

INTI INTERNATIONAL UNIVERSITY
FOUNDATION IN SCIENCE (CFSI)
BIO1204: BIOLOGY 2
FINAL EXAMINATION: JANUARY 2014 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) (i) What are the main differences in structure and function between epithelial tissue and connective tissue? (4 marks)
- (ii) What type of tissue lines the air sacs of the lung? How is its structure adapted to its function? (3 marks)
- (iii) State **TWO (2)** unique features of the epithelial tissues that line the trachea. (2 marks)
- (b) Describe **TWO (2)** substances in saliva and its function in digestion. (4 marks)
- (c) Explain the digestion of fat in human. Include organs and enzymes involved. (4 marks)

- (d) Fig. 1.1 is a vertical section of the heart to show the regions concerned with initiating and conducting impulses.

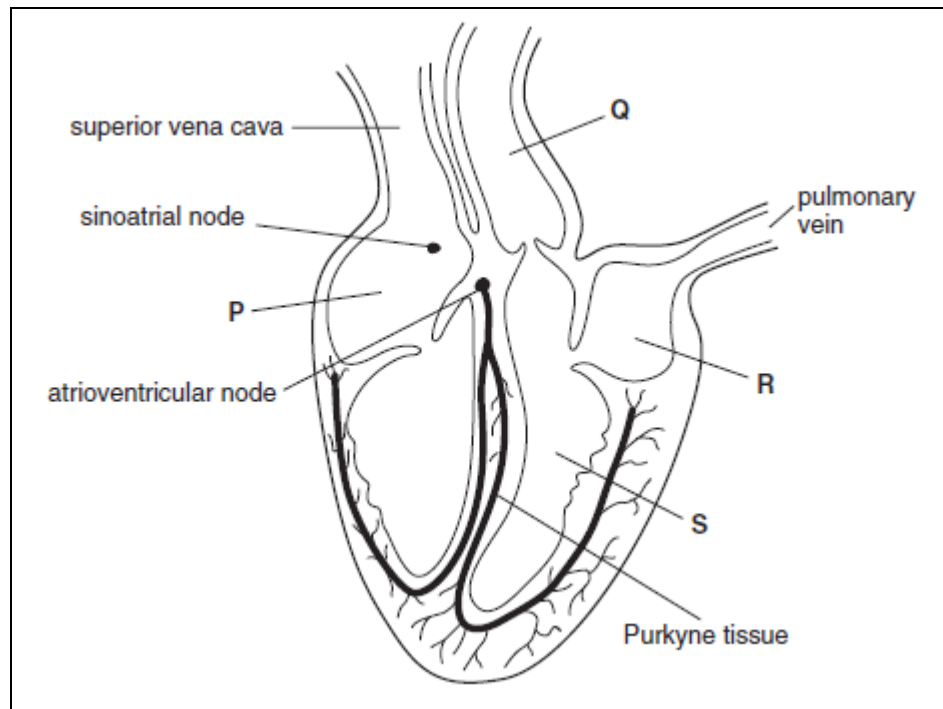


Fig. 1.1

- (i) Name the structure labeled P, Q, R and S. (2 marks)
- (ii) Explain why the wall of chamber S is much thicker than the wall of chamber R. (2 marks)
- (e) Fig. 1.2 shows the cardiac cycle of an adult human.

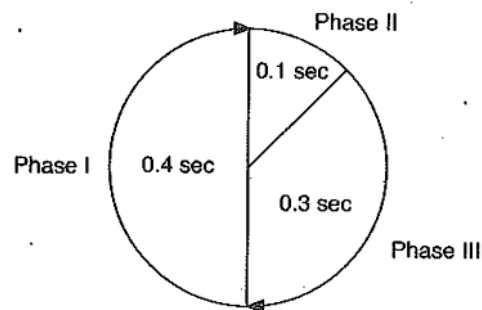


Fig.1.2

- (i) Based on Fig. 1.2, what is the heart beat in one minute? (1 mark)

- (ii) The cardiac cycle can be divided into **THREE (3)** phases. Briefly explain what happen to the heart chambers in each phase. (3 marks)

Question 2

- (a) Fig. 2.1 shows three different T lymphocytes and the events occur during an immune response to an antigen.

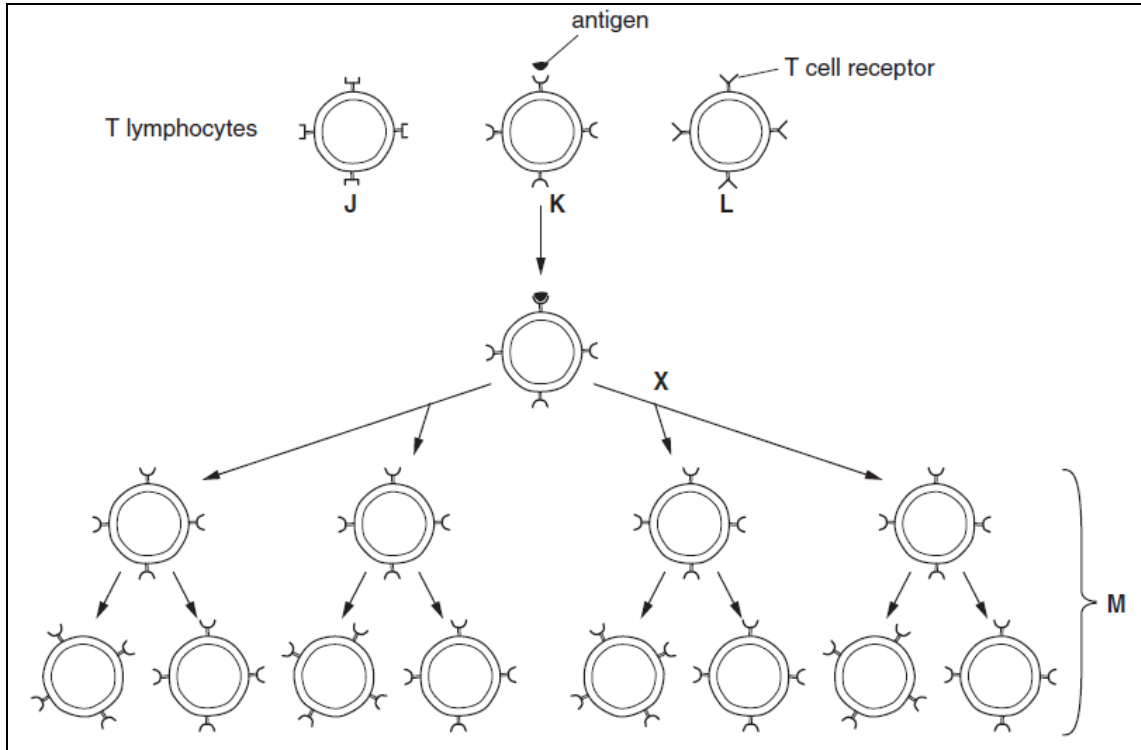


Fig. 2.1

- (i) Explain why T lymphocyte K has responded to the antigen during the immune response but not T lymphocytes J and L. (2 marks)
- (ii) State the term used to describe the phenomenon in (i) above. (1 mark)
- (iii) Name the type of nuclear division that occurs at X (1 mark)
- (iv) Describe the role of helper T lymphocytes in fighting an infectious disease. (4 marks)

- (b) Cholera bacteria release the enzyme neuraminidase which alters some of the surface proteins on the membranes of epithelial cells in the small intestine. A potential vaccine for cholera was trialled on volunteers. Fig 2.2 below shows the concentration of antibodies against cholera in the blood of a volunteer who received a first injection at week 0, followed by a booster injection at week 15.

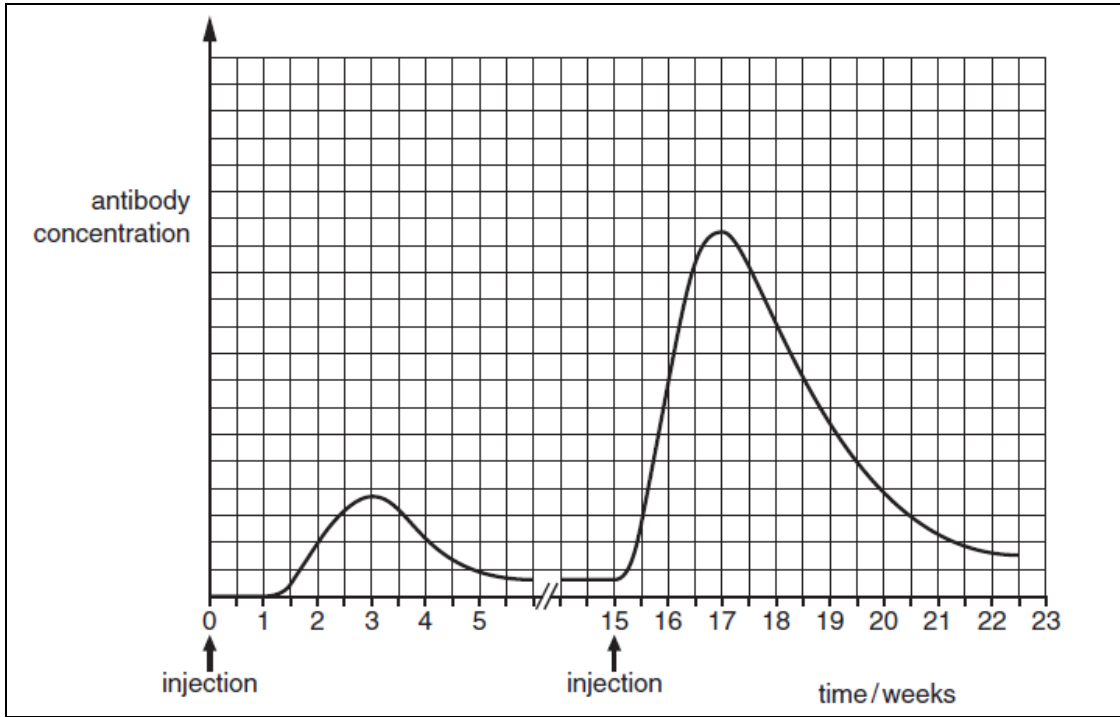


Fig. 2.2

Using the information in Fig. 2.2, explain the differences between the responses to the first injection and the booster injection.

(4 marks)

- (c) Samples of blood from **TWO (2)** patients were tested to determine the blood type. Table below shows the result of the test.

Patient	Anti-A serum	Anti-B serum	Anti-D serum
A	No Agglutination	Agglutination	No agglutination
B	No agglutination	No agglutination	Agglutination

Identify the blood type for patient A and B including rhesus type. To whom should patient B not give blood to? Why?

(3 marks)

- (d) Figure 2.3 shows the changes in potential difference (p.d.) across the membrane of a neurone over a period of time. The membrane was stimulated at time **A** and time **B** with stimuli of different intensities.

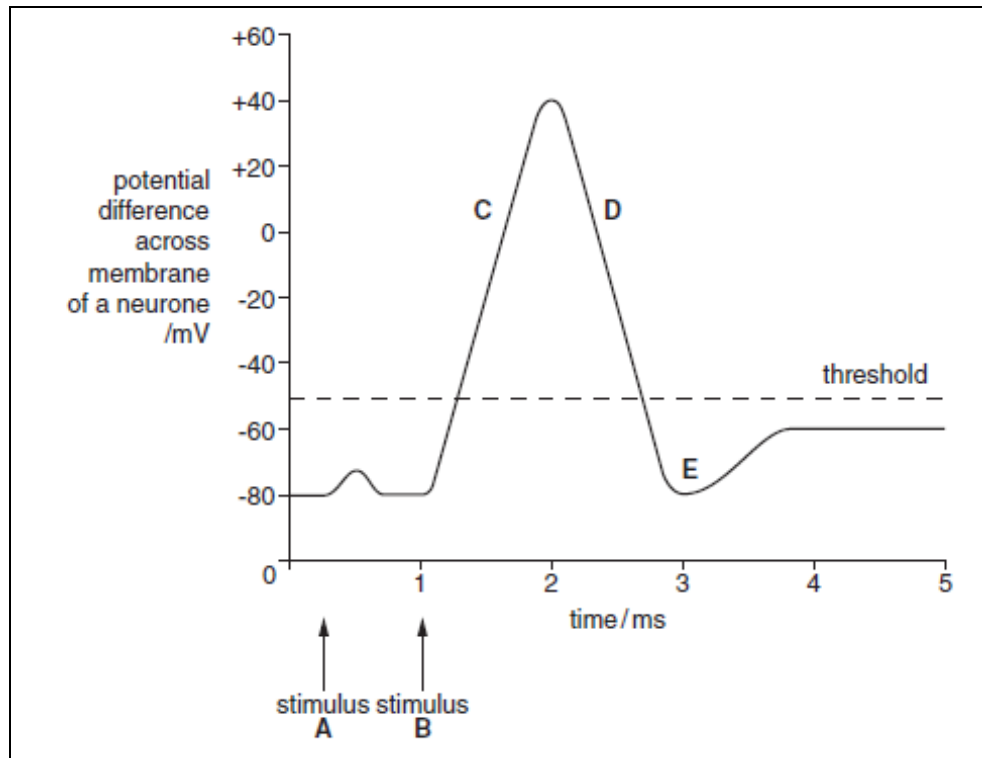


Fig. 2.3

- (i) Stimulus **B** resulted in an action potential. Describe what is occurring at **C**, **D** and **E**. (6 marks)
- (ii) Suggest why stimulus **A** did not result in an action potential being produced whereas stimulus **B** did. (1 marks)
- (iii) State **THREE (3)** differences between nervous and hormonal communication in mammals. (3 marks)

Question 3

(a) Figure 3.1 shows the structure of a nephron.

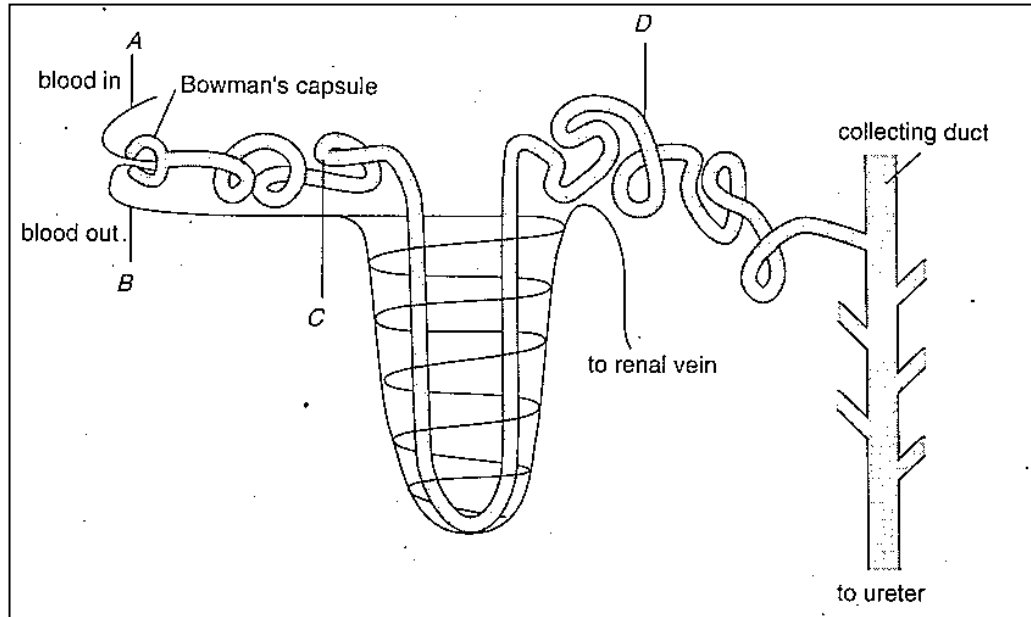


Fig. 3.1

- (i) Name the parts labeled A, B, C and D. (2 marks)
- (ii) Name the process that takes place in glomerulus. (1 mark)
- (iii) Give **ONE (1)** feature of the blood vessels associated with the glomerulus and explain how this feature facilitates the process taken place in (ii). (2 marks)

(b) Table 3.1 shows a comparison of the contents of various solutes in the blood plasma entering the kidney, glomerular filtrate and urine.

Table 3.1

Solute	Concentration of solute (g/liter)		
	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

- (i) Why glucose is not found in the urine excreted? (2 marks)

- (ii) Why protein is not found in the glomerular filtrate? (2 marks)
- (c) Explain negative feedback in controlling blood glucose level. (7 marks)
- (d) Fig. 3.2 shows simplified processes that occur in the human menstrual cycle.

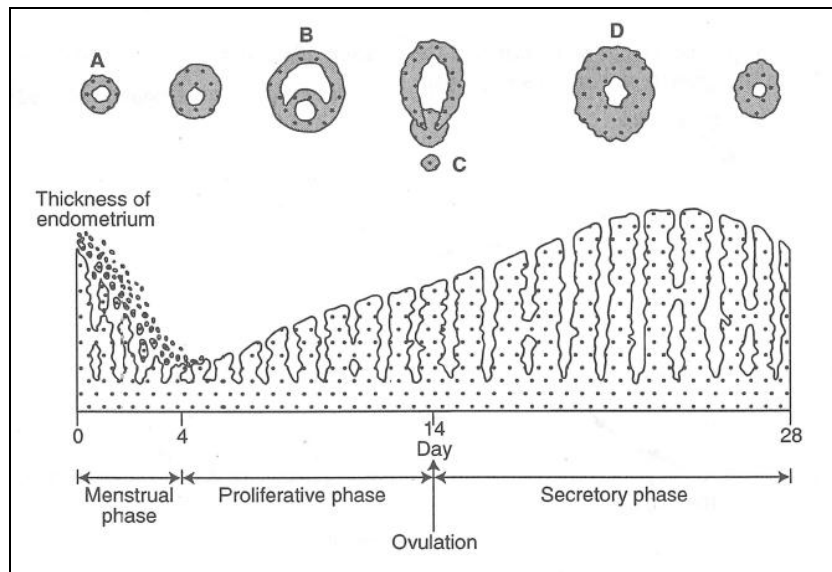


Fig. 3.2

- (i) Name structures labeled A, C and D. (3 marks)
- (ii) Explain the relationship between the breakdown of the endometrium on the first four days of a menstrual cycle with the concentration of progesterone. (2 marks)
- (iii) What is the relationship between the development of structure A into B with the increase in the thickness of the endometrium from the 4th day until the 13th day of the menstrual cycle? (2 marks)
- (iv) Explain the relationship between structure D with the increase in the thickness of the endometrium from the 14th day of the menstrual cycle. (2 marks)

Question 4

- (a) List **FIVE (5)** main types of plant tissues. State **ONE (1)** function for each of them and where it could be found in the plants (10 marks)

- (b) (i) State **THREE (3)** benefits that are provided by fungi in a plant's root. (3 marks)
- (ii) What is the function of the Casparian strip? (2 marks)
- (iii) What are the **TWO (2)** special properties of water that help transpiration to pull xylem sap up the tree? Briefly explain your answer. (4 marks)
- (c) Fig. 4.1 shows the exposure of plant species X to various periods of light (unshaded bars) and dark (shaded bars). In some cases the dark period was interrupted by periods of light. The effect on flowering is shown in each case. Critical night length for the plant is 12 hours.

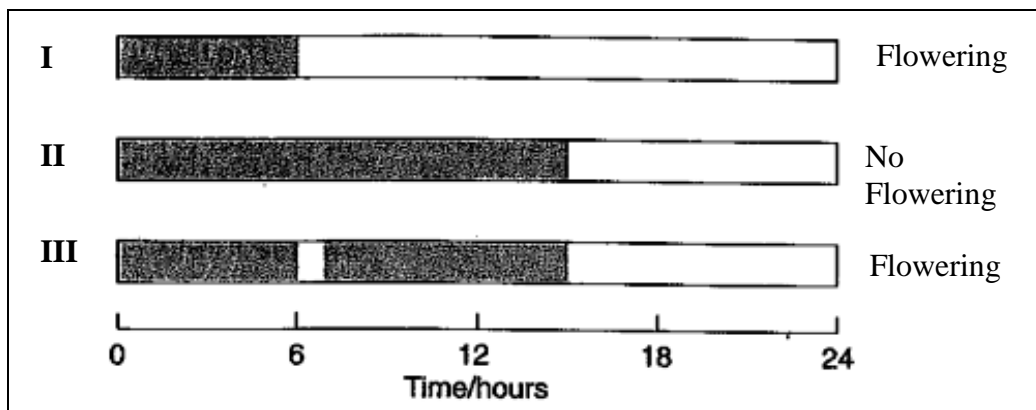
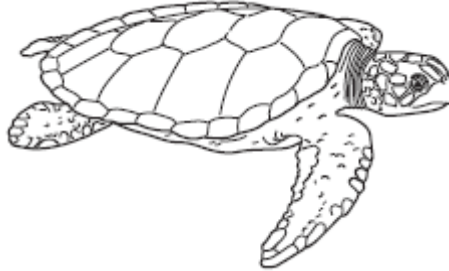


Fig. 4.1

- (i) To which photoperiodic group does the plant belong? Why? (2 marks)
- (ii) Explain the result of treatment labeled II and III. (3marks)
- (iii) What is meant by 'day-neutral plants'? (1 mark)

Question 5

- (a) The flatback turtle, *Natator depressus*, is an endangered species that nests on northern Australian beaches. Fig. 5.1 shows a flatback turtle.



Each female lays approximately 50 eggs per nest, which is a smaller number than all other species of marine turtle. The eggs are buried in the sand and when the hatchlings emerge each has a mass of approximately 43 g. Unlike most marine turtles, flatback turtles spend most of their time in coastal waters. This is where they feed and mate.

Fig. 5.1 shows the numbers of female flatback turtles nesting on a beach in northern Australia between 1993 and 2002.

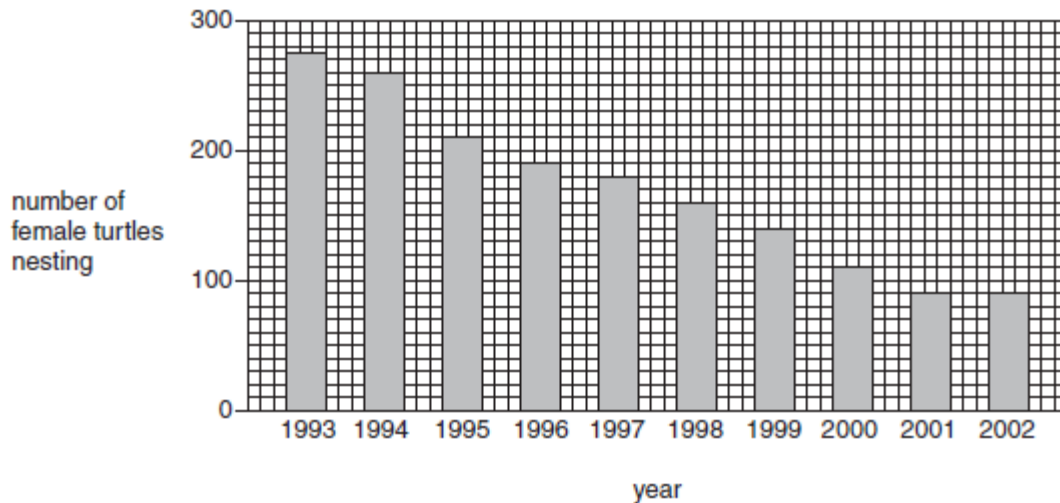
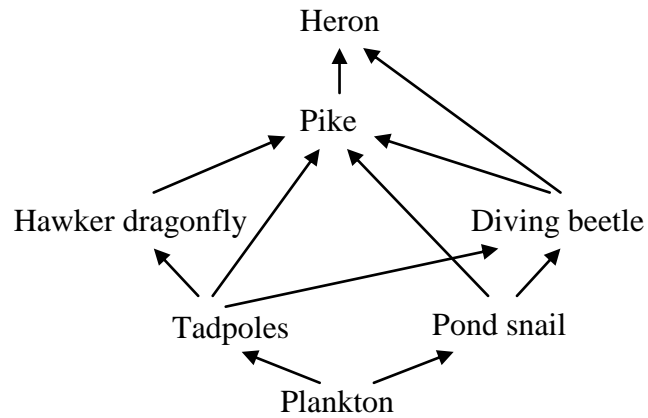


Fig. 5.1

- (i) Calculate the mean rate of decrease in the numbers of females nesting between 1993 and 2002. Show all the steps in your calculation. (2marks)
- (ii) Suggest **FIVE (5)** ways in which the flatback turtle could be protected. (5 marks)

(b) The food web shown in the diagram below illustrates a feeding pattern in a pond.



- (i) Explain 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 other organisms at the same trophic level in the pond. (3 marks)

- (iii) Why the trophic levels limited to four and five levels only? (3 marks)

- (c) Fig. 5.2 illustrates the accumulation of gases in the atmosphere as a result of human activities.

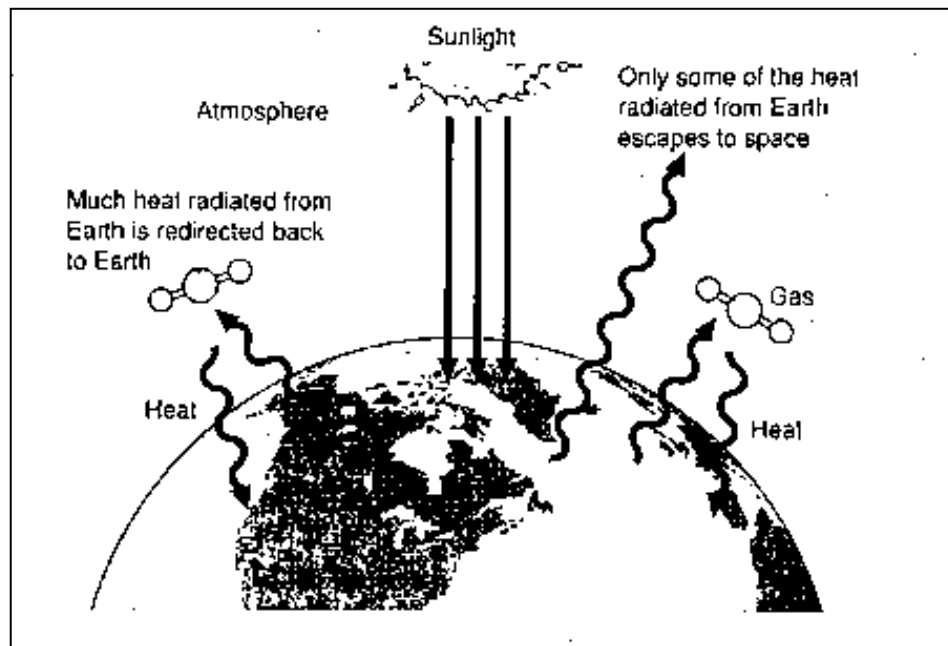


Fig. 5.2

- (i) Give **TWO (2)** examples of gases that accumulate in the atmosphere as a result of human activities. (2 marks)
- (ii) How do these gases cause global warming? (6 marks)
- (ii) State **TWO (2)** probable effects of global warming. (2 marks)

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