Write your name here

Surname	Other names

Pearson
Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Biology/Additional Science

Unit B2: The Components of Life

Foundation Tier

Friday 6 June 2014 – Afternoon
Time: 1 hour

Paper Reference
5BI2F/01

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

P43414A

1/1/1/1/1/

P 4 3 4 1 4 A 0 1 2 0

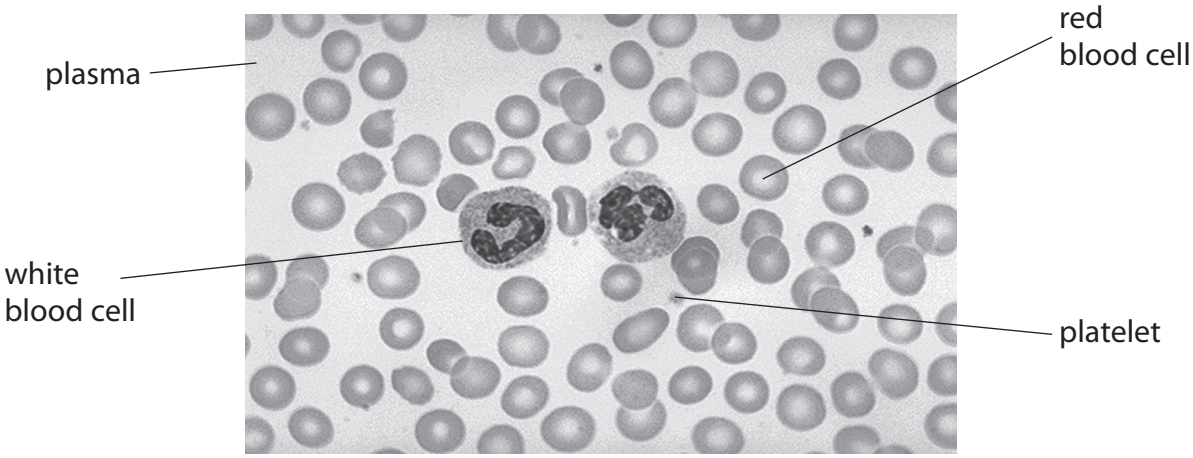
PEARSON

Answer ALL questions

Some questions must be answered with a cross in a box ☒.
If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

The blood system

1 (a) The photograph shows parts of the blood.



(i) Use words from the box to complete the sentences.

(2)

clot	flow	glucose
carbon dioxide		oxygen

Red blood cells carry ..... to body cells for respiration.

Platelets help to make blood ..... .

(ii) Describe the function of white blood cells.

(2)

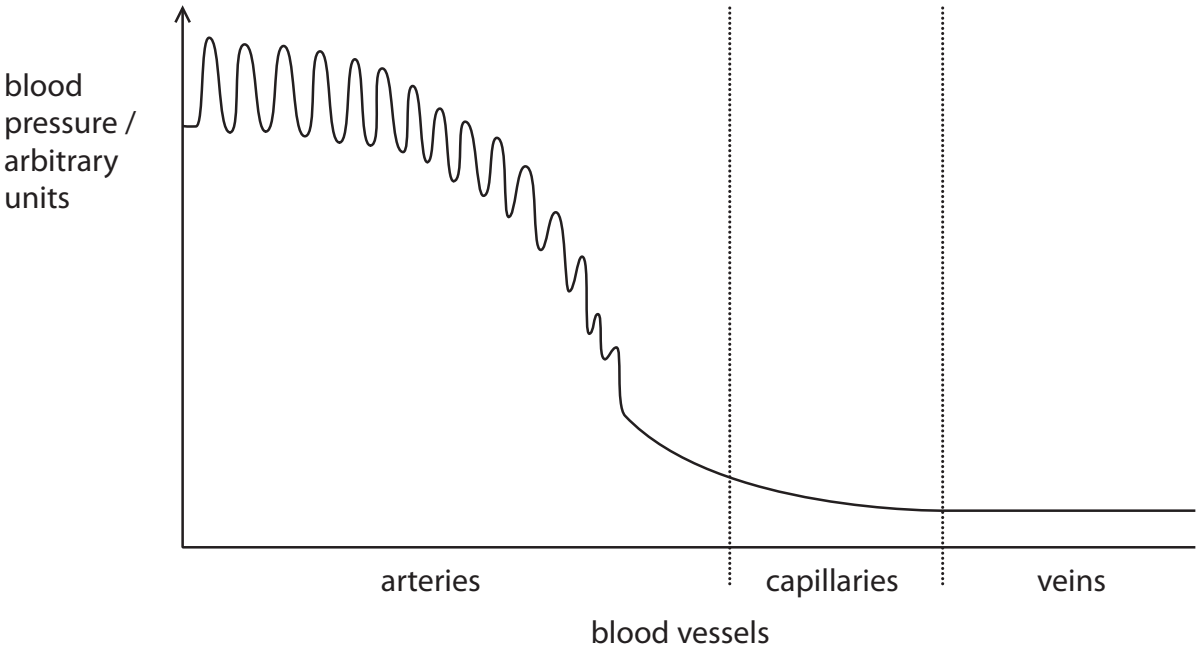
.....

.....

.....

.....

(b) The graph shows the pressure of blood as it flows through arteries, capillaries and veins.



Describe the changes in the pressure of the blood as it flows through the arteries.

(2)

(c) Explain why the walls of the left and right ventricles of the heart have different thicknesses.

(2)

(Total for Question 1 = 8 marks)

Breathing and exercise

2 Two students, X and Y, investigated how exercise affected breathing rate.

They recorded their breathing rate at rest.

Their breathing rate was then measured each minute during 5 minutes of exercise.

The results of the investigation are shown in the table.

exercise time / minutes	breathing rate / breaths per minute	
	student X	student Y
0 (at rest)	11	12
1	14	17
2	17	24
3	23	27
4	26	32
5	28	35

(a) The breathing rate of student X increased by 17 breaths per minute during the investigation.

Calculate the increase in the breathing rate of student Y from rest to 5 minutes of exercise.

(1)

..... breaths per minute

(b) Suggest a reason for the difference in the overall increase in the breathing rate between students X and Y.

(1)

.....

.....

(c) Explain why the breathing rate of the students changed during the exercise.

(2)

(d) Complete the sentence by putting a cross (☒) in the box next to your answer.

During the exercise gases pass into and out of the blood by

(1)

- ☒ **A** active transport
- ☒ **B** diffusion
- ☒ **C** osmosis
- ☒ **D** transpiration

(e) The students extended their investigation by exercising for 20 minutes.

During this exercise the students' muscles produced lactic acid, which caused cramp.

Suggest why their muscles produced lactic acid.

(2)

(f) Which substance supplies the energy used by muscles during exercise?

Place a cross (☒) in the box next to your answer.

(1)

☒ **A** water

☒ **B** oxygen

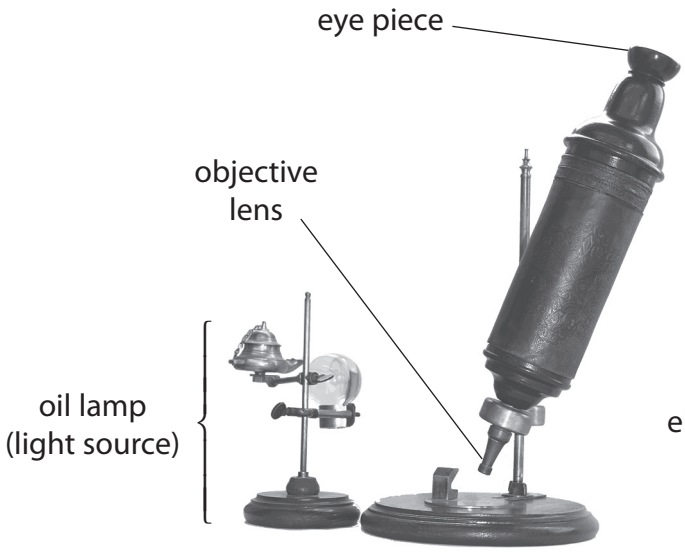
☒ **C** glucose

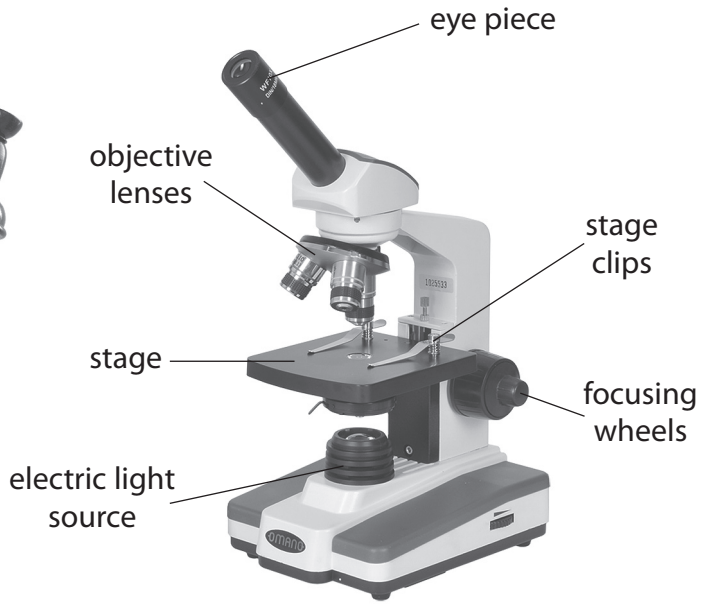
☒ **D** lactic acid

(Total for Question 2 = 8 marks)

Cells

3 The photographs show a 350 year-old light microscope and a modern light microscope.





(a) (i) Suggest how the modern light microscope helps us to see cells in greater detail than the 350 year-old microscope.

Use the photographs to help you.

(2)

.....

.....

.....

.....

.....

.....

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

Structures in bacterial cells are so small they can only be seen using

(1)

☒ **A** a hand lens

☒ **B** an electron microscope

☒ **C** a light microscope

☒ **D** a camera

(iii) Complete the sentence by putting a cross (☒) in the box next to your answer.

Bacterial cells are similar to animal cells because they contain a

(1)

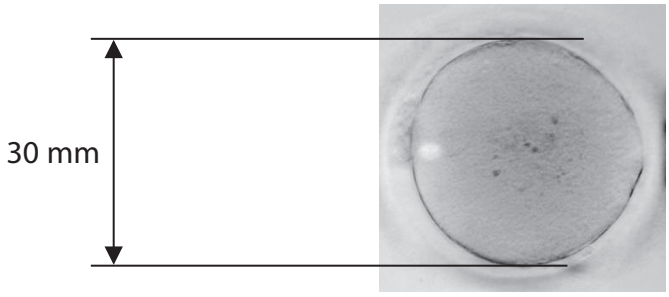
☒ **A** cell membrane

☒ **B** cell wall

☒ **C** plasmid

☒ **D** nucleus

(b) The photograph shows an animal cell magnified using a modern light microscope.



(i) The magnified animal cell has a diameter of 30 mm.

The actual diameter of the animal cell is 0.1 mm.

Calculate how many times the animal cell has been magnified.

(2)

..... times

(ii) State the function of the nucleus in the animal cell.

(1)

.....

.....

(c) Plant cells have large vacuoles.

Describe the functions of the large vacuole in a plant cell.

(2)

.....

.....

.....

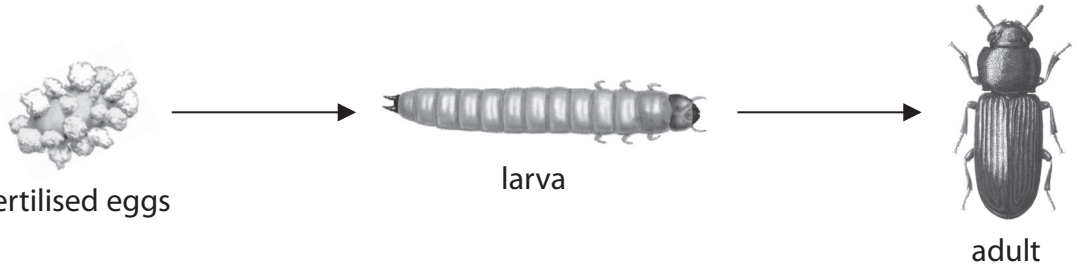
.....

(Total for Question 3 = 9 marks)

Flour beetles

4 Flour beetles are pests. They destroy food produced from crops.

The diagram shows the development of a flour beetle.



(a) (i) Flour beetles produce sex cells.

Describe the role of sex cells in the production of fertilised eggs.

(2)

.....

.....

.....

.....

(ii) It takes 120 days for the larva to develop into an adult beetle.

During this time the cells of the larva become specialised.

Name the process by which cells become specialised.

(1)

.....

(iii) A flour beetle has 16 000 genes.

Complete the sentence by putting a cross (☒) in the box next to your answer.

The 16 000 genes of the flour beetle can produce 16 000 different

(1)

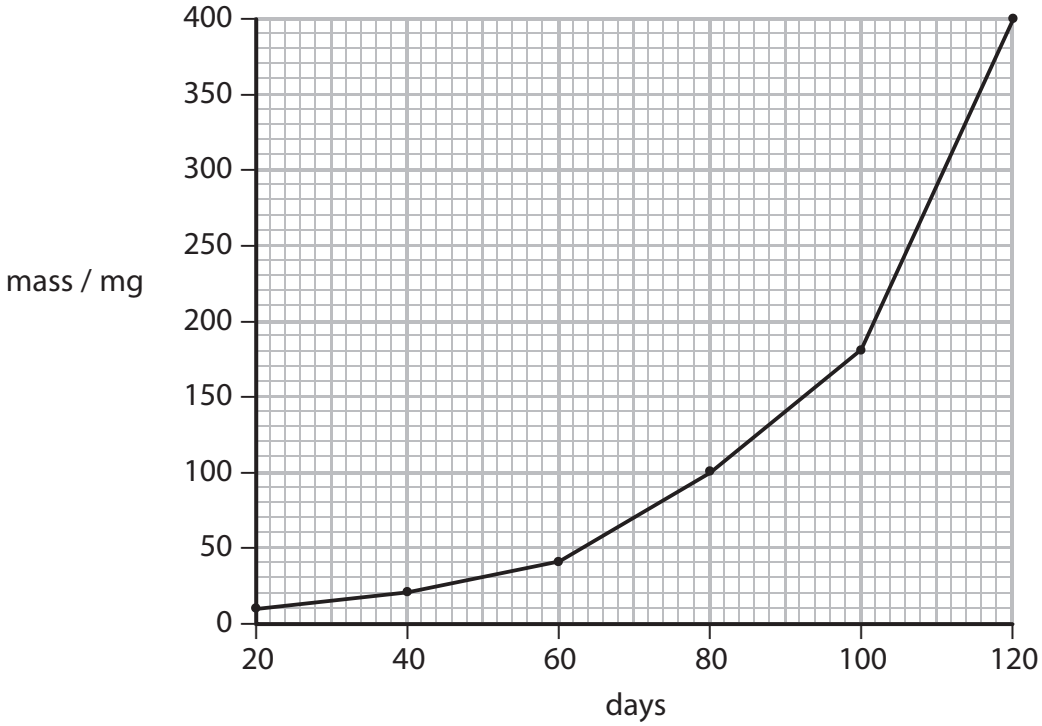
☒ **A** amino acids

☒ **B** bases

☒ **C** chromosomes

☒ **D** proteins

(b) The graph shows the mass of a flour beetle larva as it grows.



(i) State the mass of the larva on day 100.

(1)

..... mg

(ii) Describe the change in mass of the flour beetle as it grows from day 20 to day 120. Use the information in the graph to help you.

(2)

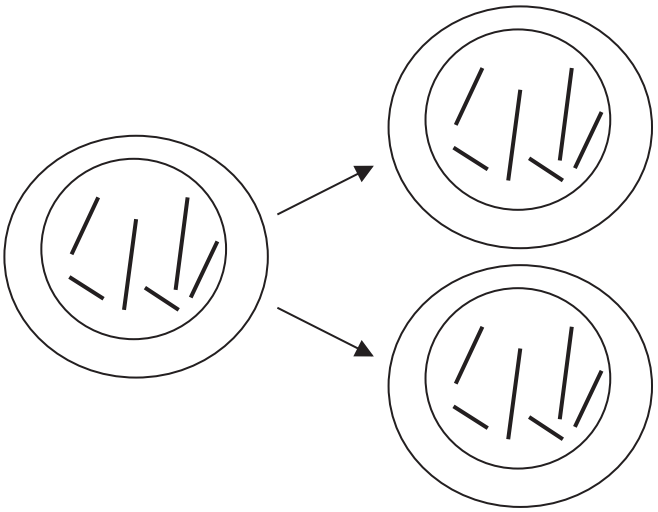
.....

.....

.....

.....

(c) The diagram shows cell division during growth.



Describe this type of cell division.

(2)

(d) Flour beetles eat flour.

Flour can be produced from genetically modified wheat.

Suggest why wheat is genetically modified.

(2)

(Total for Question 4 = 11 marks)

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Question 5 is on the next page

Plants

5 (a) (i) A plant is growing in soil with a very low concentration of mineral ions.

Explain how these mineral ions are taken into the plant from the soil.

(2)

.....

.....

.....

.....

(ii) Place a cross (☒) in the box next to your answer.

Mineral ions are transported from the roots to the leaves of the plant in the

(1)

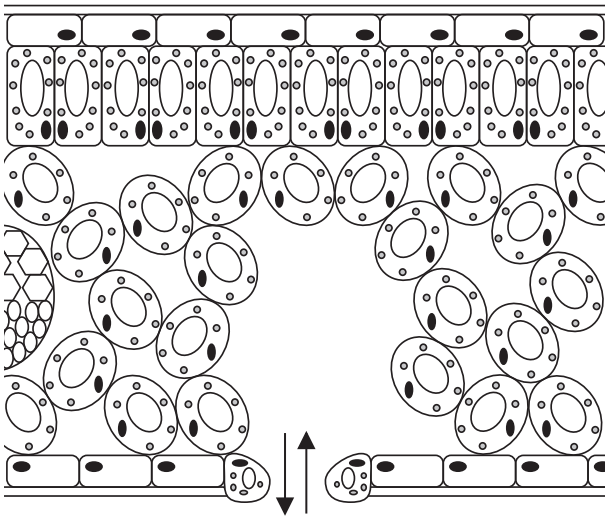
☒ **A** phloem vessels

☒ **B** root hair cells

☒ **C** stomata

☒ **D** xylem vessels

*(b) The diagram shows a section through a leaf.

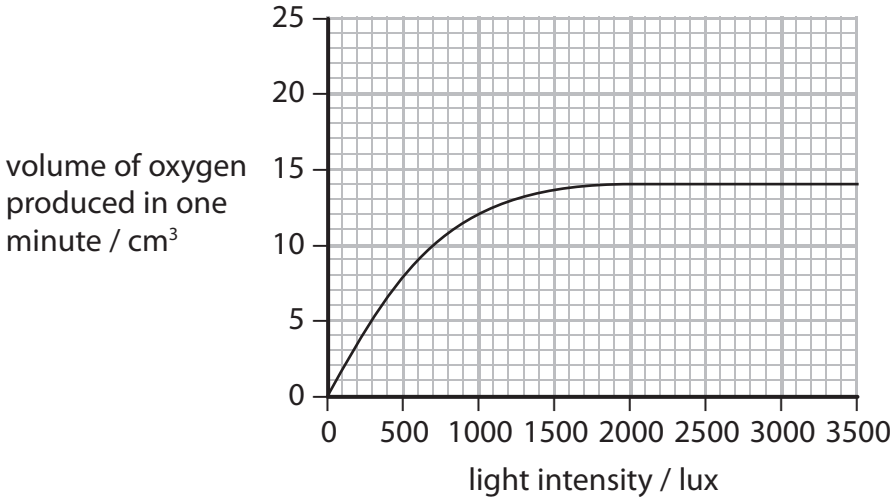


gas exchange

Explain how leaves are adapted for gas exchange.

(6)

(c) The graph shows the volume of oxygen produced by a plant in one minute at different light intensities.



(i) State the maximum volume of oxygen produced in one minute by this plant.

(1)

..... cm^3

(ii) Factors other than light intensity are limiting the rate of oxygen production above 2000 lux.

Describe how a different factor can increase the volume of oxygen produced by this plant.

(2)

.....

.....

.....

.....

(Total for Question 5 = 12 marks)

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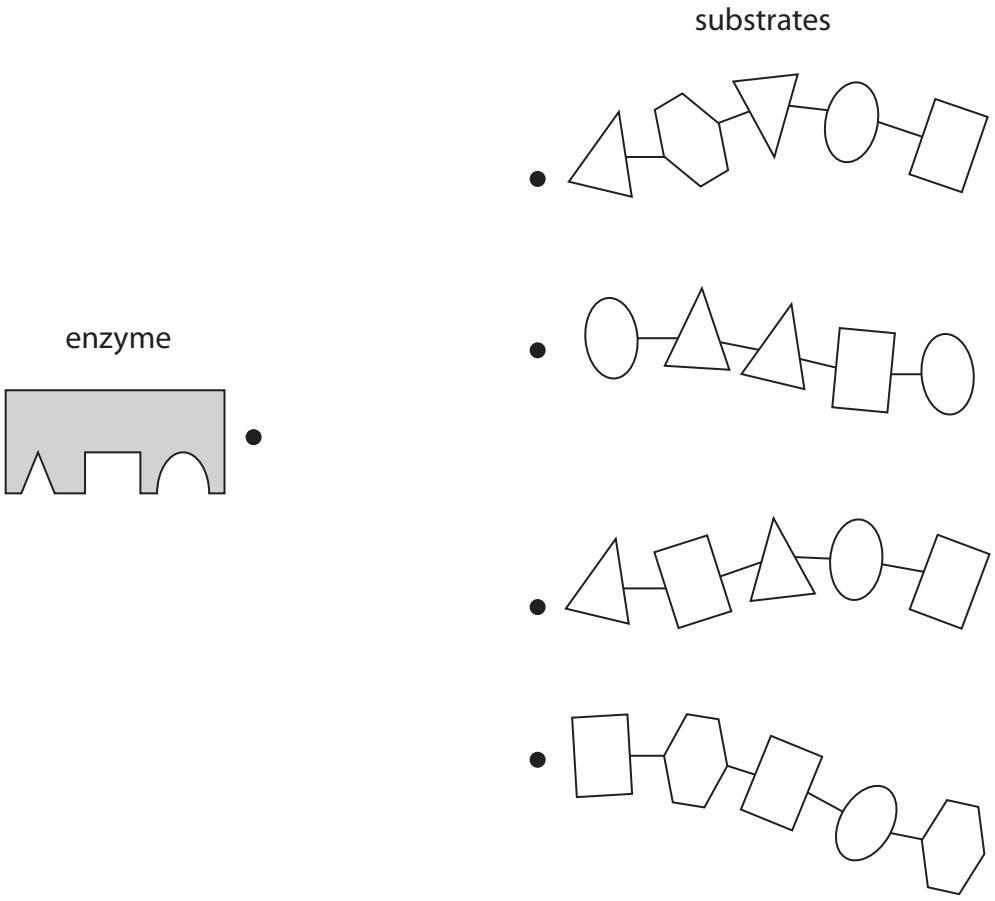
Question 6 is on the next page

Enzymes and digestion

6 (a) (i) The diagram shows an enzyme and four substrates.

Draw **one** straight line from the enzyme to its correct substrate.

(1)



(ii) The diagram models one way enzymes are thought to work with their substrates.

Complete the sentence by putting a cross (☒) in the box next to your answer.

This model represents the hypothesis known as

(1)

- ☒ **A** base pairing
- ☒ **B** DNA replication
- ☒ **C** lock and key
- ☒ **D** protein synthesis

(b) Some babies have difficulty absorbing nutrients from their food.

Protease enzymes can be added to baby food during its manufacture.

(i) Explain why protease enzymes are added to baby food.

(2)

(ii) A baby food is manufactured at 35 °C.

Higher temperatures affect the protease enzymes in baby food.

Explain how enzymes are affected by temperatures above 40 °C.

(2)

*(c) Describe the action of carbohydrase and lipase enzymes in different parts of the digestive system.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS