Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Biology/Additional Science

Unit B2: The Components of Life

Foundation Tier

Sample Assessment Material **Time: 1 hour**	Paper Reference **5BI2F/01**

You do not need any other materials.	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 ▶

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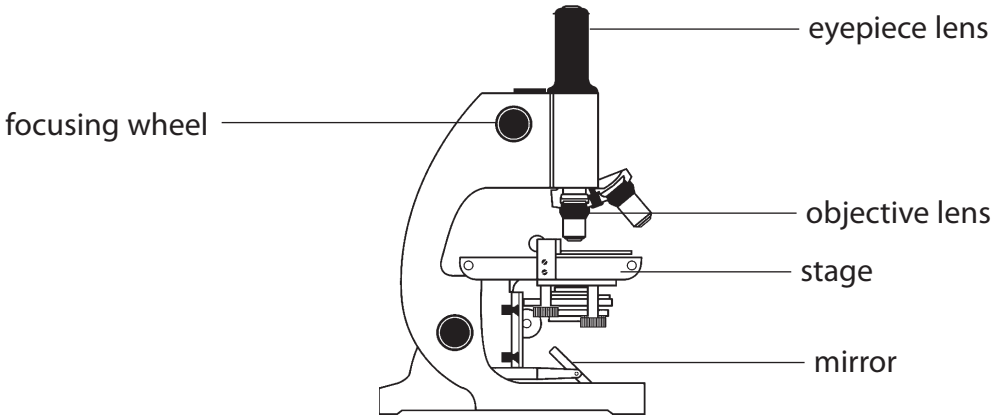
Answer ALL questions

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 ☒.

Cells

1 Scientists use a microscope to study how cells work.

(a) The diagram shows a light microscope.



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

To make the image of the cell appear larger you would

(1)

☒ **A** turn the focusing wheel

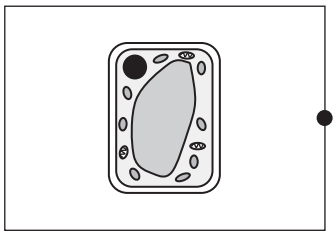
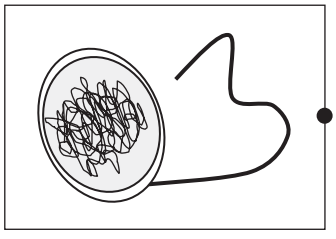
☒ **B** change the objective lens

☒ **C** clean the stage

☒ **D** move the mirror

(b) (i) Draw **one** straight line from each cell to the group of organisms to which it belongs.

(2)

cell	**organism**
	animals
	bacteria
	fungi
	plants

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

Which plant cell structures use sunlight for photosynthesis?

(1)

☒ **A** chloroplasts

☒ **B** cytoplasm

☒ **C** mitochondria

☒ **D** vacuoles

(iii) The function of the cell membrane is to allow certain substances into and out of the cell.

Describe how molecules like water can pass through a cell membrane but molecules like starch cannot.

(2)

.....

.....

.....

.....

(c) A scientist looks at a cell with a microscope that has a magnification of times 40. The cell is 0.1 mm long.

Calculate the size of the magnified image.

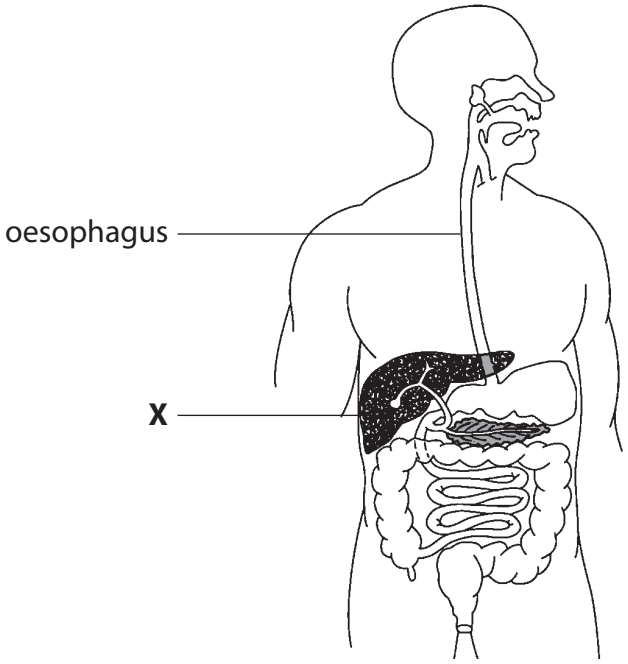
(2)

answer .....

(Total for Question 1 = 8 marks)

The human digestive system

2 The diagram shows the human digestive system.



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

Give the name of organ **X**.

(1)

☒ **A** stomach

☒ **B** small intestine

☒ **C** liver

☒ **D** pancreas

(b) Describe how food is moved from the mouth to the stomach.
You may draw a diagram to help with your answer.

(2)

(c) Draw **one** straight line from each food type to the enzyme used to digest it.

(2)

food type	**enzyme**
	pepsin
carbohydrate	lipase
	amylase
fat	ligase
	transcriptase

(d) State **one** way in which the stomach helps digestion.

(1)

.....

.....

(e) People with cystic fibrosis produce thick, sticky mucus.
This can block the duct from the pancreas to the small intestine.

Explain how this will affect a person with cystic fibrosis.

(2)

.....

.....

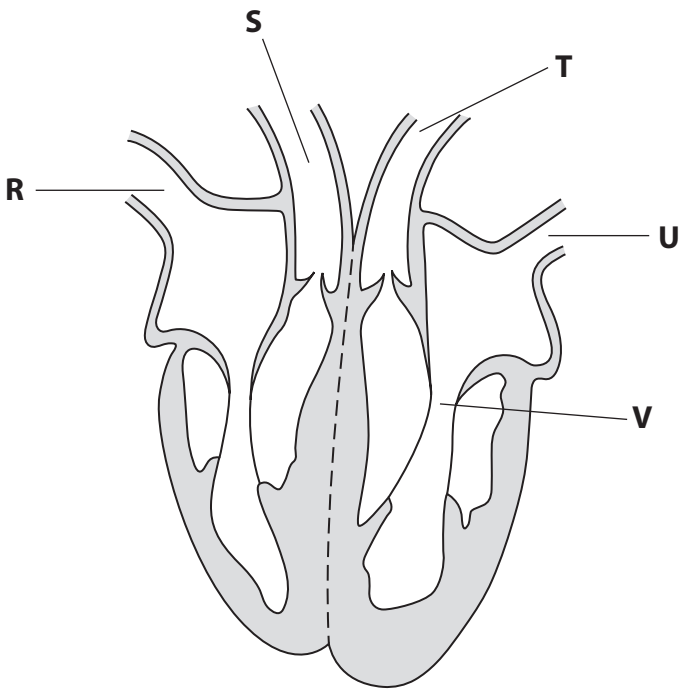
.....

.....

(Total for Question 2 = 8 marks)

Our circulation

3 (a) The diagram shows the structure of the human heart.



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

Which of the vessels in the diagram are arteries?

(1)

☒ **A** R and S

☒ **B** S and T

☒ **C** T and U

☒ **D** R and U

(ii) What is the role of the structure marked **V**?

(1)

.....

.....

(b) Describe the role of blood plasma.

(3)

(c) Explain why blood is classified as an organ.

(2)

(d) Anaemia is a condition that can change the number and shape of red blood cells.

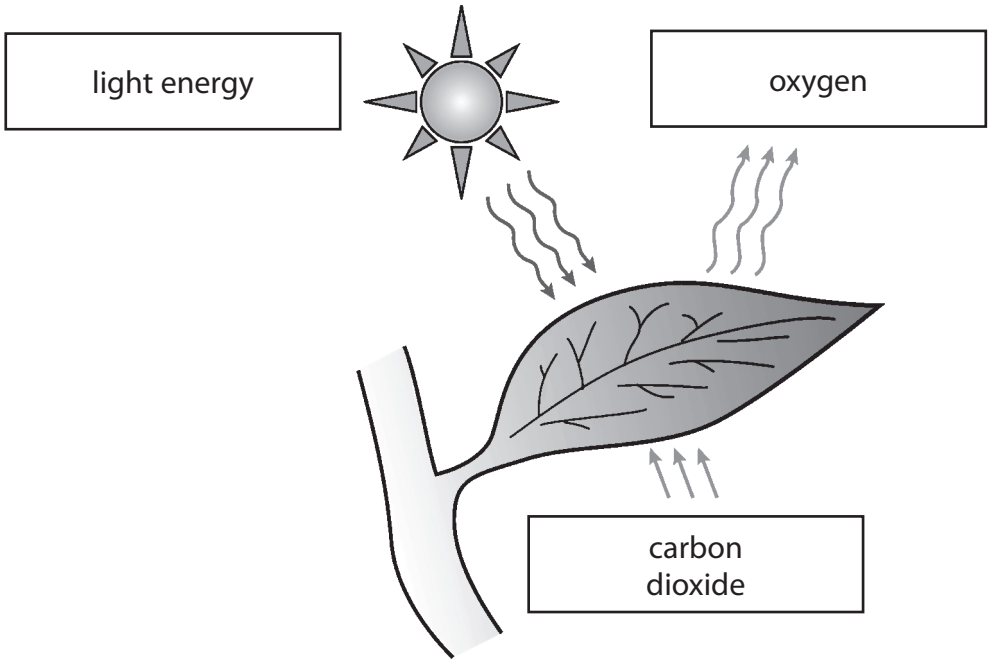
Explain how this may cause people with anaemia to have low energy levels.

(3)

(Total for Question 3 = 10 marks)

Photosynthesis

4 Photosynthesis is one of the most important chemical reactions on Earth.



(a) (i) Complete the word equation for photosynthesis.

(2)

carbon dioxide + ... ⟶ ..... + oxygen

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

Most carbon dioxide enters the leaf through the

(1)

☒ **A** waxy cuticle

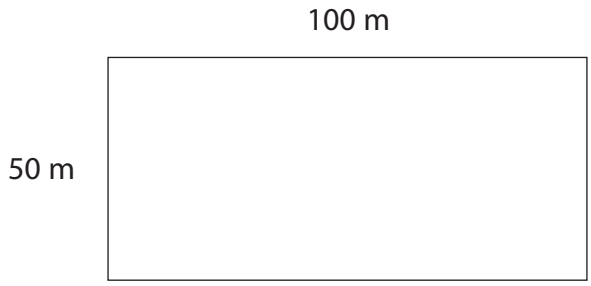
☒ **B** stomata

☒ **C** palisade cell

☒ **D** chloroplast

(b) Rudolph's teacher asked him to estimate the number of daisies on the school field.

The school field had the following dimensions.



(i) Rudolph's teacher said he had to calculate the area of the school field first.

Calculate the area of the school field.

(1)

answer .....

(ii) Rudolph placed his quadrat 20 times in the school field.

The average number of daisies in his 1 metre quadrat was 10.

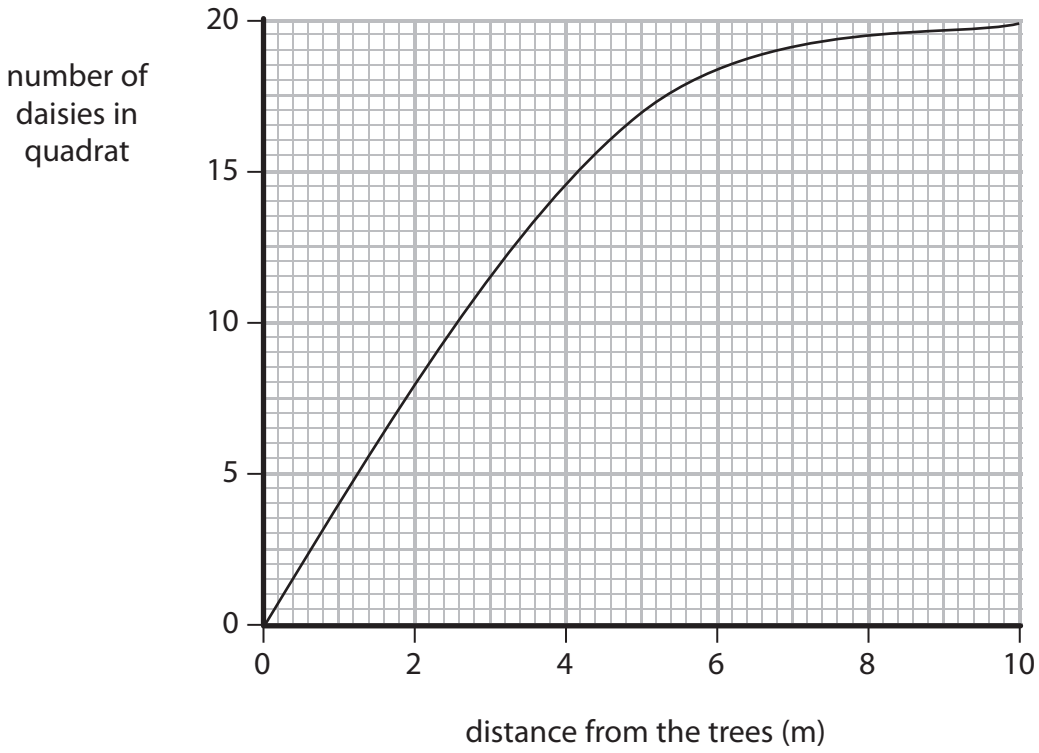
Estimate the number of daisies in the school field.

(1)

answer .....

(c) Rudolph then investigated the effect trees had on the distribution of daisies in a field.
He walked across the field away from the trees.
Every 2 metres he placed his 1 metre quadrat on the ground.
He counted the number of daisies in each quadrat.

Rudolph plotted his results on a graph.



(i) How many daisies did Rudolph find at 2 metres from the trees?

(1)

.....

.....

(ii) Describe the pattern shown by the graph.

(2)

.....

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.....

(iii) Explain why the number of daisies changed at different distances from the trees.

(2)

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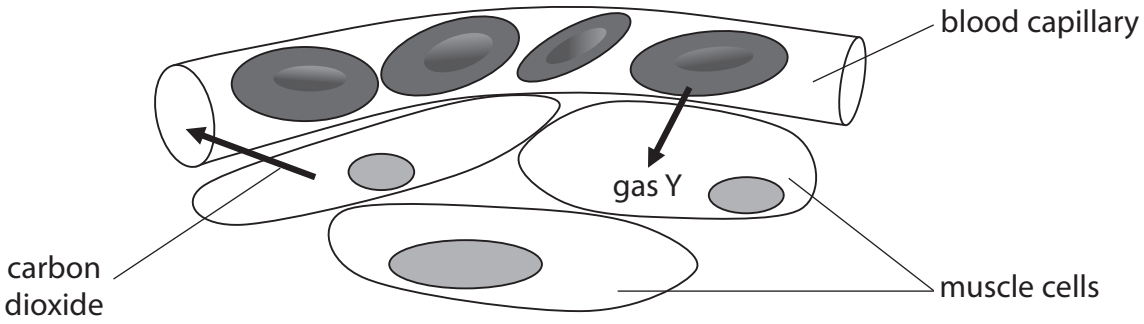
(Total for Question 4 = 10 marks)

5 When we exercise, our muscle cells need more energy.
The diagram shows the movement of gases into and out of muscle cells.



(a) (i) Give the name of gas Y.

(1)

.....

.....

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

Muscle cells produce a large amount of carbon dioxide during exercise.
Carbon dioxide moves out of muscle cells and into the blood by

(1)

☒ **A** diffusion

☒ **B** osmosis

☒ **C** respiration

☒ **D** transpiration

(iii) Explain how gas Y moves into the muscle cells.

(2)

.....

.....

.....

.....

(b) Explain why a person continues to breathe at a faster rate than usual after they stop exercising.

(2)

.....

.....

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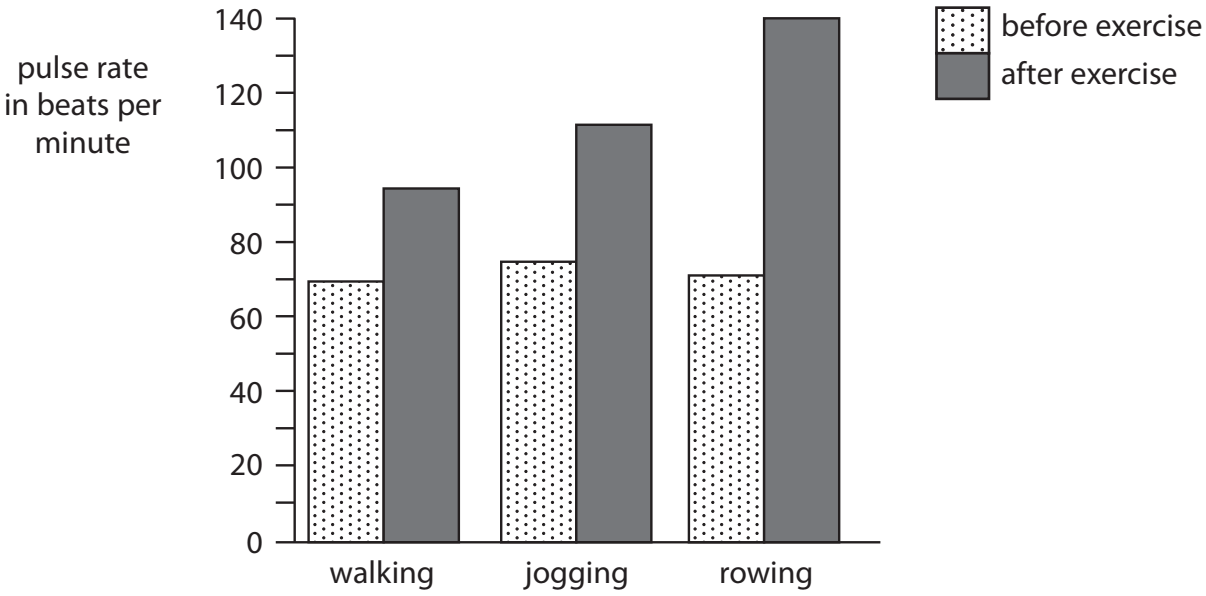
.....

*(c) The bar chart shows how the pulse rate of a person changes with three different exercises.



Using the information from the bar chart and your scientific knowledge, explain the changes in pulse rate for the different exercises.

(6)

(Total for Question 5 = 12 marks)

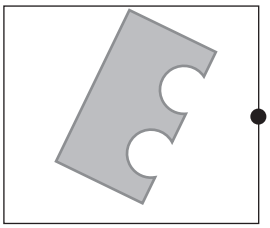
Enzymes

6 In the cells of our body, enzymes speed up chemical reactions that would otherwise take place too slowly to keep us alive.

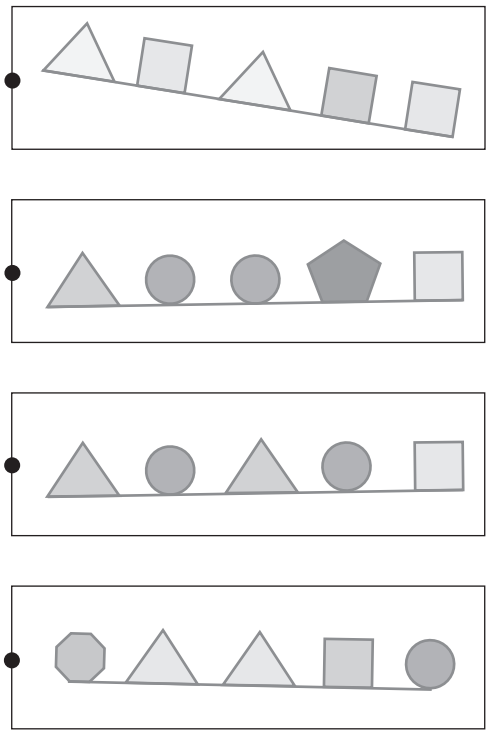
(a) Draw **one** straight line from the enzyme to its substrate.

(1)

enzyme



substrate



(b) What is an enzyme?

(1)

.....

.....

(c) Describe a factor that affects enzyme action.

(2)

.....

.....

.....

.....

*(d) (i) Biological washing powders contain enzymes.

Explain how biological washing powders are able to remove insoluble food stains from clothing.

(6)

(ii) John washes his clothes using a biological washing powder on a 60 °C washing programme.

Explain why the clothes were not washed as well as he had hoped.

(2)

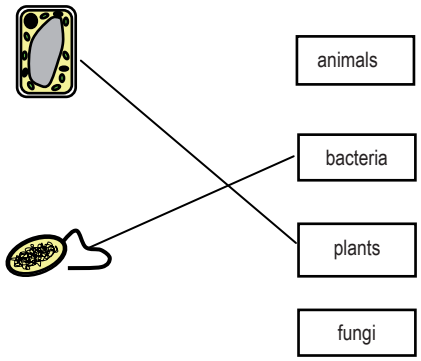
(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

Sample Mark Scheme

Unit B2: The Components of Life (Foundation Tier)

Question number	Answer	Mark
1(a)	**B**	**(1)**

Question number	Answer	Mark
1(b)(i)	1 mark for each correct line  	**(2)**

Question number	Answer	Mark
1(b)(ii)	**A**	**(1)**

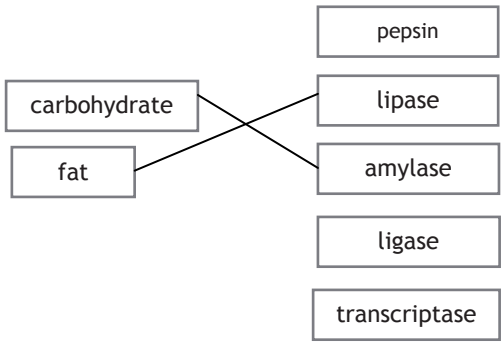
Question number	Answer	Acceptable answers	Mark
1(b)(iii)	a description including the following: cell membranes have small gaps/holes in them (1) water is small enough to fit through them/starch is too big to fit through them (1)		**(2)**

Question number	Answer	Mark
1(c)	4 (1) mm (1)	**(2)**

TOTAL: 8 MARKS

Question number	Answer	Mark
2(a)	**C**	**(1)**

Question number	Answer	Acceptable answers	Mark
2(b)	a description including **two** of the following points in a logical order: food is moistened/mixed with saliva/chewed/forms bolus and swallowed/(passes into) oesophagus/gullet (1) muscle contractions/ peristalsis (1)	credit diagram if clearly annotated	**(2)**

Question number	Answer	Mark
2(c)	1 mark for each correct answer  	**(2)**

Question number	Answer	Mark
2(d)	churns food/mixes food with digestive juices/contains protease/enzyme/pepsin/acid, which breaks down food	**(1)**

Question number	Answer	Mark
2(e)	an explanation linking the following: (digestive) enzymes not released into small intestine (1) (so) food not digested fully/fewer nutrients absorbed(1)	**(2)**

TOTAL: 8 MARKS

Question number	Answer	Mark
3(a)(i)	**B**	**(1)**

Question number	Answer	Acceptable answers	Mark
3(a)(ii)	prevents backflow of blood	a valve/named valve	**(1)**

Question number	Answer	Acceptable answers	Mark
3(b)	a description including the following: acts as solvent/solution (1) to transport two named components (eg water, antibodies, hormones, glucose, amino acids, carbon dioxide, urea, oxygen, blood cells) (1) from where they are absorbed/stored to cells that need them (1)	 accept keeping the blood fluid accept food if no specific food substance given accept waste products if no specific waste product given	**(3)**

Question number	Answer	Mark
3(c)	an explanation linking the following: blood has red cells/white cells/platelets (1) (so) is an organ because it has more than one type of cell/tissue (1)	**(2)**

Question number	Answer	Acceptable answers	Mark
3(d)	an explanation linking the following: fewer/wrong-shaped red blood cells/less haemoglobin (1) (so) lower oxygen-carrying ability (1) and less energy from respiration (1)	 accept less flexible accept lower surface area to volume ratio	**(3)**

TOTAL: 10 MARKS

Question number	Answer	Acceptable answers	Mark
4(a)(i)	water glucose	answers must be in correct order	**(2)**

Question number	Answer	Mark
4(a)(ii)	**B**	**(1)**

Question number	Answer	Mark
4(b)(i)	5000 m^2	**(1)**

Question number	Answer	Acceptable answers	Mark
4(b)(ii)	10 × 100 × 50 50 000	award both marks if correct answer is given on its own	**(1)**

Question number	Answer	Mark
4(c)(i)	8	**(1)**

Question number	Answer	Acceptable answers	Mark
4(c)(ii)	a description including any **two** of the following: the further the distance from the trees the greater the number of daisies the number of daisies increases steadily up to 4 metres from the trees/eqv then the number starts levelling off	credit correct manipulation of data; ignore data read straight off the graph, ie there were 20 daisies at 10 metres, unless a comparison is made	**(2)**

Question number	Answer	Acceptable answers	Mark
4(c)(iii)	an explanation linking a pair of the following: daisies get more minerals/nutrients/water/less competition for minerals/nutrients/water the further they are from trees (1) (so) they grow more (1)	 there is more sunlight further away from the tress (1) (so) daisies will photosynthesise/grow/reproduce (1)	 **(2)**

TOTAL: 10 MARKS

Question number	Answer	Acceptable answers	Mark
5(a)(i)	oxygen/O_2	reject O2/O^2	**(1)**

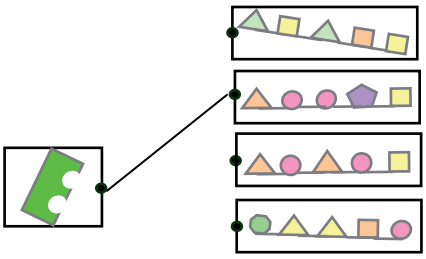
Question number	Answer	Mark
5(a)(ii)	**A**	**(1)**

Question number	Answer	Acceptable answers	Mark
5(a)(iii)	an explanation linking the following: higher concentration of oxygen in the blood/red blood cells than in muscle cells (1) (so) moves down a concentration gradient/diffuses (1)		**(2)**

Question number	Answer	Acceptable answers	Mark
5(b)	an explanation linking the following: need to take in extra oxygen (EPOC) (1) (in order) to break down lactic acid (1)		**(2)**

Question number		Indicative content	Mark
***5(c) QWC**		an explanation to include some of the following: • exercise/named exercise increases pulse rate • the more intense the exercise the greater the increase • by *x* beats per min (must be read off the graph for correct exercise), eg (for jogging) by 40 beats per min • whereas (named exercise, eg walking) increases pulse rate by 25 beats per min • this is an increase of 15 beats per min (eg when comparing jogging to walking) • more strenuous exercise/named strenuous exercise requires **more** energy • **more** oxygen • **more** glucose • to muscles • to carry out (aerobic) respiration • heart beats faster • blood flow increases (to muscles)/gets faster Do not accept references to anaerobic respiration	**(6)**
Level	**0**	No rewardable material	
1	**1-2**	• a limited explanation of the effects of exercise on heart rate • some attempt to use information from the bar chart to compare pulse rates before and after exercise • little or no attempt to explain the physiological effects of increased pulse rate in terms of either oxygen or glucose supply to the muscles • communicates ideas using simple language and little scientific terminology. Spelling, punctuation and grammar are used with little accuracy	
2	**3-4**	• an incomplete explanation of how exercise affects pulse rate • an understanding that increased exercise leads to increased pulse rates • a correct reference to pulse rate increasing for at least one of the exercises but unlikely to be a comparison between this and another exercise • some attempt to explain the physiological effects of increased pulse rate in terms of either oxygen or glucose supply to the muscles • communicates ideas showing some evidence of clarity and organisation and uses some scientific terminology appropriately. Spelling, punctuation and grammar are used with some accuracy	
3	**5-6**	• a clear explanation of the effect of exercise on pulse rate • correctly states by how much pulse rate changes for at least two exercises and there is a clear comparison of correct data for at least two of the exercises • a clear explanation of the physiological reasons why pulse rate changes with exercise, referring to oxygen and glucose supply to the muscles • communicates ideas clearly and uses scientific terminology appropriately. Spelling, punctuation and grammar are used with few errors	

TOTAL: 12 MARKS

Question number	Answer	Acceptable answers	Mark
6(a)		Only one line to be drawn from enzyme	**(1)**

Question number	Answer	Acceptable answers	Mark
6(b)	a biological catalyst	A protein that changes the rate of a reaction	**(1)**

Question number	Answer	Mark
6(c)	a description including a pair of the following: pH (1) needs to be similar to pH inside the body (1) substrate concentration (1) as substrate concentration increases then rate increasing up to a maximum (1) temperature (1) enzyme action increases to a maximum then starts to decrease (1)	**(2)**

Question number		Indicative content	Mark
***6(d)(i) QWC**		an explanation to include some of the following: • carbohydrates/proteins/fats in food • carbohydrases/amylase/enzymes digest/break down carbohydrates/starch • to glucose/maltose/sugar • proteases/pepsin/enzymes digest/break down proteins • to amino acids • lipases/enzymes digest/break down fats • to fatty acids and glycerol • carbohydrates/proteins/fats are insoluble • glucose/maltose/sugar/amino acids are soluble • (therefore) get washed away/dissolved by the water • enzymes are specific to their substrates • enzymes will work best at 40°C	**(6)**
Level	**0**	No rewardable material	
1	**1-2**	• a simple explanation of enzyme activity, linking enzymes to the breaking down of food • no linkage between types of enzymes and the food groups they act on • the name of the products of enzyme breakdown are likely to be omitted, with some reference to smaller or simpler substances • communicates ideas using simple language and little scientific terminology. Spelling, punctuation and grammar are used with little accuracy	
2	**3-4**	• a partial explanation of enzyme activity, linking enzymes to the breaking down of particular food groups • some linkage between at least one type of enzyme and the food group it acts on • some explanation that some products will be soluble and therefore will wash out of clothes • communicates ideas showing some evidence of clarity and organisation and uses some scientific terminology appropriately. Spelling, punctuation and grammar are used with some accuracy	
3	**5-6**	• a clear explanation of the key processes involved in enzyme activity leading to the breakdown of particular food groups. This explanation may include a simple description of the lock and key hypothesis • linkage between at least two types of enzymes and the food groups they act on • there is mention of at least two of the products of enzyme breakdown of food groups • communicates ideas clearly and uses scientific terminology appropriately. Spelling, punctuation and grammar are used with few errors	

Question number	Answer	Acceptable answers	Mark
6(d)(ii)	an explanation linking the following: (enzymes have) an optimum temperature/60°C is too hot (1) (therefore) decrease in activity/rate of reaction decreases (1)	 work best at 37/37.4°C denaturing occurs	 **(2)**

TOTAL: 12 MARKS

