



General Certificate of Secondary Education 2013

#### Biology

Unit 2

**Higher Tier** 

[GBY22]

**TUESDAY 18 JUNE, MORNING** 

\*GBY22\*

TIME

1 hour 45 minutes.

#### INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided. You must answer the questions in the spaces provided. Do not write outside the box, around each page or on blank pages. Complete in blue or black ink only. Do not write with a gel pen. Answer all thirteen questions.

#### INFORMATION FOR CANDIDATES

The total mark for this paper is 115. Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question. Quality of written communication will be assessed in questions **4**, **8(c)** and **13(c)**.

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1	The	pho			Examiner Marks R	Only temark
(	(a)	(i)	Name part <b>A</b> of the sperm.			
				[1]		
		(ii)	Describe <b>one</b> way part <b>A</b> is adapted to its function.			
				[1]		
				[']		
		(iii)	Give <b>one other</b> way the sperm is adapted to its function.	[1]		
				[']		
		(iv)	Suggest <b>one</b> reason why all the sperm do not appear to be the same size.			
				[1]		
(	(b)	Nar	ne the cell produced by fertilisation.		Total Ques	stion 1
				[1]		
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2 (a	1) / I	A ban on smoking Ireland in 2004.	in workplaces came in	to effect in the Republ	ic of	Examine Marks	r Only Remark
	E	Bar staff complete before the ban and	d a health questionnair I three years after the I	e about their symptom pan.	IS,		
		The table shows th	ne results of the question	onnaires.			
		Symptom	Percentage of bar of syn	r staff complaining nptoms			
			Before ban	3 years after ban			
		Eye irritation	82	51			
		Sneezing	75	34			
		Coughing	87	67			
	)   	Adapted from: Respiratory hea Agnew, Patrick Goodman, Luk Respir J October 2008; 32, Suj	th improvement continues after workpl e Clancy: Reproduced by permission o opl. 32: 259s (Abstract 1577) © Europe	ace smoking ban in Ireland by Michele f the European Respiratory Society Eu an Respiratory Society	e Ir		
	(	<ul> <li>(i) Suggest one of questionnaires</li> <li>Use data from</li> </ul>	conclusion that can be s about the health of ba n <b>the table</b> to support y	made from the results ar staff. your conclusion.	of the		
					[2]		
	(	(ii) Which sympto	m shows the greatest	change after the ban?			
				_	[1]		
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(b)	Give <b>one</b> reason why a ban on smoking in workplaces could bene non-smokers.	əfit	Examin Marks	er Only Remar
		_ [1]		
(c)	Suggest why some people are opposed to a ban on smoking in workplaces.			
		_ [1]		
			Total Qu	lestion
)			[Tur	n ov

3	Scie obs	entific method involves the following steps: ervation, making a hypothesis, experimentation, conclusion, validatio	on.	Examir Marks	er Only Remark
	Jen vac	ner is famous for having applied scientific method while developing cination as a way of preventing smallpox.			
	Sor	ne of the steps in Jenner's development of a smallpox vaccine were:			
	Α	Infect a person with cowpox. Then infect the person with smallpox.			
	В	Jenner and other scientists repeated the procedure and got the sam results.	ne		
	С	A person infected with cowpox may be protected from smallpox.			
	D	Jenner heard dairymaids say "I shall never have smallpox for I have had cowpox".	<b>;</b>		
	(a)	Which of the steps used by Jenner is an example of			
		observation?	[1]		
		validation?	[1]		
	(b)	<b>Use the information given above</b> to help explain why Jenner's vaccination is an example of artificial, active immunity.			
		Artificial			
			[1]		
		Active			
			[1]		
	We in p	now know that white blood cells, known as phagocytes, are importai rotecting the body against diseases.	nt		
	(c)	Describe how phagocytes help protect against diseases.			
			[0]	I otal Qu	Jestion 3
			[2]		
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<ul> <li>Use evidence from the diagram and the procedure to explain</li> <li>Which antibiotic was most effective</li> <li>How the experiment was a fair test</li> <li>The safety precautions needed.</li> </ul>	Examiner Marks R
In this question, you will be assessed on your written communication skills, including the use of specialist scientific terms.	
[6]	
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3

Millions of years ago	Lower leg bones	Body	Height/m
1	cannon bone hoof		1.6
10		A B	1.0
40		Son and a second	0.6
60	toe	and a	0.4

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<b>Using evidence from the table</b> , describe the changes that apper have happened to the horse over time.	ear to	Examiner Onl
	[4]	
		Total Questior
		[Turn ov



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Dui	ing step 1 the woman receives a hormone injection.		Examin Marks	er ( Re
(b)	What effect does this injection have on the ovaries?			
		_ [1]		
(c)	Describe the process of <i>in vitro</i> fertilisation at step 3.			
		_ [2]		
(d)	Suggest <b>two</b> reasons why the government introduced regulations which allow doctors to transfer only two embryos at step 5.			
	1	_ [1]		
	2	_ [1]		
(e)	Give <b>two</b> causes of infertility in males.			
	1	_ [1]		
	2	_ [1]		
			Total Qu	Jes
			[Tur	'n

7 The table shows the results of an experiment carried out to investigate the effect of placing potato cylinders into a range of sugar solutions kept at the same temperature for 24 hours.

All the potato cylinders were taken from the same potato.

Concentration of sugar solution/M	Initial mass of potato cylinder/g	Final mass of potato cylinder/g	Change in mass of potato cylinder/g	Percentage change in mass of potato cylinder
0.0	4.00	4.80	+0.80	+20.0
0.2	4.28	4.75	+0.47	
0.4	3.95	4.03	+0.08	+2.0
0.6	4.00	3.72	-0.28	-7.0
0.9	4.20	3.36	-0.84	-20.0

(a) Use the information given to suggest two ways the experiment was a fair test.

(b) Complete the table by calculating the percentage change in mass of the potato cylinder placed in 0.2M solution. Show your working.

[2]

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Examiner Only Marks Remark



Explain your answer.			
Concentration M			
Explanation			
	[0]		
	[2]		
		Total Q	uesti
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Year 1998	Percentage of adu concentration of cho	llts who have a high plesterol in their blood	
	Men	Women	
1998	75	77	
2005	58	61	
		Adapted from: www.heartstat	s.org
			[1]

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when the concentration of cholesterol in the blood is high.	Marks	R
diagram removed for copyright reasons		
Compare and contrast the effect on the heart of a build up of cholesterol in a coronary artery wall with the effect on the brain of a build up of cholesterol in an artery wall		
In this question, you will be assessed on your written communication skills, including the use of specialist scientific terms.		
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9	(a)	Name the chamber of the heart which	Exami	ner Only
		receives deoxygenated blood from the vena cava.	IN ALKS	Kemark
		[1]		
		pumps oxygenated blood into the aorta.		
		[1]		
	(b)	Explain the role of the valve between the heart and the pulmonary artery.		
		[2]		
	(c)	Name the blood vessel which returns blood from the brain to the heart.		
		[1]		
			Total Q	uestion 9
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(a)	The diagram shows chromosomes during cell division.	Examiner On Marks Rema
	(i) <b>Complete the diagrams</b> below by drawing the chromosomes of	
	the daughter cells that would be produced when this cell divided by mitosis.	
	[2]	
	Mitosis is used in asexual reproduction and cloning.	
	(ii) Give <b>two</b> other ways mitosis is used in living organisms.	
	1 [1]	
	2	
	[1]	
)		



(ii)	Why are the plants produced in this process called clones?		Examin Marks	er Only Remark
		[1]		
(iii)	) Give <b>one</b> advantage and <b>one</b> disadvantage of cloning plants in this way.	l		
	Advantage			
		[1]		
	Disadvantage	[1]		
			Total Que	estion 10
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	David's gametes
Furmela	
gametes	
	[4]
Phenotypes	
Patrick	[1]
Peter	[1]
Anne	
	[2]
	Total Qu



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	[4]		
(d)	Describe the next stages involved in the production of insulin in an industrial fermenter.		
The	[1] e plasmid with the human insulin gene inserted is then placed into a terium.		
(c)	What could you conclude if, after this process, the antibiotic-resistant gene in the plasmid remained intact?		
	[2]		
(b)	<b>Use the information in the diagram</b> to explain why it is important to use the same enzyme to cut out the insulin gene and cut open the plasmid.		
(a)	Name the type of enzyme used to cut out the insulin gene and cut open the plasmid. [1]	Examine Marks	r Only Remark

. ,	has been produced in the fermenter.	Marks	Re
	[3]		
Bef dial	ore genetically engineered human insulin was available, people with betes used animal insulin.		
(f)	Give two advantages of using genetically engineered human insulin rather than animal insulin.		
	1		
	2		
	[2]		
(g)	Suggest <b>two other</b> factors which scientists have to take into consideration when making decisions about implementing new scientific techniques.		
	[2]		
		Total Que	estic
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(c)	Describe how using different lines of evidence led scientists to the discovery of the structure of DNA.		Examine Marks	er Onl Rema
	In this question, you will be assessed on your written communication skills, including the use of specialist scientific terms.			
		_		
		_		
		_		
		_		
	[(	6]		
			[Turi	י <b>ס</b> ח

(d) The results of research into the percentage of each of the bases present in the DNA of five people are shown in the table.

Dereen	Percentage of base in DNA					
Person	Α	т	G	С		
1	30.9	29.7	19.9	20.1		
2	28.9	29.8	22.4	19.5		
3	29.2	29.6	19.1	21.3		
4	29.7	30.1	21.2	21.0		
5	28.3	29.3	20.4	19.6		
Average	29.4	29.7	20.6			

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\_\_\_\_ [1]

- (i) Complete the table by calculating the average percentage of the base C. [1]
- (ii) Suggest why the results for each base are considered to be reliable.
- (iii) What **two conclusions** can be made from these results about the percentage of the bases present in these samples of DNA?

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(iv) 5 [	Suggest <b>two</b> possible consequences of a random change in th DNA molecule during meiosis.	ne	Examine Marks	r Only Remark
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-		[2]		
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For Examiner's use only		
Question Number	Marks	
1		
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3		
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9		
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11		
12		
13		
Total Marks		

**Examiner Number** 

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