Candidate Name	Centre Number					Candidate Number				
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GCSE

SCIENCE (Double Award)

UNIT 1: (Double Award) BIOLOGY 1
HIGHER TIER

SAMPLE ASSESSMENT MATERIALS

(1 hour 15 minutes)

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**15**	
2.	**7**	
3.	**9**	
4.	**5**	
5.	**11**	
6.	**5**	
7.	**8**	
Total	**60**	

ADDITIONAL MATERIALS
In addition to this paper you will require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES
Use black ink or black ball-point pen. Do not use gel pen. Do not use correction fluid.
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.
Question **5** is a quality of extended response (QER) question where your writing skills will be assessed.

*Answer **all** questions*

1. Read this newspaper article.

A daily dose of chocolate may be good for you.

A study in Cardiff University has found that eating up to two small bars of chocolate a day may help to protect against heart disease, possibly by supplying nutrients known as flavonoids.

Scientists examined the diets of 21 000 people over 18 years old and found that eating up to 100 g of chocolate a day lowered the risk of dying from heart disease by 25%. These findings are backed up by a review of published evidence involving 158 000 people from around the world, which also showed a significant reduction of heart disease amongst the regular chocolate eaters.

However, one scientist also said “many people eat food which is too high in sugar and fat, including chocolate. This can be very bad for health. We need to help people make informed choices.”

Telegraph 16/06/15
Sarah Knapton Science editor

(a) (i) The scientists used several research methods. Use the information in the article to decide which of these statements are true/false and **circle** your answers. [2]

		True or false	
1	The scientists did their own original work	true	false
2	The scientists used the findings from a number of studies.	true	false
3	The scientists did laboratory experiments	true	false
4	The scientists did a statistical analysis	true	false
5	The scientists used probability calculations	true	false
6	The scientists tested the ideas on volunteers	true	false

(ii) The scientists used:

- a large sample size
- results from people of different ethnicity.

Explain how each of these methods increased the strength of confidence in their conclusions? [2]

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(iii) Apart from heart disease, state some of the health risks of eating a diet that is too high in sugar and fat. [3]

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(iv) What information is given on packets of food to "help people make informed choices" about the ingredients in the food? [2]

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(v) The newspaper article suggests that nutrients called flavonoids found in chocolate help to protect against heart disease.

The table below gives five classes of flavonoid and foods rich in each one.

	Class of flavonoid				
	flavonol	**flavan-3-ol**	**flavone**	**flavonone**	**anthocyanidin**
Food source	onions apples lettuce tomatoes beans almonds	apples bananas blueberries peaches pears strawberries	parsley peppers celery apples oranges melon	oranges grapefruit lemons tomatoes	blueberries bananas strawberries cherries pears cabbage

From the table:

I which **one** of the foods gives the greatest variety of flavonoids? [1]

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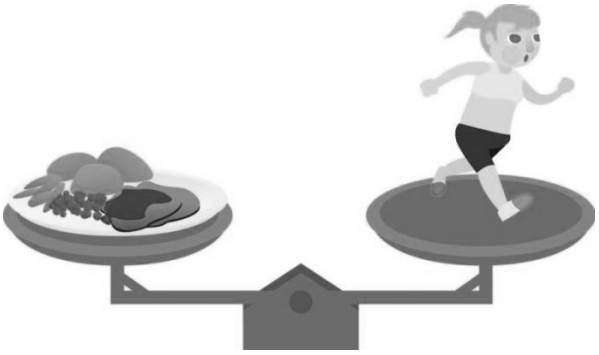
II which two flavonoids would be missing from a banana and melon smoothie? [1]

…… and ……

(b) The poster below comes from a healthy eating campaign promoting a balanced diet.



What is meant by the term ‘balanced diet’? [2]

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(c) Some doctors want the government to put an extra tax on foods with a high sugar content and use the money from the tax to reduce the price of fruit and vegetables in the shops.
Suggest **one reason for** and **one reason against** doing this. [2]

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15

2. The photograph shows a peak flow meter.

A peak flow meter measures the rate at which air can be forced out of the lungs during expiration.

Caitlin, Megan and Lowri are three students. They take the peak flow test during their college course.

The results are shown in the following table.

student	peak flow readings(litres/min)					
	1	**2**	**3**	**4**	**5**	**mean**
Caitlin	400	380	430	320	400	386
Megan	390	330	390	380	290	356
Lowri	230	320	330	360	280	…….

(a) (i) **Complete the table** by calculating the mean peak flow for Lowri. [1]

(ii) One of the students is a regular cigarette smoker. Using only the data in the table, suggest which one and state the reason for your choice. [1]

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(iii) State **one** harmful effect of smoking on the lungs and explain how it would affect peak flow. [1]

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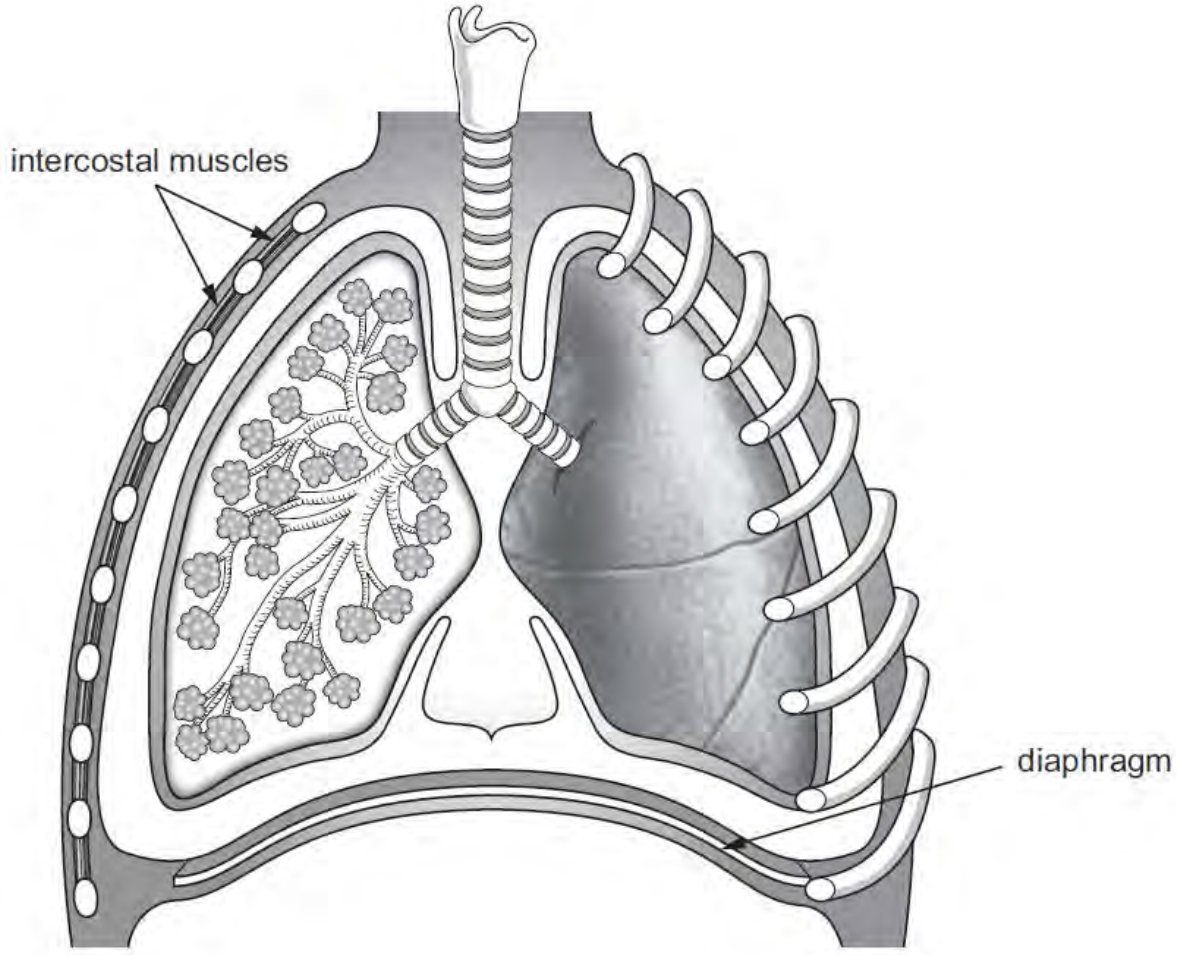
(b) The diagram shows the human respiratory system.



Explain how the intercostal muscles and diaphragm bring about **expiration** of breath from the lungs. [4]

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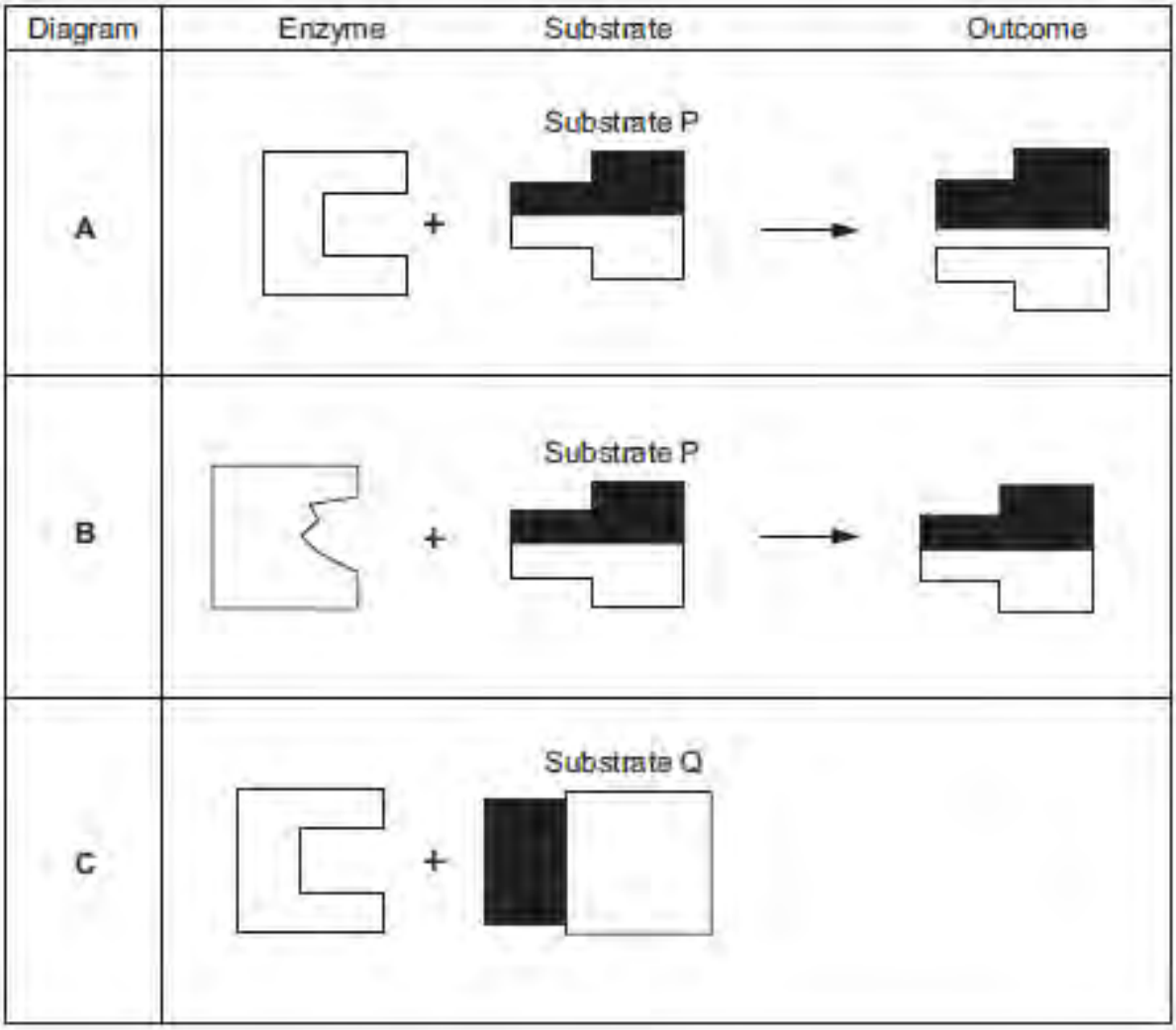
3. Diagrams (**A, B** and **C**) can be used to explain one model of enzyme action.



(a) State the name of the model of enzyme action shown in the diagrams. [1]

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(b) Use the information in diagram **A** to explain this model of enzyme action. [3]

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(c) In diagram **B**, the enzyme had been heated strongly before adding the substrate.
Explain the outcome shown in the diagram. [3]

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(d) Predict the outcome in diagram **C** and explain your answer. [2]

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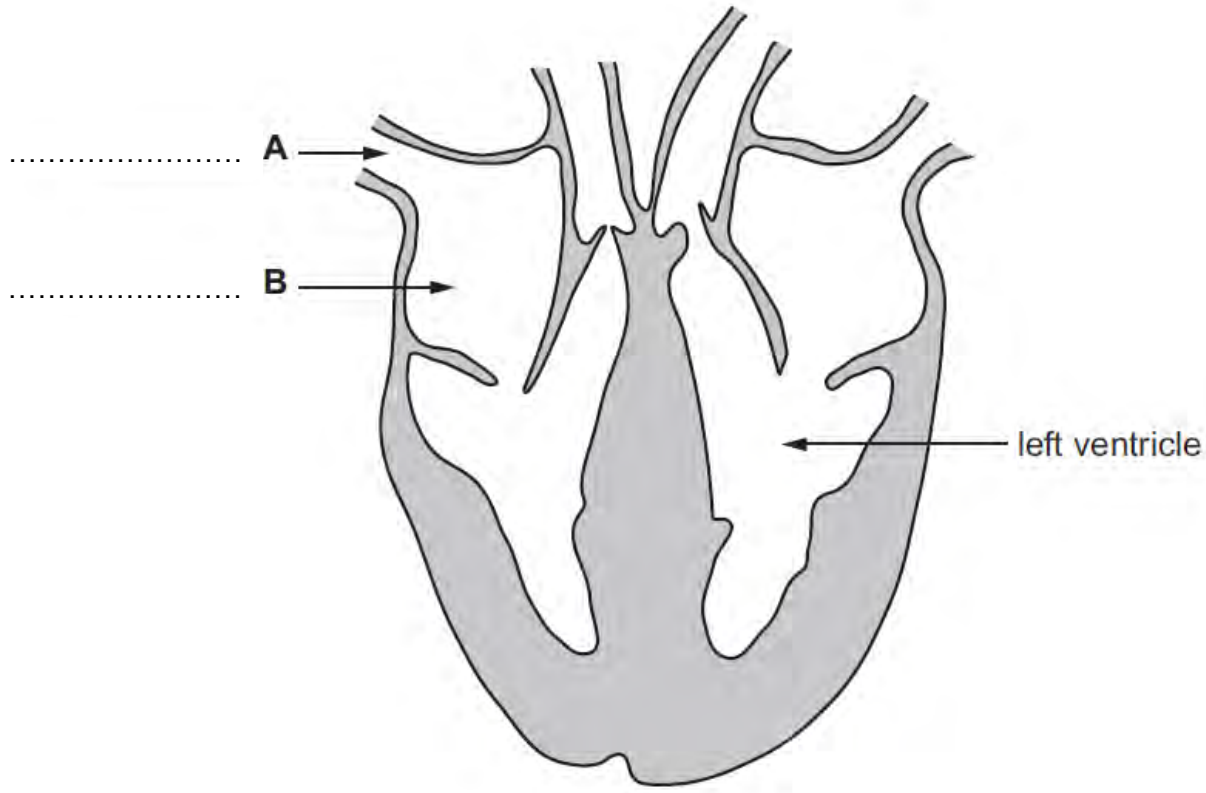
4. The diagram shows the heart in section, seen from the front.



(a) **On the diagram**, label structures **A** and **B**. [1]

(b) **Draw arrows on the diagram** to show the path taken by blood entering the heart from the lungs and leaving through the aorta. [1]

(c) The heart muscle is supplied with blood from three coronary arteries. Explain why heart action would stop if these blood vessels became blocked. [3]

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5. (a) Complete the word equation for photosynthesis. [1]

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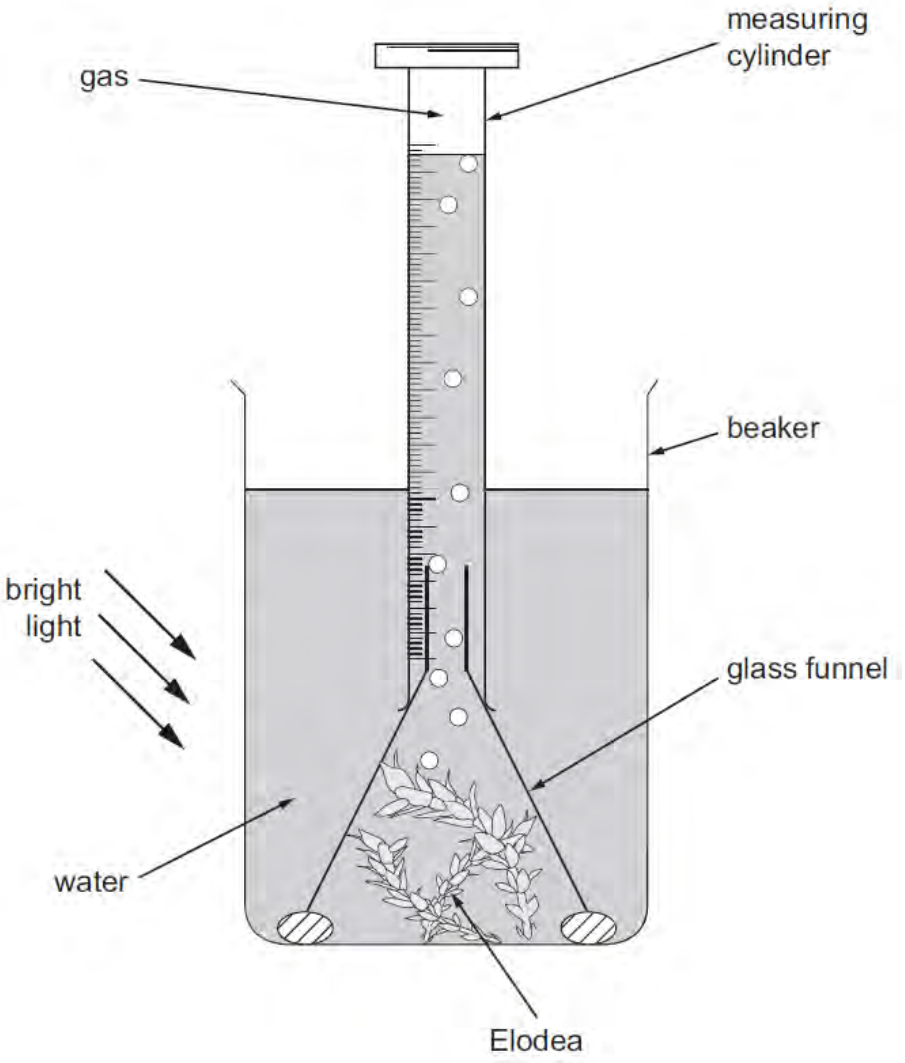
(b) The diagram below shows apparatus used to investigate factors affecting the rate of photosynthesis in an aquatic plant called Canadian pondweed (*Elodea).*



Using the apparatus shown, design an experiment to investigate the effect of increasing light intensity on the rate of photosynthesis in *Elodea*. [6 QER]

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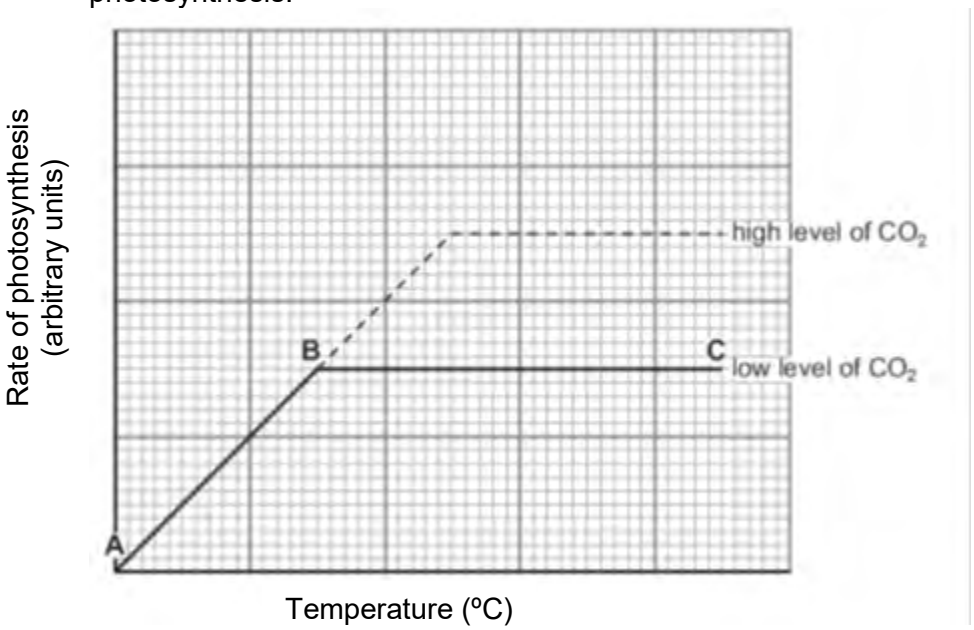
(c) The graph below shows the effect of certain limiting factors on the rate of photosynthesis.



(i) State the factor that is limiting the rate of photosynthesis from **A - B**. Give the evidence for your answer. [2]

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(ii) State the factor that is limiting the rate of photosynthesis from **B - C**. Give the evidence for your answer. [2]

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6. (a) The table shows the energy budget for a cow grazing on grass.

Input energy (food) (kJ)	Losses (kJ)		Retained energy (kJ)
	heat	undigested food waste	
2500	850	1520	…….

(i) Calculate the retained energy for the cow. **Write your answer in the table.** [1]

(ii) The Energy Conversion Efficiency (ECE) is the % of input energy retained within the cow.
Calculate the ECE for the cow. [2]

ECE = ……%

(b) Intensive farming methods aim to maximise the ECE.

Suggest **two** ways that intensive farming can reduce the energy lost as heat from the cows. [2]

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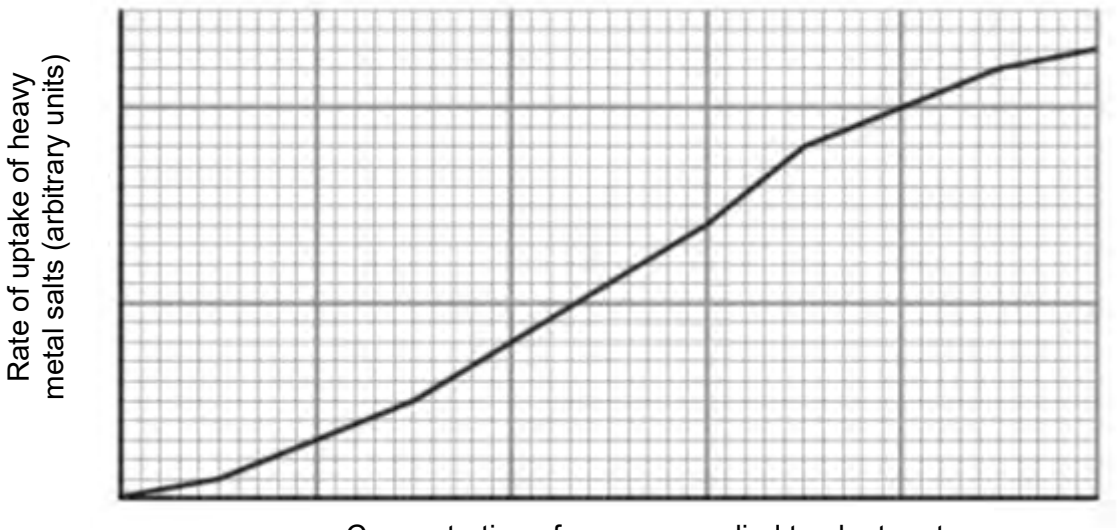
7. The photograph shows *Brassica juncea* plants growing in a greenhouse.

Read the following article.

How to harvest metal

Greenhouse trials have shown that *Brassica juncea* can take up heavy metals salts such as lead from the soil and concentrate them in its cells. The plants can then be harvested and the metals extracted.

The graph shows the rate of uptake of heavy metal salts by *Brassica juncea* during one trial.



(a) Explain the results shown in the graph. [4]

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(b) Conditions in the greenhouse were kept at the optimum for photosynthesis. Suggest **two** *other* advantages of doing the trials in a greenhouse rather than in the field. [2]

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(c) The article continued:

> Mining for heavy metals often results in waste tips in which the soil is heavily contaminated.
> Trials with *Brassica juncea* on old waste tips in Anglesey have shown that the plant can help to reduce heavy metal pollution in the soil. However it takes several years to bring about a significant reduction in contamination and it causes serious problems for local food chains – especially for the carnivores.

Explain why 'it causes serious problems for local food chains - especially for the carnivores.' [2]

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END OF PAPER