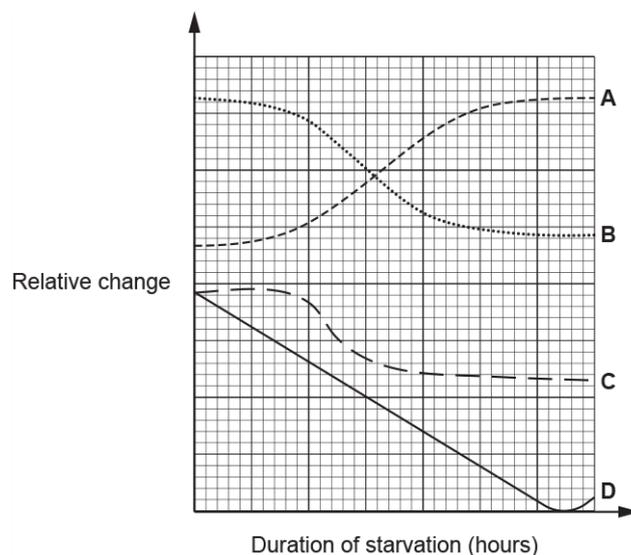


Maintaining Internal Environments (H)

1. Short-term starvation affects the levels of blood glucose, liver glycogen and the hormones insulin and glucagon.

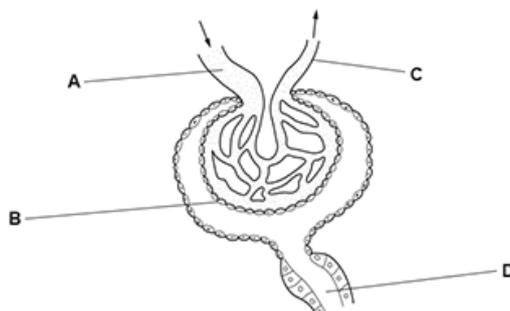
Which line on the graph represents the level of glucagon in the blood during short-term starvation?



Your answer

[1]

2. The diagram shows part of a kidney tubule (nephron).



Which structure is the proximal convoluted tubule?

Your answer

[1]

3. Urine produced after vigorous exercise is often much darker in colour than urine produced when at rest.

Which reason explains why urine becomes darker in colour?

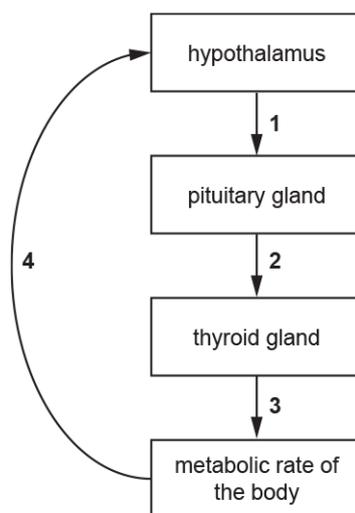
- A Increased sweating and decreased urea production.
- B Decreased ADH production and increased urea production.
- C Increased sweating and increased ADH production.
- D Increased ADH production and decreased urea production.

Your answer

[1]

4. The level of thyroxine in the body is controlled by negative feedback.

The diagram shows how this takes place.



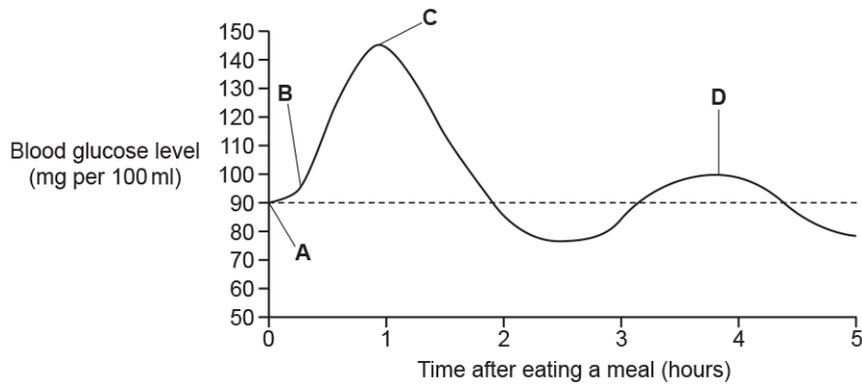
Which numbers on the diagram represent the hormones TSH and thyroxine?

- A 2 = thyroxine 3 = TSH
- B 1 = TSH 3 = thyroxine
- C 3 = TSH 3 = thyroxine
- D 2 = TSH 3 = thyroxine

Your answer

[1]

5. The graph shows blood glucose levels after eating a meal.



Which point **A**, **B**, **C** or **D** on the graph would the insulin level in the blood be at its highest level?

Your answer

[1]

6 (a). Zebras (Fig. 17.1) have evolved to live in hot grassland in Africa.

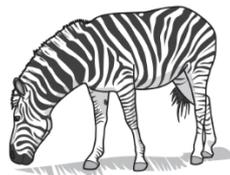


Fig. 17.1

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. 17.2**.

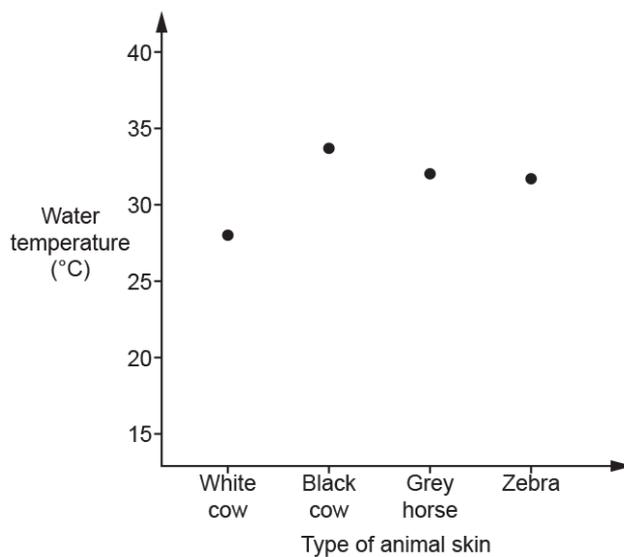


Fig. 17.2

- i. Do the results in **Fig. 17.2** support the theory that stripes keep zebras cool? Explain your answer.

----- [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]

(b). Another theory says that the stripes make a zebra less likely to be bitten by insects.

To test this theory scientists made models of zebras and covered them with sticky tape. One model was black. The other models had different widths of stripes.

Fig. 17.3 shows the number of insects that stuck to the tape.

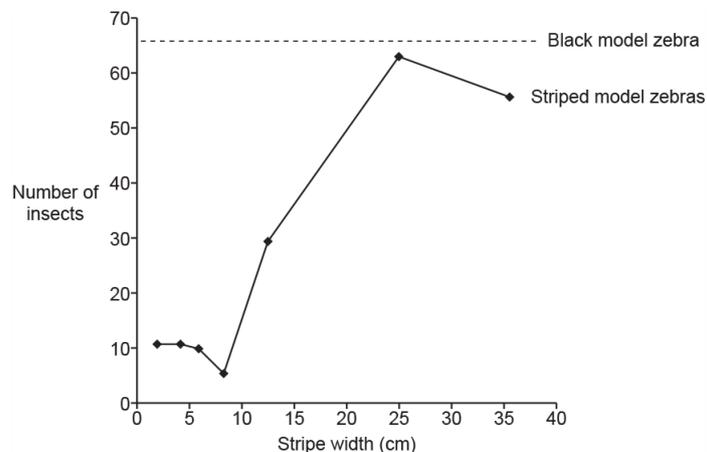


Fig. 17.3

i. Describe what Fig. 17.3 shows about the link between zebra stripes and protection from insects.

[2]

ii. Horse blankets are used to cover horses when they are outside. Companies have started to produce horse blankets with zebra stripes.

Use the information in Fig. 17.3 to suggest what width of stripe should be used to reduce insect bites.

Explain your answer.

[1]

iii. Biting insects can spread pathogens between animals.

Use the theory of natural selection to explain how zebra stripes could have developed.

[3]

7. Protein synthesis takes place inside cells.

ADH is a protein hormone made up of amino acids.

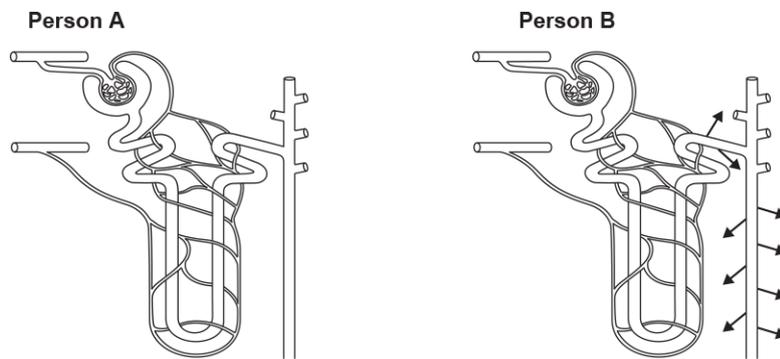
- i. Complete the sentences to explain the link between amino acids and proteins.
 Large molecules, like proteins, made of smaller molecules are called
- The smaller molecules, or amino acids, are called

[2]

- ii. Alcohol inhibits ADH production.

Person **A** and **B** both drank one small 100 ml drink.
 Only one of the drinks was high in alcohol.

Look at the diagram of a kidney tubule in person **A** and **B** after the drink.



→ Movement of water

Explain how you can tell from the diagram that person **A**'s drink contained alcohol.

[2]

10. Fig. 17.1 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.

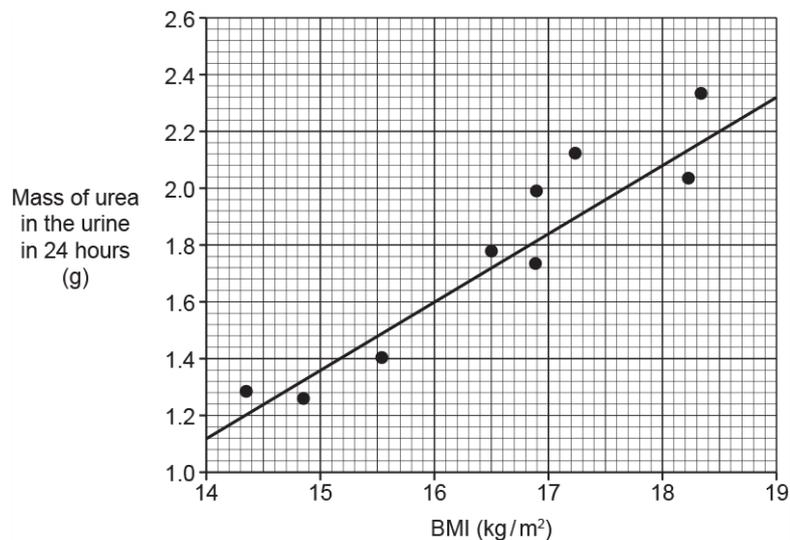


Fig. 17.1

- 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 cm³ of urine in 24 hours.

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

Concentration = g / cm³ [2]

- iii. **Fig. 17.2** shows the mass of urea in the urine against the BMI for nine **different** boys.

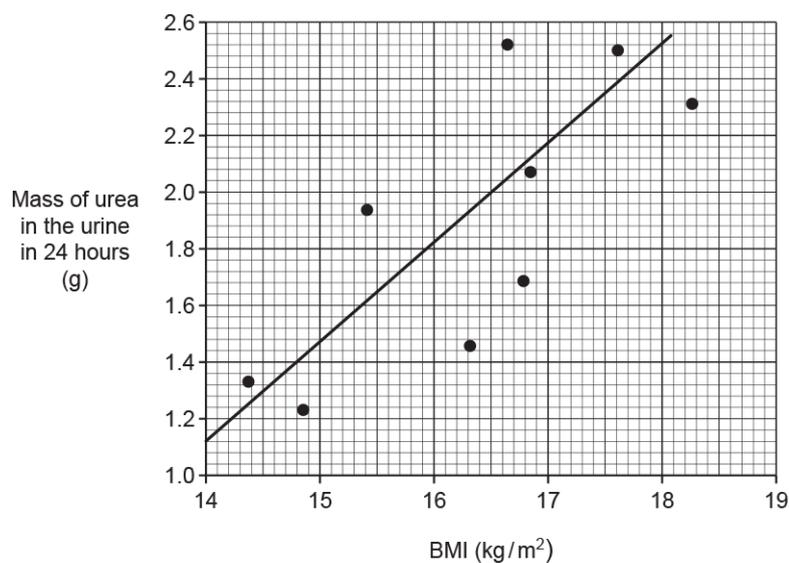


Fig. 17.2

Give **two** differences in the relationship between BMI and the mass of urea in the urine shown in **Fig. 17.1** and **Fig. 17.2**.

1

2

[2]

11 (a). Which hormone works with insulin to control blood sugar levels in the body?

Tick (✓) **one** box.

Gibberellin

Glucagon

Glucose

Glycogen

[1]

(b). A glucose tolerance test can help identify diabetes.

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

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

Key	
————	Glucose
- - - -	Insulin

'The Child with a Metabolic Condition', Chapter 31, www.nursekey.com, Nurse Key.
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Link to material: <https://nursekey.com/31-the-child-with-a-metabolic-condition/>

i. Which person has **type 2** diabetes?

Person _____

[1]

ii. Explain the reasons for your choice in part (i).

[2]

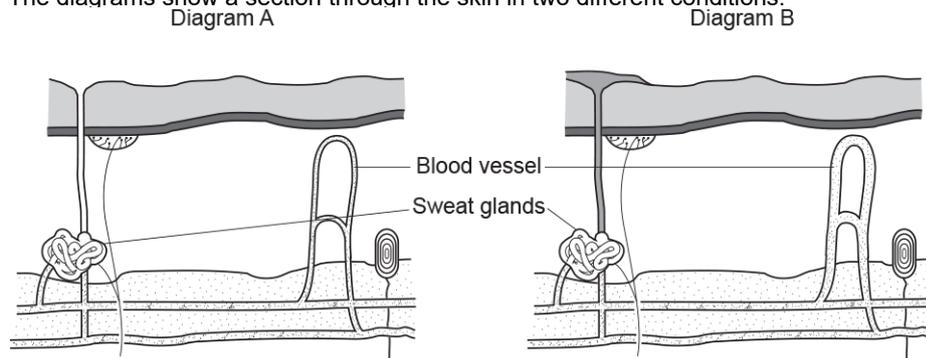
(c). Scientists are using human embryonic stem cells to grow cells to treat type 1 diabetes.

Explain why scientists use embryonic rather than adult stem cells.

[2]

13. This question is about control and coordination.

The diagrams show a section through the skin in two different conditions.

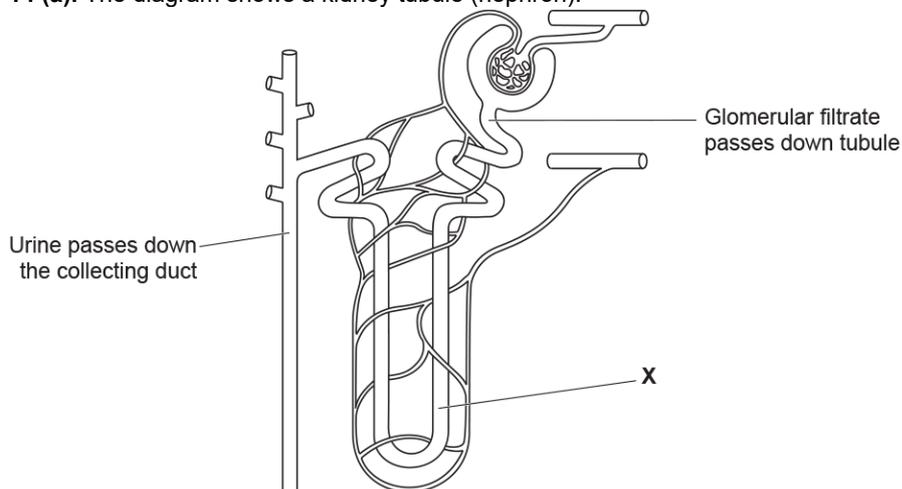


Which diagram shows the skin in a hot, humid environment?

Explain your answer.

[3]

14 (a). The diagram shows a kidney tubule (nephron).



i. What is the name of part X?

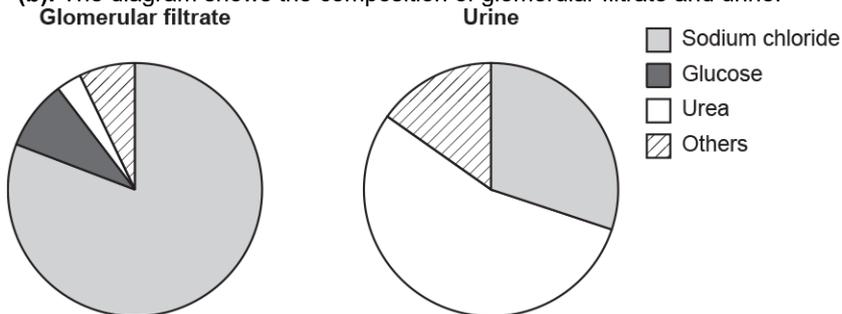
----- **[1]**

ii. The hormone ADH affects the permeability of part of the kidney tubule.

Name the part of the tubule affected by ADH.

----- **[1]**

(b). The diagram shows the composition of glomerular filtrate and urine.



What evidence is there to suggest that selective reabsorption occurs in the kidney tubule?

Use evidence from the diagram to support your answer.

[4]

(c). * Sports drinks are usually one of three types. Look at the table of information on these types of sports drink.

Sports drink	Concentration of solutes relative to body fluids	Mass of carbohydrates (g) (mainly sugars)	Order of how quickly the drink is absorbed
Hypotonic	Less	<4	1
Isotonic	Same	4 – 8	2
Hypertonic	More	>8	3

An athlete is going to run a 10 000 metre race. About an hour before the race the athlete drinks a hypertonic sports drink.

The athlete completes the 10 000 metre race. After the race the athlete drinks an isotonic sports drink.

Explain how the race causes changes in water, salt and sugar levels in the athlete's body and explain the athlete's choice and timing of drinks.
