INTI
International College Penang
LAUREATE INTERNATIONAL UNIVERSITIES

FINAL
Examination Paper

(COVER PAGE)

Session	:	**August 2017**
Programme	:	Foundation In Science (CFSI)
Course	:	**BIO1204: Biology 2**
Date of Examination	:	14 December 2017 (Thursday)
Time	:	11:00am – 1:00pm Reading Time : Nil
Duration	:	2 Hours

Special Instructions :

This paper consists of **FIVE (5)** questions. Answer **any FOUR (4)** questions in the answer booklet provided.

Materials permitted :

Non-Programmable Scientific Calculator

Materials provided :

Nil

Examiner(s)	:	**Ooi Saik Huey**
Moderator	:	Assoc. Prof. Dr. Sreeramanan A/L Subramaniam

*This paper consists of **17** printed pages, including the cover page*

INTI INTERNATIONAL COLLEGE PENANG

FOUNDATION IN SCIENCE (CFSI)
BIO1204: BIOLOGY 2
FINAL EXAMINATION: AUGUST 2017 SESSION

Instructions: This paper consists of **FIVE (5)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

(a) Briefly describe structure and function of epithelial tissue, connective tissue, muscle tissue and nervous tissue.

(4 marks)

(b) Explain how homeostatic control is achieved by negative-feedback mechanisms.

(1 mark)

(c) Discuss food processing occurs in **FOUR (4)** stages.

(4 marks)

(d) Why is an excess of fat-soluble vitamins more dangerous in the body than an excess of water-soluble vitamins?

(2 marks)

(e) State of **ONE (1)** vitamin and **ONE (1)** mineral are involved with the formation or maintenance of bones and teeth?

(2 marks)

(f) The Figure Q1(f1) shows the location of structure *A* villi. The photomicrograph shows an enlargement of part of an epithelial cell that lines the villus. Figure Q1(f2) indicates the location of structure *B* in an epithelial cell.

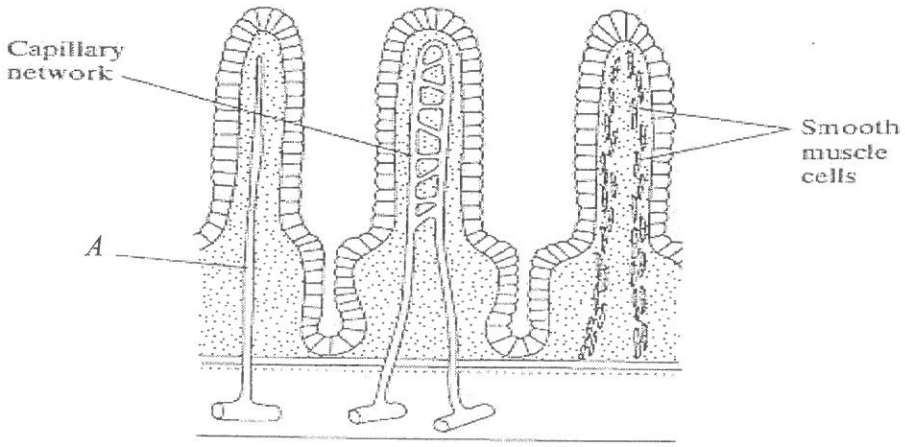


Figure Q1(f1)

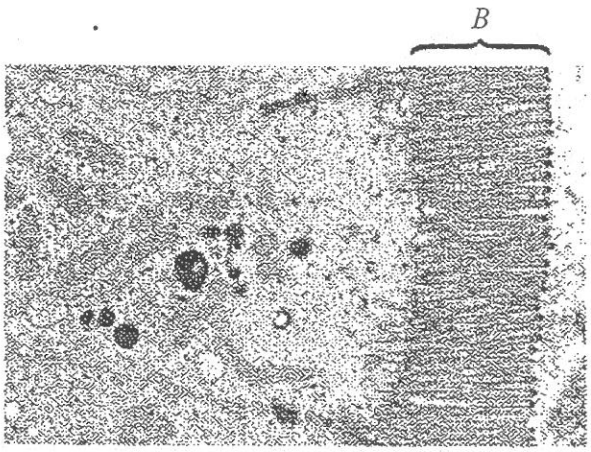


Figure Q1(f2)

(i) State **ONE (1)** function of part *A*.

(1 mark)

(ii) Suggest **ONE (1)** advantage of having muscle cells in the villi.

(1 mark)

(iii) State **ONE (1)** reason why the presence of single layer of epithelial cells enables a villus to absorb nutrients effectively.

(1 mark)

(iv) State **ONE (1)** reason why the presence of the many projections shown in structure *B* enables a villus to absorb nutrients effectively.

(1 mark)

(g) The figure Q1(g) shows a section through the heart at one stage of the cardiac cycle.

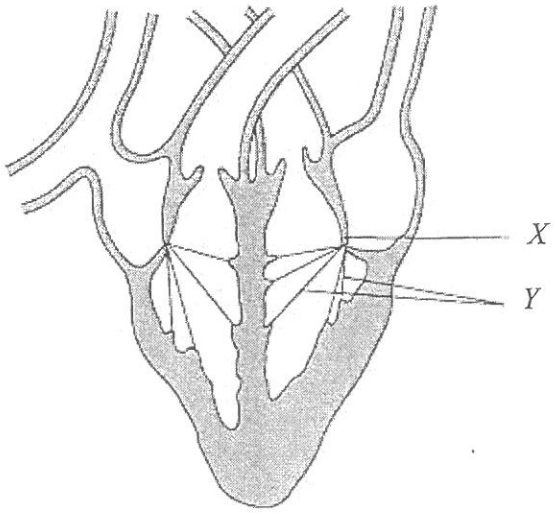


Figure Q1(g)

(i) Name the structure labelled *X*.

(1 mark)

(ii) Suggest how the structures labelled *Y* help to maintain the flow of blood in one direction through the heart.

(1 mark)

(h) The Figure Q1(h) shows a cross-section of an artery.

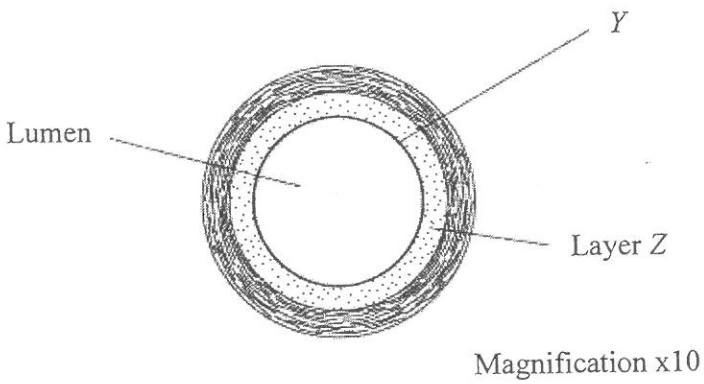


Figure Q1(h)

(i) Name the layer labelled *Y*.

(1 mark)

(ii) Layer *Z* contains a high proportion of elastic tissue.
Describe **ONE (1)** advantage of having elastic tissue in the wall of an artery.

(1 mark)

(i) Figure Q1(i) shows the passage of red blood cells through a capillary in muscle tissues:

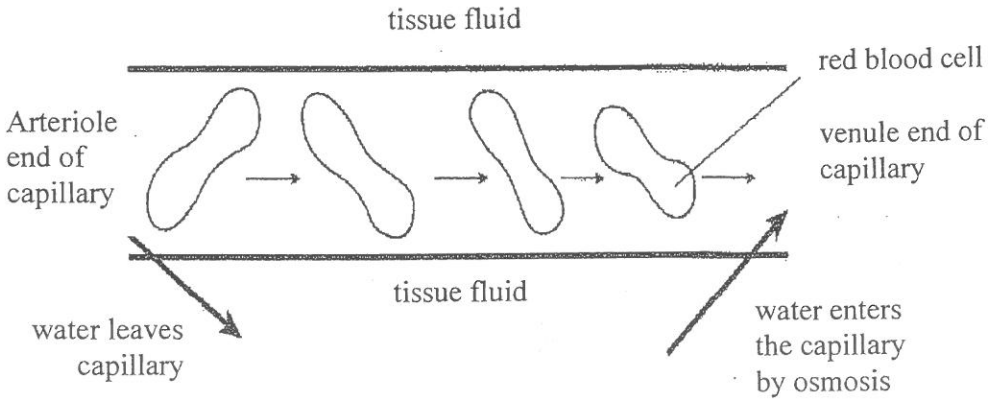


Figure Q1(i)

(i) Water leaves the capillary at the arteriole end. Water enters the capillary at the venule end by osmosis. Explain why water enters the capillary at the venule end by osmosis.

(1 mark)

(ii) State **TWO (2)** ways in which the composition of the blood at the arteriole end of the capillary differs from the composition of the blood at the venule end of the capillary.

(2 marks)

(iii) Tissue fluid accumulates in the tissues of people who do not eat enough protein. Explain why.

(1 mark)

Question 2

(a) Figure Q2(a) shows three different B lymphocytes (*K*, *L* and *M*) and the clonal selection of B cells that correspond to an immune response when exposed to an antigen.

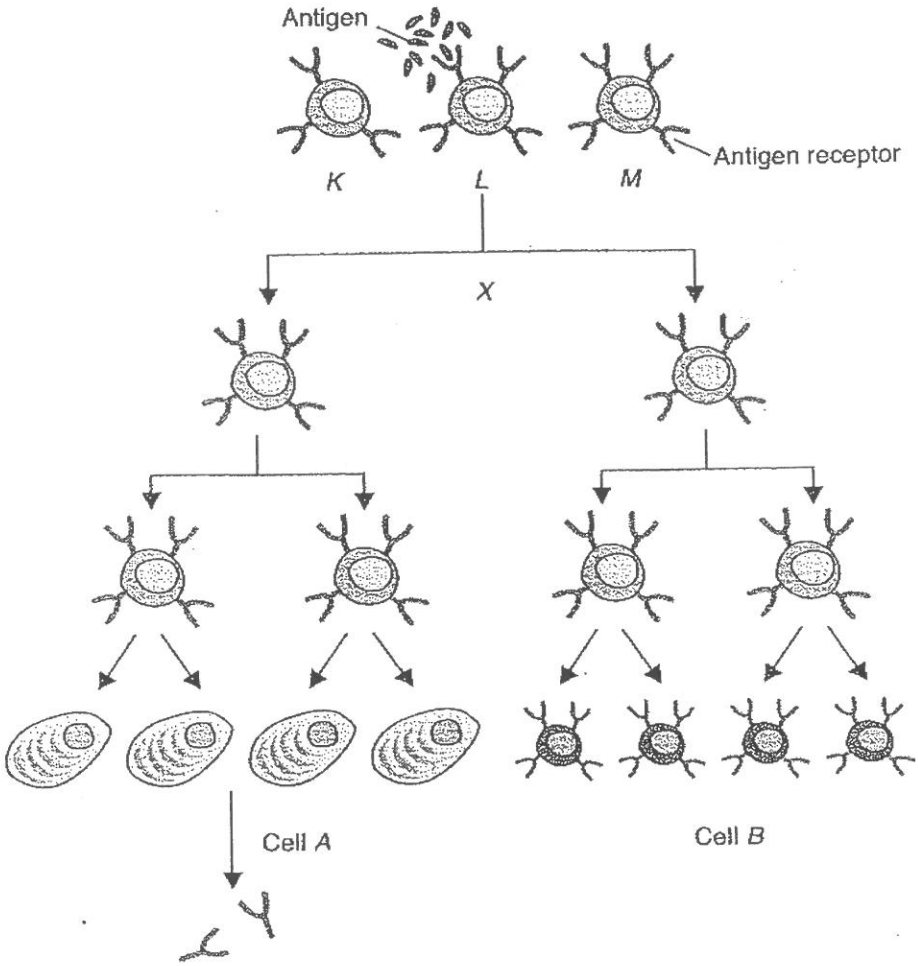


Figure Q2(a)

(i) State the type of nuclear division that occurs at *X*.

(1 mark)

(ii) Explain why B lymphocyte *L* responded to the antigen but not *B* lymphocytes *K* and *M*.

(2 marks)

(iii) The clonal expansion of the *B* cells resulted in the production of two pools of cells, cell *A* and cell *B*. Identify cell *A* and cell *B* **AND** states **ONE (1)** function for both cell *A* and cell *B*.

(4 marks)

(iv) What happens to both cell *A* and cell *B* when infection is under control?

(2 marks)

(b) Samples of blood of each group, A, B, AB and O were tested with anti-A and anti-B antibodies. In some of the samples this resulted in agglutination. The results of the tests with blood group A are shown in Figure Q2(b).

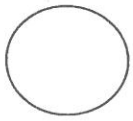
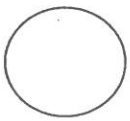
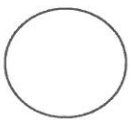
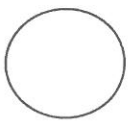
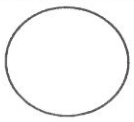
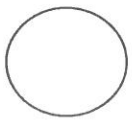
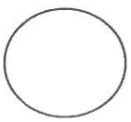
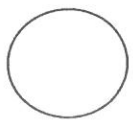
Blood group	A	B	AB	O
Appearance with anti-A antibodies				
Appearance with anti-B antibodies				

Figure Q2(b)

Key ✓ agglutination
× no agglutination

Complete Figure Q2(b) in your booklet with a tick or a cross to show the results you would expect for blood groups B, AB and O.

(3 marks)

(c) The Figure Q2(c) shows a comparison of the contents of various solutes in the blood plasma entering the kidney, glomerular filtrate and urine.

Solute	Concentration of solute (g/litre)		
	Blood plasma	Glomerular filtrate	Urine
Glucose	1.0	1.0	0
Protein	70.0	0	0
Sodium ions	3.0	3.0	3.0
Potassium ions	0.15	0.15	1.5
Urea	0.25	0.25	20.0

Figure Q2(c)

(i) Name the process by which dissolved nutrients in blood plasma enter the Bowman's capsule?

(1 mark)

(ii) Describe how the process occurs.

(2 marks)

(iii) Explain why glucose is not found in the urine excreted.

(1 mark)

(iv) Explain why protein is not found in the glomerular filtrate.

(1 mark)

(v) Explain why the solute content in the glomerular filtrate is not the same as that of the blood plasma entering the kidney.

(2 marks)

(vi) State **ONE (1)** characteristics of the proximal convoluted tubule that enhance the efficiency of active reabsorption of most of the solutes from glomerular filtrate.

(1 mark)

(d) The Figure Q2(d) shows the action of hormone *X* on its target cell.

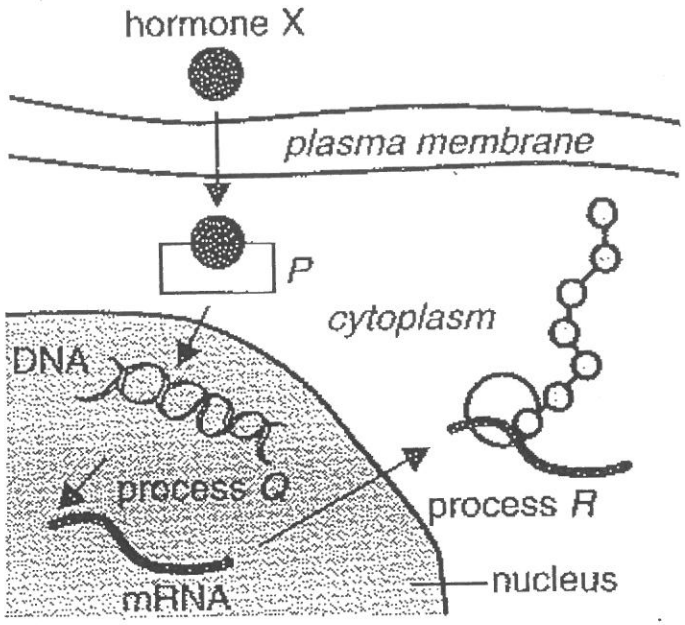


Figure Q2(d)

(i) State the type of hormone *X* and give **ONE (1)** example.

(2 marks)

(ii) Give **ONE (1)** characteristic of hormone *X* which enables it to enter the target cell.

(1 mark)

(iii) Based on the Figure Q2(d), determine the mechanism of hormone action.

(2 marks)

Question 3

(a) Figure Q3(a) shows mechanisms that control the level of calcium in the blood.

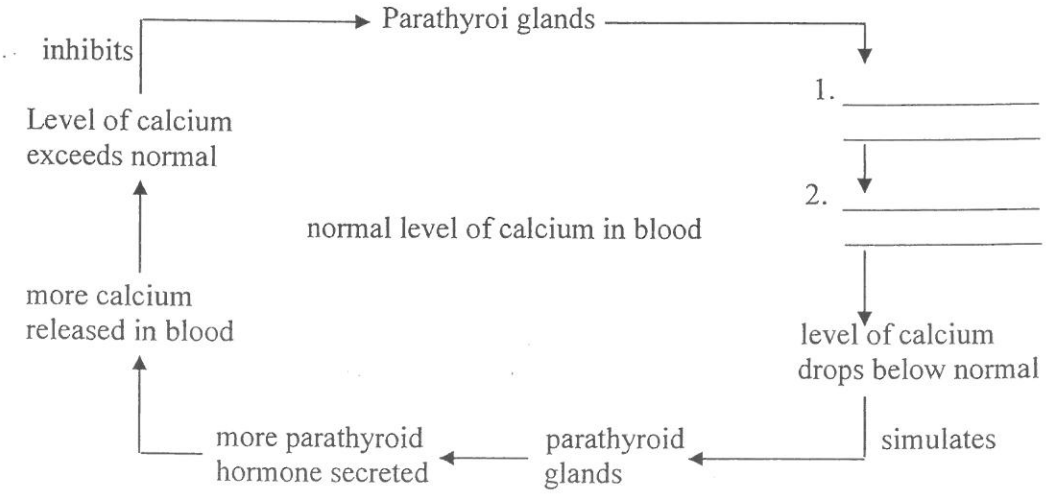


Figure Q3(a)

(i) Write appropriate labels for mechanisms 1 and 2 on Figure Q3(a).

(2 marks)

(ii) The Figure Q3(a) illustrates the response of hormone to a stimulus. Describe **TWO (2)** ways in which the response of nerve differs from the response of a hormone.

(2 marks)

(iii) Nerves and hormones are involved in the regulation of human body temperature. Describe **ONE (1)** way in which nerve pathways can produce an increase in the rate of heat loss from the body.

(2 marks)

(b) Figure Q3(b) shows the early development of an embryo.

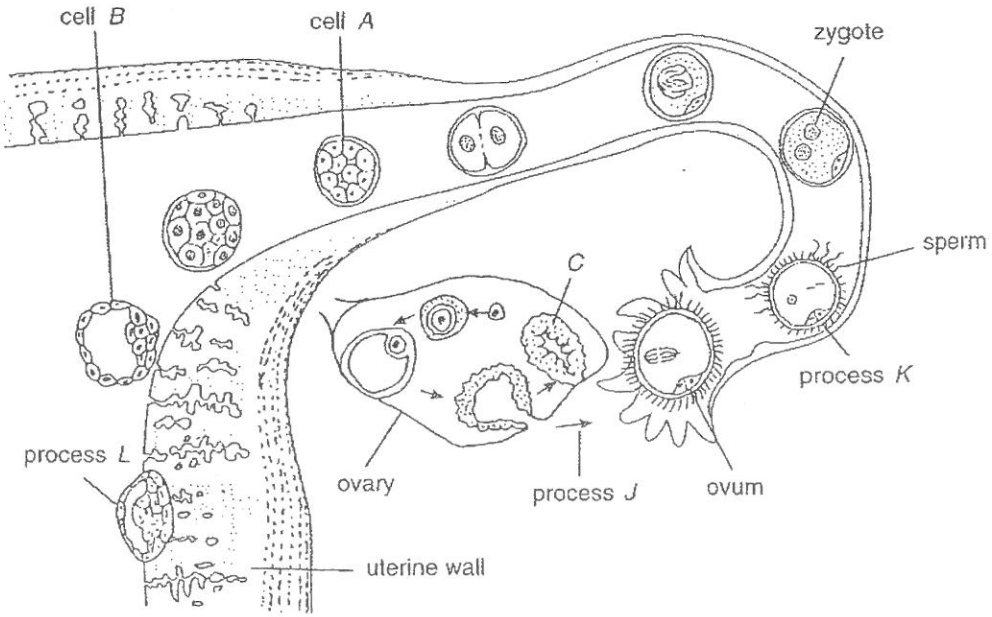


Figure Q3(b)

(i) Name the processes *J*, *K* and *L*.

(3 marks)

(ii) *A* and *B* are cells formed from the rapid mitotic division of the zygote after three days and five days respectively. Identify cell *A* and *B*.

(2 marks)

(iii) When will the meiosis division be completed?

(1 mark)

(iv) Identify *C*.

(1 mark)

(v) Name the hormone secreted by *C*.

(1 mark)

(vi) What will happen to *C* if process *K* does not occur?

(1 mark)

(c) Figure Q3(c) shows the structure of synapse.

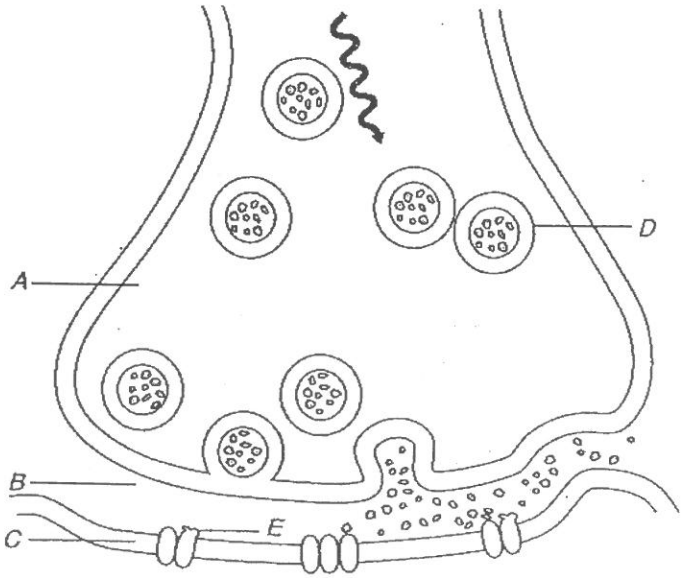


Figure Q3(c)

(i) Identify the structure labelled *A*, *B* and *C* as shown in Figure Q3(c).

(3 marks)

(ii) Identify the structure labelled *D*. Name the chemical found in *D*.

(2 marks)

(iii) Name **ONE (1)** organelle which can be found in structure *A*. Suggest a reason for its presence.

(2 marks)

(iv) What is the effect of cocaine on *E*?

(1 mark)

(v) Explain why synaptic transmission is slow compared to transmission of impulse along an axon a neuron.

(2 marks)

Question 4

(a) Compare and contrast parenchyma and sclerenchyma tissues in terms of wall thickness and function.

(2 marks)

(b) Identify the labeled zones in Figure Q4(b) and briefly state the function for each zone.

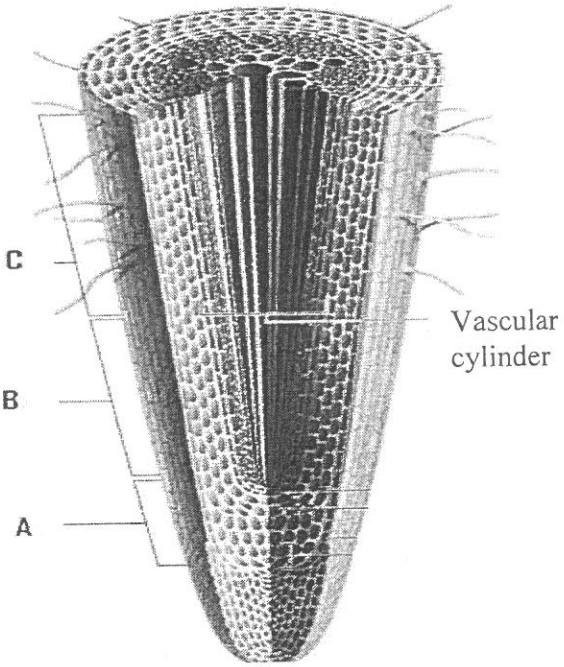


Figure Q4(b)

(3 marks)

(c) Figure Q4(c) shows the male and female parts of flower, the formation of zygote, and the formation of an embryo. Pollen grains, which are made in the anther, carry sperm, eggs are made in the ovary:

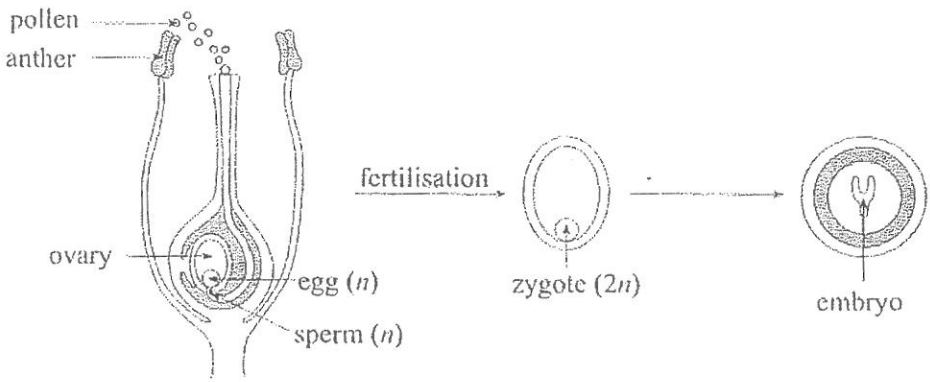


Figure Q4(c)

(i) Name the type of nuclear division that results in the formation for sperm in the anther and the formation of eggs in the ovary.

(1 mark)

(ii) State the important of fertilisation.

(1 mark)

(iii) Name the type of cell division that results in the formation of the embryo from the zygote.

(1 mark)

(iv) After fertilization, zygote begins developing into a seed. What is the role of the endosperm in a seed?

(1 mark)

(d) Figure Q4(d) shows some cells from the tissues in a root.

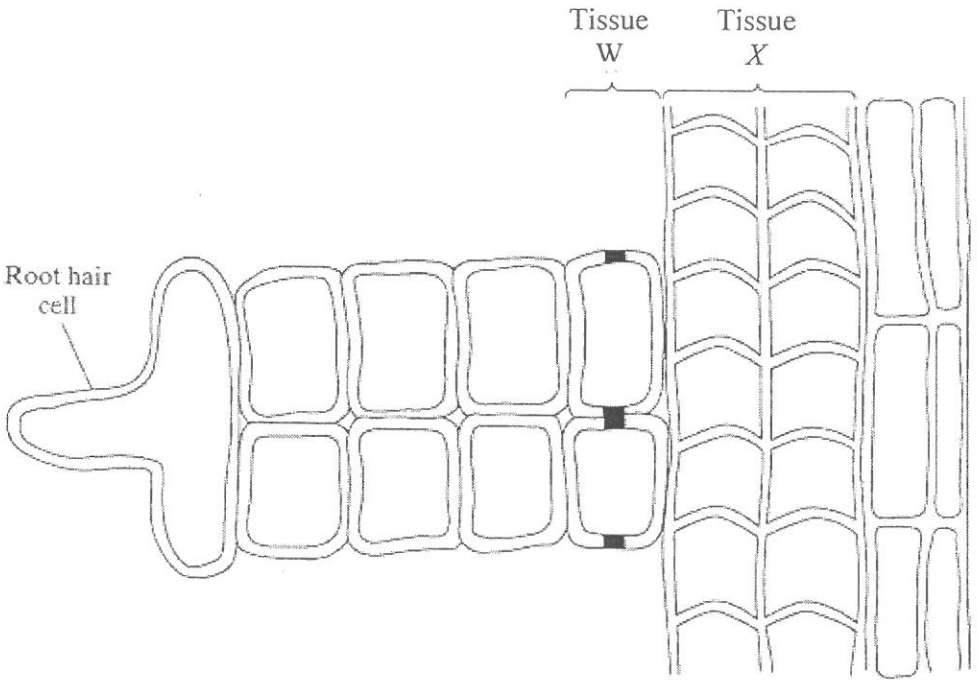


Figure Q4(d)

(i) Name the tissues labelled *W* and *X*.

(2 marks)

(ii) Explain why water moves from the apoplast pathway (extracellular route) to the symplast pathway (intracellular route) when it reaches the tissue labelled *W*.

(1 mark)

(e) Describe transpiration and its effect on water movement in a tree.

(6 marks)

(f) Sample of short-day plant species were exposed to two ranges of light and dark treatment as shown in the Figure Q4(f1). Shaded bars indicate periods of darkness and unshaded bars indicate periods of light.

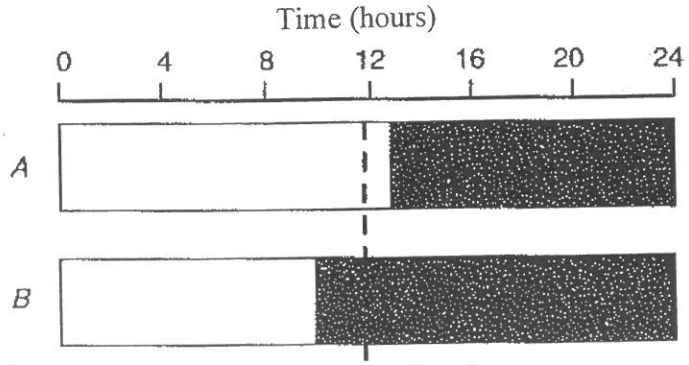


Figure Q4(f1)

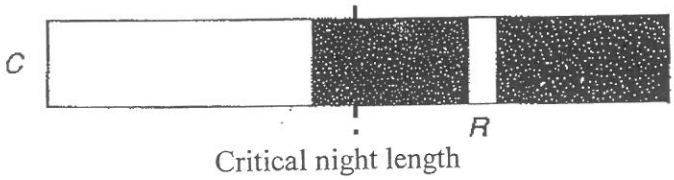


Figure Q4(f2)

(i) What is meant by short-day plants?

(1 mark)

(ii) Which form of phytochrome is required by short-day plants?

(1 mark)

(iii) Which treatment would you expect to trigger a flowering response? Explain your answer.

(2 marks)

(vi) The dark period of treatment *B* was the interrupted with a flash of red light as shown in Figure Q4(f2). What flowering response would you expect treatment *C*? Explain your answer.

(3 marks)

Question 5

(a) Figure Q5(a1) and Figure Q5(a2) show changes in the number of individuals in two populations over time.

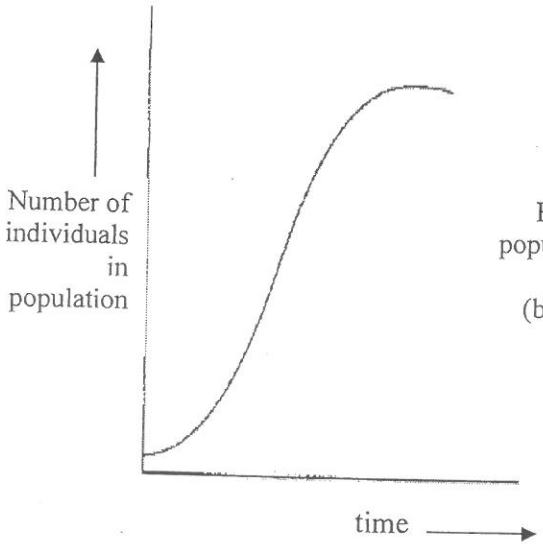


Figure Q5(a1)

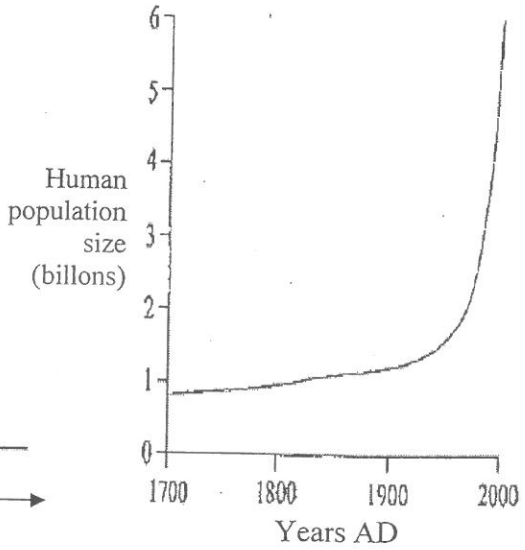


Figure Q5(a2)

Figure Q5(a1) shows a population whose size is limited by environmental factors. Figure Q5(a2) shows the human population size over the last 300 years.

(i) State **ONE (1)** environment factor that could be limiting the size of the population shown in Figure Q5(a1).

(1 mark)

(ii) State **ONE (1)** reason why the human population size has grown exponentially over the last 300 years.

(1 mark)

(iii) State **ONE (1)** possible impact on the environment if the human population size continues to grow exponentially.

(1 mark)

(b) The food web shown in the Figure Q5(b) illustrates a feeding in a pond.

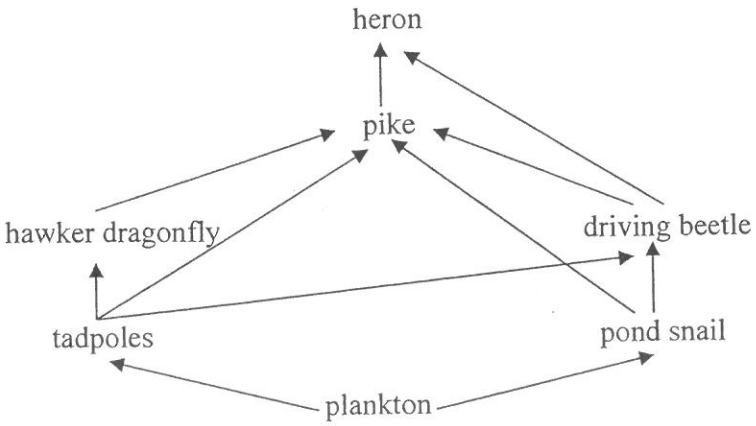


Figure Q5(b)

(i) Explain **TWO (2)** reasons why there are likely to be more plankton than pike in the pond.

(2 marks)

(ii) A disease kills most of the pond snails. Describe and explain the effects of this on their organism at the same trophic level in the pond.

(3 marks)

(iii) Figure Q5(b)(iii) illustrates a pyramid of biomass for the organisms in the ponds.

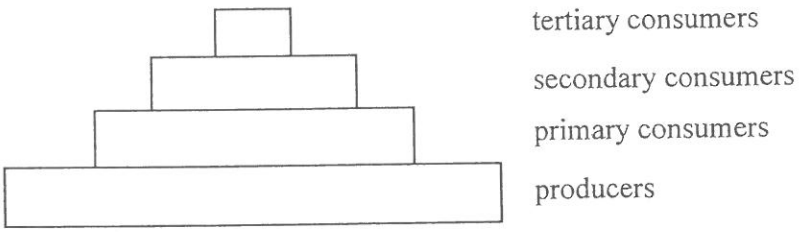


Figure Q5(b)(iii)

Some of the biomass of the produces is not transferred to the tertiary consumers. Explain what happens to this biomass.

(2 marks)

(c) Ecosystems require a constant supply of energy. In most ecosystems energy comes ultimately from the Sun is stored in organism as chemical energy. Describe

(i) the pathways that can be taken by the element carbon in an ecosystem.

(2 marks)

(ii) how chemical energy becomes available for immediate use in cells.

(2 marks)

(iii) how energy is lost from a community.

(2 marks)

(d) Figure Q5(d) shows part of the nitrogen cycle.

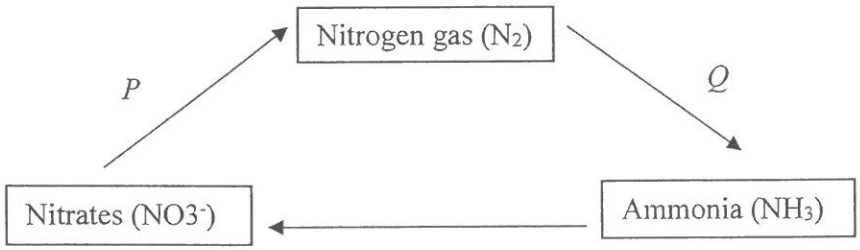


Figure Q5(d)

(i) Name processes *P* and *Q*.

(2 marks)

(ii) The conversion of ammonia to nitrate involves oxidation. What evidence in the diagram supports this?

(1 mark)

(e) What are the **THREE (3)** levels of biological diversity? Explain how human activities threaten each of these levels.

(6 marks)

~ The End ~

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