

Centre Number	Candidate Number	Candidate Name
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NAMIBIA SENIOR SECONDARY CERTIFICATE

BIOLOGY ORDINARY LEVEL

4322/2

PAPER 2

2 hours

Marks 100

2021

Additional Material: Ruler
Protractor

INSTRUCTIONS AND INFORMATION TO CANDIDATES

- Candidates answer on the Question Paper in the spaces provided.
- Write your Centre Number, Candidate Number and Name in the spaces at the top of this page.
- Write in dark blue or black pen.
- You may use a soft pencil for any diagrams, graphs or rough working.
- Do not use correction fluid.
- You may use a non-programmable calculator.
- Do not write in the margin *For Examiner's Use*.
- Answer **all** questions.
- The number of marks is given in brackets [] at the end of each question or part question.

For Examiner's Use	
1	
2	
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Total	
Marker	
Checker	

This document consists of **20** printed pages.



Republic of Namibia
MINISTRY OF EDUCATION, ARTS AND CULTURE

- 1 Fig. 1.1 shows the teeth in half of the human lower jaw.

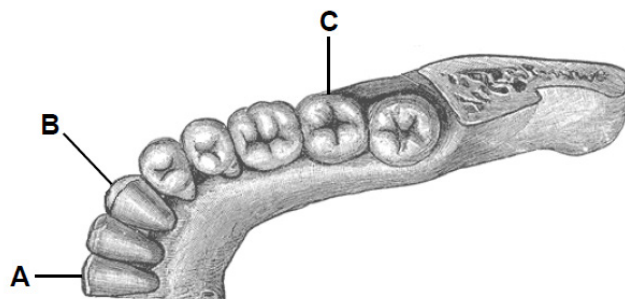


Fig. 1.1

- (a) (i) Name the type of tooth labelled **B**.

..... [1]

- (ii) State the functions of the teeth labelled **A** and **C**.

A.....

.....

C.....

..... [2]

- (b) In some parts of the world, fluoride is added to drinking water.

Outline **one** advantage and **one** disadvantage of using fluoride.

Advantage.....

..... [1]

Disadvantage.....

..... [1]

- (c) As food passes through the digestive system it undergoes both mechanical digestion by chewing and chemical digestion by enzymes.

(i) Define *digestion*.

.....
.....

[1]

(ii) Explain how saliva helps in digesting food.

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

[2]

(iii) Chemical digestion involving enzymes and absorption takes place in different parts of the alimentary canal.

Where is the enzyme responsible for the first stage of protein digestion produced?

.....

[1]

(iv) Explain why small droplets of fat are broken down more quickly by enzymes than large droplets.

.....
.....

[1]

(v) Name the substance secreted and released into the alimentary canal that contains no enzymes, but speeds up fat digestion.

.....

[1]

[11]

2 Fig. 2.1 shows the life cycle of the human.

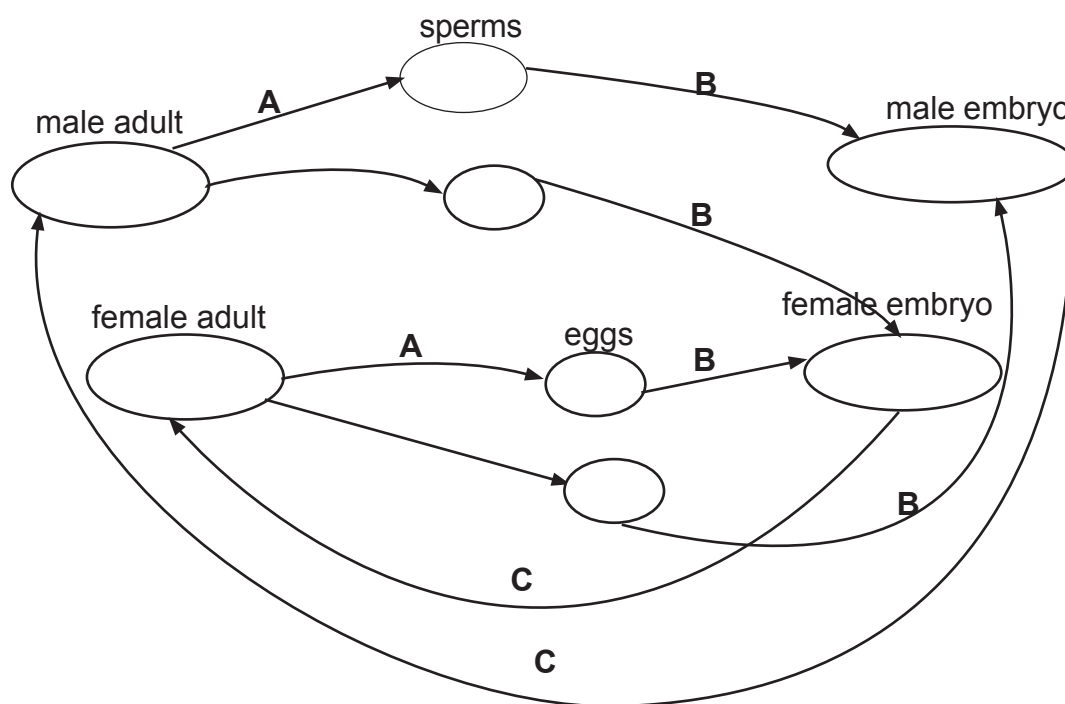


Fig. 2.1

The sex of an individual is determined by a pair of sex chromosomes in the nucleus of his or her cells. Each circle in Fig. 2.1 represents a nucleus.

- (a) (i) In the circles, on **Fig. 2.1** write the chromosome content (**XX**; **XY**; **X** or **Y**) for each nucleus. [4]
- (ii) Briefly describe the significance of the type of cell division taking place at **A**.

.....

.....

.....

.....

[2]

- (b) Enzymes are proteins which function as catalysts and are affected by a number of factors.

Fig. 2.2 shows the relationship between pH and the reaction rate of two enzymes **P** and **Q**.

The Y-axis shows the rate of reaction and the X-axis shows the change in pH.

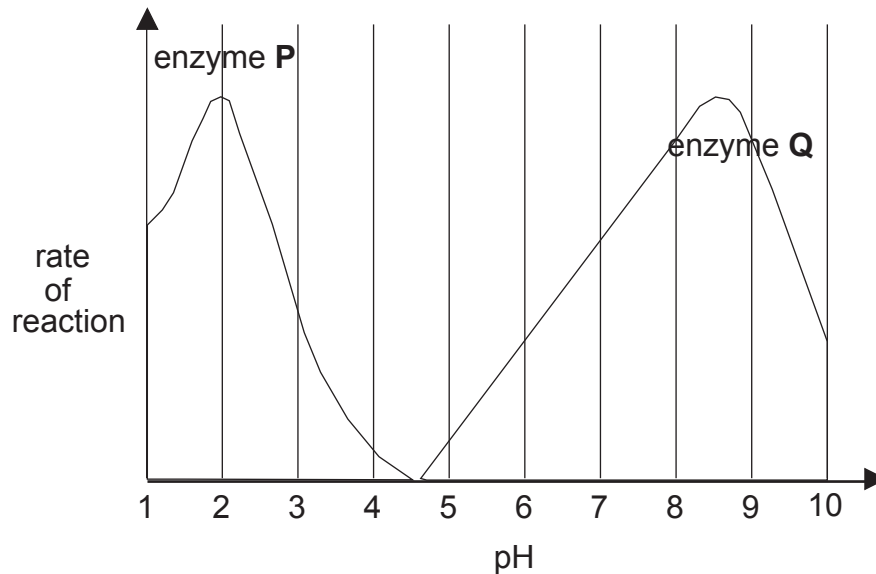


Fig. 2.2

- (i) State the optimum pH for
enzyme **P**:
enzyme **Q**: [2]
- (ii) Suggest and explain what would happen to enzyme **Q** if it was exposed to a pH of 3.
.....
.....
.....
..... [3]
- (iii) State the part of the digestive system where enzymes **P** and **Q** would be the most active.
enzyme **P**:
enzyme **Q**: [2]

[13]

- 3 A forty year old woman weighs 90 kg. Her ideal body weight should be between 60 to 65 kg.

Her usual diet is shown in Table 3.1.

Table 3.1

breakfast	lunch	dinner	snacks
cereal	sandwich	pasta and rice cakes	biscuits, chocolate and chocolate ice cream bar

- (a) Define a *balanced diet*.

.....

.....

.....

.....

[2]

- (b) The diet in Table 3.1 resulted in her being classified as malnourished.
Suggest **one** reason why she could be classified as being malnourished.

.....

.....

[1]

- (c) The woman often experiences muscle and joint pain.
Suggest **one** reason for this problem.

.....

.....

[1]

- (d) The carbohydrate to protein to fat ratio of the chocolate ice cream bar she snacks on is given as 30% : 5% : 65%.

Draw a pie chart to illustrate the ratio.

[3]

(e) A learner described the test for reducing sugars to another learner as follows.

- Place a solid piece of food in a test-tube.
- Quarter fill the test-tube with Biuret's solution.
- Heat the test-tube gently for 10 minutes.
- A blue colour indicates the presence of a reducing sugar.

The list given by the learner is incorrect in a number of ways.

Describe the correct procedure for the reducing sugar test.

1.....

.....

2.....

.....

3.....

.....

4.....

.....

[4]

(f) Eight solutions, labelled **A** to **H** were tested for the presence of starch, protein, fat and vitamin C.

The observations from these tests are given in Table 3.2.

Table 3.2

solution	colour after performing food test			
	starch	protein	fat	vitamin C
A	brown	purple	clear	colourless
B	brown	blue	clear	dark blue
C	brown	blue	cloudy	dark blue
D	black	blue	cloudy	dark blue
E	black	blue	clear	dark blue
F	brown	blue	clear	dark blue
G	black	purple	clear	dark blue
H	brown	blue	clear	colourless

Which solution(s) were found to contain

1 starch but no fats? [1]

2 protein but no vitamin **C**? [1]

[13]

- 4 (a) Study the graphs in Fig. 4.1 and answer the questions which follow.

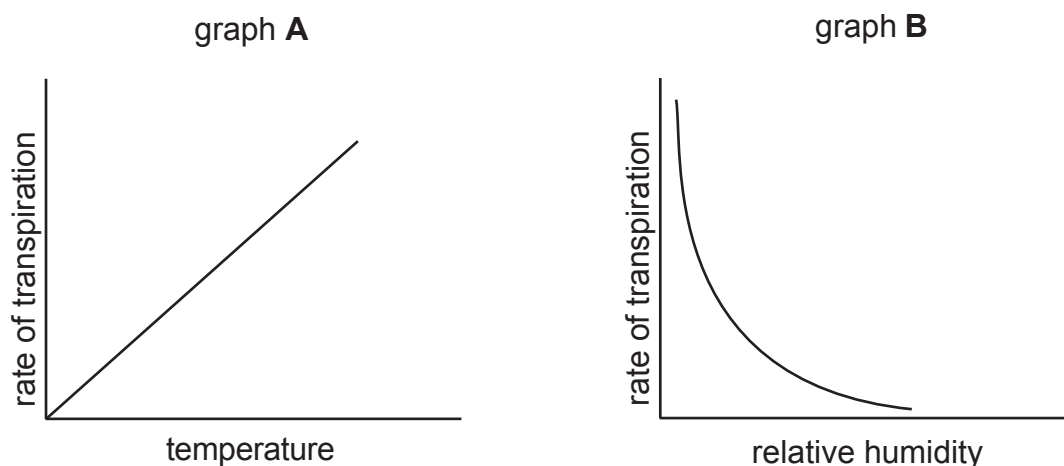


Fig. 4.1

- (i) Suggest what conclusions can be made from graphs **A** and **B**.

A..... [1]

B..... [1]

- (ii) State which other environmental condition could give similar results to those in graph **A**.

..... [1]

- (b) Fig. 4.2 shows an investigation carried out on transpiration.

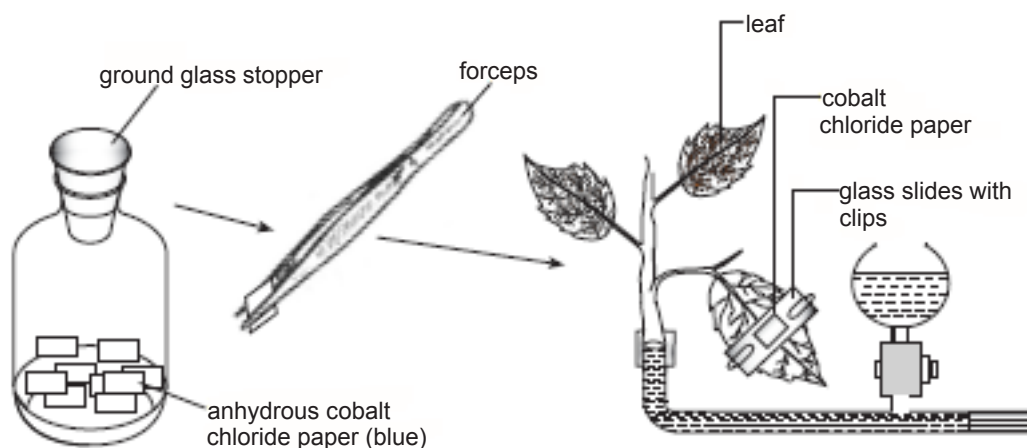


Fig. 4.2

- (i) Define *transpiration*.

..... [1]

- (ii) State why the cobalt chloride paper is kept in a jar with a ground glass stopper.

.....
.....

[1]

- (iii) State why the cobalt chloride paper is picked up with a pair of forceps.

.....
.....

[1]

- (iv) State which surface of a dicotyledonous leaf has the fastest rate of transpiration. Give a reason for your answer.

surface

reason

.....

[2]

- (v) Suggest why the experiment shown in Fig. 4.2 would indicate a slower rate of transpiration than what actually occurs at the exposed surface of the leaf.

1

.....

2

.....

3

.....

[3]

- (c) Xerophytes are plants which are adapted to dry/desert areas. To survive these harsh conditions they have special features. Fig. 4.3 shows the *Aloe dichotoma*, *Dioscorea elephatipes* and Namib Hoodia (*Hoodia currorii*) occurring in Namibia.



Fig. 4.3

Suggest **three** visible adaptations for survival in dry/desert areas.

- 1
-
- 2
-
- 3
-

[3]

[14]

- 5 Fig. 5.1 shows part of the human respiratory system.

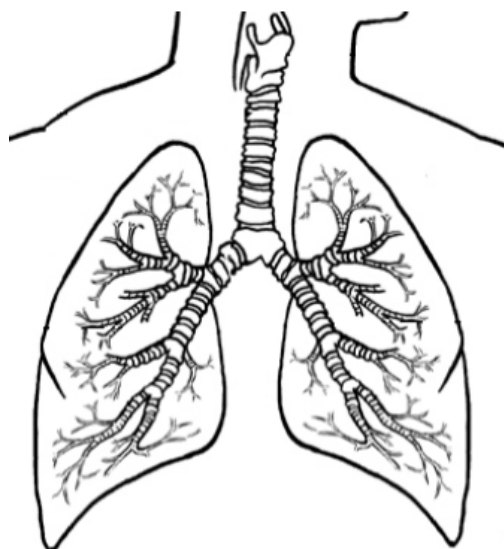


Fig. 5.1

- (a) (i) On Fig. 5.1 draw **one** label line with the letter **B** to label the bronchus and **one** label line and the letter **T** to label the trachea. [2]

- (ii) Explain the role of the cartilage in the trachea.

.....

[1]

- (iii) State the gaseous exchange surface in humans.

.....

[1]

- (iv) Describe what happens to the muscles and ribs when a person breathes in (inhales).

.....

[2]

- (b) Fig. 5.2 shows the kidney and some associated structures. Table 5.1 compares the concentrations of substances in structure **A** and **C**.

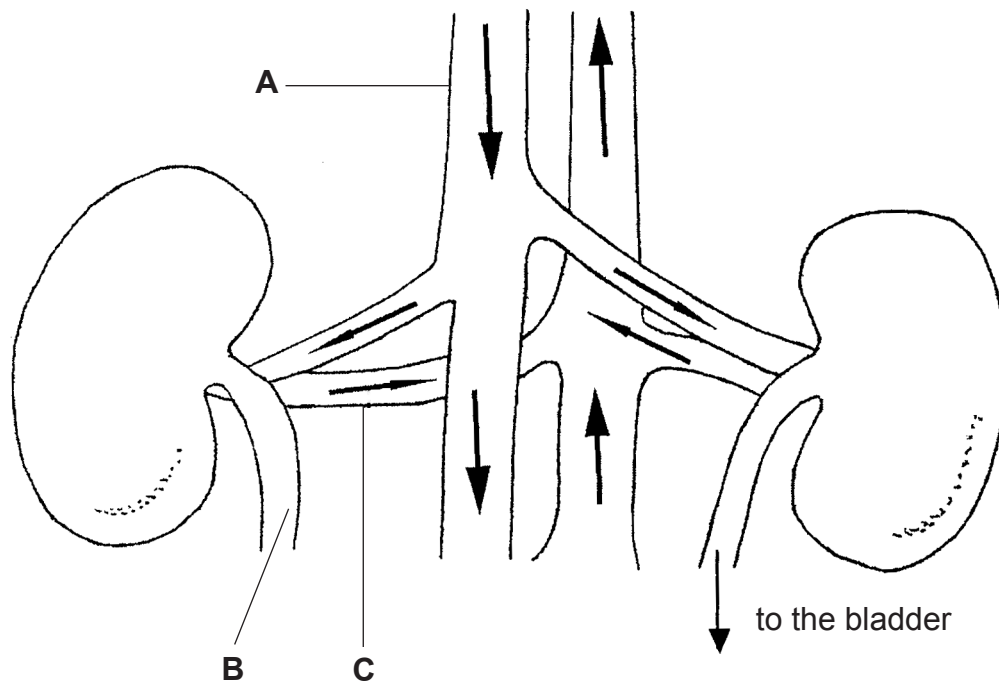


Fig. 5.2

Table 5.1

substance	concentration in	
	structure A	structure C
oxygen	high	low
carbon dioxide	low	high
glucose	high	low
urea	high	low

Identify the structures **A**, **B** and **C**.

A

B

C

[3]

- (c) (i) State where urea is formed in the human body.

..... [1]

- (ii) Describe and explain why the concentration of urea differs in structures **A** and **C**.

.....
.....
.....
..... [3]

- (iii) Explain why the concentration of oxygen is low in structure **C**.

.....
.....
..... [2]

[15]

- 6 Fig. 6.1 shows the process of blood glucose regulation in a human body. The control of the blood glucose concentration is a very important part of homeostasis.

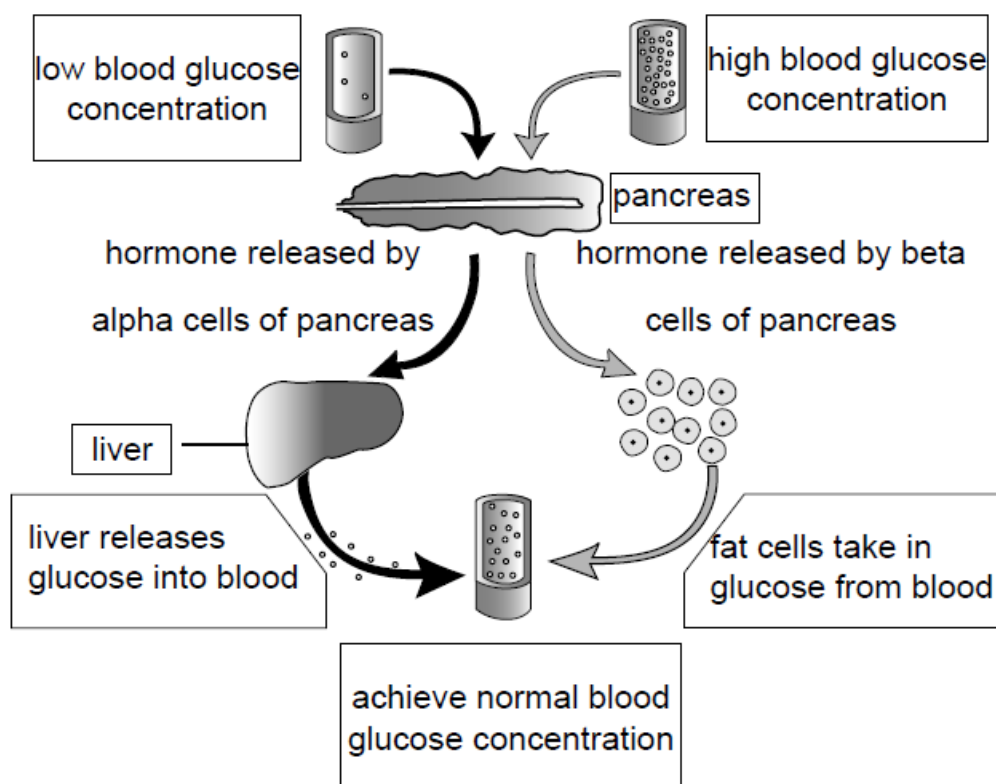


Fig. 6.1

- (a) Name the hormone released by the alpha cells of the pancreas. [1]
-
- (b) Explain what happens in the liver in order to help return the blood glucose concentration back to normal. [1]
-
-
- (c) Discuss the role of negative feedback in homeostasis. [3]
-
-
-
-
-

(d) Fig. 6.2 shows the reaction of the skin to two different environmental conditions.

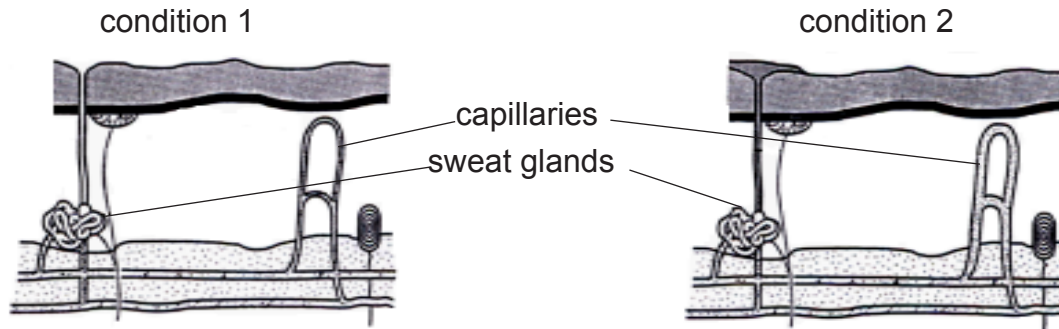


Fig. 6.2

- (i) Suggest what might have caused the skin to react in the way shown in condition 2.

..... [1]

- (ii) Describe the changes that occurred in the appearance of the skin from condition 1 to condition 2 **as shown** in the Fig. 6.2 above.

Change 1.....

.....

Change 2.....

..... [2]

- (iii) Explain how these changes are brought about.

.....

.....

.....

.....

.....

..... [3]

[11]

- 7 (a) (i) One method of measuring plant growth is by using the dry mass of the plant.

Explain why it is preferable to use dry mass rather than wet mass.

.....

.....

.....

.....

[2]

- (ii) Describe how dry mass of plants can be measured.

.....

.....

.....

.....

[3]

- (b) Eight potato tubers of the same mass were planted in identical conditions. Every week one tuber was removed and washed to clean it of soil. Each tuber was then treated as follows:

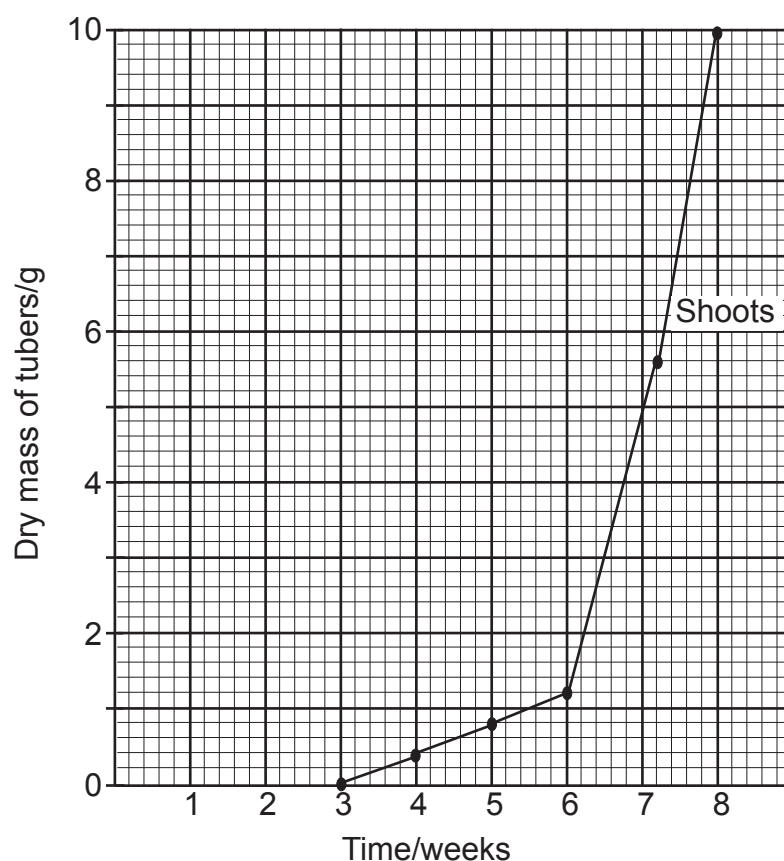
1. The shoots were removed and their dry mass was measured and recorded.
2. The roots were removed and the dry mass of the **tuber** was measured and recorded.

Table 7.1 shows the results for the tubers.

Table 7.1

time/weeks	dry mass of tubers/g
1	9.2
2	8.2
3	7.2
4	4.0
5	2.6
6	2.2
7	2.0
8	1.8

- (i) Plot the data in Table 7.1 on the grid below. The results for the dry mass of the shoots have already been plotted.



[2]

- (ii) Describe the results for the potato shoots.

.....

.....

.....

.....

[2]

- (iii) With reference to your graph, explain the shape of the curve for the potato tubers.

.....

.....

.....

.....

.....

.....

[3]

[12]

- 8 Farmers in the Otavi maize triangle were interviewed to find out whether the use of pesticides sprayed on the maize crops has increased.

Table 8.1 shows the usage of pesticides on maize crops between 1985 and 2006.

Table 8.1

year	average number of times pesticides were sprayed in one year
1985	0.6
1990	0.8
1995	1.4
1997	1.7
1999	1.9
2000	2.1
2001	2.4
2006	2.6

- (a) Suggest **one** reason for the increased use of pesticides from 1985 and 2006.

.....
 [1]

- (b) (i) Suggest how use of a pesticide such as DDT on crops, can pollute water.

.....

 [2]

- (ii) Describe the undesirable effects of water pollution by a pesticide such as DDT.

.....

 [3]

(c) Humans release carbon dioxide during respiration. This carbon dioxide enters the atmosphere as part of the carbon cycle.

(i) State **one** human activity that increases the amount of carbon dioxide in the atmosphere.

..... [1]

(ii) Explain what happens to the carbon containing compounds in plants and animals when they die.

.....

.....

.....

..... [2]

(d) Deforestation is one of the human activities that disrupt the process of photosynthesis.

State **two** other undesirable effects of deforestation on the environment.

1

.....

2

.....

[2]

[11]