1 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.

(a) Write down which type of diabetes Jessica has.

.....

Explain your answer.

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

(b) 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]**

[Total: 3]

2 Singapore is a small country.

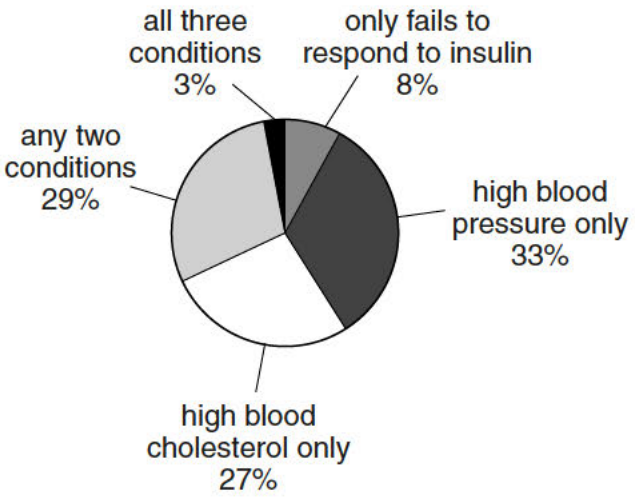
Everyone living in Singapore was offered a health check to test for three conditions.

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.



(a) 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]**

(b) It is not possible from the pie chart to work out how many of the one million people have high blood pressure.

Explain why.

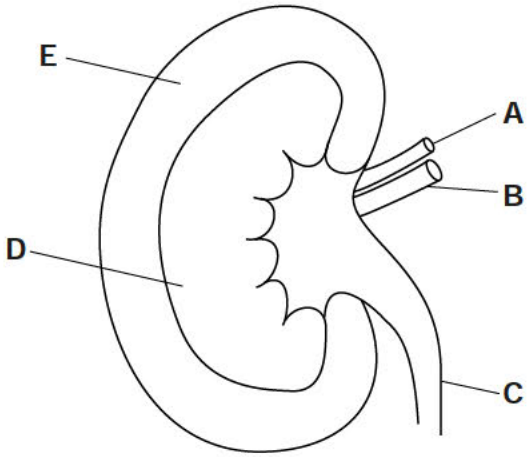
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[Total: 7]

3 This question is about how the body controls urine concentration.

(a) Look at the diagram of a kidney.



Match each letter to the correct part of the kidney.

One has been done for you.

Part of the kidney	Letter
cortex	
medulla	
renal artery	**A**
renal vein	
ureter	

[2]

(b) 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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(c) David and Jonathon are identical twins.

David has a faulty kidney and needs a transplant.

Explain why Jonathon would be the best possible donor.

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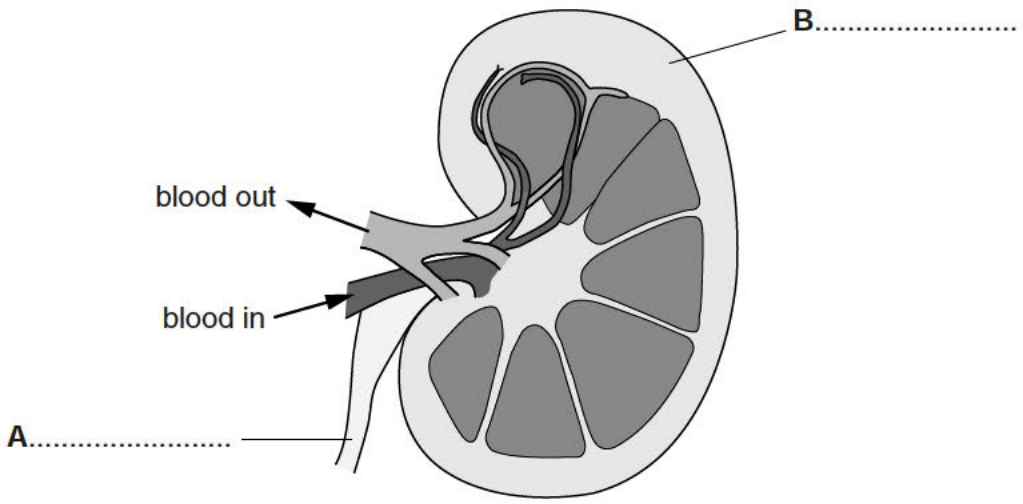
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[Total: 10]

4 Kidneys are important organs in excretion.

(a) 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]**

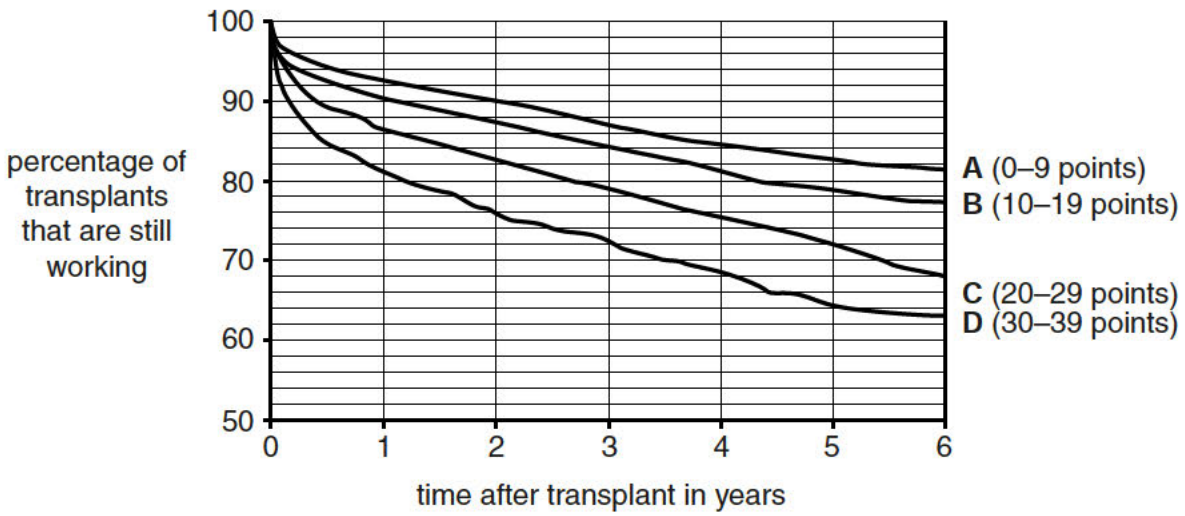
(b) A person may donate one of their kidneys.

Before they do this they are marked on a Donor Scoring System.

This gives them points for different factors such as their age.

The points are added up and turned into a grade **A**, **B**, **C** or **D**.

The graph shows the effect of the grade on the success of a transplant.



Describe the patterns shown in the graph.

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

(c) 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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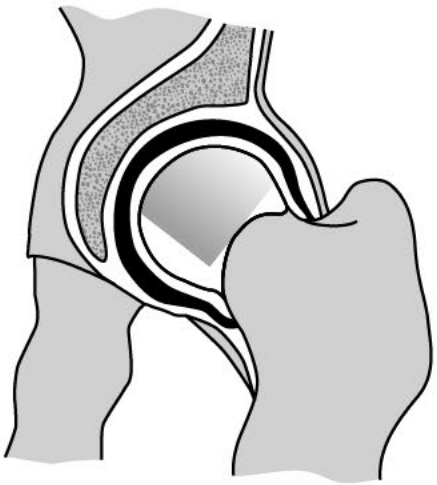
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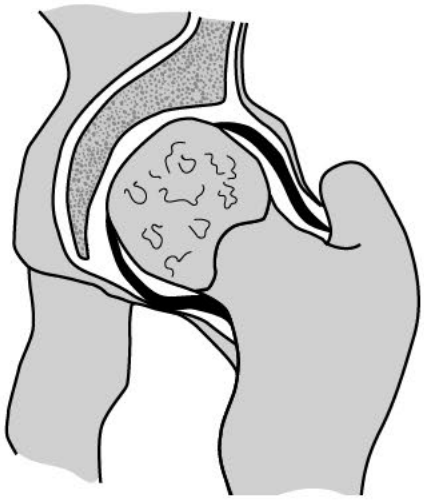
5 Norman can move his left leg normally.

His friend Arthur cannot move his left leg very much and is in pain.

The diagrams show the hip joint of each friend.



Norman's hip joint



Arthur's hip joint

Describe the range of movement allowed by Norman's hip joint and explain why this range of movement is reduced in Arthur.

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

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[Total: 6]

6 This question is about lizards.

(a) Look at the picture. It shows a frilled lizard in the cool early morning.



Frilled lizards are adapted to changing temperatures.

The frill is full of blood capillaries and is a thin layer of skin that can be extended or closed.

In early morning, when the air is cold, the lizard climbs onto a rock and extends its frill to absorb heat from the Sun.

Later in the day it is very hot and the lizard's behaviour changes to prevent overheating.

Suggest how the lizard's behaviour changes and explain how this helps the frilled lizard regulate its body temperature.

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

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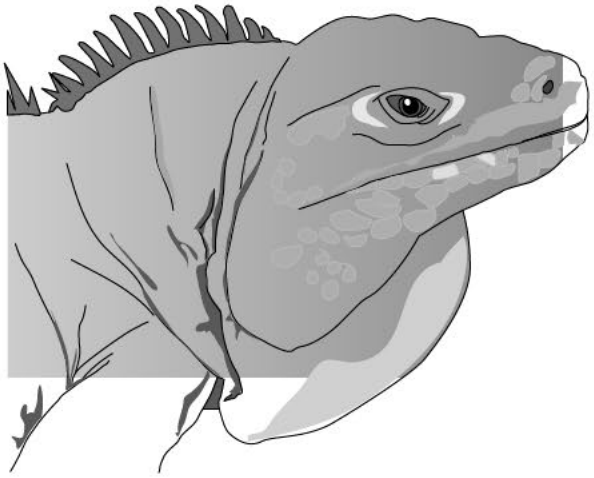
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(b) Look at the picture of a Caribbean iguana.



Read the article about a project to help Caribbean iguanas.

> The main threats to the survival of Caribbean iguanas are habitat loss and predation by cats and dogs which eat the young iguanas.
>
> Two conservation programmes are proposed.
>
> The first conservation programme, called **headstarting**, involves collecting young iguanas from the wild and raising them in captivity until they are large enough to survive in the wild.
>
> The second programme involves **captive breeding** from a small number of adults in a zoo. The young iguanas produced are released into the wild.

Winston is in charge of setting up the programme.

He believes that captive breeding would be more effective than headstarting.

Use the information to evaluate how successful captive breeding might be.

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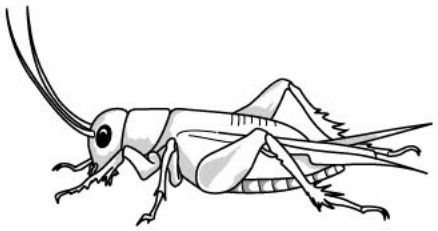
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[Total: 9]

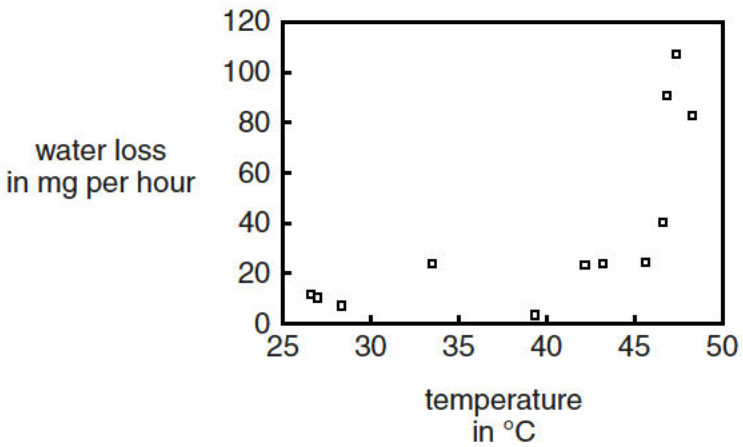
7 Crickets are small arthropods that look like grasshoppers.



One type of cricket lives on the island of Kauai in Hawaii.

It is adapted to live in hot conditions.

(a) The graph shows the loss of water from crickets at different temperatures.



Use the graph to explain how crickets survive in hot conditions.

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

(b) The crickets make a noise or 'sing' by rubbing their wings together.

This attracts a mate.

Unfortunately, the noise also attracts a type of fly.

The fly lays eggs on the cricket.

The eggs hatch and maggots burrow into the cricket and feed on it, eventually killing it.

(i) What word is used to describe the maggots in this feeding relationship?

Choose your answer from this list.

competitor **tner** **y**

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

(ii) Scientists found that some crickets on the island had a gene that made them silent.

The scientists found that after a few years most crickets on the island were silent.

However, there are still a small number of crickets that sing.

Use natural selection to explain why most of the crickets are now silent and why scientists think that this could lead to the formation of a new species.



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

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[Total: 8]