

General Certificate of Secondary Education 2010

Science: Double Award (Non-Modular)

Paper 1 Higher Tier

[G8404]

FRIDAY 21 MAY, MORNING

TIME

1 hour 45 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 twelve** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 120. Quality of written communication will be assessed in question **1(a)**. Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Details of calculations should be shown.

Units must be stated in numerical answers where appropriate.



6053

Centre Number	
71	

Candidate Number

FOR Examiner's use only				
Question Number	Marks			
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
Total Marks				

Tł	e diagram shows the lungs during expiration (breathing out).	Examin	er Only Bomork
(a	O bescribe and explain the mechanism of expiration.		
	[4]		
	Quality of written communication. [2]		
(b) Gas exchange takes place in the lungs.		
	Give one way in which the lungs are adapted to carry out this process.		
	[1]		

2. An investigation into bacterial growth was set up as shown in the diagram. Examiner Only The broth had been boiled for several minutes to make it sterile. Marks Rem Glass tubing Sterile nutrient broth С B A [1] (a) Why was the broth sterilised? The broth remains clear if there is no bacterial growth but turns cloudy if bacteria grow. (b) Complete the table to show the appearance of the broth (cloudy or clear) after two days. Tube С А В Appearance [3] (c) Explain the result for tube B. [1] (d) Name the scientist who first carried out a similar investigation. [1] (e) What theory did this investigation disprove? [1]

The	e diagram shows a section through the heart.	Examir Marks	ner Only Remark
	Branches of pulmonary artery		
	Y		
	Pulmonary artery		
(9)	On the diagram mark with an X where deoxygenated blood enters the		
(a)	heart. [1]		
(b)	Name blood vessel Y [1]		
(c)	Suggest why the pulmonary artery has two branches		
(0)	[1]		
(a)	[1]		
	L_J		

4 The diagram shows a section through the eye.

The diagram shows a section unough the eye.	Marks Remark
(a) On the diagram, draw the lens in its correct position. [1]	
(b) What is the function of the lens? [1]	
(c) Where are the light receptors in the eye? [1]	
(d) On the diagram, draw an arrow to show where electrical impulses leave the eye. [1]	



Examiner Only Marks Remark

Complete the table to describe and explain the response of the labelled parts of the skin in **hot** conditions.

Part of the skin	Response in hot conditions	
	Description	
Hair	Explanation	
		[2]
	Description	
Capillary network	Explanation	
		[2]
Sweat gland	Description Sweat produced	
	Explanation	
		[2]





(a) The diagram shows an example of a cell. This cell divides to produce 7 Examiner Only gametes. Complete the diagram to show the result of such cell division. Marks Remarl - Parent cell [3] (b) Name the type of cell division that produces gametes. [1] (c) The parent cell has a diploid number of chromosomes. What term describes the number of chromosomes in the gamete? [1]

Examiner Only

Marks Remark

- Air in Pump < Air out ◄ Transpiring plant Calcium chloride absorbs moisture from air © CCEA Calcium chloride increases in mass when it absorbs moisture. (a) Describe how you would use this apparatus to compare the rate of transpiration in two plants, one as shown in the diagram and the other with fewer leaves. [5] (b) How would you expect the rate of transpiration to differ in the plant with fewer leaves? [1]
- 8 The diagram shows apparatus that can be used to investigate the amount of water transpired by a plant.

(a) The diagram shows the apparatus used to investigate if carbon dioxide 9 Examiner Only Marks Remar is needed for photosynthesis. The plant was destarched and then the leaves were sealed in glass flasks. The plant was then left in sunlight for 12 hours. Flask 1 Flask 2 Normal conditions Chemical which removes carbon dioxide (CO_2) from the air (i) How is the plant destarched? [1] (ii) A starch test was carried out on each leaf. Describe the colour you would expect to obtain at the end of the starch test in the leaf from flask 1 leaf from flask 2 [2]

(b) Another experiment was carried out on a tomato plant to investigate Examiner Only Marks Remar where sugar was transported to after it was made in the plant leaves. The results are shown below. Percentage of the sugar Part of tomato plant transported to each part of the plant 52 Roots 45 Stem Youngest leaf 2 1 2nd youngest leaf (i) Draw an arrow to show the direction in which most sugar was transported in the plant. [1] © CCEA (ii) Name the type of cells through which sugars are transported. [1]

(iii) Give three ways sugars, made by photosynthesis, are used by plants.

1.
Marks

2.
[3]

10 (a) The diagram shows the liver and associated organs. Examiner Only Marks Rema Gall bladder Stomach Bile duct -Liver -Small Pancreas intestine © GCSE biology for CCEA by R McIlwaine & J Napier, published by Hodder & Stoughton, 2003, ISBN 9780340858257. 'Reproduced by permission of Hodder Education' (i) The gall bladder passes bile down the bile duct to the small intestine. Give one function of bile. _ [1] (ii) Name the enzyme that breaks down fats after bile has acted on them. [1]

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- (b) Proteins are digested to amino acids in the small intestine.
 - (i) Name the process by which amino acids pass into the blood in the small intestine.

_____ [1]

- (ii) Name the blood vessel that transports amino acids from the small intestine to the liver.
 - _____ [1]

Examiner Only Marks Remark

(iii) Describe how amino acids are used by cells.

[2]

(c) Excess amino acids are broken down to urea by the liver and then transported to the kidneys. Anne's kidneys failed and so she had to undergo dialysis.

The diagram shows the composition of Anne's blood as it enters the dialysis machine.



- [4]
- (ii) At the end of dialysis how would you expect the composition of the dialysis fluid to have changed?

[1]

(iii) Why does the dialysis fluid need to be changed regularly?

[1]

Examiner Only Marks

Ren

(d)	(i)	The liver and insulin regulate blood glucose levels.	Examiner Only Marks Rema
		Describe how this regulation occurs after eating a meal with a high glucose content.	
([3]	
	(ii)	Name the condition people suffer from if they cannot regulate their blood glucose levels.	
		[1]	

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(Questions continue overleaf)

11 (a) The diagram shows a food web for an island in the Arctic.

Examiner Only Marks Remark



(ii) (Use the food web to name	
8	a primary consumer	
8	a secondary consumer	[2]
(iii) (c	Use the food web to give a food chain with only five types of organisms.	[3]
	$_\rightarrow___\rightarrow___\rightarrow___$	
(iv) I	Explain why the phytoplankton (plants) are called producers.	
		[2]
(v) S v	Suggest why the numbers of zooplankton may decrease during winter.	
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(v) S v (vi) (U H	Suggest why the numbers of zooplankton may decrease during winter. On the grid draw a pyramid of numbers for your food chain in (Use the numbers of organisms shown in the food web. Beside each level write the name of the organism.	[2] (iii).
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(v) S V (vi) (U H	Suggest why the numbers of zooplankton may decrease during winter.	[2] (iii).

(vii) Explain why it is an advantage to the polar bear to have more than one food source.

[1]

Examiner Only Marks Remark

(b) The diagram shows the transfer of energy from one trophic level to the next. Energy is lost between trophic levels.



(i) What percentage of the energy available to primary consumers is transferred to secondary consumers? Show your working.

_____%[2]

(ii) Give two ways that energy is lost between trophic levels.

(c)	A scientist wanted to estimate the size of population of fish in a lake He captured a first sample containing 112 fish from the lake and pu mark on the fin of each one. He released these fish back into the lake One week later he captured a second sample which contained 140 f 16 of which were marked and 124 unmarked.	e. t a sce. ish,	Examiner Only Marks Remark
	The formula used to estimate the size of a population is given below	V.	
	$Population = \frac{\begin{array}{c} \text{Total number of fish} \\ \text{in the first sample} \end{array} \times \begin{array}{c} \text{Total number of fish} \\ \text{in the second sample} \end{array}}{\begin{array}{c} \text{Number of marked fish in the second sample} \end{array}}$		
	(i) Calculate the size of the fish population using the formula give Show your working.	n.	
	Answer	_[2]	
	(ii) Suggest two reasons why the fish population in a lake may decrease.		
	1		
	2	[2]	
	(iii) Why is it more difficult to estimate fish populations in the sea rather than in a lake?		
		[1]	
	(iv) Give one reason why it is important to monitor fish population the sea.	s in	
		[1]	

[Turn over

12	Pea	plar	nts can produce peas that are wrinkled or smooth.		Examin Marks	er Only Remark
	The smc	e gen oothr	e (allele) for wrinkled is dominant to the gene (allele) for ness.			
	Let Let	R re r rep	present the gene (allele) for wrinkled peas. present the gene (allele) for smooth peas.			
	(a)	Ap	lant breeder crossed two heterozygous pea plants.			
		(i)	Use a Punnett square to show the possible genotypes of the offspring of this cross.			
				[3]		
		(ii)	Give the phenotypes of the offspring and the ratio of the phenotypes.			
			Phenotypes and			
			Ratio	[2]		
	(b)	The kno	e breeder had a pea plant that produced wrinkled peas but he did now its genotype.	not		
		(i)	Use Punnett squares to show the backcrosses (test crosses) that I used to determine the genotype of this pea plant.	he		
				[3]		
		(ii)	If any smooth offspring are produced what does this tell you about the genotype of the parent pea plant?	out		
				[1]		

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(Questions continue overleaf)

(c) The diagram shows how plants can be produced by the process of tissue culture.

Examiner Only



1.	(i)	When choosing a plant for tissue culture suggest two desirable characteristics that the plant might have.	Examiner O Marks Re
2. [2] (ii) Why is tissue culture an example of artificial selection? [1] (iii) Suggest an advantage of using tissue culture to produce plants commercially. [1] (iv) Why do the following minerals need to be added to the nutrient jelly? [1] Magnesium [2] (v) Suggest why the explants are placed in a weak bleach solution. [1] (vi) Give two environmental conditions that would need to be controlled to produce plants by tissue culture. [1] 1. [2] 2. [2]		1	
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 vi) Give two environmental conditions that would need to be controlled to produce plants by tissue culture. 1			[1]
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2 [2]		1	
		2	[2]

(d) The diagram shows a section of DNA before and after a change occurred in the DNA structure. The letters A, T, G and C represent the four bases.



- (i) The G on the first strand changed to A. Complete the second strand by adding in the missing base. [1]
- (ii) What is a change in DNA structure called?

	[1]
(iii) What type of molecule does DNA code for?	
	[1]
	[*]

- (iv) What effect may the change in DNA structure, shown above, have on the molecule it codes for?
 - [1]

Examiner Only

Marks Remar

- (v) What approach did Watson and Crick take that led them to the discovery of the structure of DNA?
- [1]
- (vi) What term is used to describe the structure of DNA?

[2]

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