nelson net.

Unit exam

Unit 2 From single cells to multicellular organisms

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 (15 marks)

1 Which of the following would determine whether a cell is from a prokaryote?

A Presence or absence of a rigid cell wall

B Presence or absence of internal membranes that partition the cell

C Presence or absence of cellular metabolism

D Presence or absence of DNA

2 How large a cell can be is mostly limited by:

A the surface area needed to exchange materials with the surroundings.

B the number of organelles that can be packed inside.

C whether there are enough materials to build it.

D the amount of nutrients it needs to survive and function.

3 Mitochondria are organelles found in eukaryotic cells. These organelles are responsible for:

A the transport of proteins within the cell.

B synthesis of lipids.

C photosynthesis.

D cellular respiration.

4 The cell theory does not apply to which of the following groups?

A Bacteria

B Fungi

C Viruses

D Algae

5 A white blood cell engulfing a pathogen, such as a bacterium, is an example of:

A endocytosis.

B exocytosis.

C passive transport.

D diffusion.

6 If a substance is more concentrated inside a cell than in its surroundings, which of the following processes could produce a net movement of that substance into the cell?

A Diffusion

B Osmosis

C Facilitated diffusion

D Active transport

7 Which of the following statements about the phospholipid molecules in the plasma membrane is incorrect?

A The phospholipids form a bilayer.

B Each phospholipid molecule has a single hydrophilic head.

C The phospholipid heads are hydrophilic (able to absorb water).

D The phospholipid heads are hydrophobic (water avoiding).

8 In cellular respiration, the first stage is known as glycolysis. Glycolysis uses _____ to produce _____.

A glucose; pyruvate

B pyruvate; glucose

C oxygen; glucose

D oxygen; pyruvate

9 Yeast uses the process of fermentation to break down sugars. When in a bread mixture, the fermentation by the yeast produces _____, which causes the bread to rise.

A carbon dioxide

B ethanol

C water

D oxygen

10 A paramecium is a simple unicellular eukaryote that contains a contractile vacuole. The contractile vacuole:

A produces chlorophyll for photosynthesis.

B is an organelle that stores the products of respiration.

C eliminates excess water.

D gathers organic nutrients such as algae.

11 Which of the following is not a function of epithelial tissue?

A Protection against mechanical injury

B A barrier to stop fluid loss

C Control of contractions in the tissue

D Secretion of mucus

12 Which of the following correctly traces the path of blood from the heart to a toe and back to the heart again?

A Right atrium, aorta, toe capillary, pulmonary vein, left atrium

B Left ventricle, pulmonary artery, toe capillary, vein, right atrium

C Right ventricle, aorta, toe capillary, vein, right atrium

D Left ventricle, aorta, toe capillary, vein, right atrium

13 Which of the following is not likely to be present in a herbivore?

A Rumen or caecum

B Bacteria in the gut

C Long large intestine

D Canine teeth

14 Which of the following is not a function of the mammalian kidney?

A Filtration of water and solutes from the blood

B Filtration of large proteins and red blood cells from the blood

C Excretion of nitrogenous waste

D Reabsorption of water, sodium and calcium ions

15 Which of the following is not true about plant vascular tissue?

A The vascular tissue in leaves is found in the veins.

B In stems, the vascular tissue creates vascular bundles.

C Phloem cells are hollow, non-living and transport water and sugars.

D Xylem cells are hollow, non-living and transport water and minerals.

Section B Short answer (50 marks)

1 **a** There are four major types of biomacromolecule. Name two of these and complete the following table. (6 marks)

Name	Subunit	Example of a cellular function

b Red blood cells do not gain or lose water when they are placed in a 0.9% NaCl solution. What term is used to describe the concentration of the solution compared to the concentration of the red blood cells? (1 mark)

c State whether a 15% NaCl solution would be considered hypertonic or hypotonic to red blood cells. (1 mark)

d State two factors that affect the exchange of materials across membranes. (2 marks)

2 **a** Name two processes that occur in either plant or animal cells that require the use of enzymes. (2 marks)

b A class of students worked collaboratively to test the average time of reaction of a certain enzyme given specific pH levels. The results were tabulated.

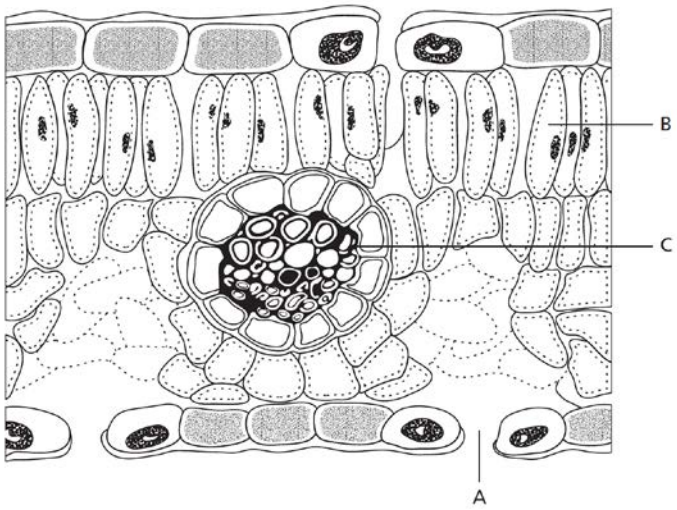
Test tube	pH	Average time of reaction (s)	Average rate of reaction (s^{-1})
A	1	Did not react	0
B	3	Did not react	0
C	5	8.9	0.1
D	7 (control)	1.5	0.7
E	9	1.7	0.6
F	12	2.1	0.5

i Write a conclusion about the relationship observed and an optimum value. (2 marks)

ii Write an inference for why there was no reaction in test tubes A and B. (2 marks)

iii Explain why a control was used in this experiment. (2 marks)

3 The diagram below shows a cross-section through a leaf.



a What is the name of the opening labelled 'A'? (1 mark)

b What is/are the function(s) of the opening labelled 'A'? (2 marks)

c What is the name of the cells labelled 'B'? (1 mark)

d What is the function of the cells labelled 'B'? (1 mark)

e What is the name of the pair of cells surrounding 'A'? (1 mark)

f What are the functions of the group of cells labelled 'C'? (2 marks)

g If this leaf was attached to a terrestrial Australian plant, describe two adaptations that would help it to minimise water loss. (2 marks)

4 **a** Write a chemical equation that summarises the process of photosynthesis. (2 marks)

b Photosynthesis is divided into two distinct stages. Complete the table about these stages. (2 marks)

Name of stage	Site within a chloroplast

c Suggest two ways of improving the rate of photosynthesis in some tomato plants that are grown in a greenhouse. (2 marks)

d Cellular respiration occurs in cells. How does the production of energy in a cell compare between when it undergoes aerobic and when it undergoes anaerobic respiration? (2 marks)

e What are the product(s) of fermentation in:

i a plant cell? (1 mark)

ii an animal cell? (1 mark)

5 **a** In animals, the exchange of gases between the internal and external environments of the organism is facilitated by the structure of the exchange surface(s). Name a class of vertebrate that possesses each of the surfaces found in the table. (3 marks)

Gas exchange surface	Class of vertebrate
Gills	
Alveoli	
Skin	

b To maximise gas exchange, surfaces need to have a range of factors. Describe two factors and their effect on the rate of gas exchange. (2 marks)

c Describe the process of filtration, including the site where filtration occurs. (3 marks)

d The following table shows the composition of various substances within a mammalian kidney. Complete the table by filling in estimated values for glucose and protein in a properly functioning kidney. (2 marks)

Substance (g/100 mL)	Plasma (g/100 mL)	Filtrate (g/100 mL)	Urine (g/100 mL)
Glucose	0.15		
Protein	7.00		
Salts	0.65	0.65	1.2
Nitrogenous waste	0.03	0.03	2.5

e Explain your values for glucose and for proteins. (2 marks)

Section C Extended answer (20 marks)

1 A student viewed some onion cells under the microscope.

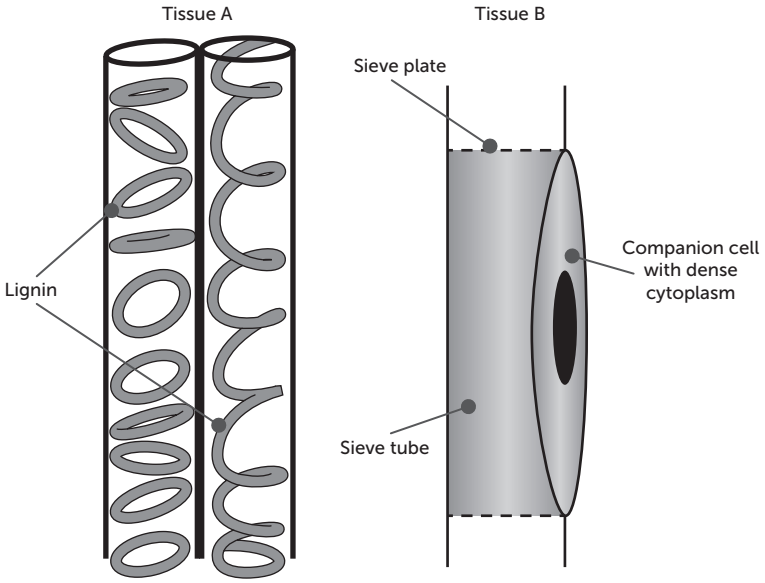
Address the following three tasks in one consolidated response.

a Write the steps for making a wet mount of onion cells. (6 marks)

b Calculate the length of one cell if the student observed under an objective magnification of 40×, 2 cells fitting across the diameter. FOV was 0.3 mm. Present your answer in micrometres. (2 marks)

c Calculate how many cells would be viewed if the student changed the objective lens to 4×. Show all working out. (2 marks)

2 The diagrams below show two types of vascular tissue in plants.



Address the following two tasks in one consolidated response.

a Name tissue B and describe its function. (3 marks)

b Name tissue A and describe its function. (7 marks)

End of examination