nelson net.

Unit exam

Unit 4 Surviving in a changing environment

Time permitted: 90 minutes

	Section	Number of questions	Marks available	Marks achieved
A	Multiple choice	15	15	
B	Short answer	5	50	
C	Extended answer	2	20	
	Total		**85**	

Grade: _____

Comments:

Section A Multiple choice (30 marks)

1 Thermoregulation is an issue for any organism living in a cold environment. Important mechanisms to conserve heat are:

A high metabolism and panting.

B high use of convection and sweating.

C layers of feathers and down and a small body mass.

D thick fur and a large body mass.

2 Each reaction in a metabolic pathway is:

A controlled by the concentration of the end product.

B controlled by an enzyme.

C controlled by the amount of reactants; more reactant reduces the rate of the reaction.

D controlled by hormones secreted by the nucleus.

3 A disease that can be transmitted between animals and humans is termed:

A a fomite.

B pandemic.

C epizootic.

D zoonotic.

4 Adele contracted influenza during the winter months. The next year in winter, she came in contact with the influenza virus, but this time she did not show any symptoms of the disease. This is due to Adele:

A being injected with influenza antibodies when she first contracted influenza.

B producing and storing memory B cells specific to the influenza strain of that year.

C producing and storing memory B cells that could respond to any strain of influenza.

D producing increased numbers of cytotoxic T cells, which destroyed the virus particles.

5 Vectors are important in the spread of many diseases. It is reasonable to suggest that:

A vectors are the organisms that cause disease.

B vectors are involved in viral diseases only (bacteria are too large to be carried by a vector).

C diseases associated with a particular vector are usually restricted to the geographical area that supports that vector.

D insects are the only organisms that act as vectors.

6 The nervous and circulatory systems work together during homeostasis. Which of the following correctly describes their main homeostatic functions?

	Nervous system	**Circulatory system**
A	Coordinates sensory information with the body's responses	Transports materials including chemical messengers around the body
B	Sends messages to effectors	Transports energy molecules
C	Sends messages along neurones	Transports oxygen and carbon dioxide
D	Sends messages quickly	Sends messages slowly

7 Vasoconstriction is the term used when blood vessels constrict. It is a mechanism used when:

A body temperature increases.

B body temperature decreases.

C countercurrent heat exchange is required.

D air temperature deviates away from optimal body temperature.

8 When the external environmental temperature around a mammal decreases, hair erector muscles perform a function to assist in homeostasis. Which of the following correctly discusses their function?

A Hair erector muscles contract; hairs stand down, creating pockets of warm air.

B Hair erector muscles relax; hairs stand down, creating pockets of warm air.

C Hair erector muscles relax; hairs stand down, cooling the body.

D Hair erector muscles contract; hair stands up, creating pockets of warm air.

9 Osmoregulation is concerned with controlling the water balance in organisms. Water is lost by various methods. Which of the following methods of water loss is *not* also used for thermoregulation?

A Urinating

B Sweating

C Evaporation

D Exhalation

10 An Australian mammal, *Ornithorhynchus anatinus*, the platypus, can survive in cold water by using various mechanisms including a countercurrent heat exchange system. Through the use of this specific mechanism, it can maintain its 32°C body temperature by:

A continuously swimming.

B heat being retained by moving from the vein to the artery.

C heat transfer due to the close proximity of the artery and vein.

D dilating (increasing the diameter of) capillaries in the tail, an extremity.

11 The scientist Robert Koch developed a series of postulates (steps) to identify the specific cause of an infectious disease. Which of the following is *not* an essential step?

A The potential pathogen must always be present when the disease occurs.

B The organism should be isolated from the host and grown in pure culture.

C Organisms from the pure culture are inoculated into an already infected and recovered host. If the disease develops, this is further evidence for a specific cause.

D The organism can then be re-isolated, grown in pure culture and compared with the organism first injected for confirmation.

12 Due to globalisation and transportation of goods, some outbreaks have become epidemics and even pandemics. Factors most likely to further increase the chance of spread are:

A low virulence and long incubation period.

B low pathogenicity and high susceptibility.

C short incubation period and high resistance.

D multiple direct and indirect modes of transmission.

13 A worldwide decline in frog population numbers has caused scientists to investigate the causes. Which of the following factors is *not* contributing to the decline?

A An increase in chytridiomycosis vectors

B Habitat destruction for agriculture or urban and industrial development

C Draining of wetlands (frog breeding grounds)

D Pollution of wetlands by runoff from land, including herbicides and pesticides

14 *Phytophthora* dieback kills susceptible plants, such as banksias, jarrah and grass trees, by attacking their root systems. Which of the following statements relating to *Phytophthora* is correct?

A *Phytophthora* spores are microscopic have a cell wall made of chitin.

B The Phylum *Oomycota* containing *Phytophthora* dieback has been removed from the Fungi Kingdom and placed in the Protista Kingdom.

C The bacterial infection is also called jarrah dieback.

D The disease is more prevalent (higher rate of spread) in dry habitats.

15 Which of the following is the main portal of entry for the disease crown gall?

A Eyes and ears

B Skin

C Mucus membranes

D A wound in the roots of a plant

Section B Short answer (50 marks)

1 **a** Pathogens can be transmitted inside airborne droplets. Describe how the droplets can exit an infected host and enter a susceptible host. (2 marks)

b Name two diseases with a mode of transmission that involves airborne droplets. (2 marks)

c Describe the life cycle of tetanus. (4 marks)

d Describe the effect that tetanus toxin has on the nervous system. (3 marks)

2 A student wanted to investigate the effect of an increase in CO_2 gas on blood pH. The student used their knowledge of animal ethics to decide that tap water and sea water were more ethical substances than animals to use in their testing. The student used a data logger to measure the pH of water every 2 minutes for 12 minutes as CO_2 was blown into a beaker of water. After three trials, the mean results were recorded in the table below.

	pH	
Time (minutes)	**Tap water**	**Sea water**
0	6.5	7.8
2	6.4	7.8
4	6.2	7.6
6	5.9	7.4
8	5.3	7.2
10	4.9	7.1
12	4.6	7.0

a Graph the mean pH of the tap water against time. (6 marks)

b Define 'reliability'. (2 marks)

c State what was done to ensure the results were reliable in this investigation. (1 mark)

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d Which of the 3 Rs of animal ethics was applied in this experiment? (1 mark)

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3 **a** Draw and label a stimulus–response model, via negative feedback, when shivering is involved. Include the general and specific components of the model. (6 marks)

b Describe four adaptations of a kangaroo surviving a hot environment. Select at least two structural or physiological adaptations. (4 marks)

4 **a** Define 'incubation period'. (2 marks)

b Describe what the malaria pathogen is doing inside a human host liver during the incubation period. (3 marks)

c Explain the need for mosquitos in the life cycle of the pathogen that causes malaria. (4 marks)

d Describe one effective method to prevent malaria. (1 mark)

5 **a** State the meaning of the term ‘interrelated’. (1 mark)

b You have studied three factors that affect the spread of disease. They are listed below for you. Apply your knowledge of Australian bat lyssavirus (ABL) and the interrelated factors to explain why spread of ABL stops when one of these factors is missing.

i A susceptible host and its density (2 marks)

ii Growth of the pathogen population (2 marks)

iii Mode of transmission (2 marks)

c Compare the terms 'endemic' and 'epidemic'. (2 marks)

Section C Extended answer (20 marks)

1 Scientists working on an innovative program were trying to build a superior plant (a xero-halophyte) adapted to low humidity and saline soil. Describe five distinct *leaf-related* adaptations the futuristic super-plant could have to survive an environment with both problems. Include four adaptations for low humidity and one adaptation for saline soil. (10 marks)

2 Draw a labelled diagram showing the life cycle of the pathogen that causes crown gall. Then describe the life cycle in words, and include the genetic modification involved in your description. (10 marks)

End of examination