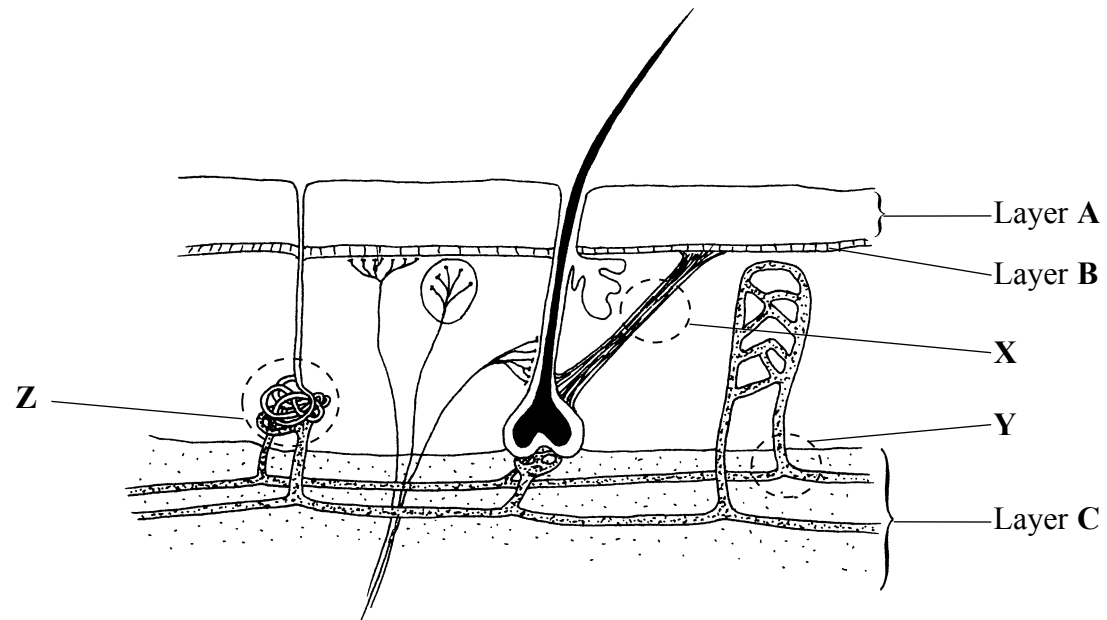


Answer ALL questions in the spaces provided

1. The diagram below shows a section through the skin.



(a) State **one** function of each of the layers labelled **A**, **B** and **C**.

A

B

C

(3)



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blank

(b) If the skin is exposed to a low temperature, changes occur in regions **X**, **Y** and **Z**.
For each region, describe the change that would occur and explain how it helps to
maintain a constant body temperature.

(i) Change at **X**

.....

.....

.....

(2)

(ii) Change at **Y**

.....

.....

.....

(2)

(iii) Change at **Z**

.....

.....

.....

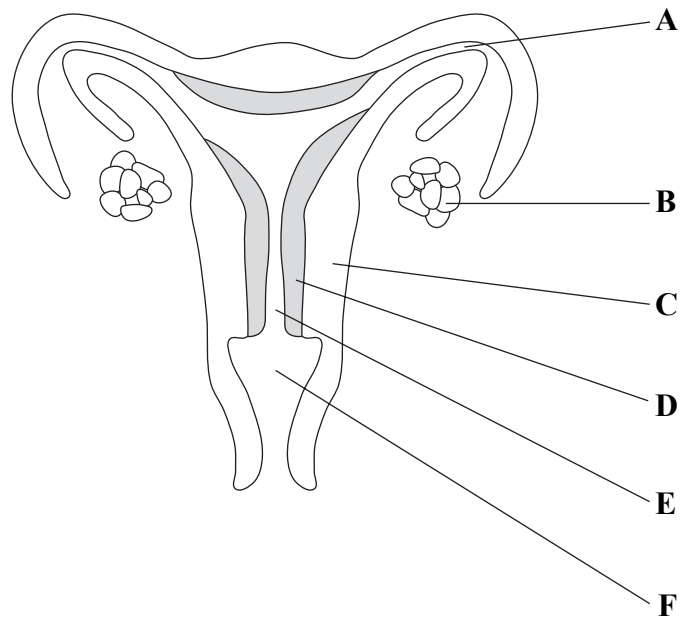
(2)

(Total 9 marks)

Q1



2. The diagram below shows the female reproductive system with parts labelled A to F.



(a) (i) Complete the table below by choosing the correct letter from the diagram.

Statement	Letter
Oestrogen is produced here.	
It is shed each month during menstruation.	
Sperms are deposited here.	
It sometimes becomes blocked as a result of gonorrhoea.	
These muscles contract and push the baby out during birth.	

(5)

(ii) On the diagram, mark with a label line and the letter X a place where successful implantation might occur.

(1)



(b) It is important to maintain a high progesterone level throughout pregnancy.

(i) Explain the reason for this.

.....
.....
.....
.....

(2)

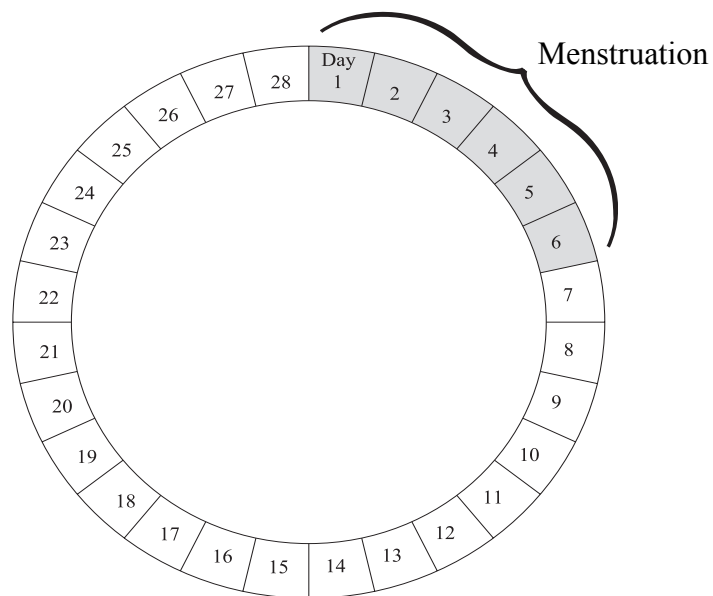
(ii) Which structure produces progesterone during the first three months of pregnancy, and which during the last six months?

First 3 months

Last 6 months

(2)

(c) The diagram below shows the menstrual cycle.



On the diagram use arrows and the letters **J** and **K** to show **two** occasions when sudden large hormone changes may occur.

(2)

Q2

(Total 12 marks)



3. Two students, **A** and **B**, ran round their school field for two minutes.

The table below shows their breathing rates just before the exercise started, as soon as the exercise stopped and then at two minute intervals for 10 minutes after the exercise had stopped.

Time	Breathing rate in breaths per minute	
	Student A	Student B
Just before start of exercise	15	13
As soon as exercise stopped	40	27
2 minutes after exercise stopped	34	18
4 minutes after exercise stopped	26	14
6 minutes after exercise stopped	18	13
8 minutes after exercise stopped	16	13
10 minutes after exercise stopped	15	13

(a) (i) For student **A**, calculate the maximum change in breathing rate caused by the exercise.

Change in breathing rate (1)

(ii) For student **B**, how long did it take for the breathing rate after exercise to return to the rate just before the exercise started?

..... (1)

(iii) Suggest which student is more likely to be a regular athlete. Give a reason for your answer.

Student

Reason

.....

(3)



(b) Explain why the breathing rate does not return to normal as soon as the exercise stops.

.....
.....
.....
.....
.....
.....

(3)

(Total 8 marks)

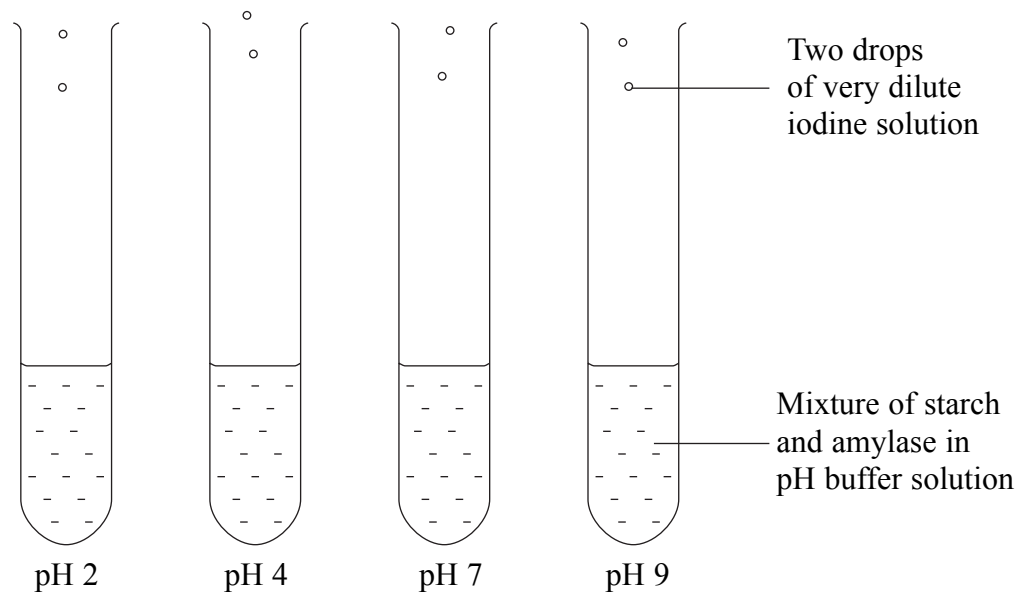
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Q3



4. A student set up an investigation to find the pH at which amylase digests starch most rapidly. This is shown in the diagram below.

One method of testing for the presence of starch is to add one or two drops of very dilute iodine solution to the starch mixture and time how long it takes for the starch to disappear.



(a) (i) What colour would the student see in the starch mixture when the iodine solution was added?

..... (1)

(ii) As the starch is broken down, what colour change would the student see?

..... (1)

(iii) State **two** precautions the student should take if a fair comparison is to be made of the rate of digestion at the different pH values.

1

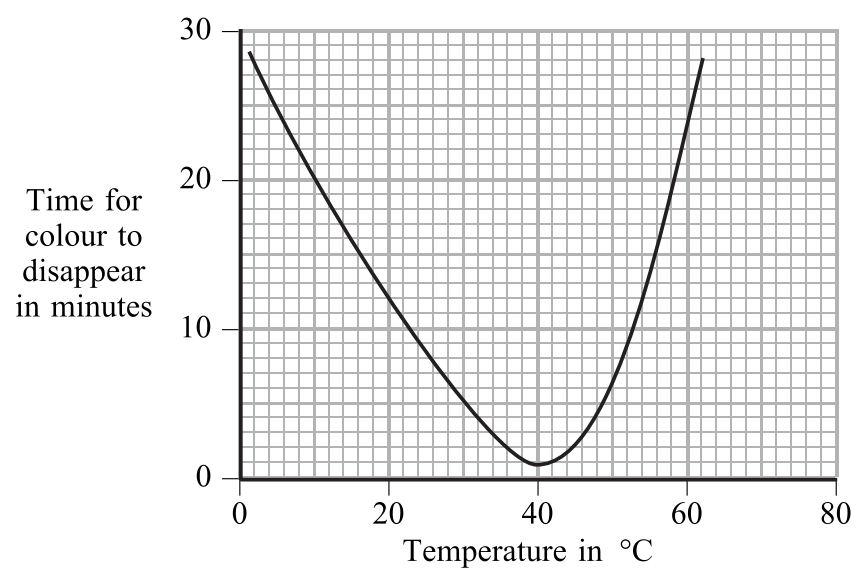
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2

..... (2)



(b) The graph below shows the results of the effect of different temperatures on another enzyme-controlled reaction. As the reaction progresses, the colour of the reagent disappears.



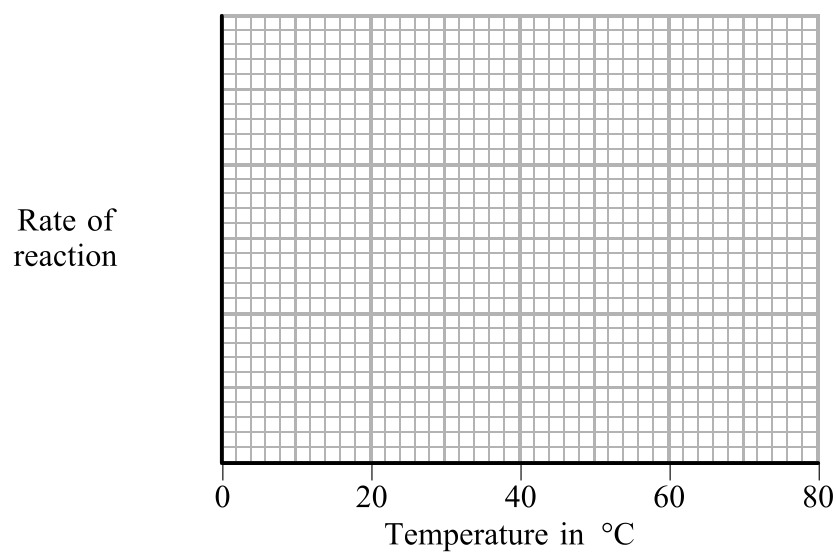
(i) What is the optimum temperature for this enzyme?

..... (1)

(ii) Explain how the enzyme was affected when the temperature changed from 40°C to 60°C.

.....
.....
..... (2)

(iii) On the graph grid below, sketch a line to represent the rate of reaction for this enzyme over the same range of temperature, as shown on the graph above.



(1)



Leave blank

(c) Enzymes control reactions that occur in the body. Complete the table below by selecting from the list the site where each of the following reactions, controlled by enzymes, occurs.

- duodenum**
- mitochondrion**
- red blood cell**
- white blood cell**
- liver**
- pancreas**
- synapse**

Reaction	Site of reaction
Amino acids are converted to urea.	
Energy is released from glucose in a cell.	
Antibodies are made from amino acids.	
Fats are broken down into fatty acids and glycerol.	

(4)

(d) Enzymes are proteins. Describe how enzymes are made in cells.

.....

.....

.....

.....

.....

.....

.....

(3)

Q4

(Total 15 marks)



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5. Read the following paragraph about digestion. Write on the dotted lines the most suitable word or words to complete the account.

A diet that contains all the nutrients required in the right quantities for an individual is described as a diet. This diet would include fats, carbohydrates, proteins, fibre, water, vitamins and Most of the carbohydrate is likely to be eaten in the form of together with small amounts of sugar. Carbohydrate is an important source of The fibre in the diet cannot be but it is important because it helps to move the food along the gut by Only very small quantities of vitamins are needed to prevent For example, vitamin is needed to prevent rickets.

(Total 8 marks)

Q5



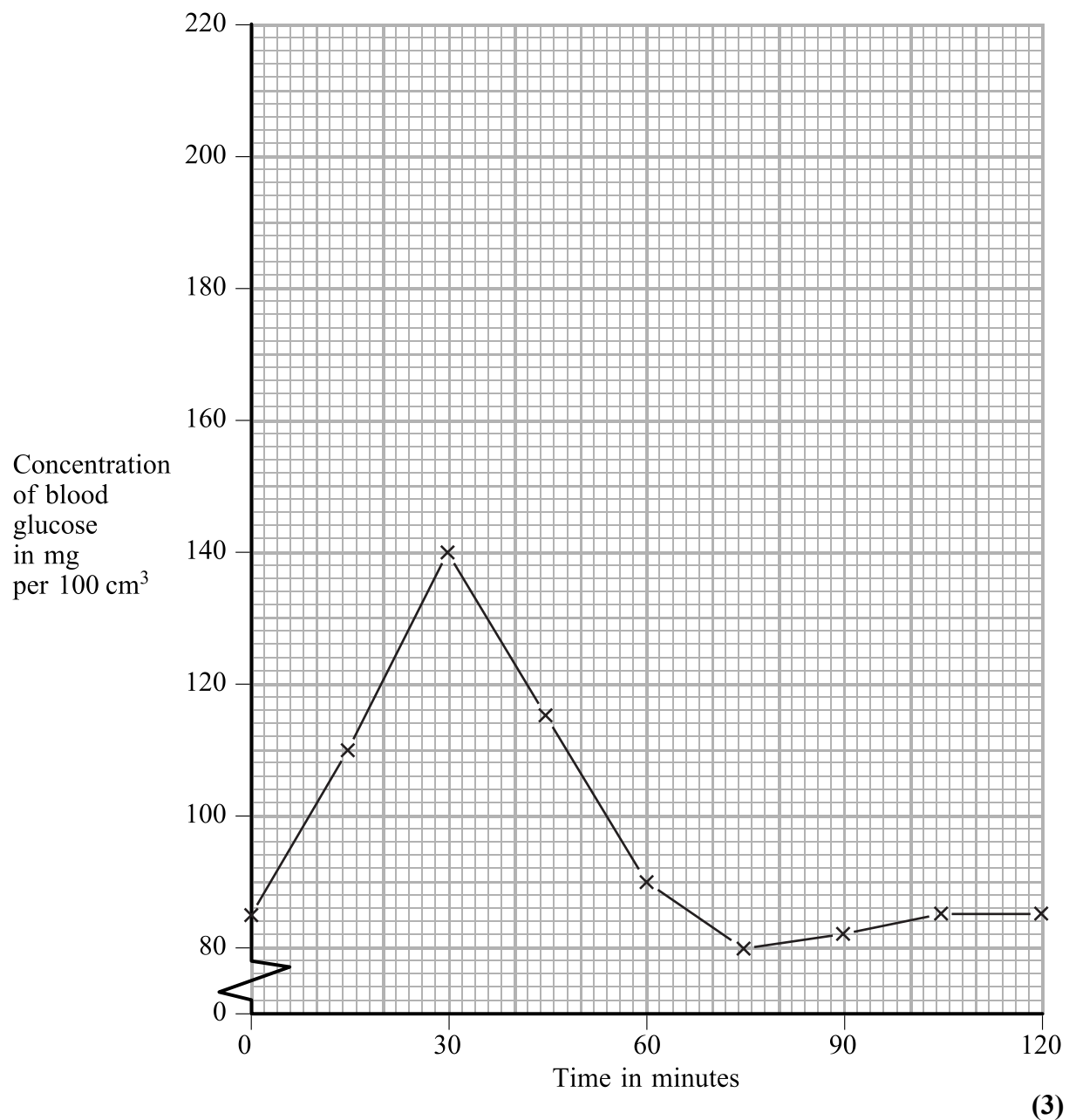
6. In an investigation, the blood glucose concentration of two students, **A** and **B**, was measured. Then each student drank a similar can of fruit juice. The concentration of their blood glucose was measured again at 15-minute intervals over a two-hour period. The results are shown in the table below.

Time after drinking fruit juice in minutes	Concentration of blood glucose in mg per 100 cm ³ of blood	
	Student A	Student B
0	85	87
15	110	125
30	140	170
45	115	190
60	90	210
75	80	210
90	82	200
105	85	180
120	85	145



(a) (i) The results for student **A** are shown on the graph below.

On the same grid plot the results for student **B**.



(3)

(ii) In student **A**, how long after drinking the fruit juice does it take for the blood glucose concentration to begin to fall?

..... (1)

(iii) In student **A**, what occurs in the pancreas to stimulate this fall?

..... (1)

QUESTION 6 CONTINUES ON PAGE 15



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(iv) In student **A**, how does the activity in the liver help to bring about this fall?

.....
.....
.....
.....

(2)

(b) Student **B** has a disorder that means his pancreas is unable to act in the same way as that of student **A**.

(i) In student **B**, how long after the meal does it take for the blood glucose concentration to reach its maximum?

.....

(1)

(ii) Compare the maximum blood glucose concentrations of students **A** and **B**.

.....
.....

(1)

(iii) The blood glucose concentration of student **B** does eventually fall back to the resting level. Describe **two** ways in which the excess glucose in the blood is used or removed.

1

.....
.....
.....

2

.....
.....
.....

(4)

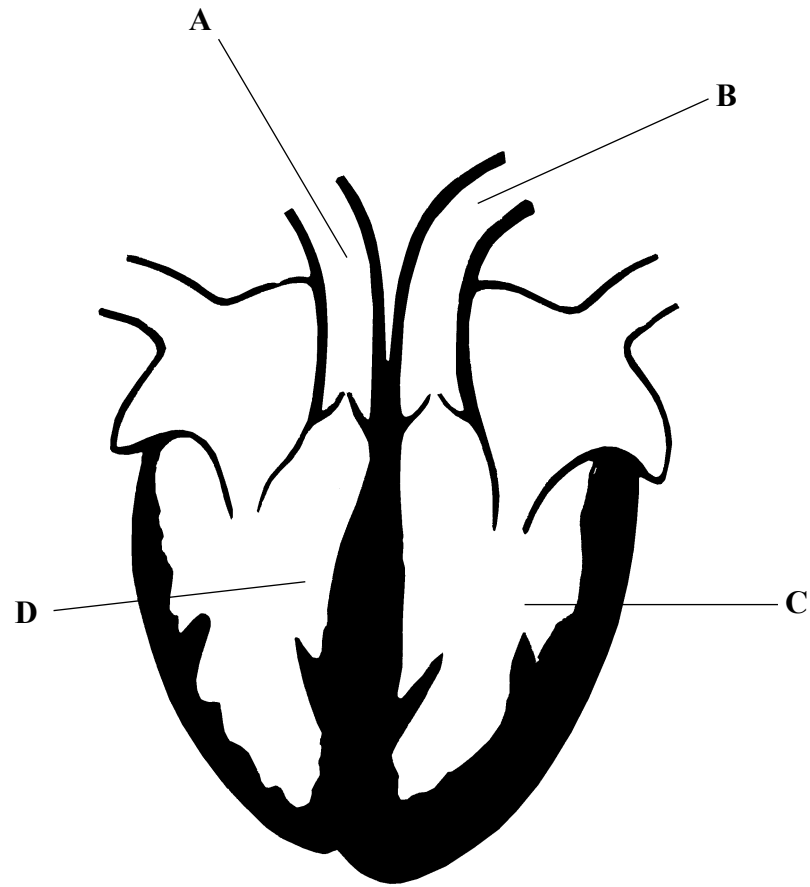
(Total 13 marks)

Q6

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7. The diagram below shows a section through the heart.



(a) (i) Name the parts labelled **A**, **B** and **C**.

A

B

C

(3)

(ii) State **two** ways in which the composition of the blood in vessel **A** differs from that of the blood in vessel **B**.

1

.....

2

.....

(2)



Leave blank

(b) (i) The heart is made of cardiac muscle. State **two** ways in which cardiac muscle differs from skeletal muscle.

1

.....

2

.....

(2)

(ii) The muscle in the walls of chamber **C** is much thicker than that in the walls of chamber **D**. Explain why this increase in thickness is of value to the heart.

.....

.....

.....

(2)

(c) Excess fluid from the tissues drains into the lymphatic system. This fluid returns to the blood through a vein, which leads to the right atrium.

(i) Name **two** substances that are likely to be present in greater quantities in the lymph than in the blood plasma. In each case state a reason for the greater quantity.

Substance 1

Reason

.....

Substance 2

Reason

.....

(4)

(ii) Suggest why the return of lymph to the blood circulation might present a problem if a person had a diet that is too high in fat.

.....

.....

(1)

(Total 14 marks)

Q7

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8. The table below gives details of the incidence of HIV in six major continents.

It also gives information about life expectancy, access to a safe water supply, infant mortality and level of income. Each of these gives some indication about social conditions in the same continents.

Feature	Continent					
	Europe	Africa	Asia	South America	North America	Oceania
% of 15 to 49 year-olds with HIV infections	0.5	6.1	0.4	0.6	0.6	0.2
Life expectancy of child born in 2005 in years	75	52	65	72	78	73
% with access to a safe water supply	100	85	94	95	100	99
Infant mortality per 1000 live births	7	88	57	26	7	29
% living on a very low income	0	66	58	24	0	0

(a) (i) In which continent is the incidence of HIV infection lowest?

.....
(1)

(ii) Compare the patterns of HIV infection and life expectancy. Use data from the table to support your answer.

.....

(3)

(iii) Suggest which continent appears to have the poorest social conditions. Use data from the table to support your answer.

.....

(2)



(b) Some people claim that the incidence of HIV infections is related to social conditions.

The table below gives information about three countries in one of the continents.

Country	% of 15 to 49 year-olds with HIV infections	% with access to a safe water supply	Infant mortality per 1000 live births	% living on a very low income
X	4.4	81	100	78
Y	21.5	98	43	34
Z	24.6	100	62	83

(i) Do the data in the table justify this claim? Explain your answer.

.....

(2)

(ii) No cure is known for AIDS but people with a higher standard of living may be able to delay the onset of AIDS-related infections. Suggest **one** way by which a higher standard of living may help delay this onset.

.....

(1)

(iii) Give **two** ways by which the spread of HIV from one person to another is prevented.

1

.....

2

.....

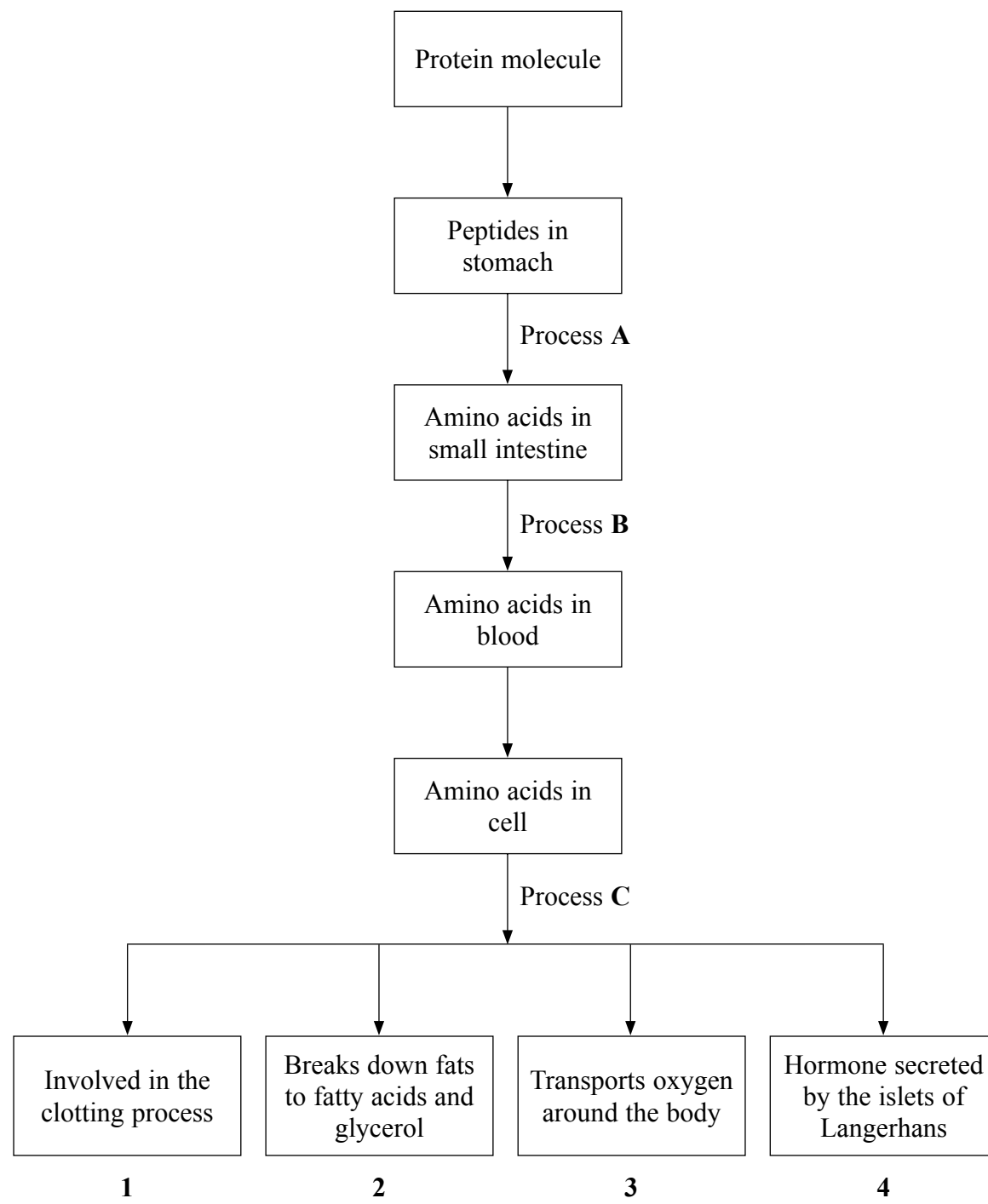
(2)

Q8

(Total 11 marks)



9. The flow chart below shows what may happen to a protein molecule in some fish eaten by a human.



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(a) (i) Name the processes **A**, **B** and **C**.

A

B

C

(3)

(ii) Process **A** uses enzymes. From where are these enzymes secreted?

.....

(1)

(iii) Which structures in the small intestine carry out process **B**?

.....

(1)

(iv) Which part of the cell brings about process **C**?

.....

(1)

(b) Many substances are produced as a result of process **C**. Name **four** possible substances to match the descriptions given on the flow chart.

1

2

3

4

(4)

Q9

(Total 10 marks)

TOTAL FOR PAPER: 100 MARKS

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