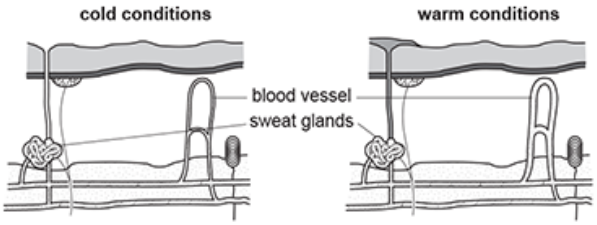
Maintaining Internal Environments (F)

1. The diagrams show changes in the skin as a person moves from cold to warm conditions.



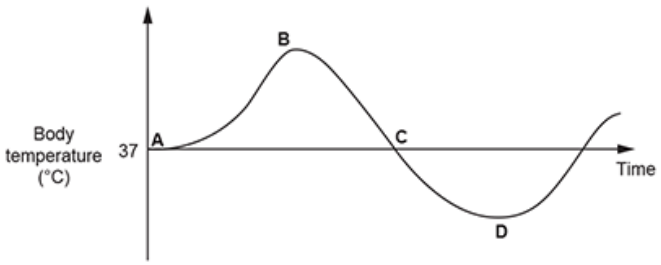
Which processes happen in the skin as a result of the change from cold to warm conditions?

A Blood vessels widen and sweat is released.
B Blood vessels narrow and sweat is released.
C Blood vessels widen and sweat production stops.
D Blood vessels narrow and sweat production stops.

Your answer ☐ **[1]**

2. The graph shows changes to body temperature during temperature regulation.

Which letter on the graph shows when shivering is occurring?



Your answer ☐ **[1]**

3. Which of these can be used to treat type **2** diabetes but **not** type **1**?

A Diet and exercise
B Exercise only
C Insulin and diet
D Insulin, diet and exercise

Your answer ☐ **[1]**

4. Transpiration has a cooling effect on the leaves of plants.

Which statement **best** describes how this happens?

A Evaporation of water from the leaf removes heat energy.
B Water entering the stomata takes heat energy from the leaf surface.
C Water dripping off the leaf causes heat energy to be lost.
D Water falling on the leaf removes heat energy.

Your answer ☐ **[1]**

5. A chemical in stevia leaves makes them taste sweet. This chemical is **not** a sugar.
People with diabetes need to know if the food they eat contains sugar.

i. Describe how you could test some stevia leaves to prove that they do **not** contain sugar.

Reagent used

Method

Expected result

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[3]

ii. Will using stevia in foods help people with type 2 diabetes?

Explain your answer.

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[2]

6. Zebras (**Fig. 23.1**) have evolved to live in hot grassland in Africa.

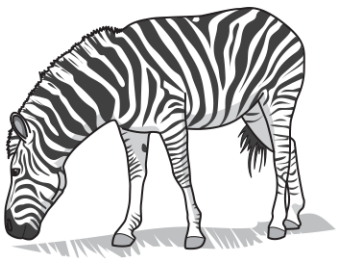

Fig. 23.1

Scientists have tried to find out why zebras have evolved stripes on their body.

One theory is that the stripes help to keep the zebra cooler than other colours. Scientists did an experiment to test this theory. They covered barrels of cold water with the skin of different animals. Then they measured the temperature of the water several hours later.

The results are shown in **Fig. 23.2.**

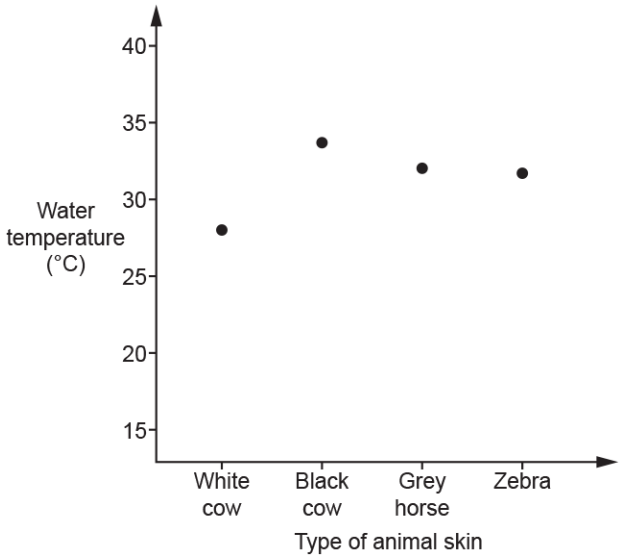

Fig. 23.2

i. Do the results in **Fig. 23.2** support the theory that stripes keep zebras cool?
Explain your answer.

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[1]

ii. The scientists were aiming to investigate if it was **only** the colour of the skin that affected temperature regulation.

Suggest **one** improvement the scientists could make to ensure they **only** investigate the **colour** of the skin.
Explain your answer.

---

[1]

7. Red blood cells burst when they are placed in a solution with a much higher water potential than the red blood cells. This is called lysis.

Explain why lysis happens.

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[3]

8 (a). Fig. 22.1 shows the mass of urea in the urine plotted against the BMI (Body Mass Index) for nine boys. BMI is a value often used to see if a person is a healthy mass for their height.

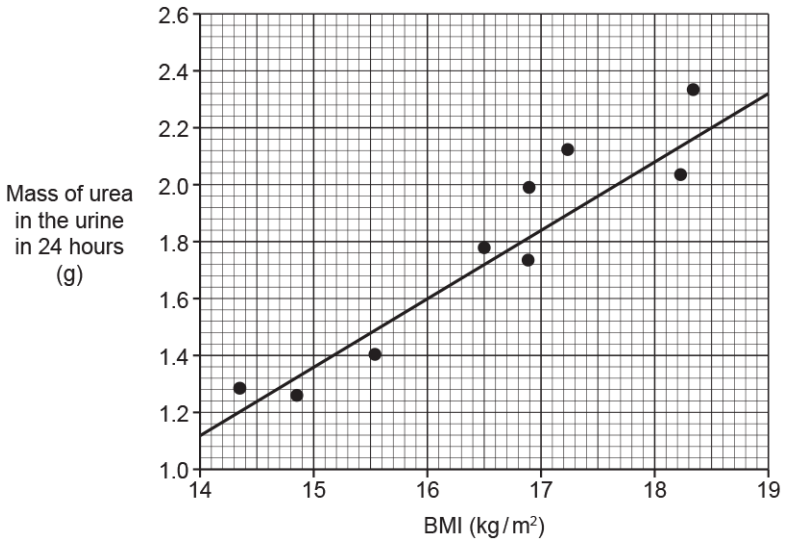

Fig. 22.1

i. What does the graph show about the relationship between BMI and the mass of urea in the urine?

---

[1]

ii. A boy has a BMI of 16. He produces 1000 cm^3 of urine in 24 hours.

Calculate the concentration of urea in the boy's urine.

Concentration = ...g / cm^3

[2]

iii. **Fig. 22.2** shows the mass of urea in the urine against the BMI for nine **different** boys.

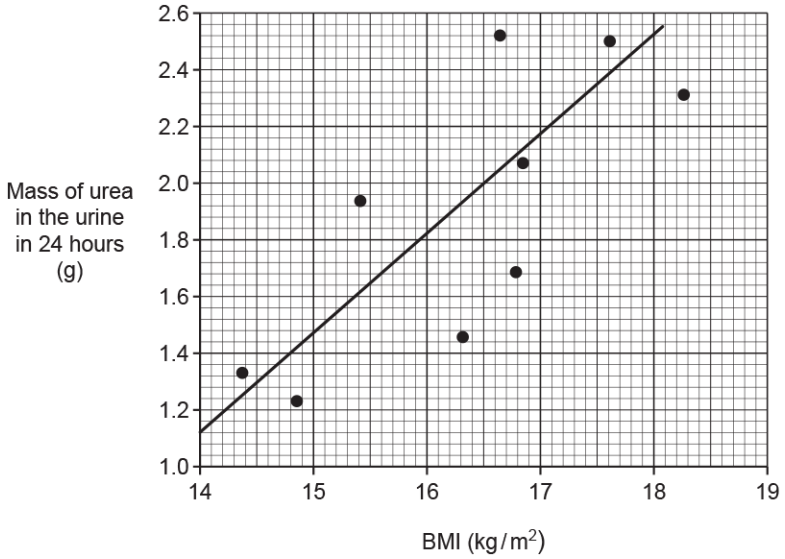

Fig. 22.2

Give **two** differences in the relationship between BMI and the mass of urea in the urine shown in **Fig. 22.1** and **Fig. 22.2**.

1 ----------

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2 ----------

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[2]

(b). The kidney filters the blood. The fluid produced by filtering the blood passes through kidney tubules.

Each kidney tubule contains a number of different parts.

Put a number (**1** to **5**) in the boxes to show the order of the parts that the liquid passes through.

The first one has been done for you.

Bowman's capsule	**1**
Collecting duct	
Proximal convoluted tubule	
Loop of Henlé	
Second coiled region	

[3]

9.

i. Explain why overheating of the body may stop chemical reactions in cells.

_____

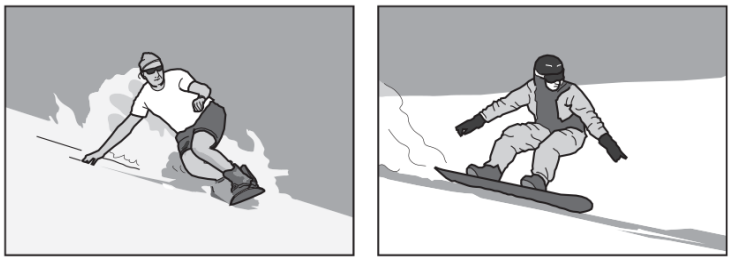
_____

_____

_____ **[2]**

ii. * Look at **Fig. 20.2** which shows two people riding on boards.

Person A is riding a board on sand in a hot desert. **Person B** is riding a board on snow.



Person A Person B

Fig. 20.2

Explain the different problems of temperature regulation for these two people and give examples of the ways their bodies solve these problems.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ **[6]**

10 (a). Diabetes can often result in high levels of glucose in the urine.

Which organ usually prevents glucose being lost from the blood when urine is made?

_____ **[1]**

(b). Drugs can be used to treat one type of diabetes. One drug prevents an enzyme working properly.

Suggest how a drug can stop an enzyme working.

_____

_____

_____ **[2]**

(c).

i. Diabetes occurs when blood sugar levels are not controlled.

Which hormone reduces blood sugar levels?

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

ii. Hormones are produced in endocrine glands.

Describe how hormones control different parts of the body.

_____

_____

_____ **[2]**

iii. * A glucose tolerance test can help identify if a person has diabetes.

The graphs show a glucose tolerance test in three people **A**, **B**, and **C**.

Key
- - - - Hormone that controls blood sugar levels
—— Glucose

'The Child with a Metabolic Condition', Chapter 31, www.nursekey.com, Nurse Key.
Item removed due to third party copyright restrictions.
Link to material: https:/nursekey.com/31-the-child-with-a-metabolic-condition/

One person is healthy and the other two people have different types of diabetes.

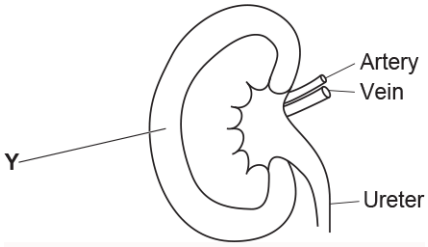
Explain the differences between the three graphs and describe how each person with diabetes could control their blood glucose levels.

Use information from the graphs in your answer.

[6]

11 (a). Look at the diagram.

It shows a vertical section through a kidney.



i. What is the name of part **Y**?

_____ **[1]**

ii. Which liquid flows through the ureter?

_____ **[1]**

iii. Draw an arrow in the ureter showing the direction that this liquid flows.

_____ **[1]**

(b). The kidney is important for water balance.

The table shows the measurements of water balance for two patients in hospital.

	Volume of water (ml)	
	Patient A	**Patient B**
Water taken into body in food and drinks	2500	2500
Water made in the body during respiration	200	200
Total input =	2700	2700
Water lost from kidneys in the form of urine	1900	1700
Water lost through skin, lungs and digestive system	1000	1000
Total output =	_____	_____

i. Calculate the total output for Patient A and Patient B.

Patient A _ _ _ _ _ _ _ _ _ _ _ _

Patient B _ _ _ _ _ _ _ _ _ _ _ _

[1]

ii. Which patient needs treatment for their kidneys?

Explain the reasons for your choice.

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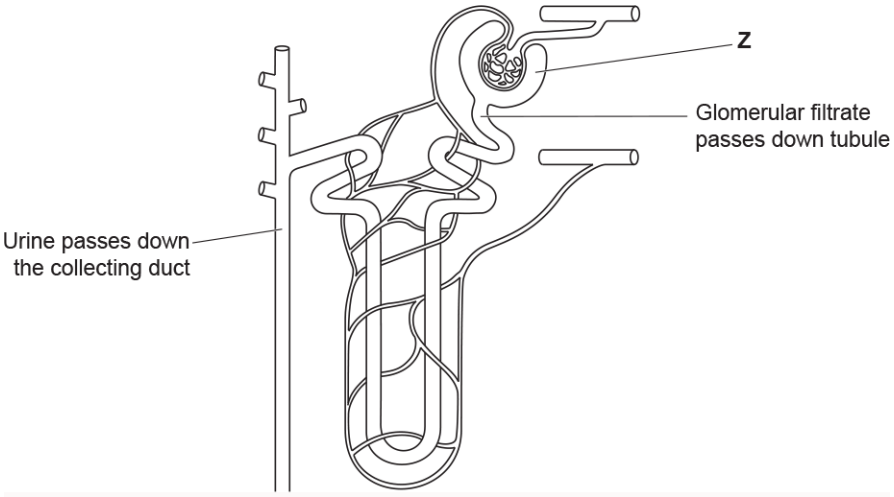
[2]

(c). Look at the diagram. It shows a kidney tubule (nephron).



i. What is the name of part **Z**?

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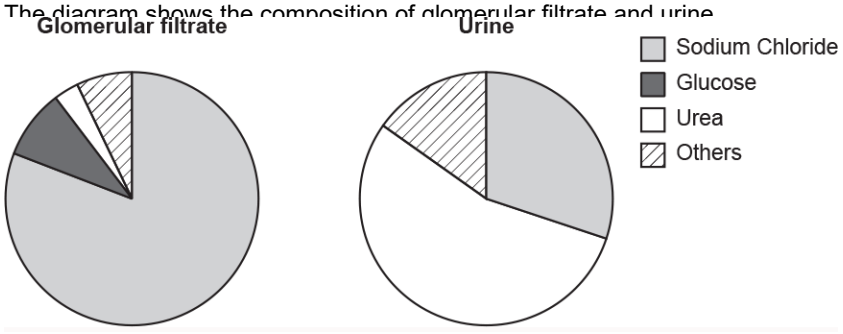
[1]

ii. The diagram shows the composition of glomerular filtrate and urine



What conclusions can be made about what happens between part **Z** and the collecting duct in the kidney tubule?

Use evidence from the diagram to support your answer.

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[3]

12. Probash is ill and is having tests in hospital.

His doctors monitor his body temperature frequently.

Explain why it is important to monitor Probash's body temperature frequently.

---

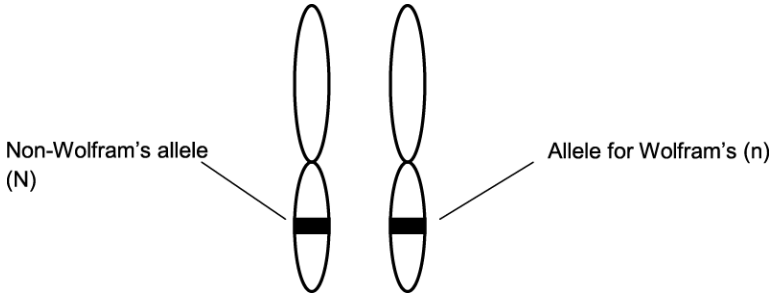
[2]

13. Wolfram's Syndrome is a genetic disorder.

It is caused by a recessive allele (n).

In people with Wolfram's syndrome, a protein does not function correctly.

i. The diagram shows a pair of chromosomes from a person called Tim.



Meena is expecting a baby.

Tim is the father.

Complete this genetic diagram.

		Tim	
Meena	N		
	n		

[2]

ii. Wolfram's syndrome can affect the pancreas.

Meena and Tim's doctor tells them that there is a chance that their baby will have problems controlling their blood glucose level.

Explain why the doctor thinks this.

Use information from part **(i)** and your biological knowledge.

[4]

14. Scientists have tested the genes of a number of people who have diabetes.

They have found that there are about four different versions of a gene that can cause diabetes.

Why might this discovery be important?

A. Diabetes cannot be treated at the current time.
B. Different patients with diabetes can be given different drugs.
C. All types of diabetes can be treated by changing the diet.
D. Glucagon injections will be able to treat these four types of diabetes.

Your answer ☐

[1]

15. If ADH levels rise, how will this affect urine?

A. higher concentration of urea
B. higher volume
C. lower concentration of sodium chloride
D. more dilute

Your answer ☐

[1]

16. Which reduces heat transfer from the skin?

A. shivering
B. sweating
C. vasoconstriction
D. vasodilation

Your answer ☐

[1]

17. One treatment for heart valve problems is to lower the patient's blood pressure.

To lower the blood pressure, a drug can be taken to **increase** the amount of water excreted by the body.

Which organ would be targeted by the drug and what effect would it have on the urine?

organ

……
……

effect on urine

……
……

[2]

END OF QUESTION PAPER