



Rewarding Learning

General Certificate of Secondary Education  
2010

Science: Biology

Paper 1  
Higher Tier

[G0903]



FRIDAY 21 MAY, MORNING

TIME

1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.  
Write your answers in the spaces provided in this question paper.  
Answer **all eighteen** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 120.  
Quality of written communication will be assessed in question **6(b)**  
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

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71

Candidate Number  
[ ]

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
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17	
18	
<b>Total Marks</b>	

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1 (a) Complete the table of changes which happen during puberty.

Change during puberty	Boys	Girls
Growth spurt		
	Yes	No
Menstruation		

[1]

[1]

[1]

(b) Name the hormone which causes these changes in girls and describe where it is produced.

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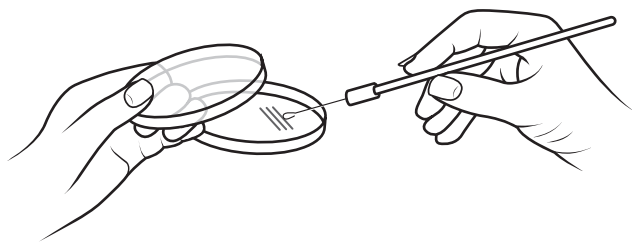
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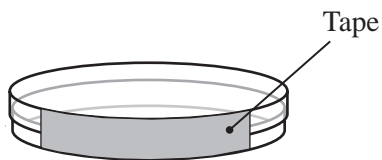
[2]

Examiner Only	
Marks	Remark

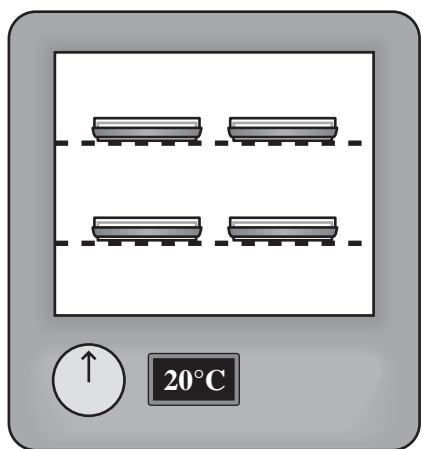
2 The diagram shows a method used to investigate microorganisms.



Streak the sample of microorganism on to a sterile agar plate



Seal the plate with tape



Incubate at 20°C

*Adapted from © Microbes in Action by Dr C J Clegg, published by John Murray, 2002, ISBN 0719575540*

(a) Name **two** groups of microorganisms.

1. \_\_\_\_\_ [1]

2. \_\_\_\_\_ [1]

(b) Use the diagram and your knowledge to describe **two** ways unwanted microorganisms can be prevented from entering the agar plate while streaking the sample.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [2]

Examiner Only	
Marks	Remark

(c) Explain why the agar plate is sealed with tape.

\_\_\_\_\_

\_\_\_\_\_ [1]

(d) Why is the agar plate incubated at 20°C and not at 37°C?

\_\_\_\_\_ [1]

Examiner Only	
Marks	Remark





5 (a) Name **one** substance, produced by burning fossil fuels,

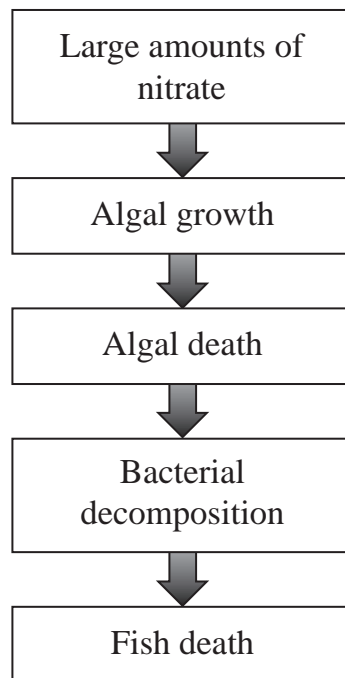
which causes acid rain.

\_\_\_\_\_ [1]

which blackens leaves and reduces photosynthesis.

\_\_\_\_\_ [1]

The flowchart summarises what happens when large amounts of nitrates pass into a lake.



(b) (i) Give **two** sources of nitrates which pass into lakes.

1. \_\_\_\_\_ [1]

2. \_\_\_\_\_ [1]

(ii) Explain how bacterial decomposition causes the death of fish.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

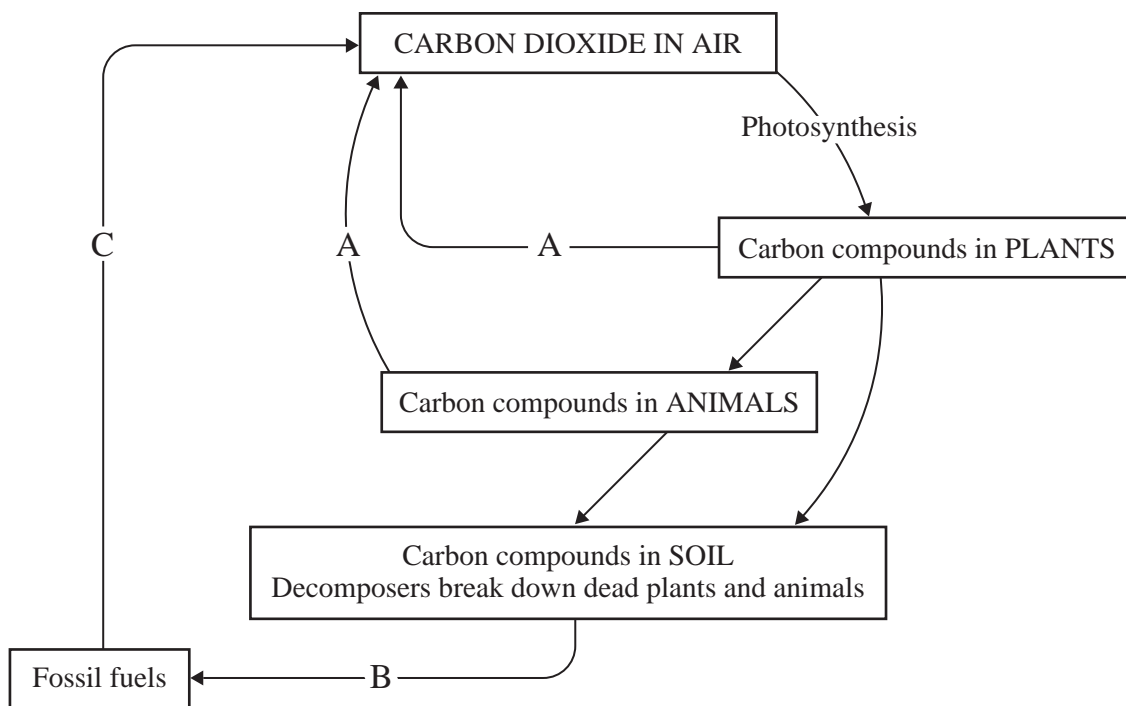
(iii) Name the process summarised in the flowchart.

\_\_\_\_\_ [1]

Examiner Only	
Marks	Remark



6 The diagram shows part of the carbon cycle.



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

A \_\_\_\_\_ [1]

B \_\_\_\_\_ [1]

C \_\_\_\_\_ [1]

(b) Use the diagram to describe how carbon, from the air, is passed through a food chain and back into the air by decomposers. Quality of written communication will be assessed in this question.

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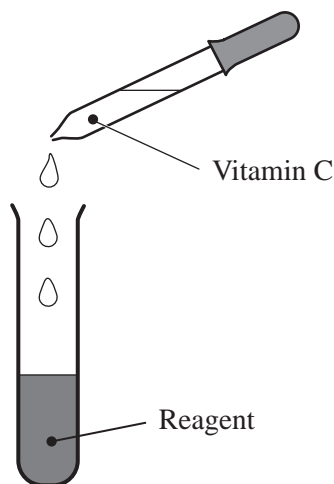
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\_\_\_\_\_ [3]

Quality of written communication [2]

Examiner Only	
Marks	Remark

- 7 The diagram shows the apparatus used to test fruit juice for vitamin C content.



- (a) Name the reagent used to test for vitamin C.

\_\_\_\_\_ [1]

- (b) Describe the colour change if vitamin C is present.

\_\_\_\_\_  
 \_\_\_\_\_ [1]

The table shows the results for three different juices.

Type of juice	Number of drops of fruit juice required to change colour of reagent
Blackcurrant	3
Orange	5
Boiled orange	18

- (c) Which juice contained the most vitamin C?

\_\_\_\_\_ [1]

- (d) Suggest **two** reasons why boiling fruit and vegetables reduces their vitamin C content.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [2]

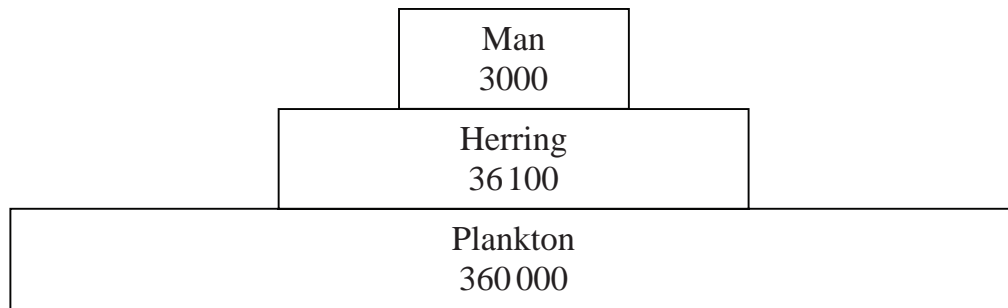
Examiner Only

Marks Remark





- 10 The pyramid shows the transfer of energy, in arbitrary units, from plankton to man.



- (a) Calculate the ratio of energy in the plankton to energy transferred to man.

Show your working.

[2]

- (b) Give **two** reasons for the decrease in energy between herring and man.

1. \_\_\_\_\_ [1]

2. \_\_\_\_\_ [1]

- (c) Give **two** ways over-fishing of the herring population, in the North Sea, could be reduced.

1. \_\_\_\_\_ [1]

2. \_\_\_\_\_ [1]

Examiner Only

Marks Remark

11 (a) Complete the table to compare aerobic and anaerobic respiration of yeast.

Write **Yes** or **No** in **each** of the empty boxes.

	Respiration in yeast		
	Aerobic respiration	Anaerobic respiration	
Uses oxygen			[1]
Releases energy			[1]
Produces ethanol			[1]
Produces carbon dioxide			[1]

(b) Where does aerobic respiration take place in the human body?  
Describe what happens to the substances produced.

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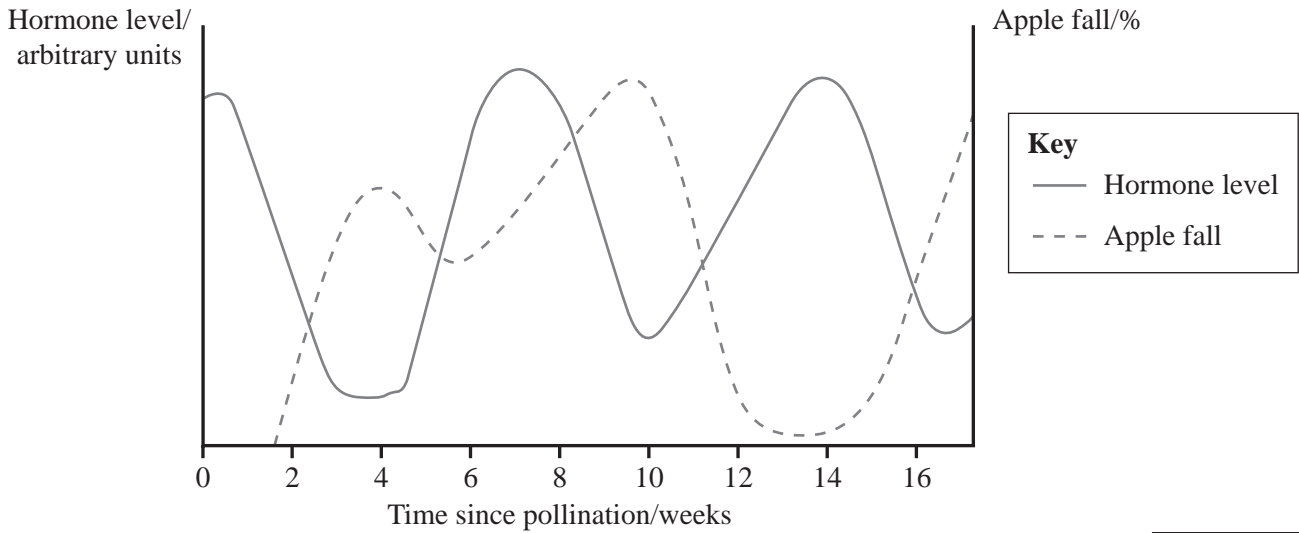
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Examiner Only	
Marks	Remark

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**(Questions continue overleaf)**

12 The graph shows the relationship between plant hormone level and the percentage of apples to fall off the trees before harvesting.



(a) Describe the relationship between hormone level and the percentage of apples that fall.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [1]

(b) Suggest **one** reason why farmers spray apple trees with artificial plant hormone.

\_\_\_\_\_

\_\_\_\_\_ [1]

(c) Give **two other** commercial applications of plant hormones.

1. \_\_\_\_\_ [1]

2. \_\_\_\_\_ [1]

Examiner Only	
Marks	Remark



When flowers are pollinated and fertilized, the developing seed produces hormones that stimulate fruit production.

(d) Explain how poor weather, which kills insects, could affect fruit yield.

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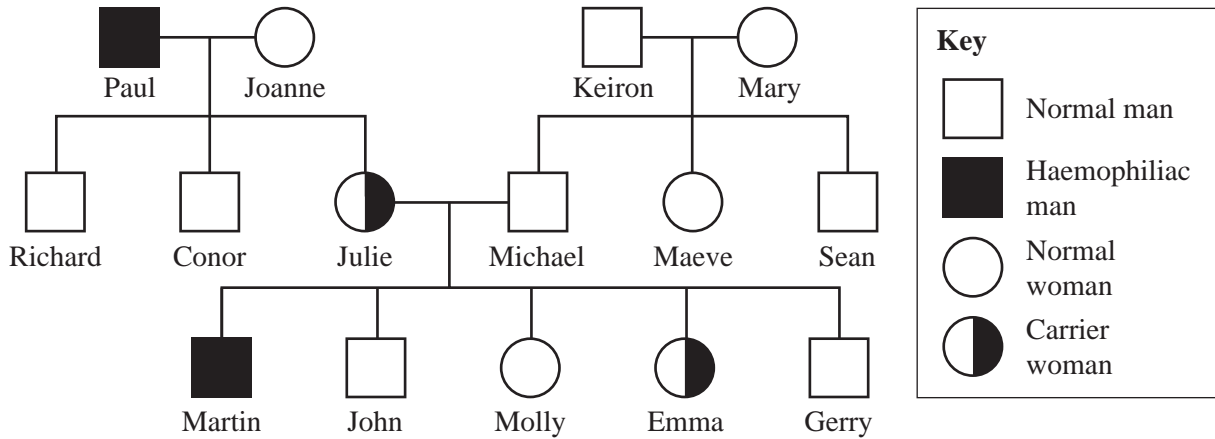
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[2]

Examiner Only	
Marks	Remark

13 The diagram shows the inheritance of haemophilia, a sex-linked condition found in humans.



Let  $X^H$  be the allele for normal haemoglobin  
 Let  $X^h$  be the allele for haemophiliac haemoglobin

(a) Give the

phenotype of Paul. \_\_\_\_\_ [1]

genotype of Emma. \_\_\_\_\_ [1]

(b) Complete the Punnett square to show the offspring of Julie and Michael.

		Michael	
		$X^H$	Y
Julie			

[3]

(c) Explain why Martin is a haemophiliac yet neither of his sisters suffer from the condition.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

**Examiner Only**

Marks	Remark

14 The eye is a receptor.

(a) Describe the role of a receptor.

\_\_\_\_\_

\_\_\_\_\_ [1]

(b) Name the layer which contains rods and cones.

\_\_\_\_\_ [1]

(c) Suggest why nocturnal mammals have a high density of rods.

\_\_\_\_\_

\_\_\_\_\_ [1]

(d) Give **two** features of the cones.

1. \_\_\_\_\_

\_\_\_\_\_ [1]

2. \_\_\_\_\_

\_\_\_\_\_ [1]

(e) Describe how the image reaches the brain.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

Examiner Only	
Marks	Remark

15 (a) Give **two** causes of infertility in women.

1. \_\_\_\_\_ [1]

2. \_\_\_\_\_ [1]

*In vitro* fertilization is one development which helps infertile women.

(b) Explain how a woman is made to produce a large number of ova at the start of *in vitro* fertilization.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [1]

(c) Describe how the ova produced are fertilized during *in vitro* fertilization.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

(d) How are the fertilized ova checked for healthy development?

\_\_\_\_\_  
\_\_\_\_\_ [1]

(e) Describe what must happen to the fertilized ovum, if the woman is to become pregnant.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

Examiner Only

Marks Remark

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**(Questions continue overleaf)**



(d) Explain why the air entering the biodigester must be sterile.

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[1]

(e) Describe what must happen to the contents of the biodigester before the penicillin can be used.

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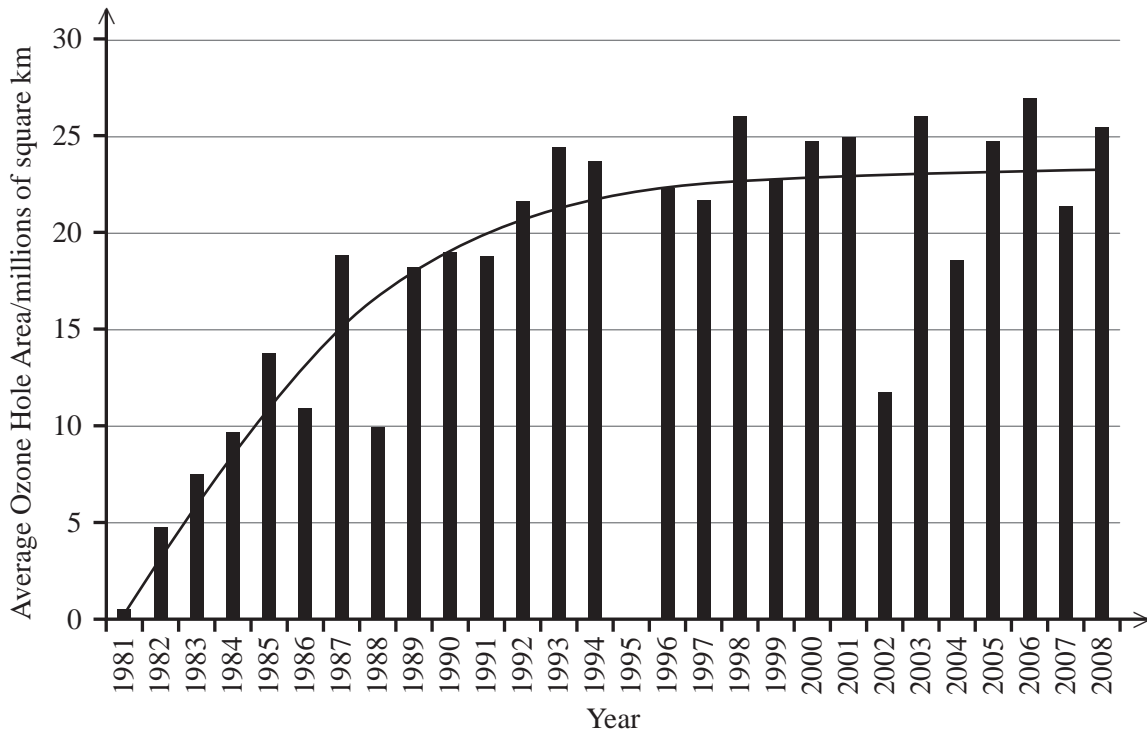
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[3]

Examiner Only	
Marks	Remark

17 The graph shows the area of the hole in the ozone layer above the Antarctic between 1981 and 2008.

Examiner Only	
Marks	Remark



(a) Describe the trend in the area of the ozone hole between 1981 and 2008.

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[2]

The changes in the ozone layer have been linked with chemicals called chlorofluorocarbons.

(b) Give **two** sources of chlorofluorocarbons.

1. \_\_\_\_\_ [1]

2. \_\_\_\_\_ [1]



(c) Explain how the hole in the ozone layer results in increased skin cancers.

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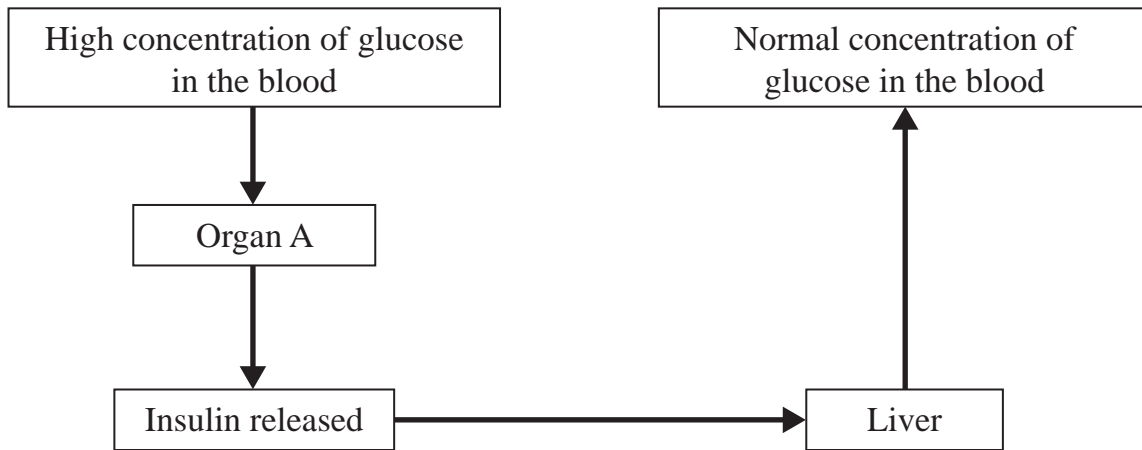
[2]

(d) Give **three** ways humans can protect themselves against skin cancer.

1. \_\_\_\_\_ [1]
2. \_\_\_\_\_ [1]
3. \_\_\_\_\_ [1]

Examiner Only	
Marks	Remark

18 The diagram shows part of the mechanism that controls blood glucose concentration.



(a) Name organ A.

\_\_\_\_\_ [1]

(b) Explain why the blood glucose concentration becomes high after eating a meal.

\_\_\_\_\_  
 \_\_\_\_\_ [1]

(c) Describe how insulin reaches the liver.

\_\_\_\_\_  
 \_\_\_\_\_ [1]

(d) Explain how insulin causes the liver to reduce the blood glucose concentration.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [3]

Examiner Only	
Marks	Remark

(e) Use the information in the diagram to help explain how the control of blood glucose concentration involves a feedback mechanism.

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[2]

Some people are unable to control their blood glucose concentration.

(f) Name this condition.

\_\_\_\_\_ [1]

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**THIS IS THE END OF THE QUESTION PAPER**

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Marks	Remark

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