

Candidate Name	Centre Number	Candidate Number

WELSH JOINT EDUCATION COMMITTEE
General Certificate of Secondary Education



CYD-BWYLLGOR ADDYSG CYMRU
Tystysgrif Gyffredinol Addysg Uwchradd

239/02

ADDITIONAL SCIENCE

HIGHER TIER (Grades D-A*)

BIOLOGY 2

P. M. WEDNESDAY, 6 June 2007

(45 minutes)

For Examiner's use only	
Total Marks	

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator.

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

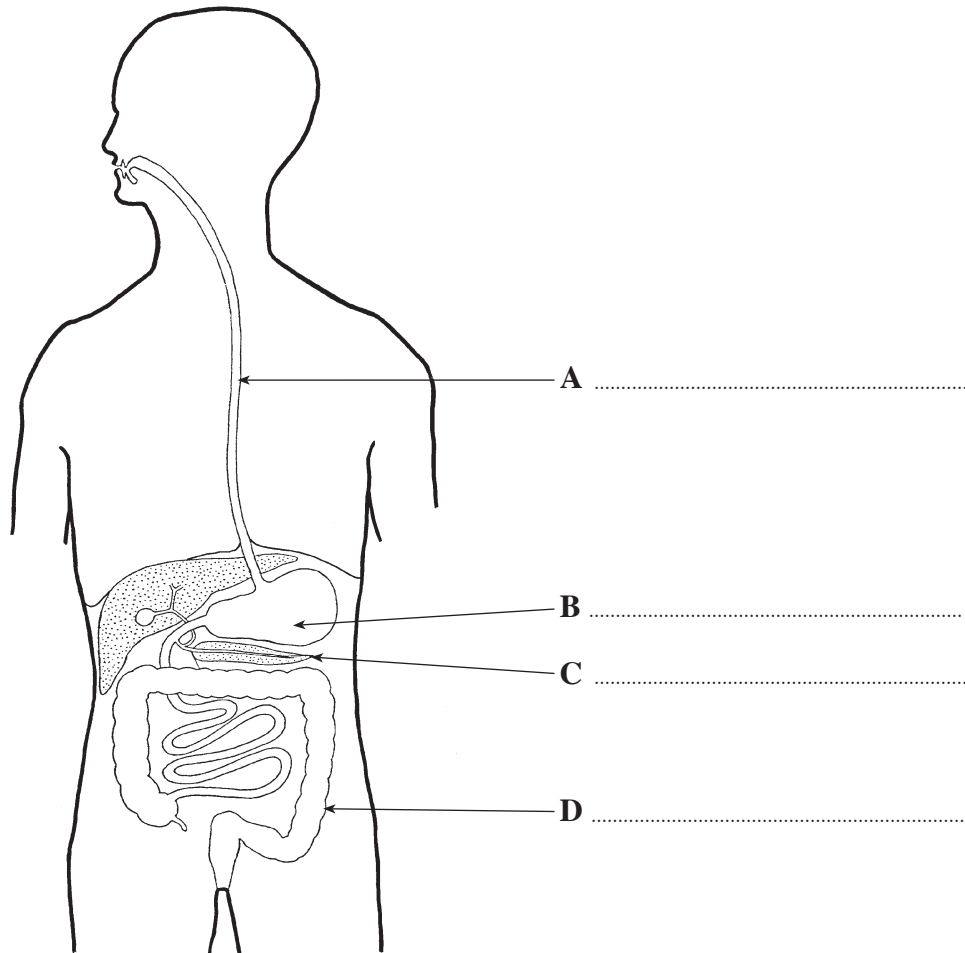
The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

Answer **all** questions.

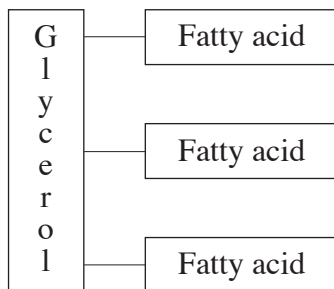
1. The diagram below shows the human digestive system.



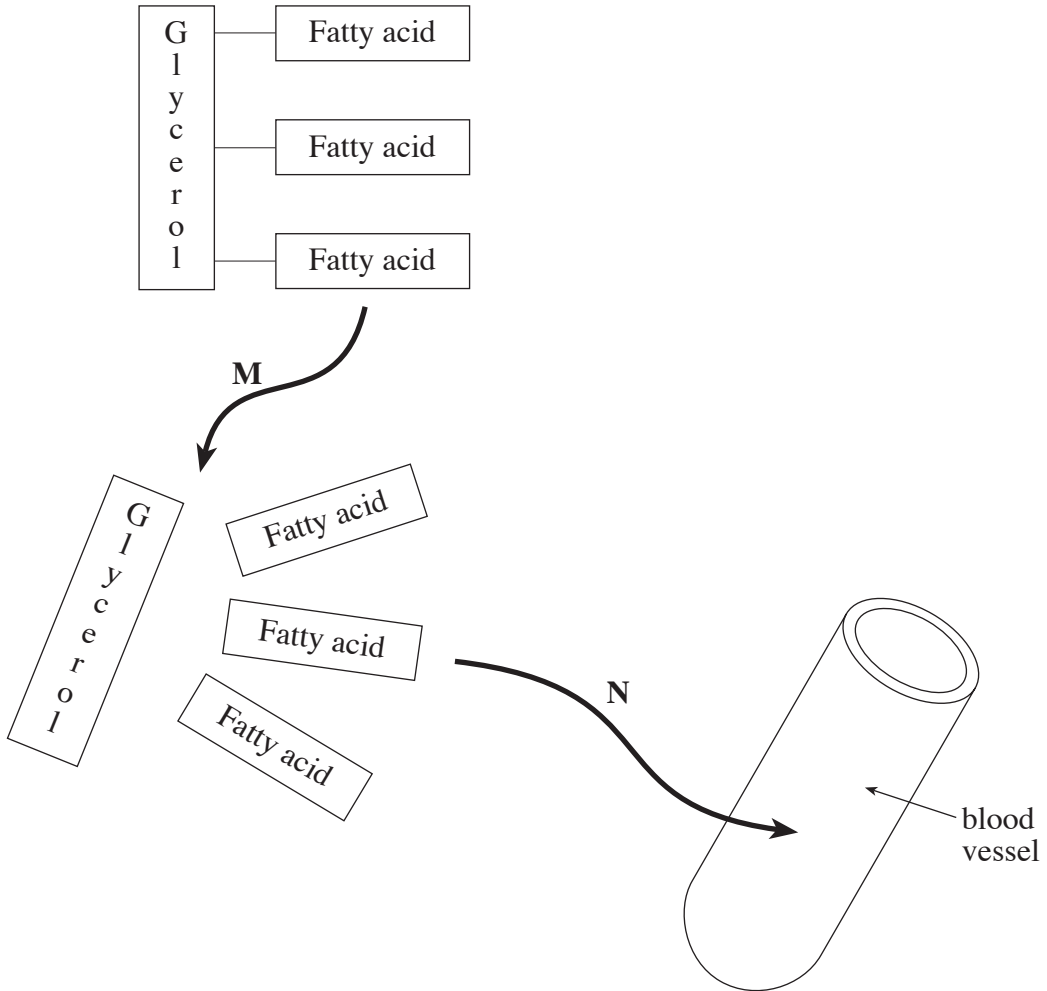
(a) Label the parts **A-D** on the diagram. [4]

(b) (i) Name the food molecule shown in the diagram below. [1]

.....



(ii) The diagram below shows two processes, **M** and **N**, that occur in the small intestine.



Name processes **M** and **N**.

[2]

M

N

2. The following article appeared on BBC news on-line (5 Feb, 2003).

Alien species 'costing Africa billions'

Plants and animals introduced from other continents are placing a huge burden on Africa. One of these alien species is the water hyacinth, a native of South America brought to Africa as an ornamental plant.



It has now spread to most of the continent's lakes and rivers, and can form huge mats of floating vegetation. These deprive life beneath the surface of light and oxygen, and reduce biodiversity, particularly fish species.



Lake covered by water hyacinth

(BBC news on-line)

The hyacinth can make fishing impossible and seriously affect water supplies, shipping and power generation. Able to double its mass in 12 days, it grows faster than mechanical cutters can clear it. The best option is biological control using species of beetles, moths, mites and fungi.

(a) Use the information on page 4 to help you answer the following questions.

(i) What is meant by an *alien* species? [1]

.....
.....

(ii) Give **two** ways in which the water hyacinth affects the lives of people living near where it grows. [2]

(I)

(II)

(iii) State what is meant by *biological control*. [1]

.....
.....

(iv) Why must biological control be used with care? [1]

.....
.....

(b) Suggest why herbicides (weedkillers) are not used to destroy the water hyacinth. [1]

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.....

(c) Suggest **two** ways in which governments could prevent the release of alien species into the wild. [2]

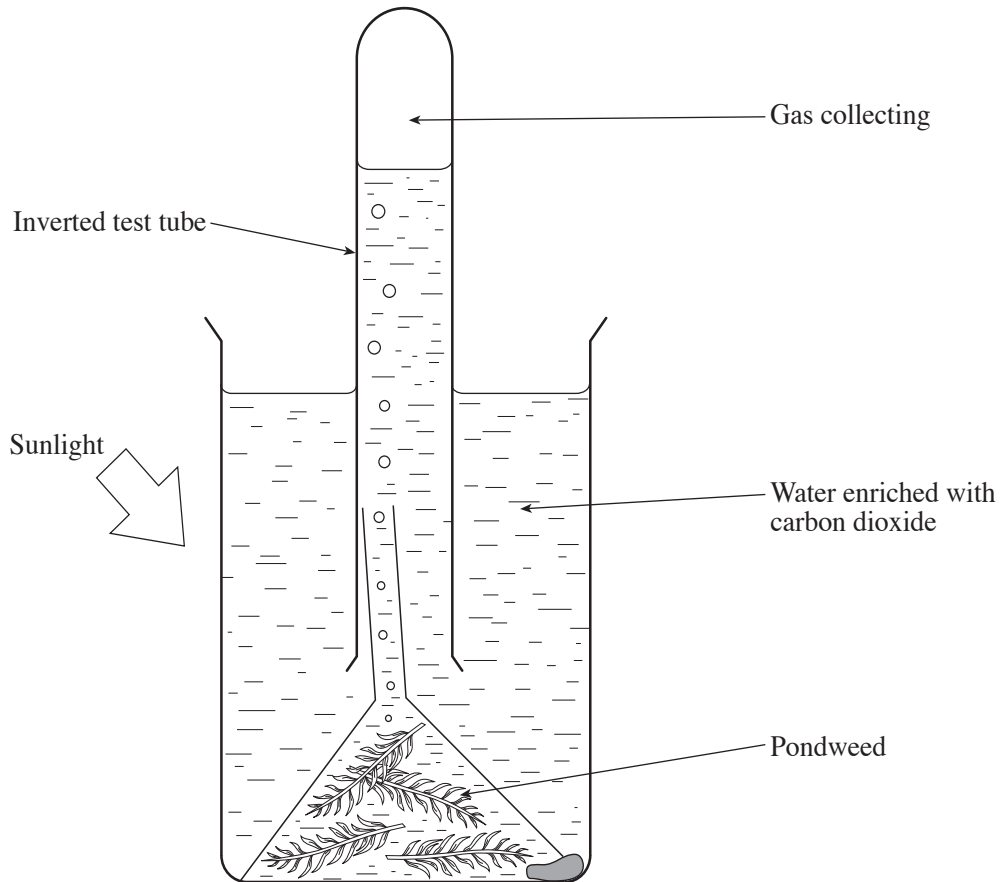
(i)

.....

(ii)

.....

3. The apparatus below was placed in strong sunlight. After a period of 20 minutes, the pondweed produced bubbles of a gas which collected at the top of the inverted test tube.



- (a) (i) Name the gas collecting at the top of the test tube. [1]

.....

- (ii) Name the process taking place in the plant which results in the production of the gas. [1]

.....

- (iii) Suggest how you could determine **the rate** at which this process is taking place. [2]

.....

- (b) Using the apparatus shown on page 6 and a lamp, describe how you could investigate the effect of light intensity on the rate of this process. [3]

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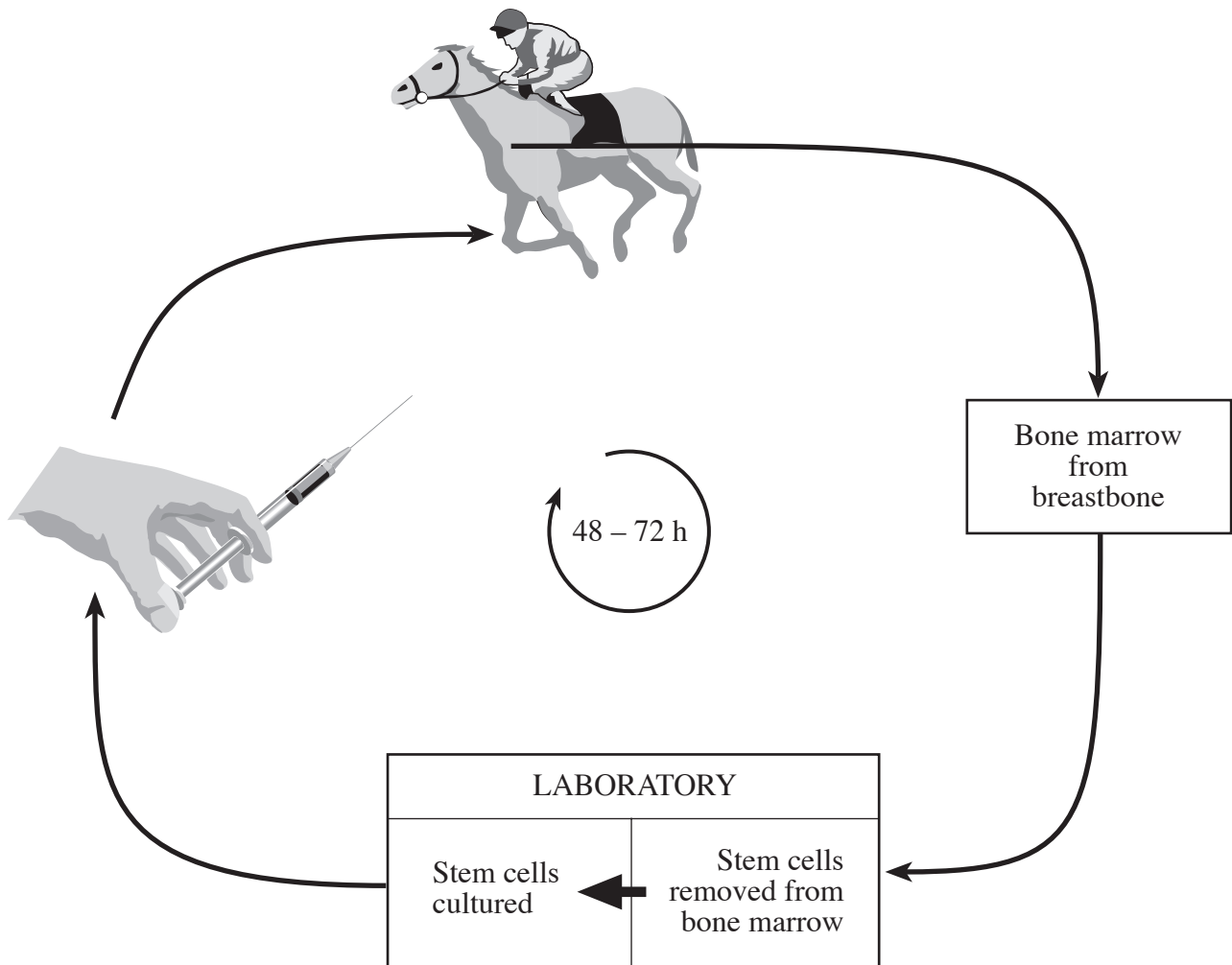
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4. Tendons are tissues that attach muscles to bones.
Recent treatment of sports horses with leg tendon injuries involves the injection of stem cells into the tendon. Stem cells from bone marrow behave like embryonic stem cells.
Bone marrow is obtained from the breastbone of the horse and sent to a laboratory where the stem cells are cultured (grown).
After 48-72 hours the stem cells are injected into the injured tendon.
This process is shown below.



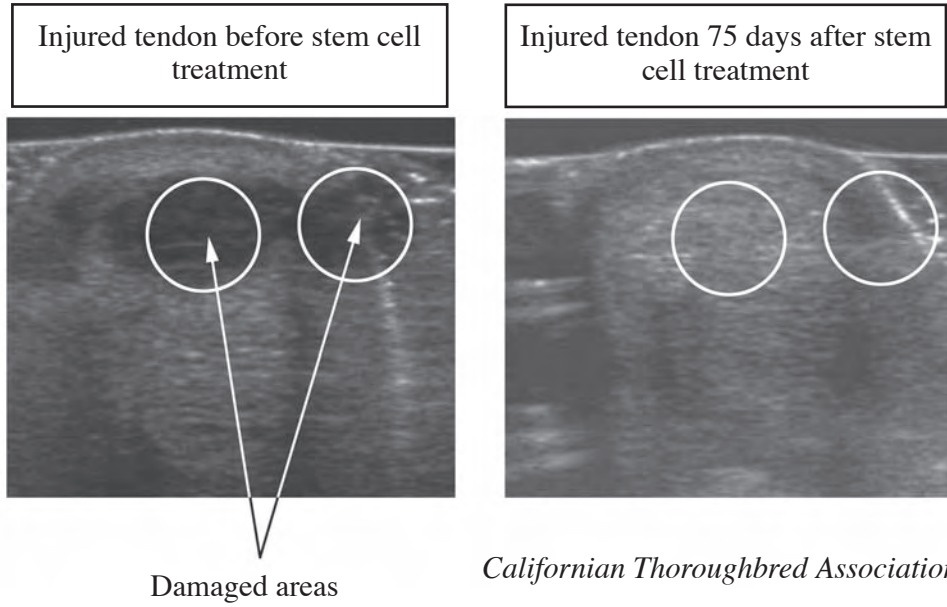
(a) What are stem cells?

[1]

.....

.....

- (b) The photograph below shows ultrasound scans of an injured leg tendon of a horse before and after stem cell treatment.



Explain **how** the stem cells have helped to repair the tendon.

[1]

.....

.....

- (c) The use of human embryonic stem cells is regulated because this kind of stem cell comes from human embryos. Why are many people concerned about using stem cells from human embryos?

[1]

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.....

5. In 2005 a 150m length of roadside hedgerow needed to be cut back, for building development, between Llanllowell and Llantrisant in South Wales.
The area was an important breeding ground in spring for four species of butterfly and a species of moth. Also growing there were eleven species of plants that flowered in May.
Before work took place the possible impact on the environment had to be assessed.

(a) Given **only** the above information, underline **three** of the following regulations which would be the *most important* to consider. [3]

- Wildlife and Countryside Act 1981
- The Control of Pollution Act 1974
- Hedgerows Regulations 1997
- Protection of Badgers Act 1992
- The Water Industries Act 1991
- Hazardous Waste Regulations 2005
- The Conservation (Natural Habitats) Regulations 1994.

(b) It was decided that no work should take place until September. Suggest why this decision was made. [2]

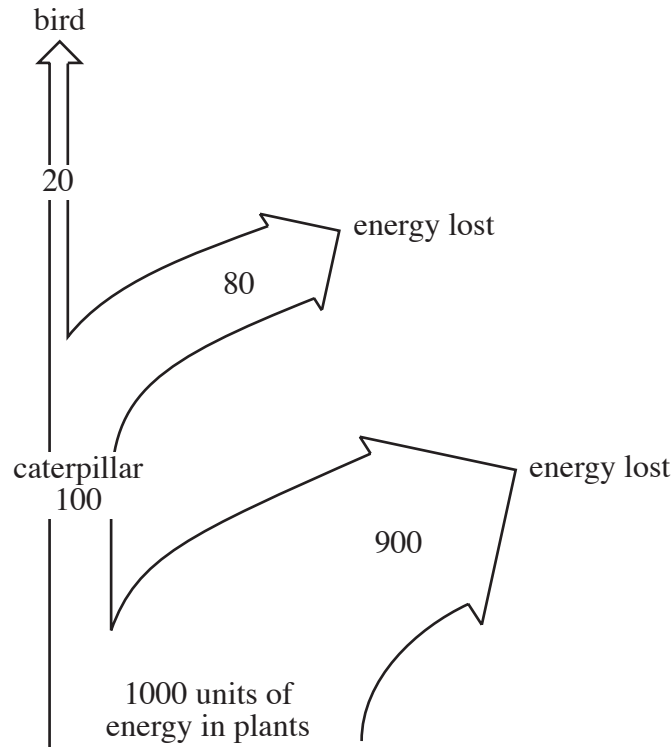
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6. Energy enters food chains in the form of sunlight.
The diagram shows the transfer of units of energy through a food chain.



- (a) Use the diagram to calculate the percentage of energy in the plant that is transferred to the bird. Show your working. [2]

Answer%

- (b) Energy is transferred through the food chain in compounds containing carbon. Name **one** of these compounds. [1]

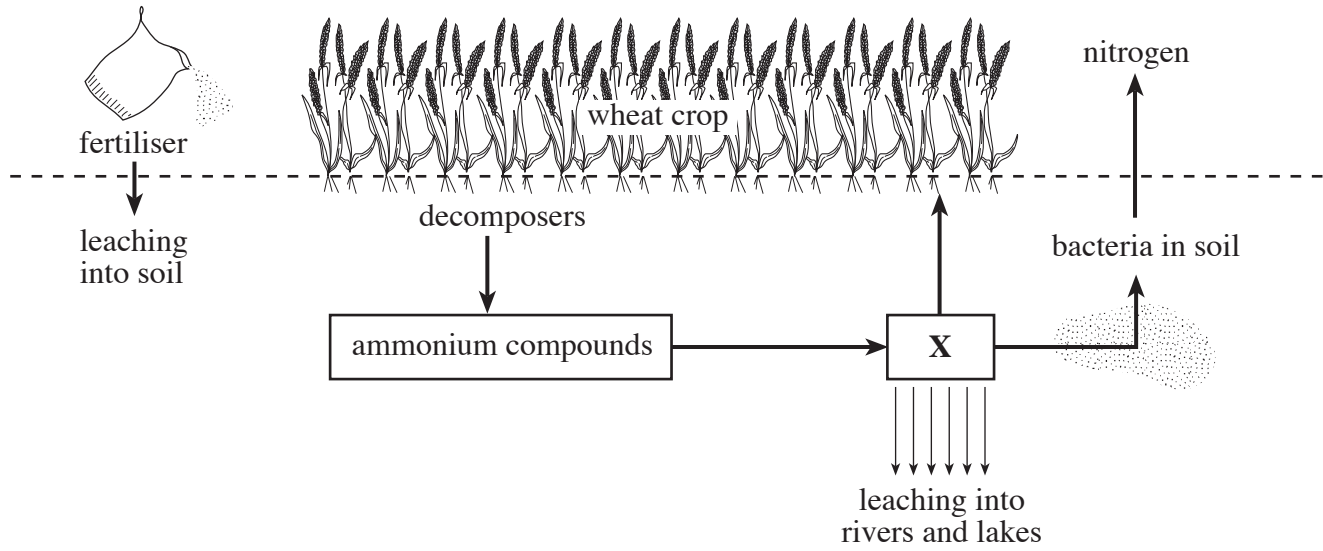
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- (c) State **two** ways in which energy is “lost” from the food chain. [2]

(i)

(ii)

7. The diagram shows part of the nitrogen cycle when wheat is grown by intensive farming.



(a) In what form is the nitrogen at **X** when it is taken up by the wheat? [1]

.....

(b) Explain how the leaching process shown in the diagram causes water pollution and may lead to the death of fish. [4]

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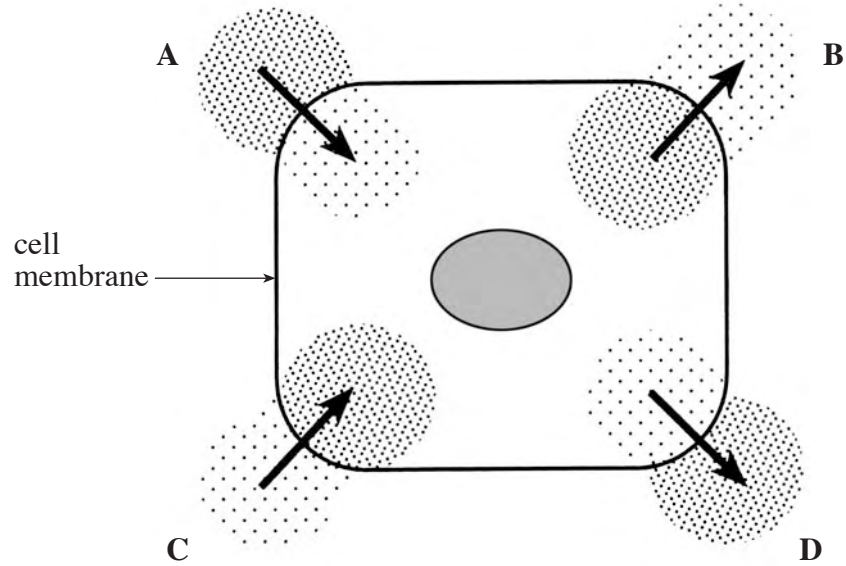
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8. The diagram shows four ways in which substances may enter and leave a cell in the small intestine.
The dots show the concentration of different substances.



- (a) Complete the following table to show which arrow represents the movement of oxygen, carbon dioxide and glucose. Name the process involved in the movement of each substance and give the reason for your answer. [9]

<i>Substance</i>	<i>Letter</i>	<i>Process</i>	<i>Reason</i>
carbon dioxide			
glucose			
oxygen			

- (b) What chemical would be produced in a muscle cell that is respiring *anaerobically*? [1]

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