

Biology Summer Work

Applied Science Biology Summer work

Please note that you may see slight differences between this paper and the original.

Candidates answer on the Question paper.

Supplied materials:

Additional resources may be supplied with this paper.

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, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions, unless your teacher tells you otherwise.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Where space is provided below the question, please write your answer there.
- You may use additional paper, or a specific Answer sheet if one is provided, but you must clearly show your candidate number, centre number and question number(s).

INFORMATION FOR CANDIDATES

- The quality of written communication is assessed in questions marked with either a pencil or an asterisk. In History and Geography a *Quality of extended response* question is marked with an asterisk, while a pencil is used for questions in which *Spelling, punctuation and grammar and the use of specialist terminology* is assessed.
- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **60**.
- The total number of marks may take into account some 'either/or' question choices.

Answer **all** the questions.

1. Singapore is a small country.

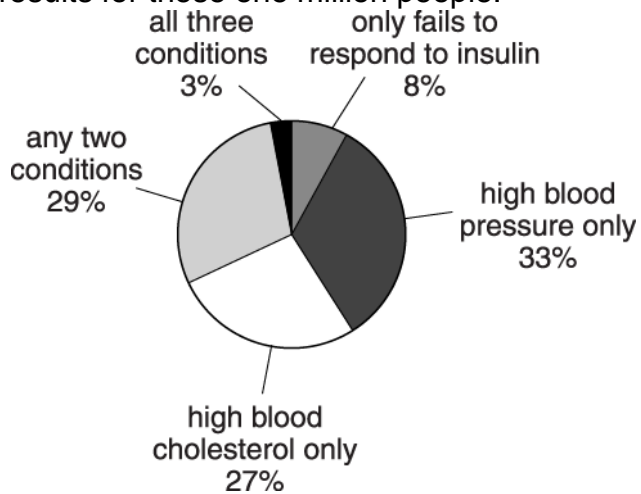
Everyone living in Singapore was offered a health check to test for three conditions.

They were tested:

- for high blood pressure
- for high levels of blood cholesterol
- to see if they failed to respond to insulin.

The check found that one million people had at least one of these conditions.

The pie chart shows the results for these one million people.



The government is worried about the possible consequences of these results for many of the people.

Explain the most serious consequences of these results for the health of the people.

Use calculations to support your answer.



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

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..... [6]

2. Sweat glands in the skin release sweat.
Explain how sweat can cool the body down.

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..... [2]

3. One of the symptoms of malaria is a fever.
In a fever, the body temperature may rise to over 40 °C.

i. How does the body monitor the rise in body temperature?

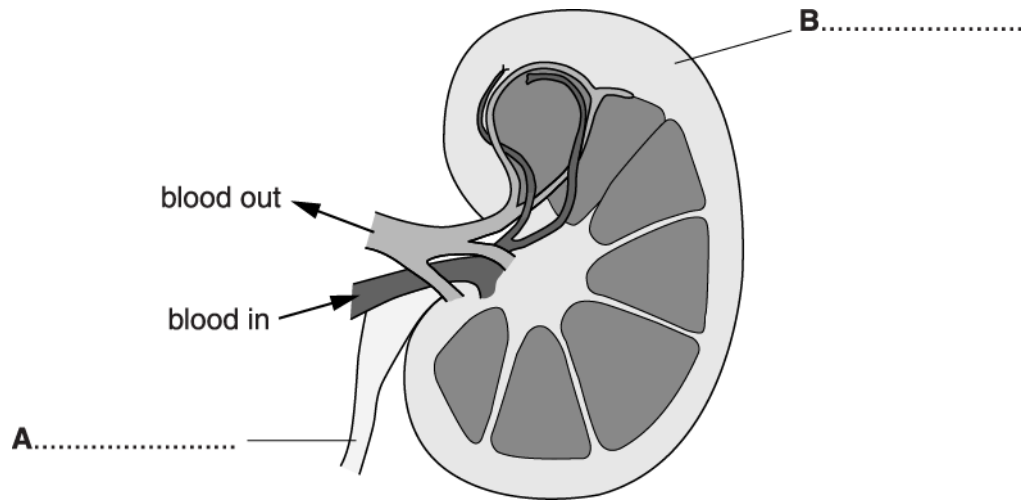
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ii. One way to cool down is by vasodilation.

Explain how vasodilation cools a body.

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..... [2]

4(a). Kidneys are important organs in excretion.
The diagram shows a section through a kidney.



i. Finish the diagram by adding the names of parts **A** and **B**.

[2]

ii. It is important that the blood entering the kidney is at high pressure.

Write down why this is important for the correct working of the kidney.

[1]

(b). Manjit and Georgina are each going to donate a kidney.

These are their donor score sheets.

Manjit

Feature	Points scored
43 years old	10
renal function	2
blood pressure	3
tissue antigens	2
body mass 65 kg	0
Total points	17

Georgina

Feature	Points scored
52 years old	15
renal function	2
blood pressure	3
tissue antigens	2
body mass 95 kg	1
Total points	

Georgina and Manjit both donate a kidney.

After 5 years, their donated kidneys have a different percentage chance of still working.

What is the difference between these two percentages?

Use the tables and information in the graph.

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..... [2]

5. How do plants get the oxygen (O) they need to make chlorophyll?

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..... [1]

6. Water intake affects urine concentration.

Alcohol reduces the amount of anti-diuretic hormone (ADH) released.

Drinking 2 litres of either water or alcoholic beer will make the urine more dilute.

However, the urine concentration is different in each case.

Explain how drinking 2 litres of water or alcoholic beer makes urine more dilute and why the concentrations would be different.



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

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7. Carbon dioxide and water are needed for photosynthesis.

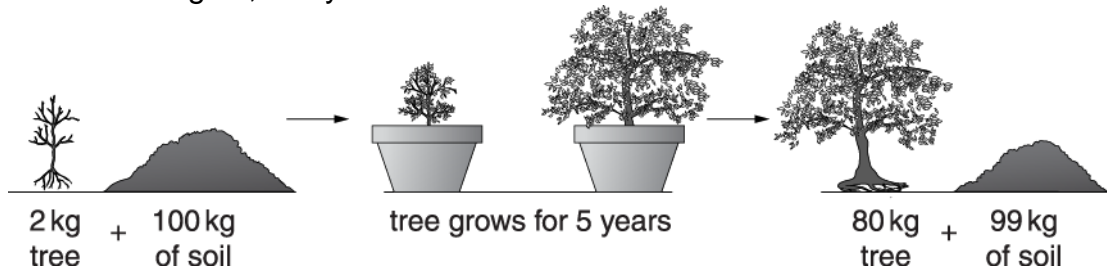
In 1649, scientists thought that plants grew by **only** taking in solid materials from the soil.

A scientist called van Helmont did an experiment to test this idea.

He grew a tree in a large pot of soil.

He measured the mass of the soil and the tree before the experiment.

He measured them again, five years later.



Explain how van Helmont's experiment proved the scientists wrong.

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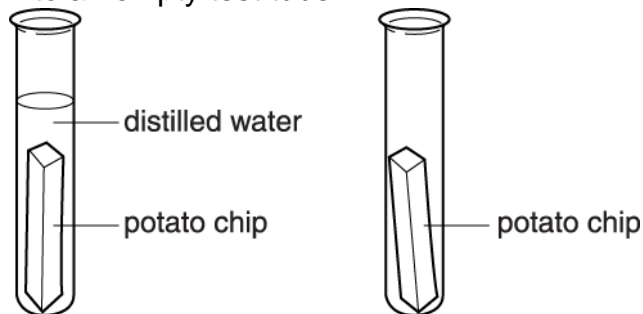
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[2]

8. Katie cuts two chips from a potato.

She puts one of the chips into a test tube of distilled water.

Katie puts the other chip into an empty test tube.



Water enters the cells of the potato chip that has been left in distilled water by osmosis.

Explain why.

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[2]

9. This question is about diabetes.



Jessica is an athlete. She has diabetes.

Jessica can help control her blood sugar levels by controlling her diet.

She must **also** inject herself with insulin every day.

Jessica needs to change the amount of insulin she injects during each day.

Jessica plans a training run immediately after breakfast.

Explain how this changes the amount of insulin she would need to inject.

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[2]

10. Malaria causes a fever.

The body temperature is very high during a fever and this may cause death.

Describe how high body temperatures can cause death.

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[2]

11. Bristlecone pine trees are among the longest living things on Earth.

One of them, called Methuselah, is in California and is over 4 800 years old.



Methuselah

Bristlecone pine trees live high up in the mountains.

The low temperature, dry soil and strong wind make the trees grow very slowly.

This is because these conditions affect both transpiration and photosynthesis.

Explain how and why these conditions affect both transpiration and photosynthesis.



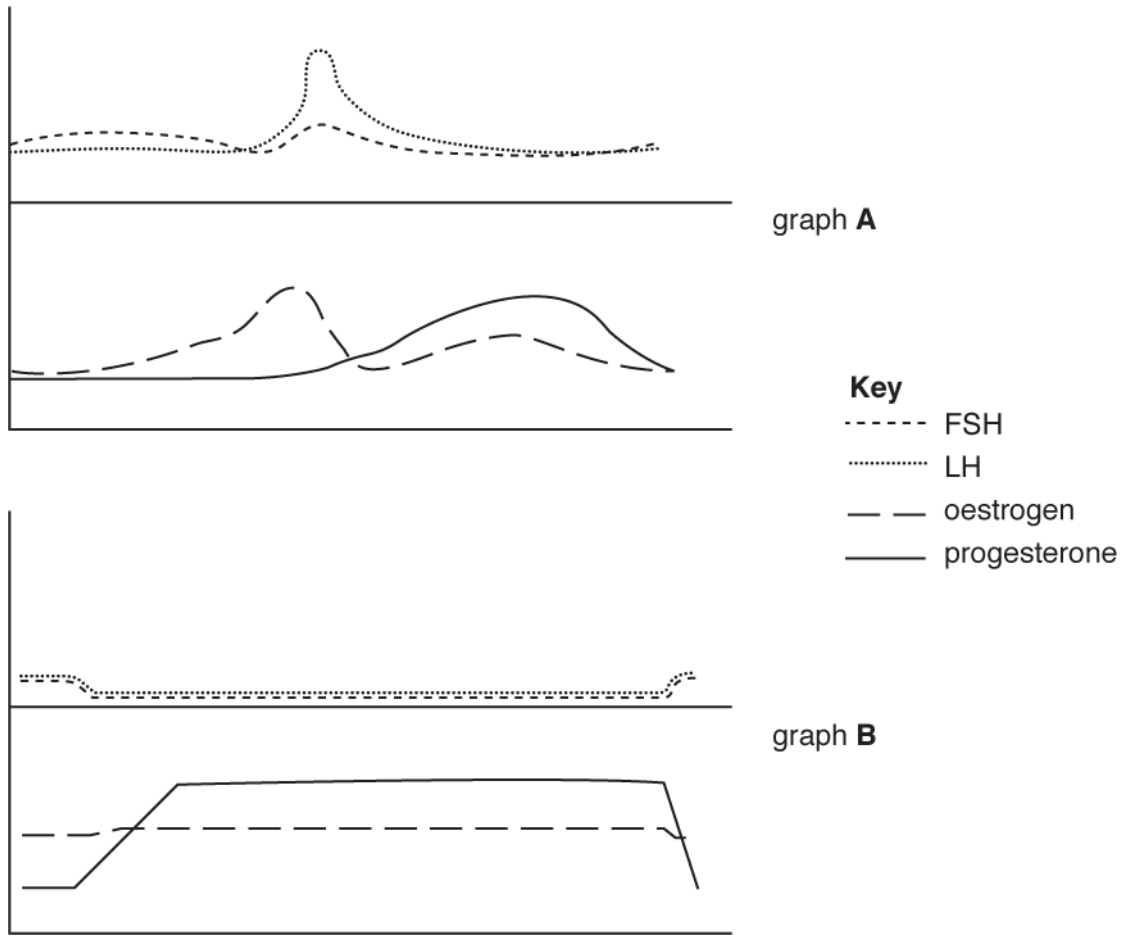
The quality of written communication will be assessed in your answer to this question.

[6]

12. The diagram shows the hormone levels in the blood during the menstrual cycle.

Graph **A** represents a normal menstrual cycle.

Graph **B** represents a cycle if the woman is taking contraceptive pills.



Compare the graphs and use them to explain how the contraceptive pill can reduce the chance of pregnancy occurring.



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

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[6]

13(a). The table shows some information about three types of mammal.

Mammal	Metabolic rate	Surface area of one red blood cell in arbitrary units	Volume of one red blood cell in arbitrary units	Surface area to volume ratio of red blood cells
Mouse	1.0	91	52	1.75
Rabbit	1.5	114	70	1.63
Shrew	7.5	60	24	

i. Calculate the surface area to volume ratio of red blood cells for the shrew.

answer =

ii. Explain how the shrew manages to maintain its metabolic rate.

Use your calculation in part **(b)(i)** and information from the table in your answer.

[3]

- (b). The units for the metabolic rate are cm^3 of oxygen consumed in one hour per gram of animal.
- Suggest why the oxygen consumed is given as **per gram of animal**?

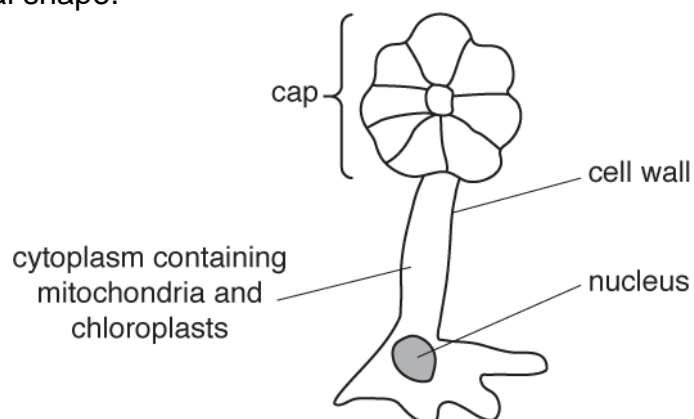
[1]

- Explain why oxygen consumption can be used as a measure of metabolic rate.

[2]

14. *Acetabularia* is a unicellular organism that lives in the sea.

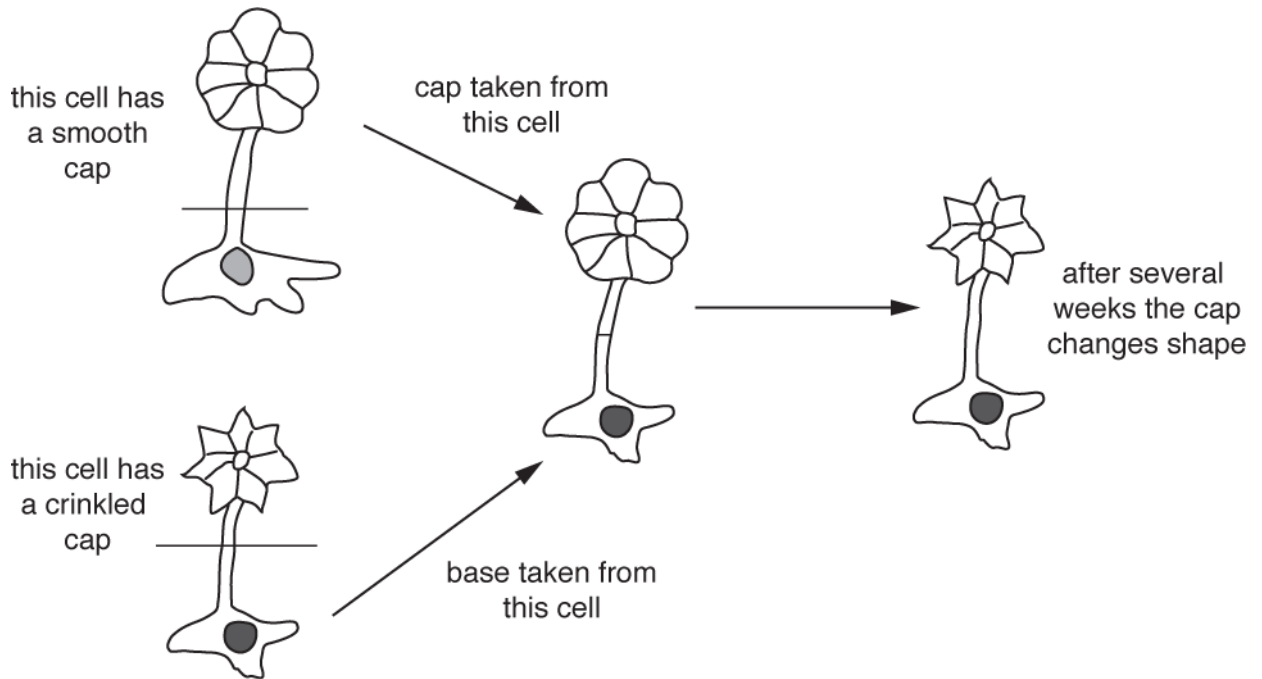
It has rather an unusual shape.



A scientist did an experiment with two types of *Acetabularia*.

The two types of *Acetabularia* had different shaped caps.

The diagram shows the scientists experiment.



The shape of the cap depends on which **proteins** are made by the cell.

Explain how the nucleus codes for proteins that are made elsewhere in the cell and suggest why it took several weeks for the cap to change shape.



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

[6]

15. Sam investigates the rate of alcohol production by fermentation. She mixes yeast with sugar and water and leaves the mixture to ferment for 4 days.

She does this for two different strains of yeast, **A** and **B**.

Sam monitors the fermentation process by recording the specific gravity of the mixture.

The lower the specific gravity the more alcohol the mixture contains.

Look at Sam's results.

Time in hours	Specific gravity in g/cm ³	
	Yeast strain A	Yeast strain B
0	1.090	1.090
24	1.065	1.057
48	1.054	1.038
72	1.044	1.023
96	1.037	1.010
120	1.037	1.001

Explain the patterns seen in the two sets of data.

[2]

16. How do plants get the hydrogen (H) they need to make chlorophyll?

[1]

END OF QUESTION paper