PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



EXAM QUESTION PACK

TOPIC 7: ANIMAL COORDINATION, CONTROL AND HOMEOSTASIS (PACK 2)

SCORE	PERCENTAGE
/44	%

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Q1.

* Explain the role of ADH in regulating the water content of the blood.

(6)

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Q2.

* The human body prevents blood glucose levels from becoming too high or too low.

Explain how the human body maintains blood glucose levels within a narrow range.

(6)

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Q3.

* Explain how the human body responds to an external temperature of 40 °C.

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Q4.

The female population of Britain is 32.6 million.

The percentage of this population taking the combined contraceptive pill is 13.2%.

The combined pill is 98.8% effective.

Calculate the maximum number of females taking the combined contraceptive pill who could become pregnant.

(3)

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(Total for question = 3 marks)

Q5.

A hospital patient was tested for diabetes.

A nurse recorded his mass and height.

Figure 10 shows these measurements.

mass in kg	height in metres
124	1.8

Figure 10

Calculate the BMI of this patient using the information in Figure 10.

(2)

BMI = ...

(Total for question = 2 marks)

Q6.

A student was investigating the effect of sweating.

The student set up two conical flasks each with a thermometer as shown in Figure 5.

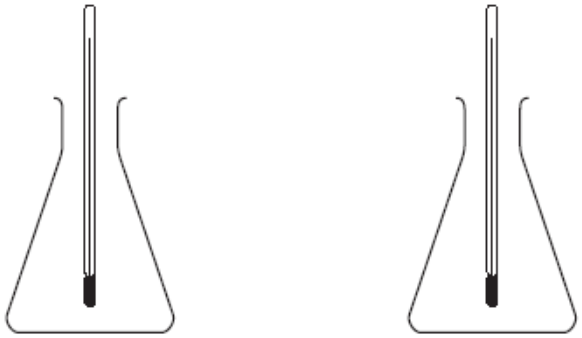


Figure 5

Flask 1 was covered in wet tissue paper.

Flask 2 was covered with dry tissue paper.

Hot water was added to each of the flasks.

The temperature of the water in each flask was recorded every minute for 10 minutes.

The results of this investigation are shown in Figure 6.

time in minutes	flask 1 (wet tissue paper) temperature in °C	flask 2 (dry tissue paper) temperature in °C
1	98	98
2	82	91
3	71	84
4	60	76
5	50	69
6	39	61
7	31	56
8	22	49
9	22	42
10	22	37

Figure 6

(i) Calculate the rate of temperature change in flask 1 from 1 to 8 minutes.

(2)

..... °C per minute

(ii) Compare the trends shown in the data for flask 1 and flask 2.

(2)

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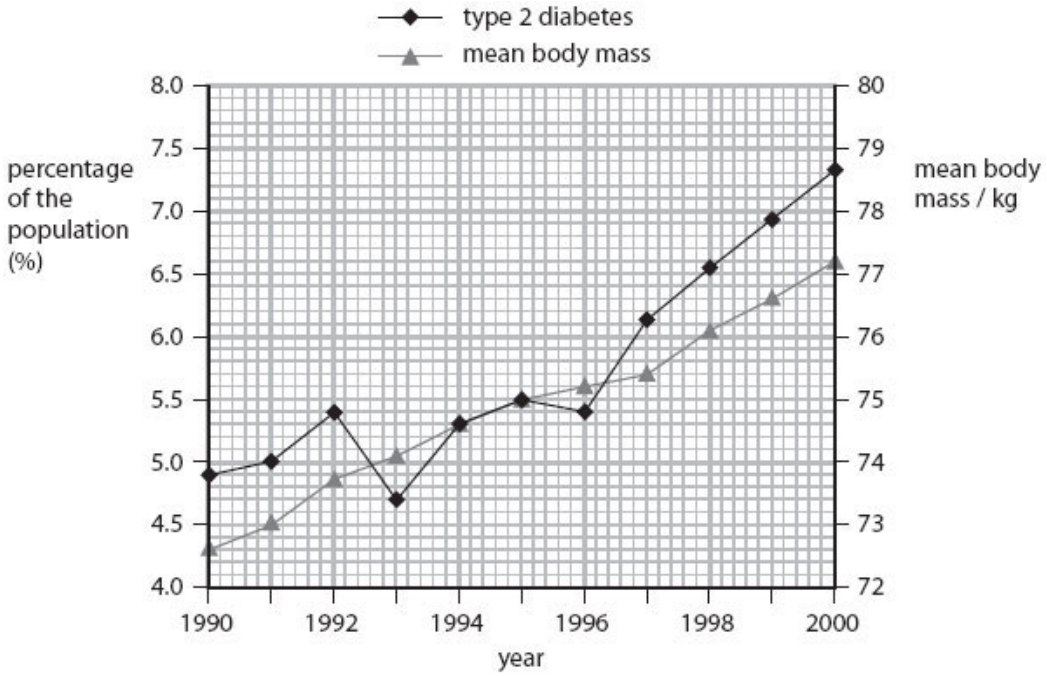
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Q7.

The graph shows the percentage of the population with type 2 diabetes and the mean body mass of the population, from 1990 to 2000.



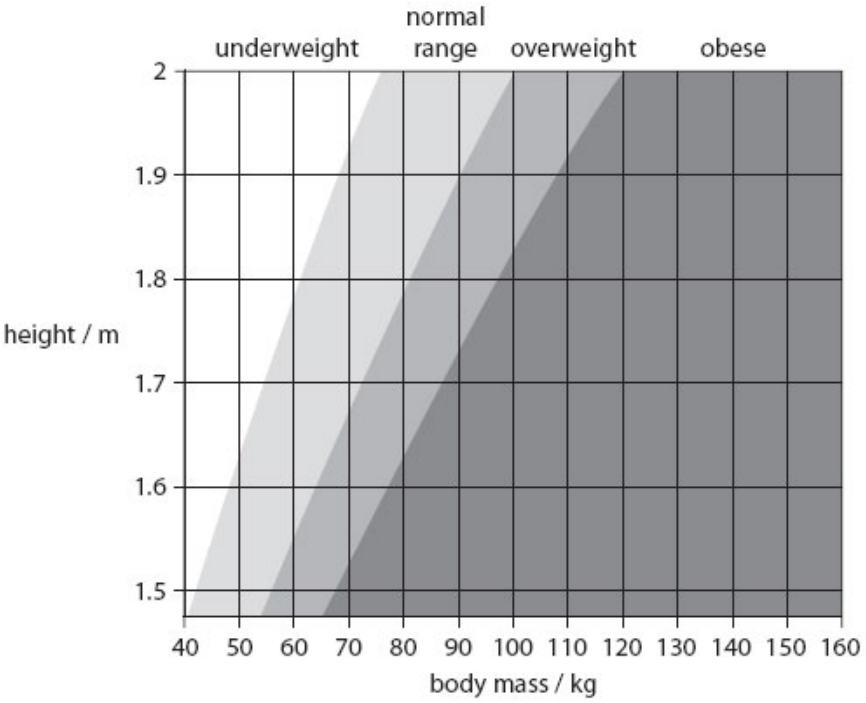
(i) Use the equation to calculate the body mass index (BMI) for a person with a body mass of 78 kg and a height of 1.7 m.

$$\text{BMI} = \frac{\text{mass / kg}}{(\text{height in metres})^2}$$

(2)

BMI .....

(ii) Use the chart to find the BMI category for this person.



Complete the sentence by putting a cross (☒) in the box next to your answer.

The BMI category for this person is

(1)

☒ **A** underweight

☒ **B** normal range

☒ **C** overweight

☒ **D** obese

Q8.

The temperature of Rebecca's brain and of one of her fingers was recorded at six different external temperatures.

temperature / °C		
external	**brain**	**finger**
20	36.9	37.0
15	37.0	36.8
10	36.7	36.5
5	36.9	36.2
0	36.8	35.6
-5	37.0	34.3

(i) Calculate the maximum temperature range for Rebecca's finger.

(1)

answer .....°C

(ii) Compare the temperature of Rebecca's brain and her finger as the external temperature decreased.

(2)

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(iii) Explain why the temperature of Rebecca's finger showed this response to the decrease in the external temperature.

(3)

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Q9.

Explain what happens to the uterus lining if the egg cell is fertilised.

(2)

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Q10.

A woman had unexplained weight loss and fatigue.
She had blood tests to investigate the cause of these symptoms.

Figure 10 shows the results.

blood test	woman's result	normal range
TSH level	5.6 mU/l	0.4 to 4.9 mU/l
thyroxine level	27.5 pmol/l	9.0 to 21.0 pmol/l
red blood cell count	5.2×10^6 cells/μl	4.2 to 5.4×10^6 cells/μl
glucose level	82.0 mg/dl	72.0 to 99.0 mg/dl

Figure 10

Comment on the results of these blood tests and the possible causes of the woman's weight loss and fatigue.

(4)

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(Total for question = 4 marks)

Q11.

Figure 11 shows the nutritional information for two different varieties of biscuit.

Variety A

Nutrition information	Per biscuit	Per 100 g
Energy	62 kcal	446 kcal
Fat	2.1 g	15.3
of which		
monounsaturated	0.9 g	6.2 g
polyunsaturated	0.3 g	2.2 g
saturated	0.9 g	6.9 g
Carbohydrates	9.562 g	68.3 g
of which		
sugars	0 g	0.4 g
Proteins	1.113 g	7.95 g
Dietary fibre	0.53 g	3.8 g
Natrium	0.07 g	0.52 g

Variety B

Nutrition information	Per Biscuit	Per 100 g
Energy	40.8 kcal	489 kcal
Protein	0.61 g	7.30 g
Carbohydrates	5.59 g	67.10 g
(of which sugars)	1.34 g	16.10 g
Fat	1.77 g	21.20 g
Saturated fatty acids	0.89 g	10.70 g
Monounsaturated fatty acids	0.70 g	8.40 g
Polyunsaturated fatty acids	0.18 g	2.20 g
Trans fatty acids	0.00 g	0.00 g
Cholesterol	0.00 mg	0.00 mg
Dietary fibre	0.51 g	6.10 g

Figure 11

(i) State why it is better to compare the nutritional information per 100 g of biscuit rather than per biscuit.

(1)

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(ii) Explain why variety A would be a better choice of biscuit for a person with type 2 diabetes.

(2)

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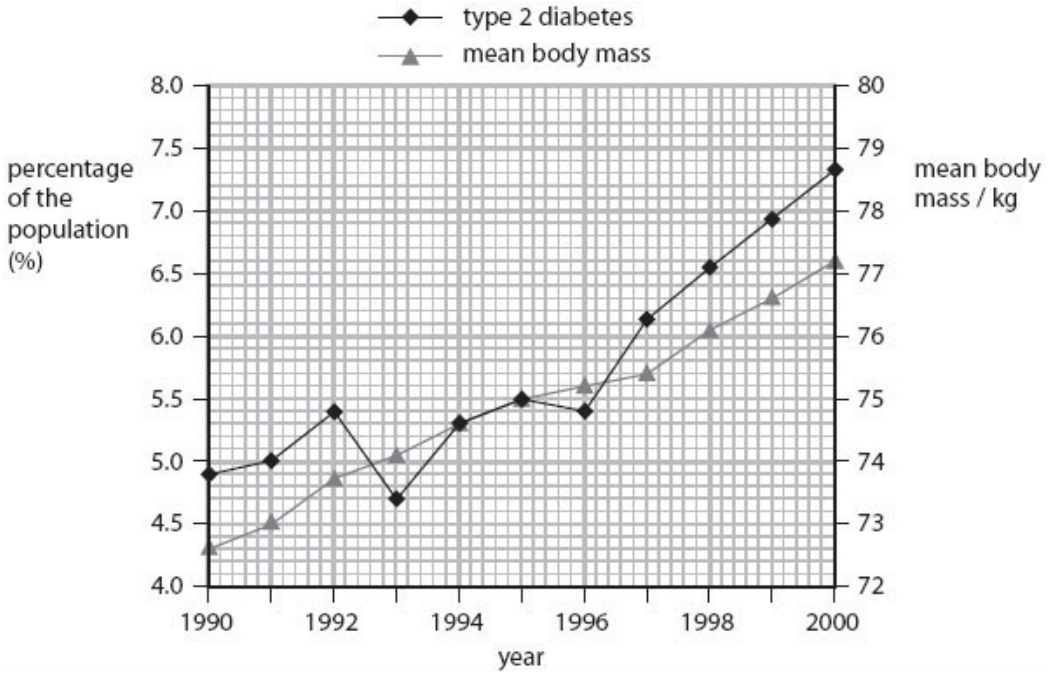
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(Total for question = 3 marks)

Q12.

The graph shows the percentage of the population with type 2 diabetes and the mean body mass of the population, from 1990 to 2000.



(i) Use information from the graph to describe the correlation between type 2 diabetes and body mass shown from 1993 to 2000.

(2)

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(ii) Suggest how a change in body mass may cause a person to develop type 2 diabetes.

(2)

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Q13.

Blood samples were taken from this patient every four hours.

The glucose concentrations were recorded in Figure 11.

time in hours	blood glucose concentration in milligrams per decilitre
0	100
4	131
8	139
12	90
16	92
20	134
24	137

Figure 11

(i) Describe the trends shown in this data.

(3)

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(ii) This patient was diagnosed as being type 2 diabetic.

Explain why the blood glucose concentration of this patient remained high from 4 hours to 8 hours.

(3)

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(iii) This patient did some exercise during these 24 hours.

Explain how the data in Figure 11 shows that this exercise occurred after 8 hours but before 12 hours.

(3)

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(Total for question = 9 marks)

Q14.

Describe the route taken by urine from the kidney until it leaves the body.

(3)

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(Total for question = 3 marks)

Q15.

A patient cannot remove enough urea from the blood when making urine.

Figure 8 shows a dialysis machine attached to the arm of this patient.

Their blood is pumped out of their arm, passed through the dialysis machine, and then put back into the patient.

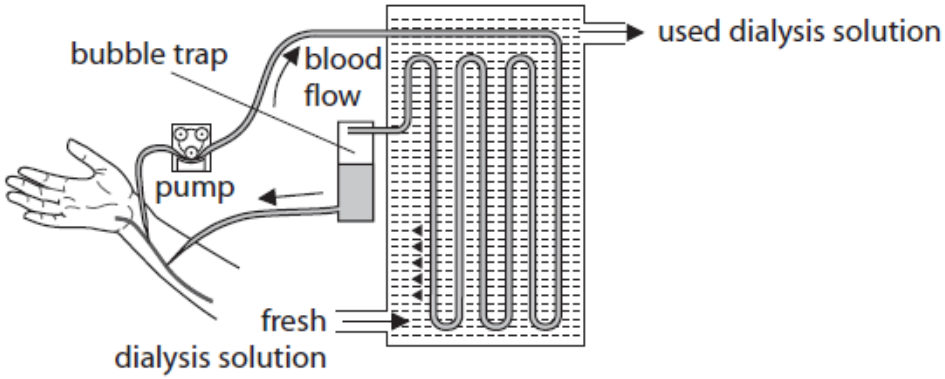


Figure 8

(i) Describe what happens to urea as the blood passes through the dialysis machine.

(2)

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(ii) Two patients need to have dialysis treatment.

Patient A needs this treatment three times a week.

Patient B needs this treatment once a week.

Give **one** reason why patient B needs dialysis treatment less often than patient A.

(1)

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(Total for question = 3 marks)

Q16.

When training, an athlete noticed some types of T-shirts became wetter and heavier due to sweating.

This athlete has three T-shirts, each made of a different material.

Devise a method this athlete could use to find the best T-shirt for training.

(3)

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(Total for question = 3 marks)

Q17.

People with diabetes insipidus are unable to produce enough of the hormone ADH.

In a medical study, the ADH levels in the blood of eight people were measured.

Four of the people, A, B, C and D, do not have diabetes insipidus.

The other four people, E, F, G and H, have diabetes insipidus.

The results are shown in the tables.

people without diabetes insipidus	ADH level in blood / µg per dm^3
A	5.2
B	2.8
C	4.9
D	3.5
Mean ADH level:	

people with diabetes insipidus	ADH level in blood / µg per dm^3
E	0.1
F	0.2
G	0.1
H	0.0
Mean ADH level:	0.1

(i) Calculate the mean ADH level in the people without diabetes insipidus.

(2)

..... µg per dm^3

(ii) Suggest why there is a wide range of ADH levels in the people without diabetes insipidus.

(2)

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(iii) Complete the sentence by putting a cross (☒) in the box next to your answer.

ADH is a hormone released into the blood by the

(1)

☒ **A** corpus luteum

☒ **B** collecting duct

☒ **C** pituitary gland

☒ **D** glomerulus

(iv) Suggest a symptom of diabetes insipidus.

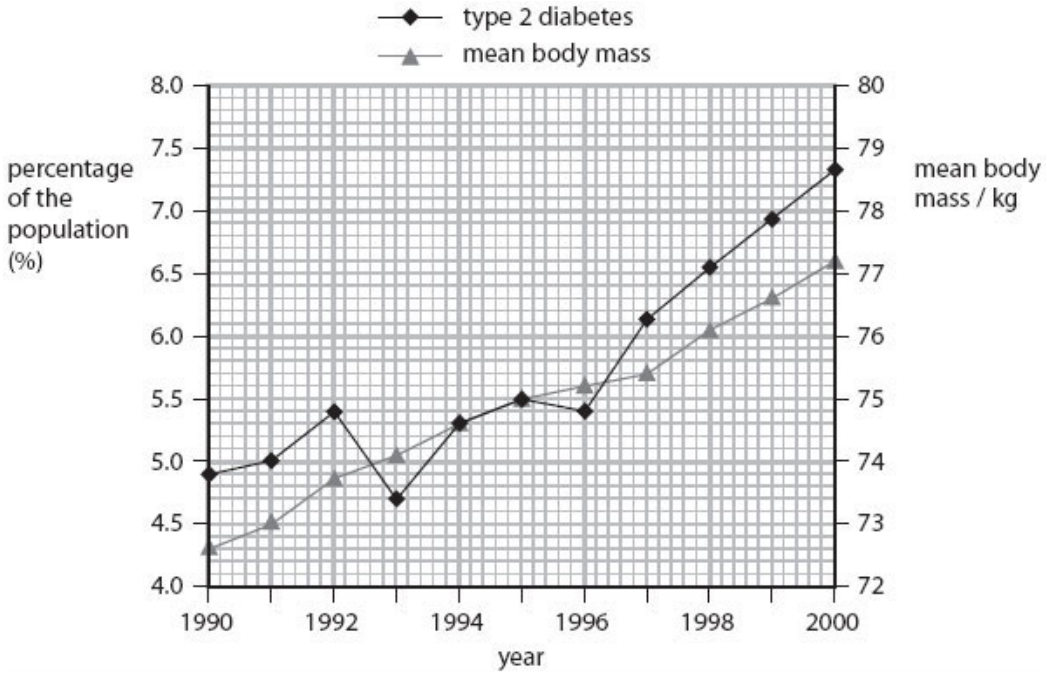
(1)

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Q18.

The graph shows the percentage of the population with type 2 diabetes and the mean body mass of the population, from 1990 to 2000.



(a) (i) Use information from the graph to describe the correlation between type 2 diabetes and body mass shown from
1993 to 2000.

(2)

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(ii) Suggest how a change in body mass may cause a person to develop type 2 diabetes.

(2)

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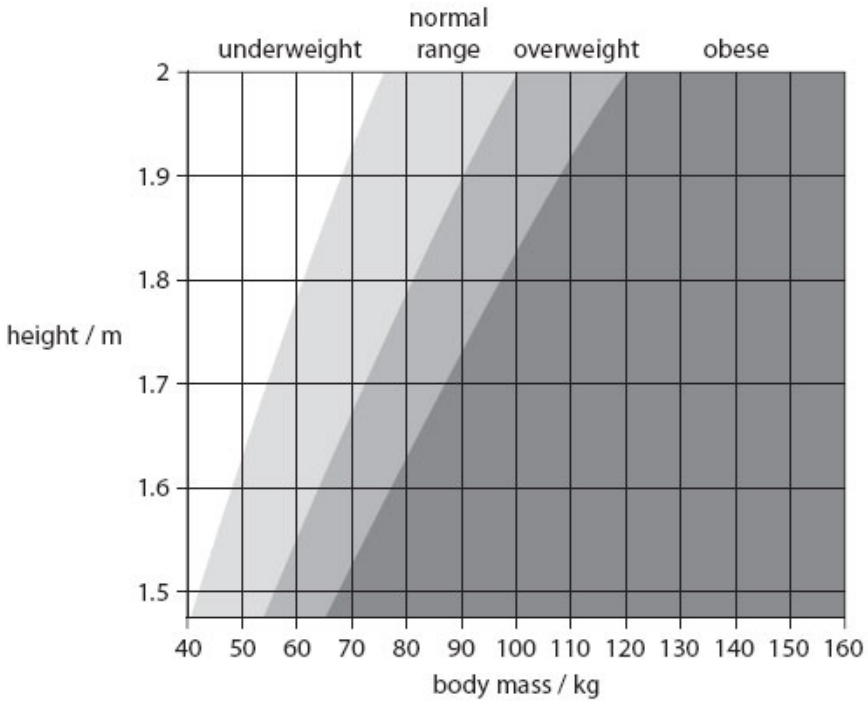
(b) (i) Use the equation to calculate the body mass index (BMI) for a person with a body mass of 78 kg and a height of 1.7 m.

$$\text{BMI} = \frac{\text{mass / kg}}{(\text{height in metres})^2}$$

(2)

BMI .....

(ii) Use the chart to find the BMI category for this person.



Complete the sentence by putting a cross (☒) in the box next to your answer.

The BMI category for this person is

(1)

☒ **A** underweight

☒ **B** normal range

☒ **C** overweight

☒ **D** obese

(c) Describe how the human body acts in response to low glucose levels in the blood.

(3)

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(Total for Question is 10 marks)

Q19.

Exercise increases adrenalin levels.

(i) State which endocrine gland secretes adrenalin.

(1)

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(ii) Explain the effect of adrenalin on liver cells during exercise.

(3)

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(Total for question = 4 marks)

Q20.

Iguanas are lizards.

Some species of iguana live on hot islands in the Pacific Ocean and use the environment to regulate their body temperature.

Figure 11 shows an iguana on a rock in the sunshine.



© benjamint444/Getty Images

Figure 11

A marine biologist measured the oxygen consumption of an iguana at different temperatures.

Figure 12 shows the results.

body temperature of the iguana in ^{0}C	oxygen consumption in cm^3 per gram per hour
20	0.4
25	0.8
30	1.1
35	1.4

Figure 12

(i) Describe how the body temperature of the iguana affects its oxygen consumption.

(1)

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(ii) Explain why the body temperature of the iguana affects its oxygen consumption.

(3)

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(iii) Iguanas do not have sweat glands.

When an iguana is too hot, it pants by opening its mouth to cool down.

Explain how this behaviour helps to cool the iguana down.

(2)

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(Total for question = 6 marks)