OCR
RECOGNISING ACHIEVEMENT

SPECIMEN H

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE

BIOLOGY B

B732/02

Unit B732: Biology module B4, B5, B6 (Higher Tier)

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

OCR Supplied Materials:
None

Other Materials Required:
- Pencil
- Ruler (cm/mm)

Duration: 1 hour 30 minutes

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

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 marked 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 photograph.

It shows two palm trees.

© iStockphoto.com/Giorgio Fochesato

(a) During photosynthesis, the trees make glucose.

The trees change the glucose into other substances, such as starch for storage.

(i) Describe **one other** substance into which trees change glucose and what the new substance is used for.

.....

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

(ii) Give **two** reasons why soluble glucose is turned into insoluble **starch** for storage.

.....

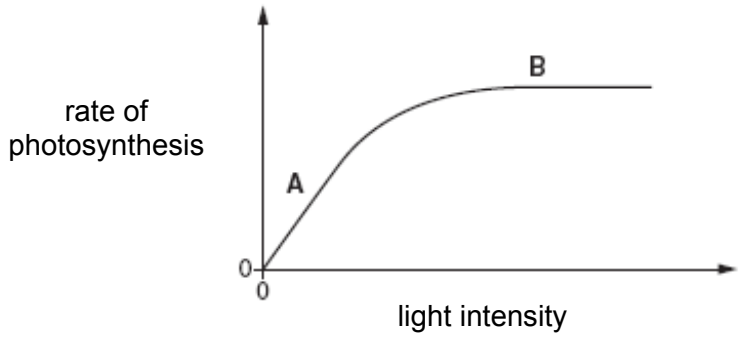
.....

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

(b) Look at the graph.

It shows the effect of increasing light intensity on the rate of photosynthesis.

The concentration of CO_2 is kept at 0.04% throughout the experiment.



(i) Explain the shape of the graph.

.....

.....

.....

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

(ii) Julie says that if the CO_2 concentration is increased, the graph will be steeper at **A** and level off at the same value at **B**.

Niall says that if the CO_2 concentration is increased, the graph will be the same at **A** but will level off at a higher value at **B**.

Who is correct? Explain your answer.

.....

.....

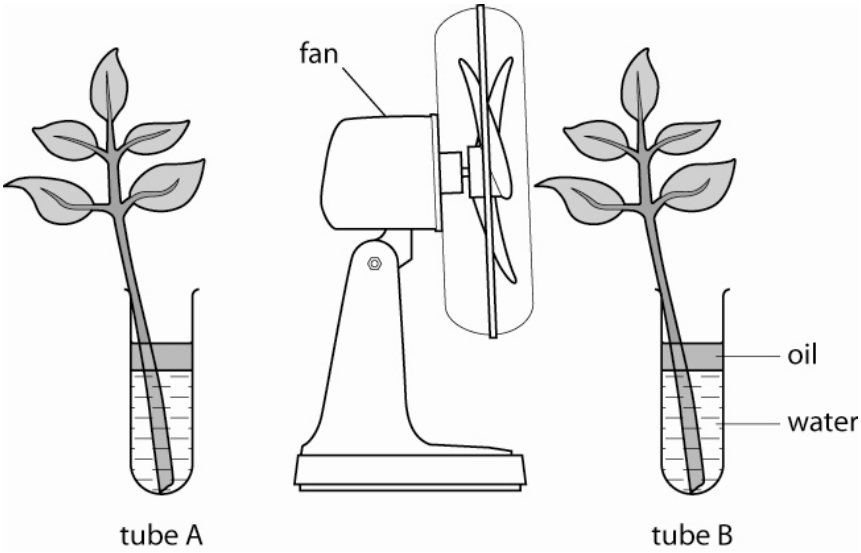
.....

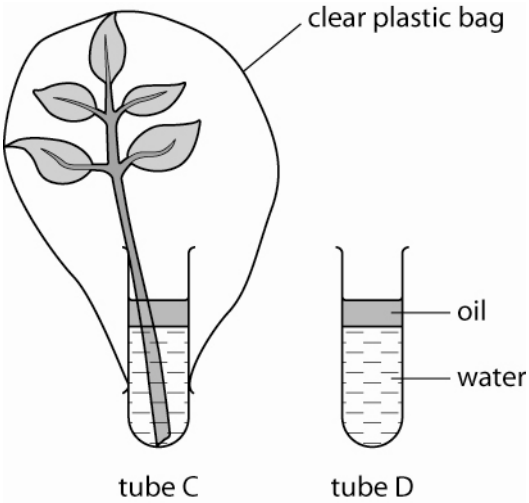
..... **[2]**

[Total: 8]

2 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

(a) Compare the effects of increasing air movement and increasing humidity on the rate of transpiration in Jo's plants.

Use information from the table, as well as your own calculations, to help you answer.

The quality of your written communication will be assessed in your answer to this question.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[6]**

(b) In Jo's experiment, water moves from the tubes to the leaves through transport vessels.

Write down the name of these vessels.

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

[Total: 7]

3 Australia produces a lot of sugar cane.

Insects eating the sugar cane affect the production of the crop.

(a) Farmers use pesticides to kill the insects.

The pesticides cause the death of some animals higher in the food chain.

Explain why this happens.

.....

.....

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

(b) Cane toads were introduced to feed on the insects.

Cane toads are much bigger than the native Australian toads. Cane toads are also poisonous.

The introduction of cane toads was **not** a success.

Suggest **two** reasons why.

.....

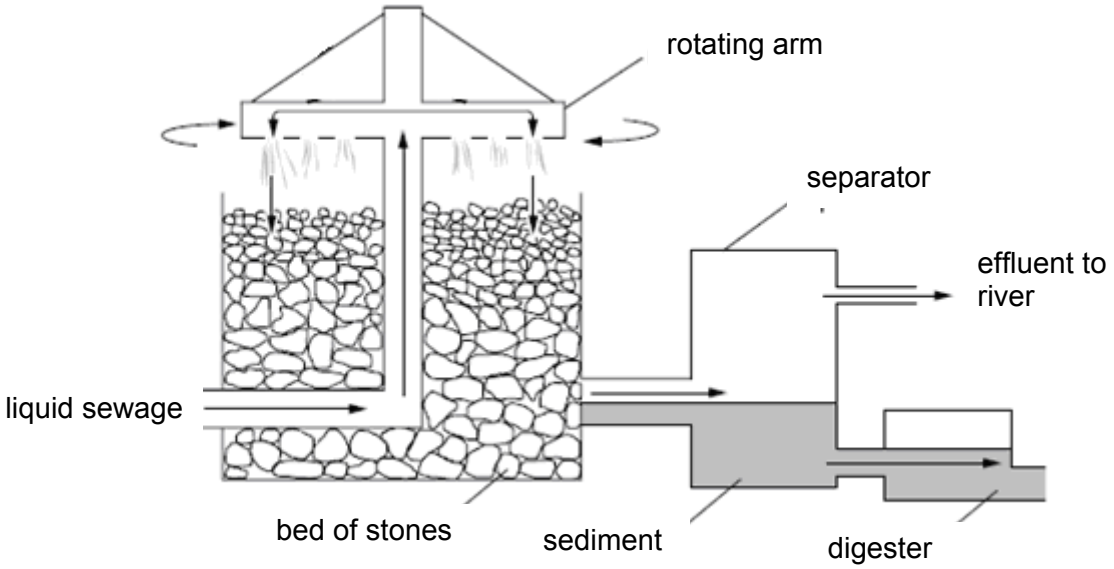
.....

.....

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

[Total: 4]

4 Look at the diagram. It shows part of a sewage works.



(a) Sewage is broken down (decayed) by microbes such as bacteria.

Sewage is broken down more quickly in the summer than in the winter.

Give **two** reasons why.

.....

.....

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

(b) After sewage has been treated it can be used as a fertiliser.

(i) Fertilisers provide minerals containing elements that are needed for healthy plant growth.

Two of these elements are nitrogen and magnesium.

Explain why plants need each element.

nitrogen .....

.....

magnesium .....

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

(ii) Explain how minerals are taken into the root hairs of plants.

.....

.....

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

[Total: 6]

Section B – Module B5

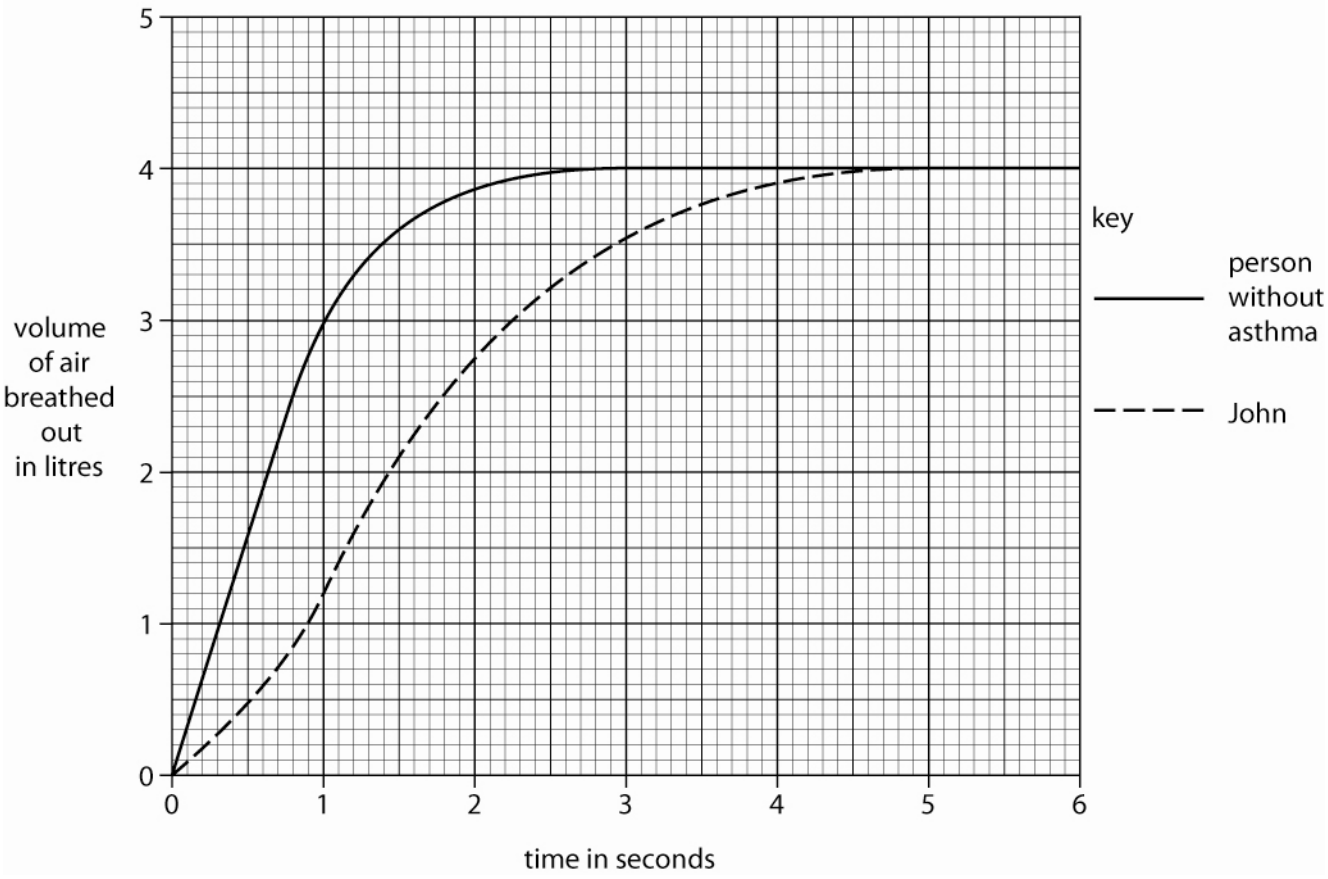
5 (a) John has asthma.

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) The doctor can decide how severe John's asthma is from the graph.

He reads off the volumes of air breathed out **after one second** and does this calculation.

$$\text{asthma value} = \frac{\text{volume of air breathed out after one second by John}}{\text{volume of air breathed out after one second by person without asthma}}$$

He looks up John's level of asthma in this table.

asthma value	level of asthma
more than 0.80	none
0.80 – 0.55	mild
0.55 – 0.30	moderate
less than 0.30	severe

Use the graph to calculate John's asthma value.

.....

.....

.....

asthma value .....

Use the table to work out what level of asthma John has.

level of asthma ..... **[1]**

(iii) What type of treatment could the doctor prescribe based on the results of the calculation?

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

(b) John was worried that blowing hard into the spirometer might lead to an asthma attack.

Describe what happens inside the lungs during an asthma attack.

.....

.....

.....

.....

.....

..... **[3]**

(c) John's doctor is concerned that John could be suffering from a different condition called chronic obstructive pulmonary disease (COPD).

COPD causes progressive and permanent damage to the lung tissue.

Some people with COPD have low oxygen levels in their blood.

Suggest why.

.....

.....

.....

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

[Total: 8]

6 Astronauts sometimes spend long periods of time in space.

When astronauts return to Earth a number of changes may have happened to their bodies.

These include:

- weakening of the muscles
- increased risk of blood clots
- decreased amount of haemoglobin
- weaker bones
- lower heart rate and blood pressure.

(a) Which **one** of these changes could be treated with heparin?

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

(b) Scientists have used studies on astronauts to learn more about the disease osteoporosis.

How can studying astronauts help them learn more about osteoporosis?

.....

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

(c) Returning astronauts may develop kidney problems.

Explain how one of the changes can lead to astronauts developing kidney problems.

.....

.....

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

(d) Suggest why astronauts in space have a lower heart rate than they normally do on Earth.

.....

.....

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

[Total: 6]

7 There are many reasons why some couples have difficulties conceiving babies.

One possible treatment for infertility is IVF.

(a) **(i)** How does fertilisation in IVF differ from normal fertilisation?

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

(ii) Before IVF with their own eggs, women are usually treated with FSH (follicle-stimulating hormone).

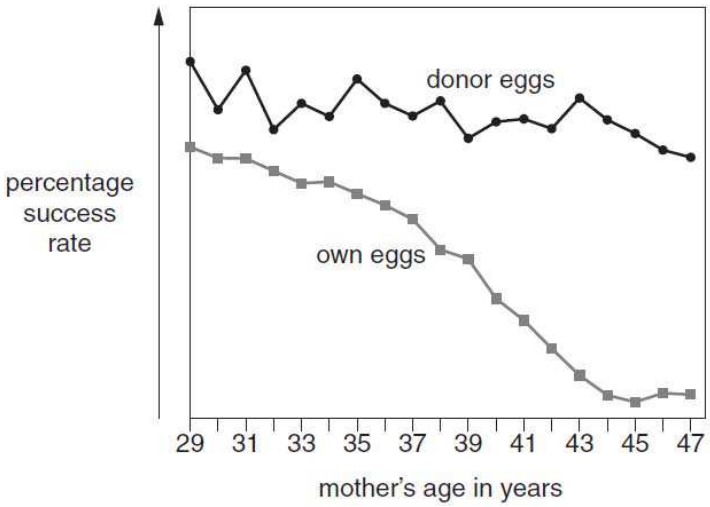
Explain why.

.....

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

(b) The graph shows the percentage success rate of IVF for women of different ages.

It shows the success rate using their own eggs or eggs from a donor.



Discuss the issues that parents have to consider when deciding which type of eggs to use for IVF.

Use the information in the graph and your own knowledge.

.....

.....

.....

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

[Total: 5]

8 Anya is investigating the effect of bile salts on the digestion of fats by lipase.

She sets up tubes containing the same amount of fat and pH indicator.

She changes the amounts of lipase and bile salts.

She then adds distilled water to make the volume the same in each tube.

The pH indicator changes colour when the pH of a solution goes from pH8 to pH6.

Anya times how long it takes for the indicator to change colour in each tube after all the solutions have been added.

She records the time in minutes in a table.

Look at her table.

		amount of lipase solution in cm^3				
		0.0	**0.4**	**0.8**	**1.2**	**1.6**
amount of bile salt solution in cm^3	**0.0**	*	*	12	4	4
	0.4	*	21	8	2	2
	0.8	*	15	5	1	1
	1.2	*	9	3	0.5	0.5
	1.6	*	7	2	0.4	0.4

* = no change after 30 minutes

Explain why the indicator changes colour and what conclusions Anya can draw about the factors affecting the digestion of fats.

✎ *The quality of written communication will be assessed in your answer to this question.*

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[6]**

[Total: 6]

Section C – Module B6

9 Read the article from a newspaper.

Fighting cholera with potatoes!

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 put a gene into potato plants to make them 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 scientists have put a gene from another species into the potato plant.

Describe how this is done, explaining how different enzymes are used in this process.

The quality of written communication will be assessed in your answer to this question.

.....

.....

.....

.....

.....

.....

.....

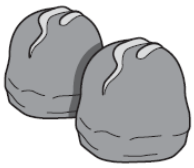
.....

.....

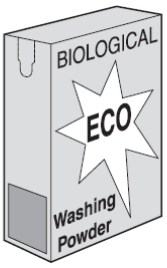
..... **[6]**

[Total: 8]

10 The diagrams show some products made using enzymes.



low sucrose chocolates



biological washing powder

(a) The chocolates are made low in sucrose using sucrase.

How will this affect the taste of the chocolates compared to chocolates high in sucrose?

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

(b) **(i)** On the packet of biological washing powder there is a warning.

It says that the powder will **not** clean clothes very well if used in areas where the tap water is very acidic.

Explain why.

.....

.....

.....

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

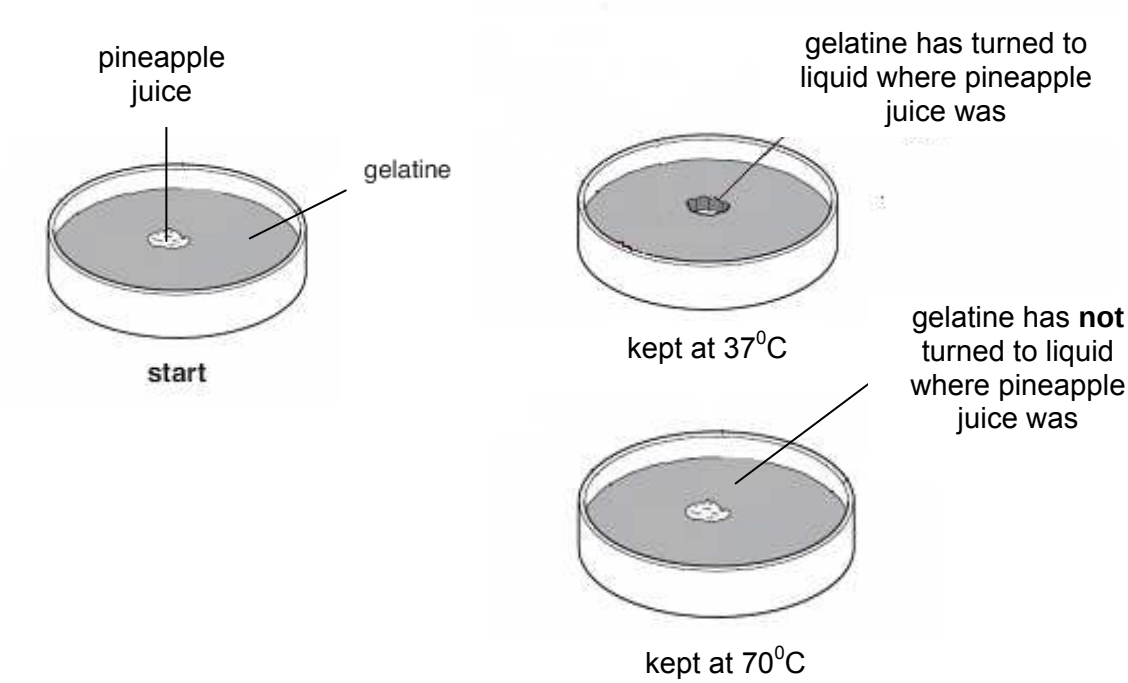
(ii) Gerant decides to do an experiment with pineapple juice.

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 37^0C.

He repeats this with another dish but keeps this dish at 70^0C.



Explain the results of Gerant's experiment.

.....

.....

.....

.....

.....

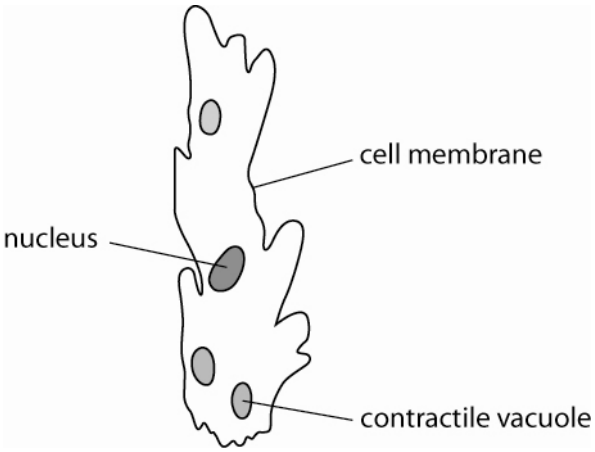
.....

..... **[4]**

[Total: 7]

11 Amoeba is the name of a group of single-celled organisms.

Look at the diagram of *Amoeba lacerate*. It lives in rivers.

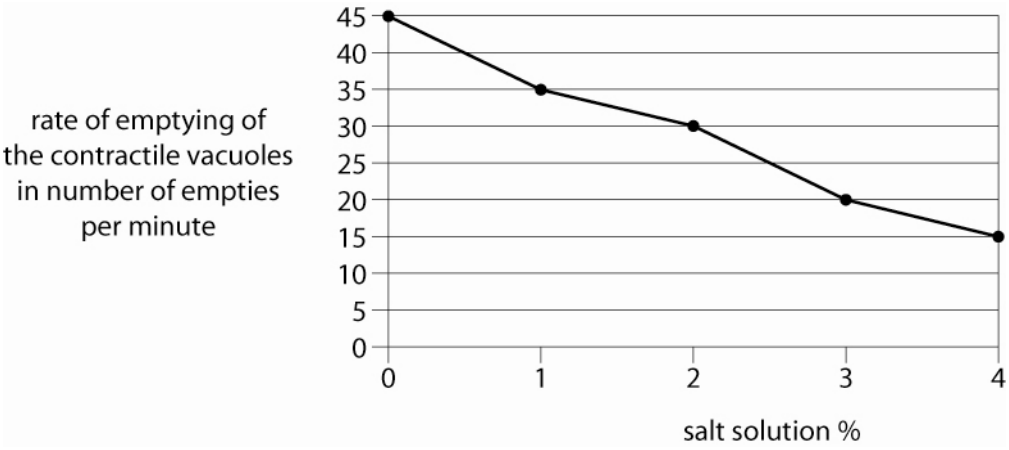


An experiment is performed on *Amoeba lacerata.*

The amoeba is placed in salt solutions of different concentrations.

The rate of emptying of its contractile vacuoles is then measured.

The graph shows the results.



(a) The contractile vacuoles empty at different rates in different salt solutions.

Explain these results.

.....

.....

.....

.....

..... **[3]**

(b) The experiment counted the number of 'empties' per minute as a measure of how quickly the amoeba removed water.

Suggest **one** reason why this data might **not** be a valid measurement of how quickly the amoeba removed water.

.....

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

(c) When the amoeba are placed in 8.5% salt solution, the rate of emptying of the contractile vacuoles is close to zero.

What can you deduce from this observation?

.....

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

[Total: 5]

12 Chris wants to make some home-made wine.

Home wine kit

Contents: yeast,
dried grape juice containing
2 kg of sugar.

Add to 10 litres of water

She buys two identical kits.

To one kit she adds no extra sugar.

To the second kit she adds 1kg of **extra** sugar.

She adds 10 litres of water to each, as in the instructions.

She then allows each one to ferment and produce a batch of wine.

(a) Chris has a table showing the maximum concentration of alcohol that can be made from different starting concentrations of sugar.

starting concentration of sugar in kg per litre	maximum final alcohol concentration %
0.10	5.6
0.15	8.4
0.20	11.2
0.25	13.6
0.30	15.6

What is the maximum final alcohol concentration for the wine that has extra sugar added?

Show how you worked out your answer.

.....

.....

.....

concentration = ...% **[2]**

(b) Look at the table.

Chris thinks that the starting concentration of sugar will be in direct proportion to the alcohol concentration in the wine.

(i) Do the data support her idea? Explain your answer.

.....

.....

.....

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

(ii) Would you expect the alcohol concentration to continue to increase as more sugar is added? Explain your answer.

.....

.....

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

[Total: 5]

Section D

13 (a) 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
1st measurement	18	72
2nd measurement	17	68
3rd 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
1st measurement	66
2nd measurement	67
3rd measurement	65

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

.....

.....

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

(b) Neil and Amy want to compare their fitness levels.

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]**

(c) Amy looks at some data for 1578 teenage girls.

The girls were divided into 5 groups depending on their Body Mass Index (BMI) scores.

Each group carried out 4 fitness tests.

The table shows the **mean** results for each group.

fitness tests	very underweight	underweight	normal weight	overweight	obese
	BMI <17	BMI 17-18.4	BMI 18.5-24.9	BMI 25.0-29.9	BMI ≥30
push-ups in count per min	30.4	29.4	27.9	23.9	17.3
sit-ups in count per min	30.0	31.7	31.9	30.1	22.4
sit-and-reach in cm	30.2	32.0	32.4	32.6	31.0
distance run in 9min in m	1371.9	1382.1	1358.5	1242.9	1140.0

K-K Mak et al. BMC Public Health 2010, **10**:88

(i) Amy says that people with lower BMIs have higher fitness levels.

Is Amy correct? Explain your answer.

.....

.....

.....

.....

..... **[3]**

(ii) Amy's BMI is 29.3.

Amy uses the table to predict that she will do 30.1 sit-ups in a minute in a sit-up test.

Is this a reasonable prediction for Amy for this test?

Explain your answer.

.....

.....

.....

..... **[3]**

[Total: 10]

[Paper Total: 85]

END OF QUESTION PAPER