

## 50<sup>th</sup> NATIONAL SCIENCE OLYMPIAD

### LIFE SCIENCE

6 MARCH 2014

12:00 – 15:00

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### INSTRUCTIONS

Please read the instructions carefully before answering the questions

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This is a multiple choice paper. Please answer all the questions on the answer sheet provided. Each question is followed by answers marked A, B, C and D. **Only one answer is correct.** Choose the most correct answer and shade the corresponding circle on the answer sheet completely using an HB pencil.

**NB!** The answer sheets are marked electronically – do not make any other dots or marks on the answer sheet. Select only one answer for each question or your answer will be discarded. **Ensure that you shade your selection clearly.**

Note that the question numbers 1 – 100 on the answer sheet moves from top to bottom in several columns. Ensure that the number of your selection on the answer sheet corresponds with the number of the question in your examination paper. Should you make a mistake, please erase the incorrect answer completely.

The use of **non-programmable** electronic calculators is permitted.

The last three pages of the examination paper contain data for physics as well as a periodic table that you are allowed to use.

**To Avoid Disqualification** - You are required to complete all the information requested on the answer sheet. Please complete the information in script as well as shade the corresponding blocks. If the corresponding blocks are not shaded appropriately, your results will be returned without a name and you will be disqualified. The student number allocated to you can be obtained from your teacher and consists of eight digits e.g. 08149701

Do not fold the answer sheets.

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Three hours are allowed to answer the questions

The SAASTA Education Unit wishes you the best of luck

# NATIONAL SCIENCE OLYMPIAD

## LIFE SCIENCES 2014

1. A hypothesis is ...
- A an assumption to account for something not fully understood.
  - B a plan of how an investigation should be carried out.
  - C a complete explanation of the cause of the phenomenon.
  - B factual evidence which explains the phenomenon.

2. Annual rings in woody stems are caused by an increase in the rings of the ...
- A secondary xylem.
  - B primary phloem.
  - C primary xylem.
  - D both primary phloem and primary xylem.

3. In comparison with the renal artery, the renal vein carries ...
- A a higher oxygen concentration and more nitrogenous waste.
  - B the same oxygen concentration and the same amount of nitrogenous waste.
  - C a lower oxygen concentration and less nitrogenous waste.
  - D a lower oxygen concentration and more nitrogenous waste.

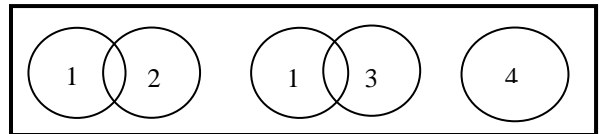
4. Which one of the following general equations for respiration in various micro-organisms represents fermentation?

- A  $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$
- B  $C_2H_2OH + O_2 \rightarrow CH_3COOH + H_2O$
- C  $C_6H_{12}O_6 + 12HNO_3 \rightarrow 6CO_2 + 6H_2O + 12HNO_2$
- D  $2C_2H_5OH + 2CO_2 \rightarrow 2CH_3COOH + CH_4$

5. A man experiences slight problems with his vision and speech after a serious head injury. Which section of his brain was possibly damaged?

- A Hypothalamus
- B Medulla oblongata
- C Cerebrum
- D Cerebellum

6. Numbers **1**, **2**, **3** and **4** below refer to four populations of frogs. These populations are represented diagrammatically by circles. Overlapping circles show populations that are capable of interbreeding to produce fertile offspring.



It would be reasonable to conclude that ...

- A if populations **2** and **4** were to die out, two different species would remain.
  - B populations **1**, **2**, **3** and **4** represent four different species.
  - C if population **2** were to die out, two different species would remain.
  - D if population **3** were to die out, only one species would remain.
7. Which type of substance could be most easily separated from an enzyme?

- A Co-enzyme
- B Activator
- C Prosthetic group
- D A protein substrate

8. When a mouse with white fur was crossed with a mouse with black fur, the  $F_1$

- generation had grey hair. What ratios of phenotypes could be expected in the F<sub>2</sub> generation?
- A 75% white : 25% black  
 B All grey  
 C 50% white : 50% black  
 D 50% grey : 25% black : 25% white
9. Which blood vessel in a human will contain the most completely mixed oxygenated blood?
- A Vena cava inferior  
 B Hepatic portal vein  
 C Pulmonary vein  
 D Pulmonary artery
10. Which ONE of the following chemical processes does not involve the elimination of the elements of water between two molecules?
- A Condensation  
 B Hydrolysis  
 C Esterification  
 D Phosphorylation
11. Which of the following makes up part of the appendicular skeleton?
- A Skull  
 B Pectoral girdle  
 C Rib cage  
 D The vertebral column
12. In the deamination of an amino acid in the liver, which could be an initial product?
- A A keto acid  
 B Urea  
 C Glucose  
 D Glycogen
13. An increase in crop production by the use of fertilizers is mainly due to ...
- A a change in the amount of energy available in the ecosystem.  
 B an increase in the complexity of the food web.  
 C a change to a more effective food web.  
 D an increase in the number of decomposers.
14. A generalized discharge of impulses through the network of the mammalian sympathetic nervous system produces
- A contraction of the radial muscles of the iris of the eyes.  
 B relaxation of the sphincters of the gut.  
 C contraction of the coronary arteries of the heart.  
 D conversion of glucose into glycogen in the liver.
15. Sensory data supplied to the cerebellum is used to ...
- A initiate voluntary movement.  
 B regulate motor movement.  
 C provide conscious information on muscular movement.  
 D control reflexes of the gut and blood system.
16. It is assumed that a mated pair of Large White butterflies produce an average of 80 fertilized eggs and the sexes occur in equal numbers. If there were no mortality, how many butterflies would be expected as a second filial generation from a single mated pair?
- A 1 600  
 B 3 200  
 C 12 800  
 D 128 000
17. The effect of the intake of excessive vitamin D on a mammal would be to increase ...
- A the secretion of parathormone  
 B the deposition of calcium in the bones.  
 C fractures of the bones.  
 D the level of blood calcium.

18. The following are involved in the process of cellular respiration:

- (i) Energy
- (ii) Carbohydrates
- (iii) Carbon dioxide
- (iv) Water
- (v) Oxygen

Which ONE of the following combinations correctly represents their involvement in the above process?

- A (ii) + (iii) = (i) + (iv) + (v)
- B (ii) + (iv) = (i) + (iii) + (v)
- C (i) + (ii) = (iii) + (iv) + (v)
- D (ii) + (v) = (i) + (iii) + (iv)

19. The following processes occur during photosynthesis:

- (i) Reduction of carbon dioxide
- (ii) The splitting of water
- (iii) The synthesis of glucose
- (iv) Formation of oxygen gas
- (v) Formation of ATP

Which ONE of the following combinations is CORRECT for the light phase?

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

20. Which cell structures are most likely to be abundant at sites of active transport?

- A Lysosomes
- B Mitochondria
- C Rough endoplasmic reticulum
- D Golgi apparatus

21. Towards the end of a long period of starvation, which molecules will most likely be used to synthesise glucose?

- A Cellulose
- B Glycogen
- C ATP
- D Galactose

22. The cones of the human retina are sensitive to colour. Which is the best explanation to this?

- A Different wavelengths of light affect a light-sensitive substance to different extents
- B Different colours of the spectrum break down a light sensitive substance to different products
- C Different colours of spectrum decolourize a single light-sensitive substance in different types of cone
- D Red, blue and green light affect three different light-sensitive substances in three different types of cones

23. In very cold weather, the pinna of the human ear may be very cold while the skin behind the ear is warm. Which is the best explanation of this?

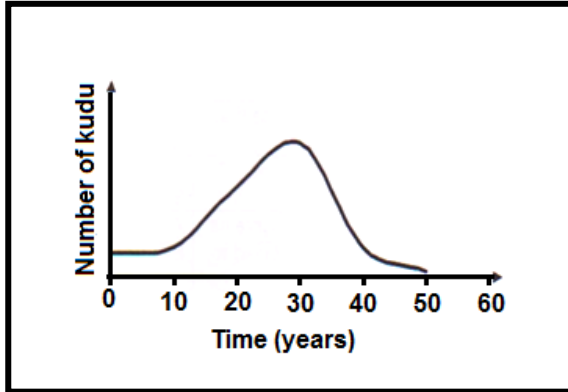
- A More heat is lost per unit area of surface from the ear pinna
- B Blood tends to be shunted through a vessel as superficial vessels are constricted
- C The metabolic activity of the tissue of the pinna is lower
- D A larger amount of water is evaporated from the surface of the pinna

24. In humans ADH is secreted in response to a need to conserve water. This hormone acts by increasing the permeability of the ...

- A glomerulus.
- B the proximal tubules.
- C the loop of Henlé.
- D the distal tubules and collecting ducts.

25. The graph below indicates the number of kudu in a certain area over a specific time.

- (i) Absence of predators
- (ii) Individuals acclimatise to the environment
- (iii) Floods destroyed the habitat



Which ONE of the following combinations of factors indicates the correct sequence of events that were probably responsible for the change in numbers during the period indicated in the graph?

- A (iii) → (ii) → (i)
- B (ii) → (i) → (iii)
- C (ii) → (iii) → (i)
- D (i) → (iii) → (ii)

26. Which of the following explains why the blood has difficulty returning to the heart from the legs?

- (i) The blood has been through the capillaries and is therefore under reduced pressure in the veins
- (ii) The veins have no valves which prevent the blood slipping back
- (iii) The legs are below the heart so blood is moving against gravity

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

27. The following is a list of compounds found in cells.

- 1 Glucose
- 2 Carbon dioxide
- 3 Proteins
- 4 Vitamins

Which of the following are organic compounds?

- A 1, 2, 3, 4
- B 1, 2 and 3
- C 1, 3 and 4
- D 2, 3 and 4

28. Which process of cell division is essential if Mendel's first law of Segregation is to be fulfilled?

- A Division of the centromere
- B Duplication of chromosomes
- C Pairing of homologous chromosomes
- D Formation of chiasmata

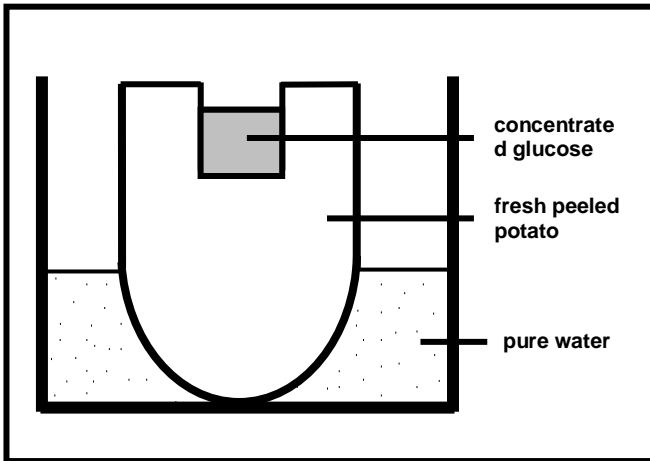
29. Which is an irregular feature of the DNA molecule?

- A The arrangement of sugar-phosphate groups
- B The pattern of the helix structure
- C The pairing of Adenine with Thymine and Guanine with Cytosine
- D The order of the bases on a single chain of the molecule

30. How many different genotypes could be derived in one generation from a dihybrid cross between two organisms which were heterozygous for both characters?

- A 4
- B 8
- C 9
- D 16

31. Study the diagram below and answer the question that follows:



Which of the following will occur after a few days?

- A The level of the pure water will increase, while the level of the glucose solution will decrease
- B The mass of the potato will increase, while the level of the glucose solution will also increase
- C The level of the pure water will increase, while the level of the glucose solution will also increase
- D The mass of the potato will decrease, while the level of the glucose solution will increase

32. Unattached viruses always possess ...

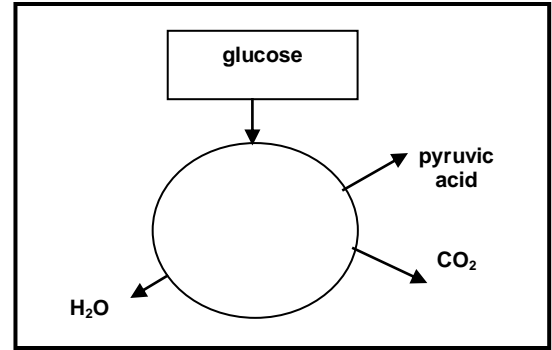
- A DNA.
- B RNA.
- C enzymes.
- D proteins.

33. After which ONE of the following activities would a person produce most concentrated urine, assuming that conditions are similar in all other aspects before the start of the various activities?

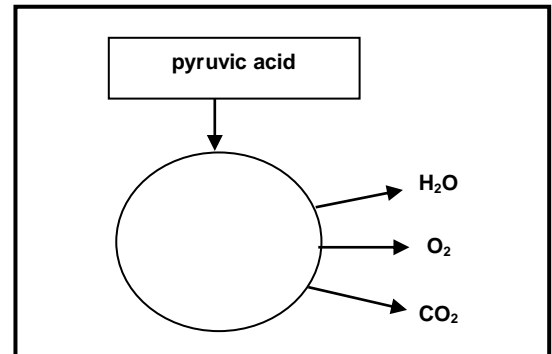
- A A strenuous game of rugby
- B One hour of swimming in cold water
- C One hour rest on a cool morning
- D Drinking a litre of cold water

34. Which ONE of the following is the best representation of a part of the Krebs cycle?

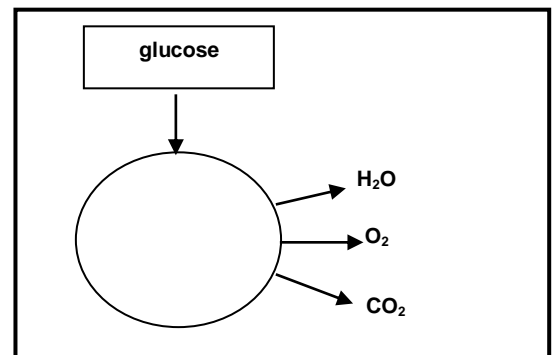
A



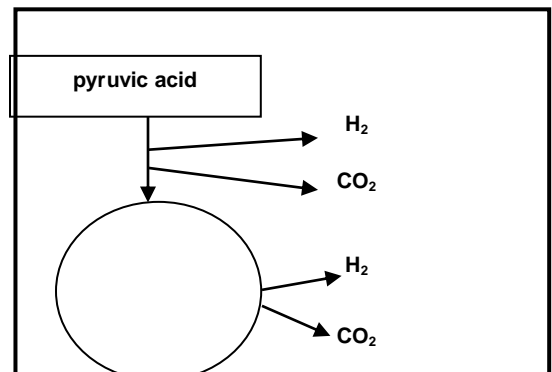
B



C

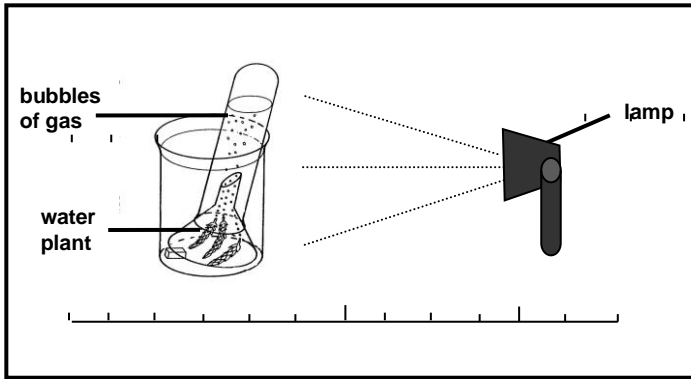


D

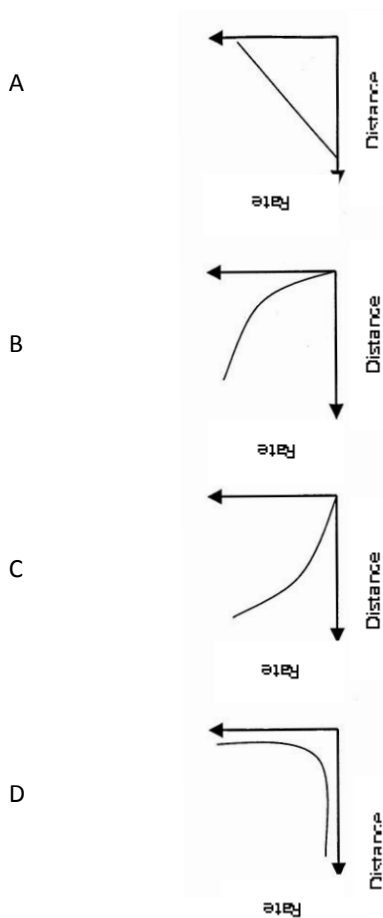


35. A group of learners set up an investigation to test the effect of light on the rate of photosynthesis. They counted the number of

bubbles of gas given off by the water plant as the lamp was moved away from the plant.



Which ONE of the following graphs best shows the expected results?



36. 84% of a human population were able to taste the substance phenylthiourea. The gene

concerned with this has only two known alleles T and t. The non-tasters are recessive homozygotes. What was the frequency of the recessive allele in the population?

- A 0.04
- B 0.16
- C 0.40
- D 0.80

37. In which cell of the female mammal does the nucleus undergo reduction division?

- A Oogonium
- B Primary oocyte
- C Secondary oocyte
- D First polar body

38. The disease caused by the deficiency of vitamin PP is ...

- A rickets.
- B pellagra.
- C scurvy.
- D anorexia nervosa.

39. Listed below are some stages in the test for starch in green leaves.

- (i) Rinse the leaves thoroughly with water
- (ii) Boil the leaves in water for 2 minutes
- (iii) Immerse the leaves in iodine solution
- (iv) Boil the leaves in alcohol

The correct sequence in which these stages should be carried out, is ...

- A (i) → (iii) → (iv) → (ii)
- B (iii) → (ii) → (iv) → (i)
- C (i) → (iv) → (iii) → (ii)
- D (ii) → (iv) → (i) → (iii)

40. In the mammalian embryo, the first structure to develop a relationship with the wall of the uterus is the ...

- A amnion.
- B chorion
- C allantois.
- D trophoblast.

41. If a young sunflower plant was placed in a red solution and left in the sun for 2 hours, which of the following parts of the stem will turn red?

- A Xylem
- B Epidermis
- C Phloem
- D Cortex

42. Which is the direct source of high-energy electrons in the light reactions of photosynthesis?

- A Water
- B Hydroxyl ions
- C NADPH<sub>2</sub>
- D ATP

43. An animal which weighed 4 grams consumed 2 cm<sup>3</sup> of oxygen in 10 minutes. Which figure expresses the respiratory rate in volume of oxygen used per gram of body weight per minute?

- A 0.01
- B 0.05
- C 0.10
- D 1.00

44. The following table shows the concentration (in g/100 cm<sup>3</sup> fluid) of urea, glucose and protein in blood plasma of the renal artery and in urine.

The concentration (in g/100 cm<sup>3</sup> fluid) of the three components in the blood plasma of the renal vein would most likely be:

	Urea	Glucose	Protein
Blood plasma of renal artery	0,03	0,10	8,00
Urine	3,00	0,00	0,00

	Urea	Glucose	Protein
A	0,015	0,08	8,00
B	0,00	0,00	8,00
C	0,03	0,10	8,00
D	3,00	0,00	0,00

45. A potometer is used to measure the ...

- A rate of water uptake by a plant.
- B rate of plant growth.
- C rate of photosynthesis.
- D root pressure of a plant.

46. Water passing into the root travels along the following path:

- A Epidermis → cortex → xylem → pericycle
- B Epidermis → pericycle → cortex → xylem
- C Epidermis → cortex → pericycle → xylem
- D Epidermis → xylem → cortex → pericycle

47. In DNA, if the sequence of bases on one strand is AGG, the corresponding bases on the complementary strand are ...

- A ACC.
- B TAA.
- C CTT.
- D TCC.

48. Common water-borne diseases are ...

- A asthma, typhoid and TB.
- B asbestosis, cholera and HIV/Aids.
- C bilharzia, malaria and emphysema.
- D typhoid, cholera and bilharzia.

49. Which of the following shows the correct path of air movement during exhalation?

- A Alveoli → bronchioli → trachea → bronchus
- B Alveoli → bronchioli → bronchus → trachea



- C Bronchus → bronchioli → trachea → alveoli  
 D Trachea → bronchioli → bronchus → alveoli
50. The latent heat of vapourization of water is approximately 2.5 joules per cm<sup>3</sup>. If 800 cm<sup>3</sup> of water is vapourized from the lungs and skin per day, what is the approximate heat loss of a man by this process?
- A 320 J  
 B 600 J  
 C 2 000 J  
 D 4 000 J
51. An investigation was undertaken to determine a relationship between asthma and pollution from an oil refinery. Which of the following factors would least affect the investigation?
- A Age of the learners  
 B Distance from the oil refinery  
 C Gender of the learners  
 D Allergy to different food types
52. The animals at the end of a food chain are generally fewer in number because...
- A they have long gestation periods and few offspring.  
 B predators have high levels of intra-specific competition and infant mortality is high.  
 C there is insufficient energy to support large numbers of tertiary consumers as a result of energy losses in the food chain.  
 D they are always the largest organisms in the food chain.
53. In which animal cells would Golgi apparatus be most abundant?
- A Voluntary muscle  
 B Red blood cells  
 C Gland cells  
 D Unfertilised egg cells
54. What is the CORRECT order for classifying an organism?
- A Kingdom, phylum, class, order, family, genus, species  
 B Kingdom, phylum, genus, class, order, family, species  
 C Kingdom, order, family, phylum, class, genus, species  
 D Phylum, kingdom, class, order, family, genus, species
55. Which ONE of the following is a function of the liver?
- A It produces hydrochloric acid.  
 B It produces vitamin D.  
 C It produces bile.  
 D It stores blood and bile.
56. Which structure is found in Angiosperms but not in gymnosperms?
- A Carpel  
 B Stigma  
 C Pollen tube  
 D Ovule integument
57. Which of the following are examples of connective tissues?
- (i) *Squamous tissue*  
 (ii) *Blood tissue*  
 (iii) *Cuboidal tissue*  
 (iv) *Tendons*
- A (i) and (ii) only  
 B (ii) and (iv) only  
 C (iv) only  
 D (ii) and (iii)
58. Xerophytes are adapted to reducing water loss by ...
- A decreasing the surface area of the plant.

- B increasing the tissue volume of the aerial parts.
- C decreasing the ratio of surface area to volume.
- D increasing the area covered by the root system.

59. Which of the following comparisons between arteries and veins are correct?

**Arteries / Veins**

- A Thin muscular wall / Thick muscular wall
- B Large lumen / Small lumen
- C Transport blood away from the heart / Transport blood towards the heart
- D Always transport oxygenated blood / Always transports deoxygenated blood

60. A biologist discovered a new living cell with a distinct cell wall but with no definite nucleus. The cell is likely to be that of a/an ...

- A animal.
- B plant.
- C virus.
- D bacterium.

61. In actively growing young plants, the best data to use for estimating the rate of photosynthesis would be ...

- A ratio of oxygen evolved to carbon dioxide absorbed.
- B increase in fresh weight.
- C increase in dry weight.
- D increase in carbohydrate.

62. The rate of photosynthesis in a submerged water plant was measured by collecting the gas which was given off in a standard period of time. With light as the limiting factor, all other conditions were kept constant. The volume of the gas produced with the light source 5 cm from the plant was 20 cm<sup>3</sup>. Assuming that the gas contained a constant proportion of oxygen,

what would be the expected volume in cm<sup>3</sup> if the light were 10 cm from the plant?

- A 5
- B 10
- C 15
- D 40

63. The protein in the ground substance of cartilage is ...

- A fibrinogen.
- B perichondrium.
- C pericardium.
- D chondrin.

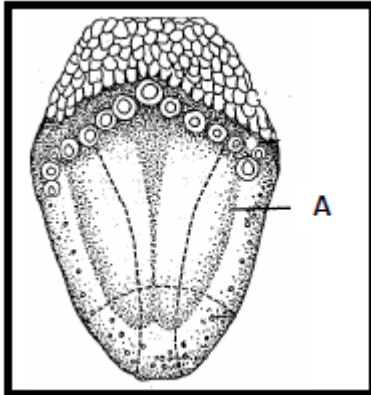
64. Corals and jelly fish belong to this phylum:

- A Arthropoda
- B Cnidaria
- C Platyhelminthes
- D Porifera

65. Under conditions of constant illumination, the compensation period for a whole aquarium would be of infinite length when ...

- A the biomass of animals equals the biomass of plants.
- B the respiratory exchanges of the animals are equal to the photosynthetic exchanges of the plants.
- C the oxygen intake of the animals equals the oxygen output of photosynthesis.
- D the carbon dioxide output of the animals and plants equals the photosynthetic intake of plants.

66. The diagram below illustrates the surface view of the tongue.



Which of the following tastes is the region labelled A sensitive to?

- A Sweet
- B Sour
- C Bitter
- D Salty

67. The difference between nucleic acids and nucleotides is that ...

- A nucleic acids are building blocks of nucleotides.
- B nucleotides are building blocks of nucleic acids.
- C nucleotides are larger than nucleic acids.
- D nucleic acids are in the nucleus and nucleotides are in the cytoplasm.

68. Which ONE of the following would lead to stomatal closure?

- A Decrease in carbon dioxide concentration in the intercellular spaces of the leaf
- B Active photosynthesis in the stomatal guard cells
- C Conversion of sugar to starch in the stomatal guard cells.
- D Increase in pH in the stomatal guard cells.

69. Two individuals are most likely members of the same species if they ...

- A have different number of chromosomes.
- B can mate and produce fertile offspring.
- C breed at the same time.

D are phenotypically different.

70. The following steps occur during eutrophication:

1. Aquatic algae grow rapidly
2. Bacteria use up oxygen
3. Excess nitrate and phosphate discharged into the river
4. Dead algae decomposed by bacteria
5. Fish die of suffocation

The correct order in which eutrophication occurs is ...

- A 3 → 4 → 1 → 5 → 2
- B 5 → 3 → 2 → 4 → 1
- C 5 → 2 → 3 → 1 → 4
- D 3 → 1 → 4 → 2 → 5

71. Which condition promotes activity of the lymph nodes?

- A Local infection
- B Absorption of fat
- C Loss of blood
- D Stress conditions which stimulate the secretions of the adrenal cortex.

72. Which sequence of values represents the best approximation to the optimum pH for the action of the enzymes in the human digestive system?

- A 6,7: 1,8: 8,0: 7,0
- B 1,8: 6,7: 7,0: 8,0
- C 7,0: 8,0: 1,8: 6,7
- D 1,8: 7,0: 6,7: 8,0

73. A moist surface is necessary for gas exchange between organisms and the environment because ...

- A gases diffuse more rapidly through water than through air.
- B moist membranes can be kept alive.
- C gases diffuse through membranes in solution.
- D living organisms first evolved in water.

74. Which ONE of the following CORRECTLY describes the cells produced by meiosis?

CELLS PRODUCED BY MEIOSIS	
Chromosome complement	Genetic composition
A Haploid	Different
B Diploid	Identical
C Diploid	Different
D Haploid	Identical

75. The transcription of CAGT forms ...

- A GTCA in mRNA.
- B GTC A in mRNA.
- C GTCA in DNA.
- D GUCA in DNA.

76. A gene is that part of the genome that produces a ...

- A nucleotide.
- B dipeptide
- C codon.
- D specific polypeptide.

77. A common function of both phosphorous and calcium in humans is that they ...

- A are involved in clotting of blood.
- B aid in the functioning of muscles and nerves.
- C form part of nucleic acids.
- D prevents kwashiorkor in young children.

78. Which substance increases in the blood plasma when there is an uptake of carbon dioxide?

- A Carbonic acid
- B Potassium bicarbonate
- C Sodium bicarbonate
- D Sodium chloride

79. Which statement concerning the rhesus factor in human blood is false?

- A There is no naturally occurring antibody to the rhesus factor
- B Antibodies to the rhesus antigen develops in the mother's blood during pregnancy if she is rhesus negative
- C The rhesus factor is inherited as a dominant gene
- D A transfusion of Rh positive blood to an Rh negative women would protect an Rh positive foetus

80. The following hormones affect the level of blood glucose in humans.

1. *Insulin*
2. *Somatotropin*
3. *Glucagon*
4. *Thyroxine*
5. *Adrenalin*

Which numbers represent opposing controlling factors?

- A 3 and 4
- B 4 and 5
- C 1 and 3
- D 2 and 3

81. In a colony of bees, the dominance of the queen is maintained by the ...

- A provision of royal jelly for the queen larva.
- B secretion of pheromones by the queen
- C provision of eggs by the queen
- D suppression of sexual development of the workers.

82. Which of the following substances is not found dissolved in human blood plasma?

- A Water
- B Carbon dioxide
- C Haemoglobin
- D Urea

83. Which of the following statements concerning haemoglobin is incorrect? It ...

- A is found in white blood corpuscles.
- B contains the element iron.
- C transports oxygen.
- D transports carbon dioxide

84. The letters represents individuals in a flock of hens in which one bird predominates over the other in the pairs by pecking.

X pecked U	U pecked Z
V pecked X	X pecked T
Y pecked V	Z pecked W
T pecked W	V pecked Z

Which was the second most dominant bird?

- A X
- B Z
- C V
- D Y

85. In an ecological study of species of wood louse, account was taken of the edaphic factors, microclimate, food preferences, reproductive habitats and organisms in competition with it. Which aspect of ecology was being studied?

- A Environment
- B Ecosystem
- C Ecological niche
- D Evolution

86. Which of the following are sources of phenotypic variation?

- (i) *Random fertilization*
- (ii) *Crossing over*
- (iii) *Random assortment of chromosomes in Metaphase 1*
- (iv) *Mutation*

- A (i), (ii), (iii) and (iv)
- B (i), (ii) and (iv)

- C (i), (ii) and (iii)
- D (ii), (iii) and (iv)

87. The study of fossils is called ...

- A anthropology.
- B ecology.
- C palaeontology.
- D geology.

88. Which factors would promote stability in an ecosystem?

- A Reducing predators and parasites
- B Equalising the numbers of producers and consumers
- C Increasing the number of species
- D Restricting the development of succession

89. The beneficial effect of including leguminous crop in a farming rotation is derived from the symbiotic nitrogen-fixing bacteria in the root nodules. How is this effect transmitted to the other crops in the rotation?

- A By the action of saprophytes on the leguminous plant material
- B By diffusion of nitrates from the root nodules to the soil
- C By infection of the other crops from the root nodules of the leguminous crop
- D By fixing nitrogen in the soil by released symbiotic bacteria

90. When the first child of two parents, without any visible genetic disorder, was born, the child was found to have a serious genetic disorder. The parents were told that a recessive gene had caused the disorder, and that only one pair of genes was involved. If they had a second child this child ...

- A was certain to have the disorder.
- B had a 1 in 2 chance of having the disorder.
- C had a 1 in 4 chance of having the disorder.
- D no chance of having the disorder.

91. The sex of the child is determined by which of the following?

- A The length of the mother's pregnancy
- B The length of time between ovulation and copulation
- C The presence of an X chromosome in an ovum
- D The presence of a Y chromosome in a sperm

92. Variability in a species is most likely to be increased by ...

- A changing environmental conditions.
- B outbreeding between different populations
- C mutation within a population.
- D selection for specific characteristics in different populations.

93. Which of the following pairs are both substances involved in the clotting of blood?

- A White blood cells and fibrinogen
- B Platelets and fibrinogen
- C Haemoglobin and platelets
- D White blood cells and platelets

94. Which evidence on evolution is most directly provided by fossils?

- A Time taken for evolutionary change
- B Cause of evolutionary change
- C Relationship between species
- D Sequence of organisms in time

95. The palisade cells of a species of plant contain 28 chromosomes. How many chromosomes will there be in each gamete produced by the plant?

- A 4
- B 14
- C 28
- D 56

96. When certain marine organisms were placed in fresh water, they eventually died.

Which could be the most likely explanation?

- A Loss of water from the tissues
- B Excess of water in the tissues
- C Loss of salts
- D Loss of permeability of the external membranes

97. The main flow of lymph along lymphatic vessels is due to ...

- A irregular pressure of the surrounding muscles and a system of valves.
- B the action of the lymph nodes.
- C pressure of plasma passing from the blood capillaries to lymphatic vessels.
- D negative pressure in the veins of the neck into which the thoracic lymph duct opens.

98. Which treatment of a sample of blood would increase its intake of oxygen from atmospheric air?

- A Raising the temperature
- B Decreasing the carbon dioxide content
- C Raising the atmospheric pressure
- D Lowering the pH value

99. Which statement best describes factors associated with the pulse wave in the blood system of a mammal?

- A The rate at which the pulse rate travels depends upon the heart rate and the velocity of the blood in the arteries
- B The absence of a pulse wave in veins indicates that blood is propelled in them by some factor other than the heart beat
- C The energy of each pulse is temporarily stored in the elastic walls of the arteries
- D A decrease in capillary resistance would increase the pressure, amplitude and velocity of the pulse wave

100. Which substance, produced in a human digestive system, contains enzymes capable of promoting hydrolysis of whole protein molecules?

- A Secretion of pyloric glands
- B Pancreatic juice
- C Chyle
- D Intestinal juice (succus entericus)

***The End***