

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE

B732/01

BIOLOGY B

Unit B732: Biology modules B4, B5, B6 (Foundation Tier)

Candidates answer on the question paper
 A calculator may be used for this paper.

OCR Supplied Materials:
 None

Duration: 1 hour 30 minutes

Other Materials Required:

- Pencil
- Ruler (cm/mm)

Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

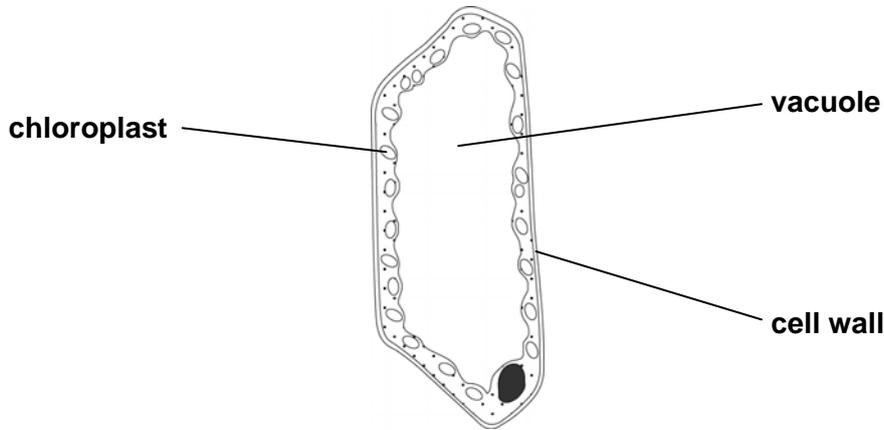
- Your quality of written communication is assessed in questions with a pencil (✎).
- The number of marks for each question is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **85**.
- This document consists of **28** pages. Any blank pages are indicated.

Examiner's Use Only:			
1		9	
2		10	
3		11	
4		12	
5		13	
6			
7			
8			
Total			

Answer **all** the questions.

Section A – Module B4

1 Look at the diagram of a plant leaf cell.



(a) A root hair cell does **not** contain chloroplasts.

Suggest why.

.....

.....

.....

..... [2]

(b) What are the jobs of a root hair cell?

.....

..... [2]

[Total: 4]

2 Australia produces a lot of sugar cane.

(a) Look at the table showing climate information for Australia and the UK.

month	Australia		UK	
	average temperature in °C	average daily sunshine in hours	average temperature in °C	average daily sunshine in hours
January	31.4	6.8	7.0	1.9
February	31.2	6.1	7.4	2.5
March	30.6	6.5	10.2	3.6
April	29.2	6.7	12.6	4.9
May	27.6	6.7	16.5	6.3
June	26.0	7.2	19.4	6.0
July	25.7	7.3	22.2	6.4
August	26.6	7.9	22.3	6.2
September	28.1	8.6	18.9	4.7
October	29.5	8.8	14.6	3.8
November	30.6	8.5	9.9	2.3
December	31.4	7.8	7.8	1.6

Sugar cane grows better in Australia than in Britain.

Use the data in the table and your own knowledge to explain why.

.....

.....

.....

..... [3]

(b) Insect pests can eat the sugar cane. This reduces the crop yield.

Describe how farmers can prevent insects eating the sugar cane.

.....

.....

..... [2]

[Total: 5]

3 This question is about sewage.

(a) Jenny wants to show that decay is caused by microorganisms, such as bacteria.

Describe how Jenny could do an experiment to show that decay is caused by microorganisms.

.....

.....

.....

.....

..... [3]

(b) The microorganisms need a gas to help them break down the sewage.

(i) Put a tick (✓) in the box next to the correct gas.

carbon dioxide

carbon monoxide

nitrogen

oxygen

[1]

(ii) The presence of this gas is one factor that helps the microorganisms.

Write down **one other** factor that helps the microorganisms break down sewage.

..... [1]

(c) After sewage has been treated it can be used as fertiliser by farmers.

(i) Why does sewage need to be treated before it can be used as fertiliser by farmers?

.....
..... [1]

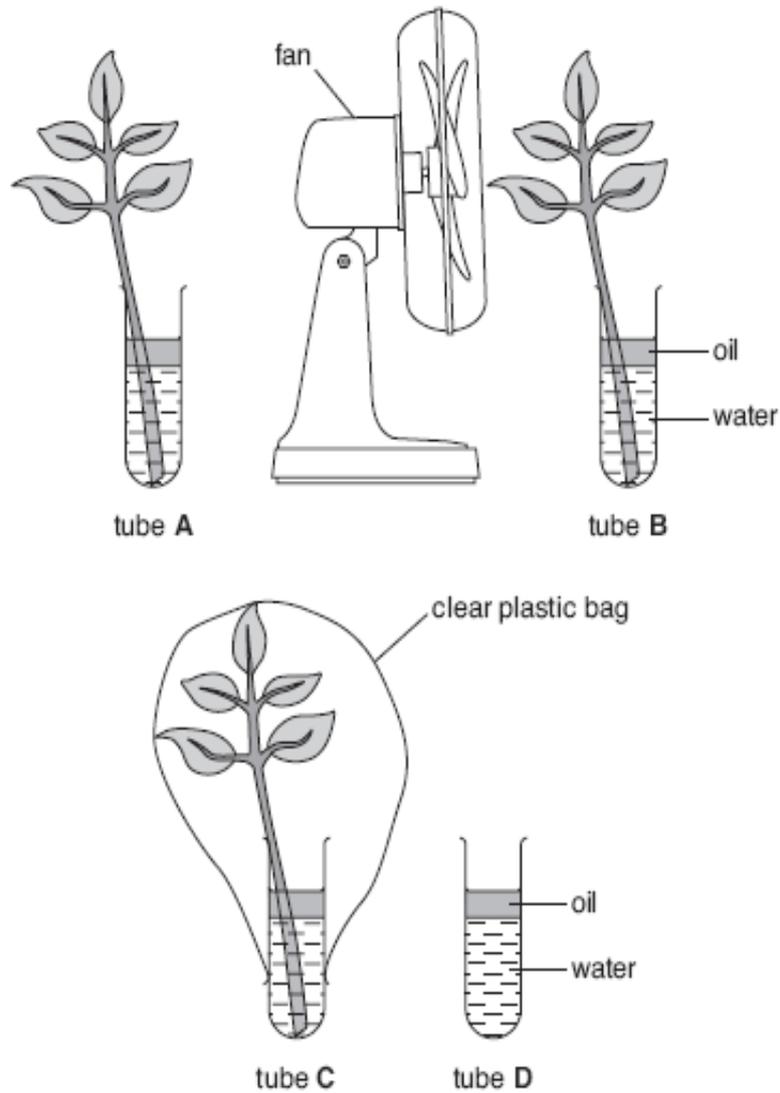
(ii) Fertilisers are used in intensive farming.

What is meant by intensive farming?

.....
..... [1]

[Total: 7]

- 4 Jo is investigating the effect of some factors on transpiration in plants.
Look at the diagram. It shows the apparatus she uses.

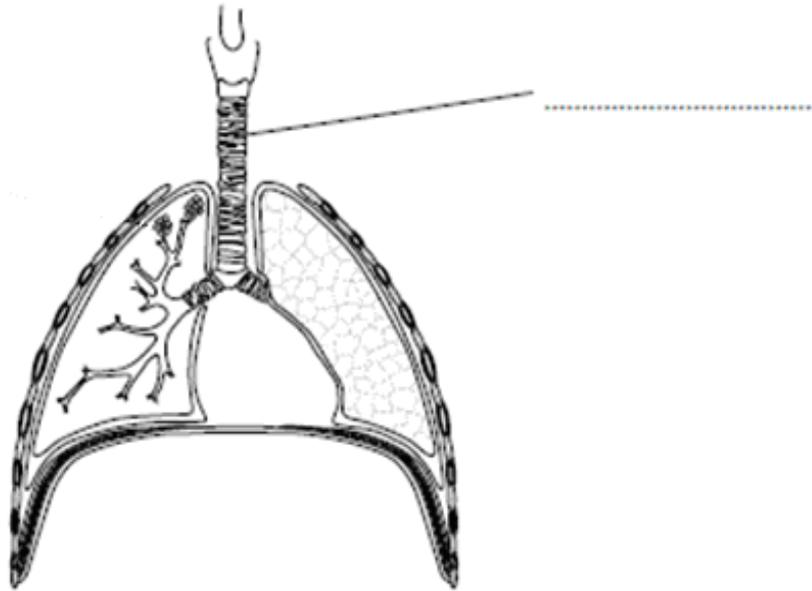


Jo records the mass of each tube and its contents.
She leaves the apparatus for 5 days in the same room.
She then records the mass again.
The table shows Jo's results.

tube	A - left at room temperature	B – left in room with a moving fan next to it	C – left in room with a clear plastic bag over it	D – no plant left at room temperature
mass at start in g	42.4	47.3	39.2	31.9
mass at end in g	35.3	35.8	38.5	31.9

Section B – Module B5

5 The diagram shows the main parts of the human respiratory system.



(a) Write the correct name next to the label line.

Choose the part from this list.

air sac

bronchus

diaphragm

intercostal muscle

trachea

[1]

(b) The respiratory system can be damaged by a number of different medical conditions.

One of these conditions is asthma.

Write down the name of **one other** condition that can damage the respiratory system.

..... [1]

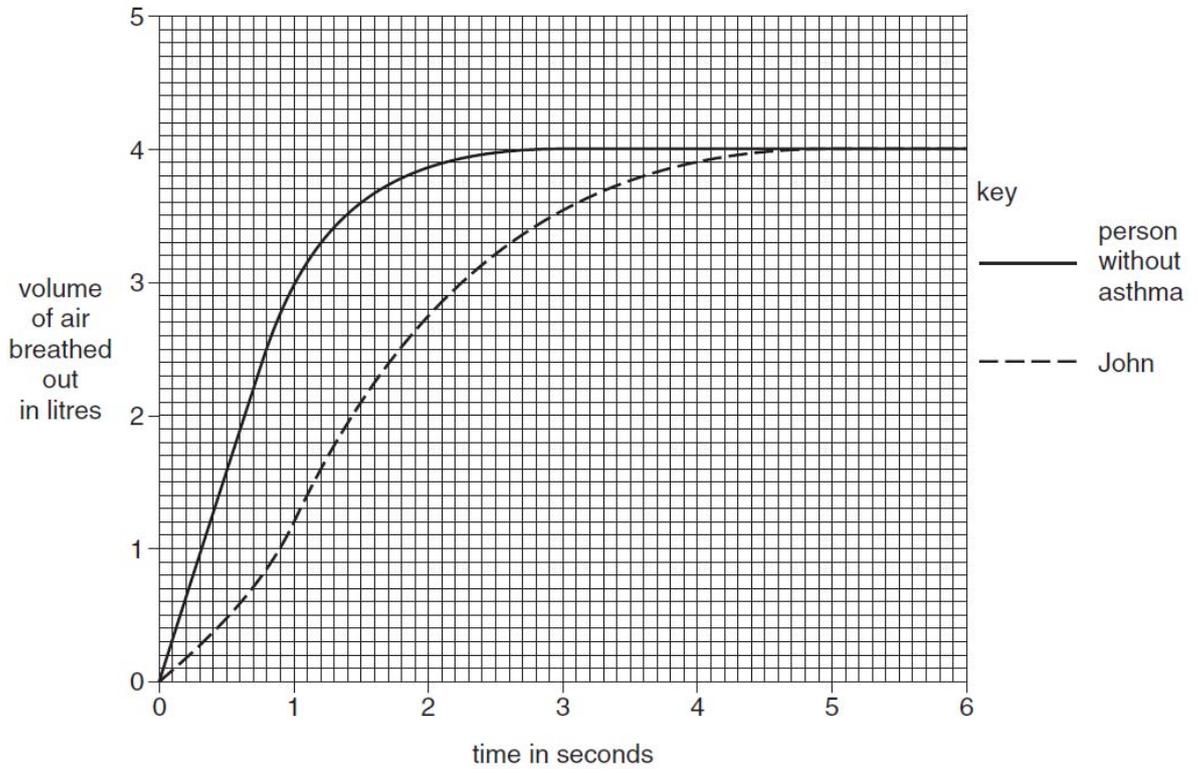
(c) John has asthma.

He goes to his doctor who asks him to breathe into a machine called a spirometer.

This measures the volume of air John breathes out in a single deep breath.

The graph shows the results for John.

It also shows the results for a person of John's size and age who does **not** have asthma.



(i) John and the other person have the same vital capacity.

Look at the graph.

What is their **vital capacity**?

answer litres [1]

(ii) One of the symptoms of asthma is difficulty in breathing.

Look at the graph.

What evidence does the graph show that supports the fact that John has asthma?

.....

..... [1]

- (iii) John was worried that blowing hard into the spirometer might lead to an asthma attack. Suggest what precautions he or his doctor could have taken to make the test as safe as possible.

.....

.....

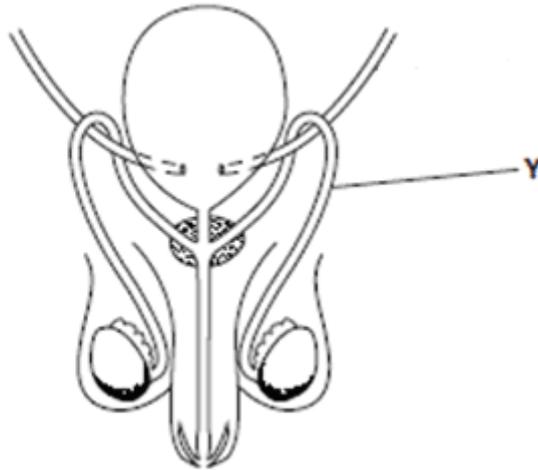
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..... [2]

[Total: 6]

6 Paul and Sue have been trying to start a family.
However so far Sue has not become pregnant.
Paul goes to his doctor to check his fertility.

(a) The diagram shows Paul's reproductive system.



Paul's doctor finds that the tube labelled Y on the diagram is narrower than usual.
Will this affect Paul's fertility? Explain your answer.

.....
.....
..... [2]

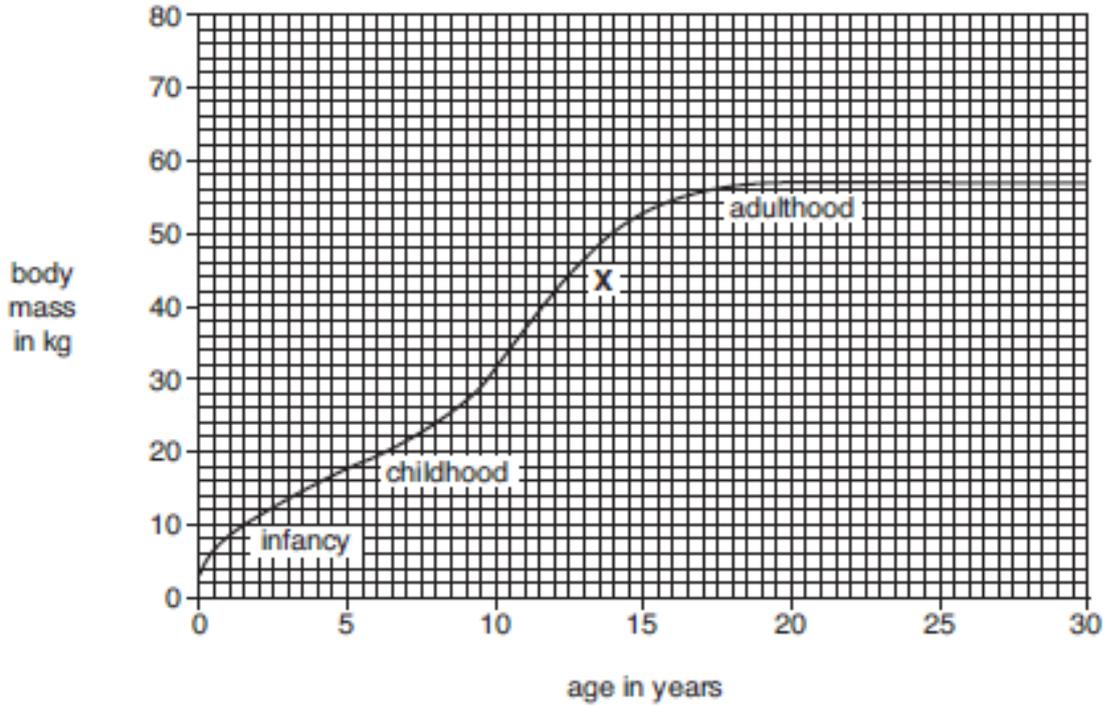
(b) Fertility treatments have been developed by scientists to help people become pregnant.
Suggest how such developments could affect couples like Paul and Sue.

.....
.....
..... [2]

[Total: 4]

7 Mass since birth can be recorded on average growth charts.

The graph shows average growth data for women up to the age of 30.



(a) The graph shows four different stages of growth.

Look at the graph.

Name the stage labelled with an X.

..... [1]

(b) Look at the graph.

(i) At what age do women grow most quickly?

..... [1]

(ii) At what age do women stop growing?

..... [1]

8 Tony decides to donate blood.

The nurse in charge of the donation is talking to him.



I am glad that you have decided to give blood.
There is nothing to worry about. You have about six litres of blood.
The amount that we will take does not cause you any harm.
We have tested your blood. You are O negative and we have not found any problems in your blood.

(a) Why is it important to donate blood?

.....
.....
..... [2]

(b) The nurse tells Tony that he is **O negative**.

What is this describing?

.....
.....
..... [2]

(c) In the past, some people thought that illnesses could be treated by removing some of a patient's blood using a type of worm called a leech.

The leech was placed on the patient so its mouthparts pierced the skin so it could feed on the patient's blood.

When a leech feeds, **anti-coagulants** from its mouthparts enter the patient's blood.

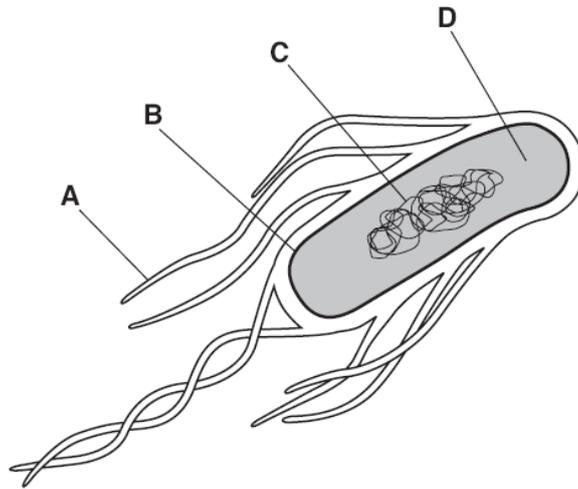
Suggest how the anti-coagulants help the leech.

.....
.....
..... [2]

[Total: 6]

Section C – Module B6

- 9 (a) Sewage can contain bacteria called coliforms.
A coliform is shown in the diagram.



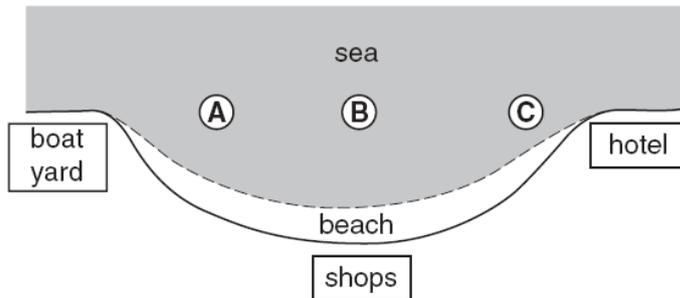
- (i) Look at the diagram.
Which labelled part is a flagellum?
Choose **A**, **B**, **C** or **D**.

answer [1]

- (ii) On the diagram, the coliform is shown 90 mm long.
It is shown on the diagram 30 000 times larger than in real life.
Light microscopes can be used to see things as small as 0.3 microns (0.0003mm).
Use calculations to show that a light microscope can be used to count the number of coliforms in a sample.

.....
.....
..... [2]

- (b) Coliforms can be found in sea water if sewage is released into the sea.
 The number of coliforms in samples from the sea near beaches is counted.
 This tells people whether it is safe to swim.
 The drawing shows an area around a beach.



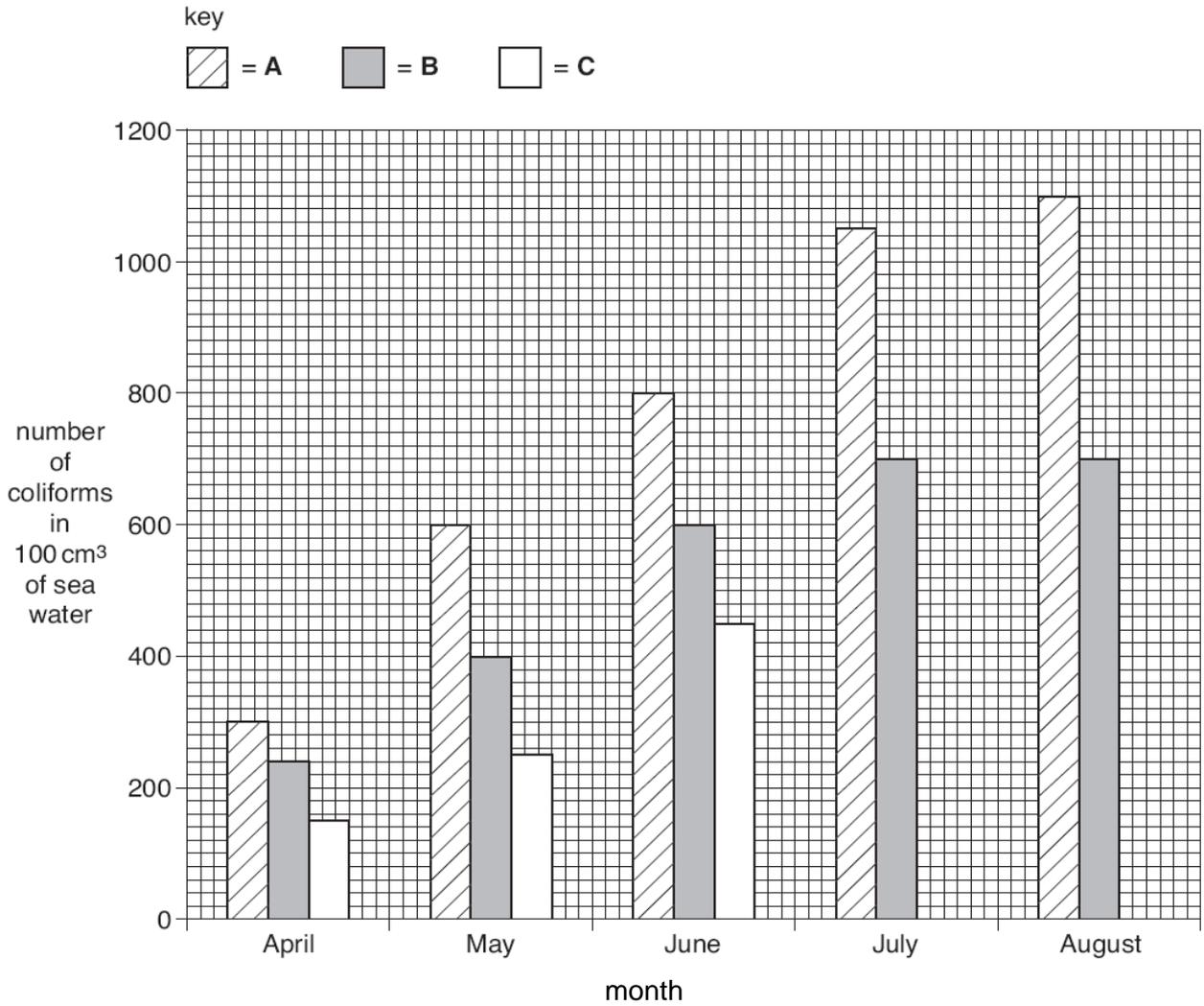
The sea water has been sampled at points A, B and C.
 The table shows the results for point C.

month	number of coliforms in 100 cm ³ of water at point C
April	150
May	250
June	450
July	500
August	300

- (i) The bar chart shows the number of coliforms found in the sea at sample sites A, B and C.

Use the information in the table to draw the **two** bars on the bar chart for point C in July and August.

[1]



(ii) The beach is closed to people if the number of coliforms goes above 1000 in 100 cm³ of water.

During which **two** months is the beach closed?

..... and [1]

(iii) Scientists think that the sewage may be leaking from **one** of the three buildings near the beach.

Look at the graph and the drawing of the beach area.

Write down which building the sewage **probably** comes from.

Explain your answer.

.....

 [2]

(iv) The scientists are **not certain** about which building the sewage is leaking from.
What could the scientists do to support their conclusion?

.....

..... [1]

[Total: 8]

11 Read the article from a newspaper.

	<u>Fighting cholera with potatoes!</u>
	Cholera can spread very quickly from person to person. It is a disease caused by bacteria. It kills 200 000 people a year.
	Scientists have used potato plants to make a new medicine. They hope that this new medicine might stop people getting cholera.
	The scientists genetically engineered the potato plants so they produce the medicine. They hope that just eating the potatoes will protect people from the disease.

(a) Cholera often spreads very quickly after natural disasters such as earthquakes.

Explain why earthquakes can cause **cholera** to spread very quickly.

.....

.....

..... [2]

(b) The potato plants used to make the new medicine have been **genetically engineered**.

Describe the process used to genetically engineer the potato plants.

.....

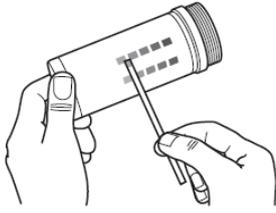
.....

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..... [2]

[Total: 4]

12 The diagrams show some products made using enzymes.



reagent testing strips for people with diabetes



biological washing powder



low sucrose chocolates

(a) Describe how people with diabetes use reagent testing strips.

.....

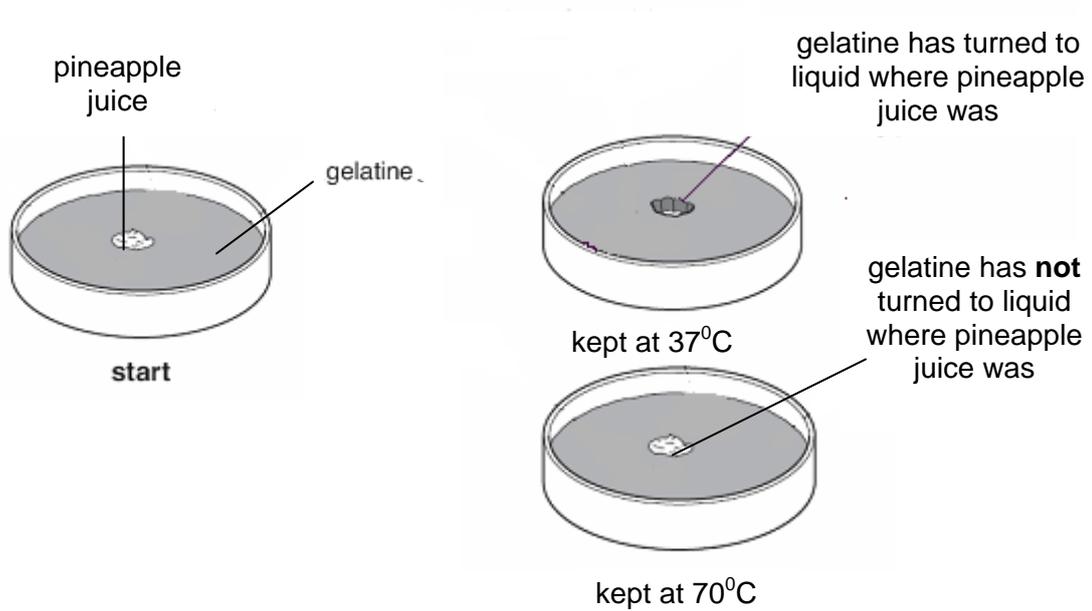
.....

..... [2]

(b) The chocolates are made low in sucrose using sucrose.
How will this affect the taste of the chocolates compared to chocolates high in sucrose?

..... [1]

- (c) Gerant decides to do an experiment with pineapple juice. He puts a small amount of the pineapple juice in a dish containing a jelly called gelatine. Gelatine is a protein. When gelatine is digested it turns to liquid. He keeps the dish at 37 °C. He repeats this with another dish but keeps this dish at 70 °C.



Explain the results of Gerant's experiment.

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[4]
[Total: 7]

Section D

13 This question is about measuring fitness levels.

(a) One way of measuring fitness is to calculate someone's **recovery rate**.

Recovery rate is a measure of how quickly after exercise the pulse rate returns to a resting level.

Recovery rate can be calculated using the formula:

$$\text{recovery rate} = \frac{\text{pulse rate during exercise} - \text{pulse rate after 1 minute}}{10}$$

The table shows how recovery rate relates to fitness level.

recovery rate	fitness level
less than 2	poor
2 to 2.9	fair
3 to 3.9	good
4 to 5.9	excellent
above 6	outstanding

Pulse rate is measured in beats per minute (bpm).

(i) Amy measures her pulse rate whilst running on a treadmill.

It is 120 bpm.

She stops running and measures her pulse rate one minute later.

Now it is 91 bpm.

Show that Amy's **fitness level** is 'fair'.

Show all your working clearly.

[1]

(ii) When Neil does the test, his recovery rate is 3.1, so his fitness level is 'good'.

Is Neil really fitter than Amy?

Explain your answer.

.....

.....

..... [2]

(b) Amy measures her resting pulse rate.

She counts her pulse for 15 seconds. She does this three times.

Amy uses each measurement to calculate her pulse rate in **beats per minute** (bpm).

She now has three values for her pulse rate in bpm.

The table shows her results.

	number of pulses in 15 seconds	pulse rate in beats per minute
1 st measurement	18	72
2 nd measurement	17	68
3 rd measurement	19	76

Neil measures his resting pulse rate.

He counts his pulse for 60 seconds (1 minute).

He does this three times.

The table shows his results.

	pulse rate in beats per minute
1 st measurement	66
2 nd measurement	67
3 rd measurement	65

Compare the methods used by Amy and Neil for measuring pulse rate.

.....

.....

..... [2]

(c) Neil and Amy want to measure their fitness levels in a different way.

First, they measure their resting pulse rates.

Then they exercise by doing press-ups for one minute.

Then they measure their pulse rates every minute for five minutes.

The table shows their results.

	pulse rate in bpm						
	resting pulse rate in bpm	straight after exercise	1 min after exercise	2 min after exercise	3 min after exercise	4 min after exercise	5 min after exercise
Neil	66	110	82	68	66	66	66
Amy	72	128	114	102	92	84	78

Look at the table.

Who is the fittest, Neil or Amy?

Explain your answer using data from the table.

.....

.....

..... [2]

- (d) Amy and Neil have now measured their fitness levels using two different methods. Evaluate these methods and the results they produce.

.....

.....

.....

.....

..... [3]

[Total: 10]

[Paper Total: 85]

END OF QUESTION PAPER

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GATEWAY SCIENCE

B732/01

BIOLOGY B

Unit B732: Biology modules B4, B5, B6 (Foundation Tier)

MARK SCHEME

Duration: 1 hour 30 minutes

MAXIMUM MARK **85**

Guidance for Examiners

Additional guidance within any mark scheme takes precedence over the following guidance.

1. Mark strictly to the mark scheme.
2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.
3. Accept any clear, unambiguous response which is correct, eg mis-spellings if phonetically correct (but check additional guidance).
4. Abbreviations, annotations and conventions used in the detailed mark scheme:

/ = alternative and acceptable answers for the same marking point

(1) = separates marking points

not/reject = answers which are not worthy of credit

ignore = statements which are irrelevant - applies to neutral answers

allow/accept = answers that can be accepted

(words) = words which are not essential to gain credit

words = underlined words must be present in answer to score a mark

ecf = error carried forward

AW/owtte = alternative wording

ORA = or reverse argument

eg mark scheme shows 'work done in lifting / (change in) gravitational potential energy' (1)

work done = 0 marks

work done lifting = 1 mark

change in potential energy = 0 marks

gravitational potential energy = 1 mark

5. If a candidate alters his/her response, examiners should accept the alteration.
6. Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.

Question		Expected answers	Marks	Additional guidance
1	(a)	because there is no light underground / AW (1) so no need for chloroplasts for photosynthesis (1)	2	
	(b)	absorb water (1) absorb minerals (1)	2	
Total			4	

Question		Expected answers	Marks	Additional guidance
2	(a)	because it is warmer and there is more sunlight (in Australia) (1) so more / faster photosynthesis (1) and the glucose / starch produced by photosynthesis can be used for growth (1)	3	answers must link conditions to increased photosynthesis to increased growth for full credit allow reference to warmer temperature increasing the rate of chemical reactions (1)
	(b)	insecticides / pesticides (1) BUT use insecticides / pesticides to kill insects (2) predators / biological control / suitable example (1) BUT predators / biological control / suitable example to eat the insects (2) max two	2	
Total			5	

Question		Expected answers	Marks	Additional guidance	
3	(a)	idea of two samples set up, one with bacteria killed and one sample untreated (1) samples left for specified time in a sealed container / in controlled conditions (1) method of identifying positive result for decay in the untreated samples (1)	3	allow example of method to kill the bacteria in control sample eg heating (1) allow example of conditions under which sample kept eg in a tube with a bung in the top (1) allow examples of positive result eg can see mould growing / loss in mass due to decay (1)	
	(b)	(i)	oxygen / tick in 4th box (1)	1	
		(ii)	moisture / warmth (1)	1	allow water / heat / temperature allow pH allow (coarse stone) filter
	(c)	(i)	to release minerals in the sewage (used by plants for growth) / AW (1)	1	allow prevent contamination of fields (1) allow to remove parts of sewage which will not decompose (1)
		(ii)	trying to produce as much food as possible from the land / plants / animals available (1)	1	
Total			7		

Question	Expected answers	Marks	Additional guidance
4 (a) 	<p>Level 3 Answer applies knowledge of factors that affect transpiration to draw conclusions which correctly compare the effects of increased air movement and increased humidity on the rate of transpiration, supported by calculations of percentage loss. All information in answer is relevant, clear, organised and presented in a structured and coherent format. Specialist terms are used appropriately. Few, if any, errors in grammar, punctuation and spelling. (5–6 marks)</p> <p>Level 2 Answer applies knowledge of transpiration to correctly describe the effects of increased air movement and increased humidity on the rate of transpiration shown in the experimental data, supported by calculations. For the most part the information is relevant and presented in a structured and coherent format. Specialist terms are used for the most part appropriately. There are occasional errors in grammar, punctuation and spelling. (3–4 marks)</p> <p>Level 1 Answer applies knowledge of transpiration to correctly describe the effect of either increased air movement or increased humidity on the rate of transpiration, using some data from the table. Answer may be simplistic. There may be limited use of specialist terms. Errors of grammar, punctuation and spelling prevent communication of the science. (1–2 marks)</p> <p>Level 0 Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>Relevant points include:</p> <ul style="list-style-type: none"> • reference to what each experiment is testing ie A = natural air movement + natural humidity therefore control, B = high air movement, C = high humidity • in A: mass of water lost = 7.1g, % mass lost = 16.7% • in B: mass of water lost = 10.6g, % mass lost = 24.3% • in C: mass of water lost = 0.8g, % mass lost = 1.8% • increased air movement increases rate of transpiration • increased humidity decreases rate of transpiration • reference to comparing result from B-A against C-A to compare the effects • positive effect of increased air movement (24.3 – 16.7 = 7.6) is less than negative effect of increased air humidity (1.8 - 16.7 = -14.9)
(b)	(control) to show loss in mass is due to plant alone / to show loss in mass is only due to transpiration (1)	1	

Question		Expected answers	Marks	Additional guidance
	(c)	same starting mass / controlled room temperature / controlled light intensity / same type of plant / same size plant (1)	1	allow same surface area of leaf
	(d)	xylem (1)	1	
Total			9	

Question		Expected answers	Marks	Additional guidance
5	(a)	trachea (1)	1	
	(b)	bronchitis / (lung) cancer / pneumonia (1)	1	allow higher level answers: cystic fibrosis / asbestosis / tuberculosis / emphysema (1)
	(c)	(i) 4 (litres) (1)	1	
		(ii) he breathes out more slowly (than the person without asthma) / AW (1)	1	
		(iii) make sure breathing is normal at start / after test (1) have inhalers available (in case of asthma attack) (1)	2	allow let him stop the test if he is having problems / AW (1)
Total			6	

Question		Expected answers	Marks	Additional guidance
6	(a)	(yes – no mark) Y is the sperm duct / carries sperm (1) so if Y is narrower then it carries fewer sperm (1) OR (no – no mark) Y is the sperm duct / carries sperm (1) Y is still open so sperm can still pass through (1)	2	answers must support conclusion drawn to gain credit allow Y is narrower so could get more easily blocked (1)
	(b)	any two from idea of increasing chances of pregnancy by using treatments (1) although pregnancy still not guaranteed (1) can cost money to go through treatments / may not be able to afford treatment (1) increased chance of multiple births (with some treatments) (1) have to consider ethical issues (1)	2	allow example of ethical issue (1)
Total			4	

Question		Expected answers	Marks	Additional guidance
7	(a)	adolescence / puberty (1)	1	ignore teenager / youth
	(b)	(i)	1	
		(ii)	1	

Question	Expected answers	Marks	Additional guidance
(c) 	<p>Level 3 Well-reasoned conclusion about Lucy's parents concern. Applies knowledge of factors that affect growth to show how a broad range of interacting factors could have led to Lucy growing less than average. All information in answer is relevant, clear, organised and presented in a structured and coherent format. Specialist terms are used appropriately. Few, if any, errors in grammar, punctuation and spelling. (5–6 marks)</p> <p>Level 2 Simple conclusion about Lucy's parents. Applies knowledge of factors that affect growth to show how at least two factors could have led to Lucy growing less than average. For the most part the information is relevant and presented in a structured and coherent format. Specialist terms are used for the most part appropriately. There are occasional errors in grammar, punctuation and spelling. (3–4 marks)</p> <p>Level 1 Recalls some factors that affect growth. Answer may be simplistic. There may be limited use of specialist terms. Errors of grammar, punctuation and spelling prevent communication of the science. (1–2 marks)</p> <p>Level 0 Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>Relevant points include:</p> <ul style="list-style-type: none"> • yes because she is below the line and therefore underweight • no because she is only being compared to an average, there is time for her to grow and catch up, it is not necessarily bad to be below average <p>factors include:</p> <ul style="list-style-type: none"> • genes inherited from parents / quality of diet / amount of exercise / levels of hormones / health / disease <p>applications include:</p> <ul style="list-style-type: none"> • genes: Lucy's parents are shorter / lighter than average so Lucy will inherit genes which make her shorter / lighter • diet: in Lucy's diet a possible lack of proteins needed for growth / calcium needed for teeth and bones / not having balanced diet could limit growth / eating too little / AW • exercise: lack of regular exercise by Lucy could mean she does not develop strong bones / strong muscles • hormones: lack of hormones during infancy / puberty to stimulate growth • health / disease: Lucy could suffer from poor health / (specific) diseases which can limit growth <ul style="list-style-type: none"> • idea that could be a combination of factors that influence growth
	Total	9	

Question		Expected answers	Marks	Additional guidance
8	(a)	because blood is always needed / otherwise blood will run out (1) blood is needed for transfusions / used in operations / used for injured people (1)	2	allow people with blood loss / people who need blood eg haemophilia (1)
	(b)	blood group O (1) rhesus negative (1)	2	
	(c)	stop (blood) clotting (1) so blood keeps flowing / leech can keep feeding (1)	2	
Total			6	

Question		Expected answers	Marks	Additional guidance
9	(a)	(i) A (1)	1	allow ringed / underlined answer
		(ii) $(90/30000) = 0.003\text{mm}(1)$ therefore size of coliform $> 0.0003\text{mm}$ (1)	2	
	(b)	(i) both bars correctly drawn (1) (July = 500, August = 300)	1	allow bars of any width drawn to correct height (+/- half square)
		(ii) July and August (1)	1	allow answers either way round
		(iii) boat yard (1) because most coliforms / bacteria are found in A / nearby (1)	2	answers must link high number of coliforms to proximity to boatyard to gain full credit
		(iv) take more samples / collect samples over longer period of time / take samples from sewage pipes of buildings to compare with samples from sewage (1)	1	allow collect more evidence (1) if no other mark awarded ignore repeat the <u>same/identical</u> experiment again
Total			8	

Question	Expected answers	Marks	Additional guidance
10 	<p>Level 3 Describes process of fermentation in detail in terms of anaerobic respiration and the need for keeping air and other micro-organisms out. All information in answer is relevant, clear, organised and presented in a structured and coherent format. Specialist terms are used appropriately. Few, if any, errors in grammar, punctuation and spelling. (5–6 marks)</p> <p>Level 2 Describes reactants and products of fermentation and need for yeast and absence of oxygen. For the most part the information is relevant and presented in a structured and coherent format. Specialist terms are used for the most part appropriately. There are occasional errors in grammar, punctuation and spelling. (3–4 marks)</p> <p>Level 1 Names fermentation and identifies that alcohol is made and yeast is used. Answer may be simplistic. There may be limited use of specialist terms. Errors of grammar, punctuation and spelling prevent communication of the science. (1–2 marks)</p> <p>Level 0 Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>Relevant points include:</p> <ul style="list-style-type: none"> • process is fermentation • yeast is used • alcohol is made • extracting sugar from source material • sugar / glucose is broken down • in the absence of oxygen • by anaerobic respiration • production of carbon dioxide • entry of air and other micro-organisms must be prevented <p>allow higher level answers:</p> <ul style="list-style-type: none"> • keeping fermentation warm • clarifying/clearing/drawing off the wine <p>ignore any references to distillation or drinks produced by distillation unless linked to toxic effects of alcohol on yeast at high concentrations</p>
	Total	6	

Question		Expected answers	Marks	Additional guidance
11	(a)	because earthquakes damage water supplies / sewage systems / AW (1) this means water supplies mix with sewage allowing transmission of cholera (1)	2	answers must link damaged sewage/water systems to transmission of cholera to gain full credit ignore other methods of transmission
	(b)	removing a gene from one organism (1) and inserting it into the potato plant so the gene works in the potato plant (1)	2	
Total			4	

Question		Expected answers	Marks	Additional guidance
12	(a)	test their urine / blood (by dipping strip in) (1) any one from: for sugar / glucose against chart / by colour change (1) so that they know how much insulin to inject (1)	2	
	(b)	(low sucrose) will be sweeter (1)	1	
	(c)	pineapple juice contains enzyme / protease (1) so the (enzyme / protease) breaks down / digests gelatine (1) this (breakdown / digestion) only occurs at low temperatures (37°C) / does not occur at high temperatures (70°C) / AW (1) because the enzyme denatures / changes shape at high temperature (70°C) / ORA (1)	4	answers must be linked and in order to gain full credit allow enzymes cannot react with substrate / protein at high temperatures (1)
Total			7	

Question			Expected answers	Marks	Additional guidance
13	(a)	(i)	$((120 - 95) \div 10 =) 2.9$ so fitness level is 'fair'	1	
		(ii)	Yes or no or possibly (no mark) because recovery rate is above that of Amy / Amy's recovery rate is 2.9 but Neil's rate is 3.1 / fitness level for Amy is only 'fair' but fitness level of Neil is 'good' (1) because recovery rates are close to each other so within limits of uncertainty (1) no repeats taken so not average figures (1) there are different way of measuring fitness and this is only one way (1)	2	reasoning must be linked to answer to gain full credit
	(b)		the first method is quicker / ora (1) the first method less chance of miscounting / less accurate / ora (1) the first method is less precise / will only get final values that are multiples of 4 / ora (1)	2	
	(c)		Neil (no mark) Neil returned to resting value after 2 / 3 min (1) but Amy still had not returned to resting after 5 min / AW (1) Neil's pulse rate returned to resting level quicker than Amy's (1)	2	answers must support conclusion to gain full credit ignore simply 'Neil increased by less'

Question		Expected answers	Marks	Additional guidance
	(d)	<p>first method only two values / limited amount of data used to assess fitness (1)</p> <p>second method idea of more evidence / data (1) number of press-ups not counted so perhaps not a fair test (1)</p> <p>although two methods are used, they both indicate that Neil is fitter than Amy (1) do not take into account age or mass etc. (1)</p>	3	<p>allow idea of one being heavier / doing more work</p> <p>allow different exercises could be done for each method therefore results may not be conclusive (1) allow there is evidence from two different methods to support a conclusion / AW (1)</p>
		Total	10	

Assessment Objectives (AO) Grid
(includes quality of written communication )

Question	AO1	AO2	AO3	Total
1(a)		2		2
1(b)	2			2
2(a)		3		3
2(b)	2			2
3(a)	3			3
3(b)(i)	1			1
3(b)(ii)	1			1
3(c)(i)		1		1
3(c)(ii)	1			1
4(a) 		4	2	6
4(b)		1		1
4(c)		1		1
4(d)	1			1
5(a)	1			1
5(b)	1			1
5(c)(i)		1		1
5(c)(ii)		1		1
5(c)(iii)		2		2
6(a)	2			2
6(b)		2		2
7(a)	1			1
7(b)(i)		1		1
7(b)(ii)		1		1
7(c) 	2	2	2	6
8(a)	2			2
8(b)	2			2
8(c)	1	1		2
9(a)(i)	1			1
9(a)(ii)		2		2
9(b)(i)		1		1
9(b)(ii)		1		1
9(b)(iii)			2	2
9(b)(iv)		1		1
10 	6			6
11(a)	1	1		2
11(b)	2			2
12(a)	2			2

Question	AO1	AO2	AO3	Total
12(b)		1		1
12(c)		4		4
13(a)(i)			1	1
13(a)(ii)			2	2
13(b)			2	2
13(c)			2	2
13(d)			3	3
Totals	35	34	16	85

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