Please check the examination details below before entering your candidate information				
Candidate surname	Other r	names		
Pearson Edexcel International GCSE (9–1)	Centre Number	Candidate Number		
Tuesday 14 M	ay 2019			
Afternoon (Time: 2 hours)	Paper Reference	e 4BI1/1B 4SD0/1B		
Biology Unit: 4BI1 Science (Double Award) Paper: 1B	4SD0			
You must have: Calculator, ruler		Total Marks		

Instructions

- Use **black** ink or ball-point pen.
- Fill in the boxes at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided there may be more space than you need.
- Show all the steps in any calculations and state the units.
- Some questions must be answered with a cross in a box ⊠. If you change your mind about an answer, put a line through the box ₩ and then mark your new answer with a cross ⊠.

Information

- The total mark for this paper is 110.
- The marks for each question are shown in brackets
 use this as a guide as to how much time to spend on each question.

Advice

- Read each question carefully before you start to answer it.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.







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	ome plant cells contain many chloroplasts, some plant cells hloroplasts and some plant cells contain no chloroplasts.	
		(3)
(c) Ribosomes are fo	und in plant cells and in animal cells.	
Name the proces	s that occurs at the ribosomes.	(1)
	(Total for Question 1 = 9	marks)

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The photograph shows a type of fish called a salmon. (Source: © Alexander Raths/Shutterstock) Some humans eat salmon as a source of protein. Protein is a component of a balanced diet. (a) Which statement describes what happens to salmon protein in the human stomach? (1) A it is digested into amino acids **B** its surface area is increased by bile C its pH is raised by hydrochloric acid **D** it is absorbed by villi (b) The table lists other components of a balanced diet and their functions. Complete the table by giving a function of each component. The first one has been done for you. (3) **Function** Component lipid store of energy vitamin D iron



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(c) A student investigates the effect of genetic modification on the growth of salmon.

The student measures the mass and length of one normal salmon and one genetically modified salmon when both salmon are 18 months old.

The table shows the student's results.

Type of salmon	Mass in g	Length in cm
normal	1250	33
genetically modified	3000	61

(i) It is recommended that a 15-year-old person needs 50 g of protein per day for a balanced diet.

A normal salmon contains 20% protein.

Calculate how many 15-year-olds can have their recommended daily allowance of protein supplied by the 18-month-old normal salmon.

(2)

number =



Discuss the student's conclusion.	
	(6)
(d) The passage describes the role of enzymes involved in the ge	enetic modification of salmon
Complete the passage by writing a suitable word in each spa	
	(3)
Il salmon contain a length of DNA called a	, which controls the
roduction of growth hormone. Another length of DNA, from a diffe	erent species of fish, is cut ou
sing a enzyme. This DNA is the	I Joined to the samon DNA
sing an enzyme called	
nis causes the salmon to produce growth hormone at all times.	



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(c) The diagram shows sandpipers feeding.

Sandpipers have long beaks so that they can dig for worms in the mud.



(Source: © Birchside www.fotosearch.com)

Explain how sandpipers evolved to have long beaks.

(4)



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This apparatus can be used to show osmosis. Important of the subset of	DO NOT WRITE IN THIS AREA
(b) Describe how this apparatus could be modified to measure the rate of osmosis at different temperatures. (3)	DO NOT WRITE IN THIS AREA
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- Wheat seeds contain stores of a large insoluble molecule. 5 This molecule is digested by amylase as the seeds germinate.
  - (a) What is the name of this large insoluble molecule?
  - glucose X Α
  - lipid В  $\times$
  - С protein  $\times$
  - D starch  $\times$
  - (b) A student investigates the oxygen absorbed by germinating seeds at different temperatures. The diagram shows some of the student's apparatus.



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<ul> <li>(ii) What is the function of the soda lime?</li> <li>(1)</li> <li>A it absorbs carbon dioxide</li> <li>B it absorbs oxygen</li> <li>C it releases carbon dioxide</li> <li>D it releases oxygen</li> <li>(iii) The student measures the distance moved by the coloured liquid and converts this to volume of oxygen absorbed.</li> <li>The volume of oxygen absorbed can be calculated using the formula volume = π × radius² × distance</li> <li>Calculate the volume of oxygen absorbed when the coloured liquid moves a distance of 6.0 mm.</li> <li>[diameter of tube = 1.0 mm]</li> </ul>	(i)	Suggest why the student opens the tap after obtaining one set of results.	(2)
<ul> <li>B it absorbs oxygen</li> <li>C it releases carbon dioxide</li> <li>D it releases oxygen</li> <li>(iii) The student measures the distance moved by the coloured liquid and converts this to volume of oxygen absorbed.</li> <li>The volume of oxygen absorbed can be calculated using the formula volume = π × radius² × distance</li> <li>Calculate the volume of oxygen absorbed when the coloured liquid moves a distance of 6.0 mm.</li> <li>[diameter of tube = 1.0 mm] (3)</li> </ul>	(ii)	What is the function of the soda lime?	(1)
<ul> <li>C it releases carbon dioxide</li> <li>D it releases oxygen</li> <li>(iii) The student measures the distance moved by the coloured liquid and converts this to volume of oxygen absorbed.</li> <li>The volume of oxygen absorbed can be calculated using the formula volume = π × radius² × distance</li> <li>Calculate the volume of oxygen absorbed when the coloured liquid moves a distance of 6.0 mm.</li> <li>[diameter of tube = 1.0 mm]</li> </ul>	$\mathbf{X}$	A it absorbs carbon dioxide	
<ul> <li>□ D it releases oxygen</li> <li>(iii) The student measures the distance moved by the coloured liquid and converts this to volume of oxygen absorbed can be calculated using the formula volume = π × radius² × distance</li> <li>Calculate the volume of oxygen absorbed when the coloured liquid moves a distance of 6.0 mm.</li> <li>[diameter of tube = 1.0 mm] (3)</li> </ul>	$\times$	B it absorbs oxygen	
<ul> <li>(iii) The student measures the distance moved by the coloured liquid and converts this to volume of oxygen absorbed.</li> <li>The volume of oxygen absorbed can be calculated using the formula volume = π × radius² × distance</li> <li>Calculate the volume of oxygen absorbed when the coloured liquid moves a distance of 6.0 mm.</li> <li>[diameter of tube = 1.0 mm]</li> </ul>	$\times$	<b>C</b> it releases carbon dioxide	
<ul> <li>to volume of oxygen absorbed.</li> <li>The volume of oxygen absorbed can be calculated using the formula volume = π × radius² × distance</li> <li>Calculate the volume of oxygen absorbed when the coloured liquid moves a distance of 6.0 mm.</li> <li>[diameter of tube = 1.0 mm]</li> </ul>	$\mathbf{X}$	<b>D</b> it releases oxygen	
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(3)		Calculate the volume of oxygen absorbed when the coloured liquid moves a	
volume =		[diameter of tube = 1.0 mm]	(3)
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(a) (i) Describe the role of a sperm cell.	(1)
(ii) Describe the structures found in part B.	(2)
(iii) Explain why part A contains many mitochondria.	(2)
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(b) Nicotine is a chemical found in cigarettes.

A scientist investigates how nicotine affects sperm cells.

The scientist gives male rats different concentrations of nicotine.

He then calculates the percentage of damaged sperm cells in the semen produced by each rat.

The table shows his results.

Concentration of nicotine in mg per kg of rat	Percentage of damaged sperm cells (%)
0.0	6.4
0.5	16.8
1.0	24.8

(i) The sample of semen from a rat given a nicotine concentration of 1.0 mg per kg contains  $5.8 \times 10^7$  sperm cells.

Calculate the number of damaged sperm cells in this sample.

(2)

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(ii) The scientist concludes that cigarette smoking could make mal	e humans infertile.
Discuss this conclusion.	(5)
(Total for Ques	tion 6 = 12 marks)

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	ve the boiling tube and record the colour of the solution uses this method for each of the four fruit juices.		
	ws the student's re	-	
	Fruit juice	Colour of solution after heating for three minutes	
	A	blue	
	В	brick red	
	С	yellow	
	D	green	
(i) Give two	variables that the st	tudent controls in his investigation.	

highest

	(iii) The student is now given sugar solutions with concentrations of 1%, 5%, 10 and 20%.	%
DO NOT WRITE IN THIS AREA	Explain how the student could use these solutions to estimate the concentration of sugar in the four fruit juices.	(3)
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(b) Some fruit juices contain high concentrations of sugar.	
These fruit juices increase the number of bacteria in the mouth.	Ö
This may lead to an increase in tooth decay.	TON
(i) Suggest why high concentrations of sugar may increase tooth decay. (2)	WRIT
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(ii) Explain another health risk to children who drink fruit juices with high	<b>E</b>
concentrations of sugars. (2)	DO NOT WRITE IN THIS
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8 A scientist investigates the effect of exercise on breathing rate.

She measures the breathing rate in breaths per minute of two people, P and Q, every 5 minutes for 30 minutes.

This is her method.

- measure their breathing rate every 5 minutes while they exercise for 20 minutes
- measure their breathing rate every 5 minutes for a further 10 minutes while they recover from the exercise

The table shows her results.

Time in minutes	Breathing rate in breaths per minute			
Time in minutes	Person P	Person Q		
0	12	15		
5	20	24		
10	22	24		
15	25	23		
20	24	20		
25	16	19		
30	12	15		

(a) (i)	Plot a line graph of the results for person P and person Q.					
	Use a ruler to join your points with straight lines.					
		+++++-				

(ii) Explain the change in breathing rate during exercise.

(3)

(6)

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	(2)	DO NOT WRI
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(b) The time taken to recover from exercise is often a good measure o The scientist concluded that person P is much fitter than person Q		
Comment on the validity of this conclusion.	(4)	g
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(Total for Ques	stion 8 = 15 marks)	DO NOT WRITE IN THIS ARE

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Pollution can occur in the atmosphere and in rivers.(a) Carbon monoxide can pollute the atmosphere.Describe the effects of carbon monoxide pollution on humans.		DO NO	AREA
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Explain the biological consequence	ces of sewage pollution on a river ecosystem.	
Explain the biological consequence		(6
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			als produce hormones to communicate between cells.		
	(i)	W	hich hormone causes the development of secondary sexual characteristics in girls? (1)	D	REA
•	\mathbf{X}	Α	adrenaline	TON	HIS A
•	\mathbf{X}	В	oestrogen	WRI	Ë
•	\times	С	progesterone	Ē	S H
•	\times	D	testosterone	THE SECOND	T WI
	(ii)	W	hich hormone causes an increased blood flow to the muscles during exercise? (1)	DO NOT WRITE IN THIS AREA	DO NOT WRITE IN THIS AREA
•	\mathbf{X}	Α	adrenaline		
•	\mathbf{X}	В	insulin		
•	\mathbf{X}	C	progesterone		
•	\mathbf{X}	D	testosterone		A
	(iii) W	hich of these is a correct statement about hormones? (1)	DO NOT WRITE IN THIS	41S AREP
1	\times	Α	they always produce short-term changes	WRIT	EN
1	\times	В	they are carried by neurones	E N	WRITE
1	\times	C	they are transported in the plasma	E	T WI
1	\times	D	they always produce a rapid response	ARE	ONC NC
	(b) Pla	ants	produce plant growth substances such as auxin.	A	
	Su	igge	est why some biologists do not consider auxin to be a hormone. (2)		
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	(c) Plant growth substances stimulate root growth from a cut stem.
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