

## UNEB UACE BIOLOGY PAPER 1 2016

1. In estimating the number of fish in a small lake, 625 fish were netted, marked and released. After a week, 873 fish were netted and of these 129 had been marked. The estimated size of the population of fish in the lake is

- A. 92
- B. 180
- C. 631
- D. 4230

2. Which one of the following, if increased to an *Elodea* plant in water at 30°C, would lead to a rise in the number of bubbles released from the plant?

- A. Light
- B. Temperature
- C. Wind velocity
- D. Humidity

3. In breeding, the propagation of a variety with desirable characters is referred to as

- A. hybridization
- B. artificial selection
- C. cross breeding
- D. In breeding.

4. Animals **A**, **B**, **C** and **D** have their body volumes and surface areas as shown below.

Animal	Volume cm <sup>3</sup>	Surface area cm <sup>3</sup>
<b>A</b>	32.0	61.1
<b>B</b>	1.2	3.0
<b>C</b>	3.3	8.2
<b>D</b>	7.5	49.0

Which one of the them would have the greatest need for a respiratory system?

5. In the mammalian eye, rods have a poorer visual acuity than cones because they are

- A. fewer in number
- B. smaller in size
- C. connected to more than one optic nerve.
- D. less sensitive to light.

6. Facultative parasites are more difficult to control than the obligatory ones because they

- A. are capsulated
- B. have many hosts
- C. can change the mode of feeding
- D. live in colonies.

7. The beginning of the recovery process in an axon is marked by

- A. sodium, ions leaving the axon
- B. potassium ions entering the axon.

- C. sodium ions entering the axon  
D. potassium ions leaving the axon.
8. The high heat capacity of water has the biological importance of
- A. minimizing temperature changes in animal fluids.
  - B. cooling animals
  - C. preventing freezing of cell contents
  - D. controlling heat loss in animals
9. Which one of the following statements is correct about base pairing in nucleic acids?
- A. Purines only pair with pyrimidines.
  - B. Guanine is paired with adenine
  - C. Hydrogen bonds only occur between pyrimidines.
  - D. Purine bases pair with other purines.
10. All the alleles present in the population of a species are called the population's
- A. gene frequency
  - B. gene pool
  - C. genome
  - D. genotype
11. Which one of the following sets of conditions in the guard cells would lead to the opening of the stoma?
- A. High carbondioxide concentration and low sugar concentration.
  - B. Low carbondioxide concentration and high sugar concentration.
  - C. High sugar concentration and high carbondioxide concentration.
  - D. Low pH and high starch concentration.
12. Lignification of plant cells has the effect of
- A. widening the cells and making them more permeable
  - B. making the cells impermeable and lengthening them.
  - C. strengthening the cells and making them more permeable
  - D. making the cells more rigid and killing them.
13. Which one of the following would not apply to apopulation whose size is growing exponentially?
- A. Absence of predators
  - B. Reproduction rate being higher than death rate
  - C. Shortage of reproducing individuals
  - D. Absence of completion for resources.
14. Which one of the following sets consitis of functionally related substances?
- A. Chitin, keratin, cellulose
  - B. Haemoglobin, myosin, starch.
  - C. Collagen, keratin, glycogen

D. Glucose, starch, chitin.

15. During respiration in the absence of oxygen, pyruvic acid is converted into

A. lactic acid and water in animals

B. ethanol and carbon dioxide in plants

C. lactic acid and carbon dioxide in animals

D. ethanol and water in plants.

16. Which one of the following is the first step during protein synthesis?

A. Translation

B. Transportation

C. Transcription

D. DNA replication.

17. An efficient physiological homeostatic mechanism is one which

A. allows large fluctuations

B. responds to deficiency faster than excess

C. responds to small fluctuations.

D. allows positive feedback.

18. In single circulation, the blood pressure is low because

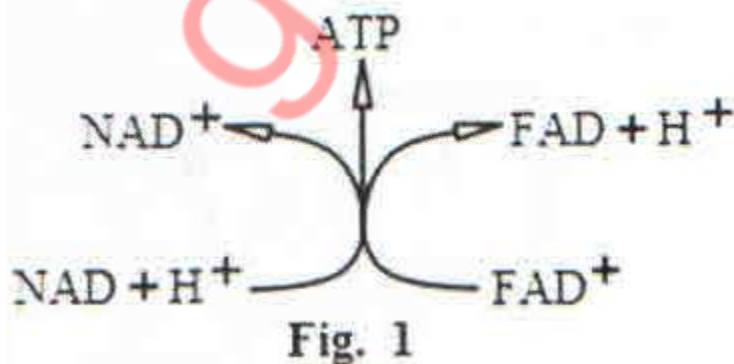
A. the blood passes through two capillary systems

B. animals that have single circulation

C. the single circulation system lacks valves

D. the main vessels in single circulation are capillaries

19. Figure 1 shows a schematic diagram of a portion of a reaction chain:



Which one of the following is not true of the reaction?

A. FAD is reduced

B. ATP is used in the reaction

C. Hydrogen passes from reduced NAD to FAD.

D. NAD is oxidized.

20. A tissue viewed under a microscope showed numerous lysosomes in the cells. Which one of the following is a possible cause?

A. Active transport

B. Infection

C. High rate of internal transport

D. High rate of protein synthesis.

21. During locomotion in a tetrapod, which of the following is the correct order of movement of limbs after the animal has moved its left hind limb?

A. Left fore, right hind, right fore

B. Left fore, right fore, right hind

C. Right hind, left fore, right fore

D. Right fore, left fore, right hind

22. What would be the phenotypic ratio of the offspring when a test cross is carried out on an individual who is a carrier of albinism?

A. 3:1

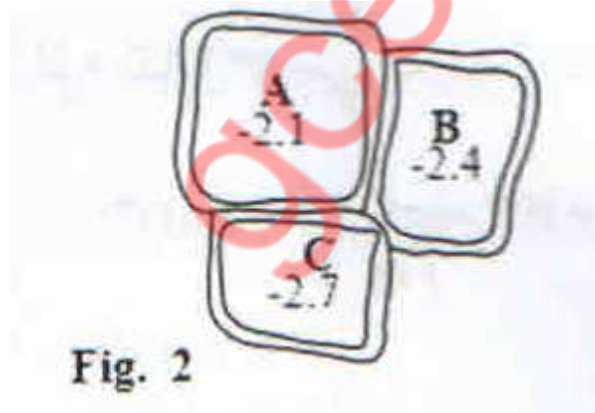
B. 1:2:1

C. 1:1

D. 9:3:3:1

23. Figure 2 represents plant cells *A*, *B* and *C* with their respective water potentials in (kPa) indicated.

Which of the following is a correct direction of water movement between the cells?



A. *C* to *A*

B. *A* to *B*

C. *C* to *B*

D. *B* to *A*

24. In *Drosophilla*, there are red-eyed and white-eyed types, the red eye being dominant over white. Genes controlling eye color are sex linked. The ratio of the phenotypes resulting from mating a red-eyed male *XY* and a white-eyed female *XX* is

A. 1 red-eyed : 2 white-eyed

B. 1 red – eyed : 1 white – eyed.

C. all red – eyed

D. 2 red – eyed : 1 white – eyed.

25. The purple sulphur bacteria live at the bottom of pond under green algae because the bacteria

A. absorb light of different wavelength from the algae.

B. are parasites

C. are shielded from direct sunlight.

D. do not require light for photosynthesis.

26. Vertebrates **A** and **B** belong to the same species and are terrestrial. **A** lives in a dry environment while **B** lives in a wet environment. The kidney structure of **B** would differ from that of **A** by having

A. fewer and bigger glomeruli with shorter loop of Henle

B. more numerous and smaller glomeruli with longer loop of Henle

C. more numerous and bigger glomeruli with shorter loop of Henle

D. fewer and smaller glomeruli with longer loop of Henle

27. Figure 3 is a cross section of a thorax showing flight muscles in an insect.

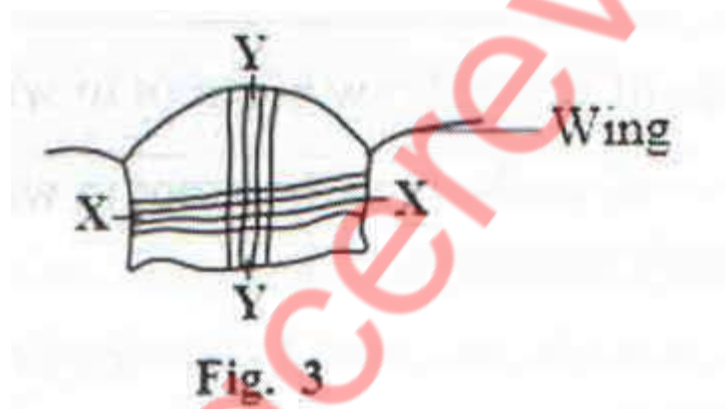


Fig. 3

Which action of the muscles lowers the wings?

A. Relaxation of **Y**

B. Contraction of **Y** and relaxation of **X**

C. Contraction of **X**

D. Contraction of **X** and relaxation of **Y**

28. Insects have been able to occupy diverse terrestrial habitats mainly because of their ability to

A. move swiftly

B. conserve water

C. live as parasites on other organisms

D. withstand high temperatures

29. In an experiment, a respiratory quotient of 1.3 was observed in a skeletal muscle of a vertebrate. Which one of the following is a possible explanation?

A. The muscle was fatigued

- B. The vertebrate was oxidizing.
- C. Lactic acid had accumulated
- D. Some anaerobic respiration had occurred.

30. What type of learning is exhibited by a predator when it avoids eating a brightly coloured prey?

- A. Exploratory
- B. Habituation
- C. Associative
- D. Trial and Error

31. Beetroot cells contain a water soluble re pigment. Two treatments on beetroot were setup as shown in Table 1.

**Table 1**

Test tube	Treatment
Test tube 1	Pieces of washed raw beetroot in water
Test tube 2	Pieces of washed raw beetroot in water containing a respiratory poison.

After 30 minutes, the water in the test tube 2 contained the red pigment while that in test tube 1 did not.

Which statement explains the colour in test tube 2?

- A. Retention of the pigment in cells is an active process.
- B. Pigment molecules passed out and were replaced by the poison molecules.
- C. The poison made the cell membrane semi permeable.
- D. Water passed out by osmosis and carried the soluble pigment with it.

32. An advantage of larval form during development is to

- A. provide protection for the young
- B. reduce competition between the young and the adults
- C. allow rapid growth of the young
- D. allow sufficient time for development.

33. Which one of the following would lead to convulsive muscular contractions resulting from impulse transmission?

- A. Prevention of the action of acetylcholine.
- B. Inhibition of acetylcholine formation
- C. Destruction of acetylcholine as soon as it is formed.
- D. Inhibition of the formation of cholinesterase formation

34. Which one of the following features does not contribute to the efficiency of a red blood cell?

- A. Biconcave shape
- B. Being filled with haemoglobin
- C. Being numerous in numbers
- D. Absence of a nucleus

35. Which one of the following does not determine the order in which amino acids line up protein synthesis?

- A. The base sequence in DNA

- B. The sequence of base triplets in mRNA  
C. The number of the ribosomes involved  
D. The sequence of anticodons in the tRNA
36. During water stress, there is reduced photosynthesis mainly due to shortage of  
A. carbon dioxide  
B. water  
C. light  
D. mineral salts
37. A fragment of an earthworm can regenerate into a new worm because earth worms  
A. reproduce asexually  
B. possess a high number of undifferentiated cells  
C. are hermaphrodites  
D. have a high rate of cell division
38. Which one of the following structures are characteristic of a floating plant?  
A. Light, thin leaves with hairy surface.  
B. Broad, thin leaves with thin cuticle  
C. Light, thin leaves with thick cuticle.  
D. Broad, thin leaves with aerenchyma
39. The human eye and an octopus' eye are examples of  
A. homology  
B. divergent evolution  
C. analogy  
D. adaptive radiation
40. A disadvantage in parallel flow system in fish gills is that  
A. water flows too slowly over the respiratory surface  
B. blood does not get saturated enough with oxygen  
C. blood and water are not close enough  
D. water flows too rapidly over gills.

#### **SECTION B**

41. a) State the role of cell membranes.  
b) Why is transport across cell membranes necessary?  
c) Give three differences between active transport and diffusion.  
d) Give two examples of processes in plants that require active transport
42. Figure 4 shows the variation of metabolic rate with environmental temperature in a mammal.

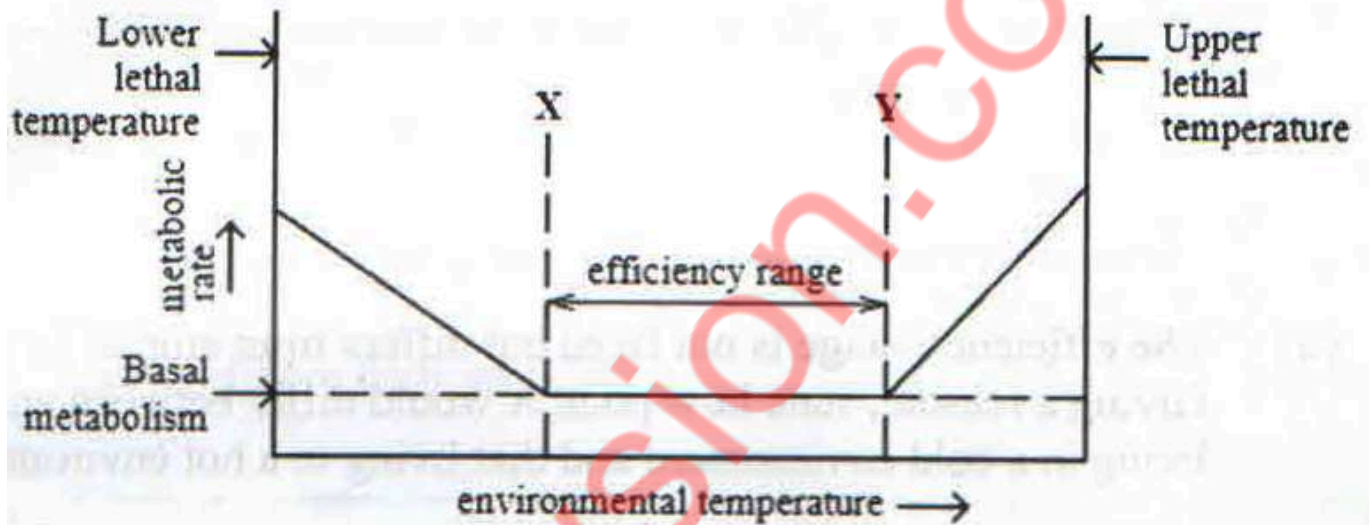


Fig. 4

- a) What do temperature **X** and **Y** represent?
  - b) What does the efficiency range mean?
  - c) Explain the variation of metabolic rate with environmental temperature outside the efficiency range.
  - d) The efficiency range is not fixed but differs from animal to animal. Giving a reason, state how point **X** would differ between an animal living in a cold environment and that living in a hot environment.
43. How do high levels of each of the following gases in the atmosphere affect the environment?
- a) Sulphur dioxide
  - b) Carbondioxide
  - c) Cholorofluoro carbons (CFCs)
- 44 a) Describe four problems faced by terrestrial plants.
- b) In what ways are mosses poorly adapted to terrestail life?
45. Figure **5a** and **5b** show viability of fescue grass seed at different conditions.



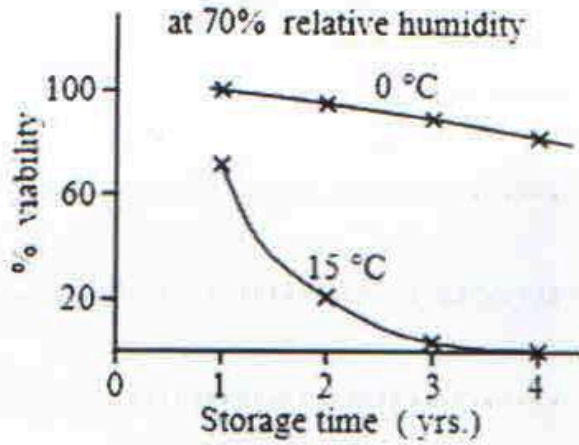


Fig. 5 (a)

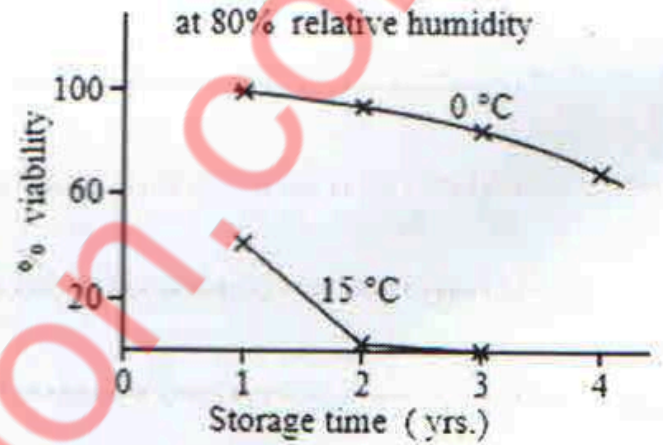


Fig. 5 (b)

- a) From the figures, state the factors that affect viability of fescue grass seeds.
- b) Describe the effect of each factor in (a) on the viability of the seeds
- c) Explain the effect of each factor in (a) on viability of the seeds

46. Table 2 shows blood group systems in humans. Complete the Table by

- i) filling in the antigens and antibodies for each blood group.
- ii) indicating whether agglutination occurs (by a cross **X**) or no agglutination occurs (by a tick **✓**), when an individual of each blood group receives blood from blood group **AB**.

Table 2

Blood Group	Antigens	Antibodies	Agglutination/no agglutination when receives blood of AB blood groups
A			
B			
AB			
O			

- b) How can a Rhesus negative mother affect a Rhesus positive foetus in her womb?

END