SECTION A.

1. Fill in the blank with the term that best completes the sentence.

a) The _____ is the maximum population size that can be supported in an area wit hout harming the environment.

b) Populations gain individuals through births and _____.

c) Under ideal conditions, populations can grow at _____ rates.

3 marks

2. In healthy polluted aquatic ecosystem, the group with the highest concentration of poll utants in their bodies are the

A. Tertiary consumers

B. Secondary consumers

C. Primary consumers

D. Primary producers **1 mark**

3. Which one of the following substances is not transported by the blood circulatory syst em in arthropods?

(a) Nutrients.

(b) Hormones.

(c) Respiratory gas.

(d) Nitrogenous wastes. **1mark**

4. The oxidation of a respiratory substrate occurs according to the following equation.

$C_{18}H_{36}O_2 + 26O_2 \rightarrow 18CO_2 + 18H_2O$

What is its respiratory quotient after complete oxidation in the body?

(a) 0.7

(b) 0.8

(c) 0.9

(d) 1 **1 mark**

5. Which one of the following organisms possesses a heart which pumps out only deoxy genated blood?

(a) Birds.

(b) Mammals.

(c) Amphibians.

(d) Fish. **1 mark**

6. Which one of the following methods is used by the bony fish to regulate its internal en vironment?

(a) Actively takes up salts through its gills.

(b) Constantly drinks water.

(c) Produces isotonic urine in small quantities.

(d) Produces dilute urine in large quantities. **1 marks**

7. Name:

(i) The photochemical pigment present in rods.

(ii) Color-sensitive pigment present in cones. **2 marks**

8. Which one of the following would occur at a synapse treated with a poison which rend ers cholinesterase inactive?

(a) Conduction of impulses ceases.

(b) Conduction speed of impulses reduces.

(c) Conduction of impulses in post synaptic neuron continues.

(d) The direction of impulses reverses. **1 mark**

9. The mammalian eye receives fewer stimuli per unit time compared to insect compoun d eye because the

A. Mammalian eye occupies a smaller part on the head than the insect eye.

B. Mammalian eye has less focusing units than the insect eye.

C. Time lapse between reception of light, stimulus and recovery is shorter in the i nsect eye.

D. Mammalian eye has a smaller field of view.**1 mark**

10. Explain the advantages of supplying the pulmonary circulation with blood at lower pr essure than that of the systemic circulation.**4 marks**

11. What do you understand by respiratory substrate? **2 marks**

12. Explain the roles of coenzymes nicotinamide adenine dinucleotide (NAD), Flavin ade nine dinucleotide (FAD) and coenzyme A in respiration. **3 marks**

13. Fill the following table with appropriate words **4marks**

Animal	**Excretory organ**	**Excretory nitrogenous sub strate**
Reptile		
Paramecium		
Earthworm		
Cockroach		

14. Describe the characteristics of the receptor cells. **3 marks**

15. a) Give the importance of synapses in the nervous system. **4 marks**

b) Explain why the,

i) Production of acetylcholinesterase at the synapse is important during nerve impulse tr ansmission. **3 marks**

ii) Impermeability of the axon membrane to sodium ions in a part of a neuron helps to maintain the resting potential in that part. **3 marks**

16. Use your knowledge of the nervous system and the endocrine system to answer the q uestions that follow

a. Discuss the similarities between the structure and functioning of nervous and hormonal systems. **3 marks**

b. Discuss the differences between the structure and functioning of nervous and hormonal systems. **3 marks**

17. Name the bony structure and individual bones which form

(i) Axial. **2 marks**

(ii) Appendicular skeletons. **2 marks**

18. what can you do to maintain your skeleton healthy? **2** marks

19. If an insect eats plant seeds containing 100J of energy, energy from which 30 J is us ed for respiration while 50J remains in faeces.

a. Calculate the net secondary production. **2 marks**

b. Estimate the production efficiency. **2 marks**

20. The equation $C_{57}H_{104}O_6 + 80_{O2}$'n $57CO_2 + 52H_2O$+ Energy.

Represents oxidation of lipids. Calculate QR for this equation. **2 marks**

21. Examine the contribution of deforestation on flooding and desertification. **4 marks**

22. Nowadays kidneys' diseases are well known and some people with kidney failure are being treated in different hospitals in our country and abroad.

a. Write the types of treatments you know for the person with kidney failure. **/2marks**

b. Discuss the advantages and disadvantages of such treatment. / **4marks**

23. Identify what should happen when a neuron is damaged. /**2marks**

24. identify what happens when an action potential arrives at a synaptic knob of an excit atory synapse. **/6marks**

SECTION B

25. Evaluate the possible methods for conservation of natural resources. **10 marks**

26. a. What are the negative effects of deforestation? **5 marks**

b. Assess the possible measures to solve the problems caused by deforestation. **5 mark s**

27. Write short notes on the impact of industrial sewage and fertilizer application to the environment. Explain how that area was polluted. **10 marks**

28. The loop of Henle acts as a counter-current multiplier. Justify this statement. **10 mar ks**

29. A sample of 39 ground beetles was captured from an area of waste ground measurin g 100*25 meters. Each animal was marked and then released. A second sample of 35 w as captured the following day and 20 individuals of them were marked.

a. Estimate the number of ground beetles in the population. **/4marks**

b. State three assumptions that must be made in order to make this estimation. /**6marks**

30. Table below shows the relative contribution of anaerobic and aerobic respiration to t he total energy output in an individual during exercises.

Duration of exercis es (min)	**From aerobic res piration**	**From anaerobic respiration**
0.5	83	17
2.0	40	60

10.0	9	91
60.0	1	99

a) Compare the relative contribution of aerobic and anaerobic respiration to the t otal energy output. **4 marks**

b) Explain changes in the relative contributions of aerobic and anaerobic respirati on during duration of exercises. **3 marks**

c) Explain why diving mammals have reduced heartbeat. **3 marks**

GOOD LUCK!