... AUG GCA GGC AAU CAA CUA UAU UAU.. 3'

protein... Met- Ala- Gly- Asn- Gln- Leu- Tyr- Cys....

mutant gene.... 5'..... ATG GCT GGA ATC AAC TAT ATT AT... 3'

Indicate whether each of the following statements is correct or incorrect using ✓or x marks.

1. The DNA strand shown is the one used as the template by RNA polymerase enzyme.	×
2. Complimentary DNA strand can also produce a mRNA molecule.	✓
3. The mutation can be described as a point mutation.	✓
4. Mutant gene will not produce a protein	×
5. Mutant gene will produce a protein with a different primary structure	✓

2 × 5

10

(14) Given below are some important achievements in biology and the names of scientists who were involved in them. Match each name of the scientists with the appropriate achievement using the letters given.

(A) Watson (B) Johansen (C) Southern (D) Wallace (E) Morgan

1. Developed blotting technique for DNA.	C
2. Prepared genetic maps of chromosomes.	E
3. Developed the theory of Natural selection.	D
4. Discovered the structure of DNA.	A
5. Gave the name genes to hereditary units discovered by Mendel.	B

1 × 5

5

(15) Several internal and external factors affect food spoilage by microorganisms. Any factor that influences growth and activity of microorganisms influence food spoilage. Put a tick (✓) mark to indicate the type of microorganism that is likely to grow in following food types under normal conditions.

	biscuits	beef	salted food	sugary food	Lime juice
Bacteria		✓	✓		
Mold/ Yeast	✓	✓	✓		✓
Virus					

1 × 4

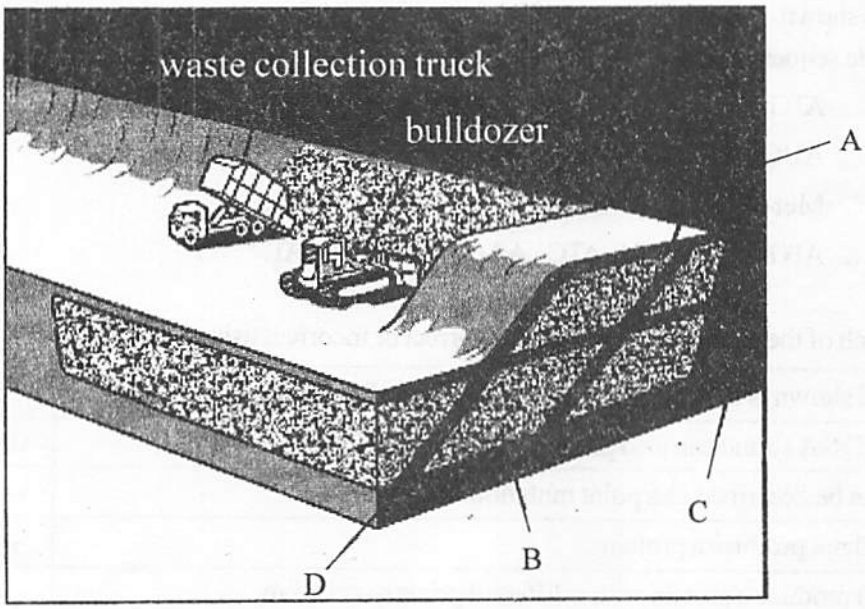
4

↑

Ignore

This coloumn is not stated in Sinhala medium papers.

(16) This question is based on the sanitary land fill illustrated in the diagram.



Select key places that occur following activities by putting a ✓ mark in the relevant cage

	A	B	C	D
1, Anaerobic decomposition of waste		✓		
2. Materials preventing bad odor	✓			✓
3. Materials preventing attraction of animals.	✓			✓
4. Area where pollutants are leached			✓	

1 × 4
Each raw

(4)

(17) (i) In the Nitrogen cycle N is converted to different chemical forms in the soil, by the nitrogen fixing bacteria, nitrifying bacteria and denitrifying bacteria. These bacterial processes can be respectively described as :

a. Reduction, oxidation, oxidation
b. Reduction, oxidation, reduction
c. Reduction, reduction, oxidation
d. Oxidation, oxidation and reduction

Put a tick mark (✓) in the appropriate box to indicate correct response.

a.	b.	c.	d.
	✓		

1 × 4

(4)

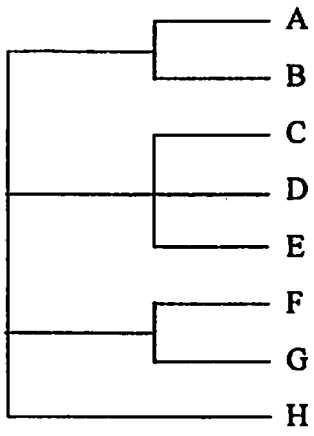
(ii) Which of the following bacteria will not improve soil fertility? Put a tick mark (✓) in the appropriate box.

Nitrogen fixing bacteria	
Nitrifying bacteria	
Denitrifying bacteria	✓

1 × 3

(3)

(18) IUCN red data classification system is given here.
Fill in the following table.



Threat level prefix and Organism	Put ✓ mark to indicate the appropriate threat category.			
	Extinct	Threatened	Low Risk	Other
C - *Dermochelys coreacea*		✓		
D - *Caretta caretta*		✓		
B - *Alphonsea hortensis*	✓			
A - Woolly mammoth	✓			
G - *Crocodylus palustris*			✓	
H - *Oecophylla smaragdina*				✓
F - *Melanochelus trijuga*			✓	
E - *Elephas maximus*		✓		

1 × 8
Each row

8

(19) Symbiotic associations can be beneficial to both organisms or it can be beneficial to one organism, or it can be harmful to one organism. Indicate whether following Symbiotic relationships are beneficial (+), harmful (-) or do not affect (0) each of the following organism. Put either +, - or 0 in cages in front of each organism.

	Organism 1		Organism 2	
1.	*Rhizobium*	+	Soya Bean plant root	+
2.	*Dendrobium* Orchid	+	*Dipterocarpus* plant	0
3.	Green Algae	+	Ascomycota fungi	+
4.	*Clostridium tetani*	+	Human	−
5.	Sea Anemone	+	Hermit Crab	0
6.	*Loranthus*	+	Mango tree	−

1 × 6
Each row

6

(20) Fill in the following table to show some features of terrestrial ecosystems of Sri Lanka by putting a ✓ mark in the relevant cages.

	Tropical Rain Forest	Montane Forest	Dry Mixed Evergreen Forest	Thorn Forests/ Shrubs	Savannas
1. Evergreen plants present	✓	✓	✓	✓	✓
2. Xerophytes are present			✓	✓	
3. Epiphytes are common	✓	✓			
4. Trees usually have smooth barks	✓				
5. Continuous canopy	✓				
6. Occurrence of frequent fires					✓

1 × 5
Each coloumn

(5)

Part A 40

Part B 121

Total $40 + \left(\frac{121}{2}\right) = 100.5$