1. Question part 1/2 | 5090 May-June 2024 P2 V2 Q4

4 Fig. 4.1 is a simplified diagram of a nephron.

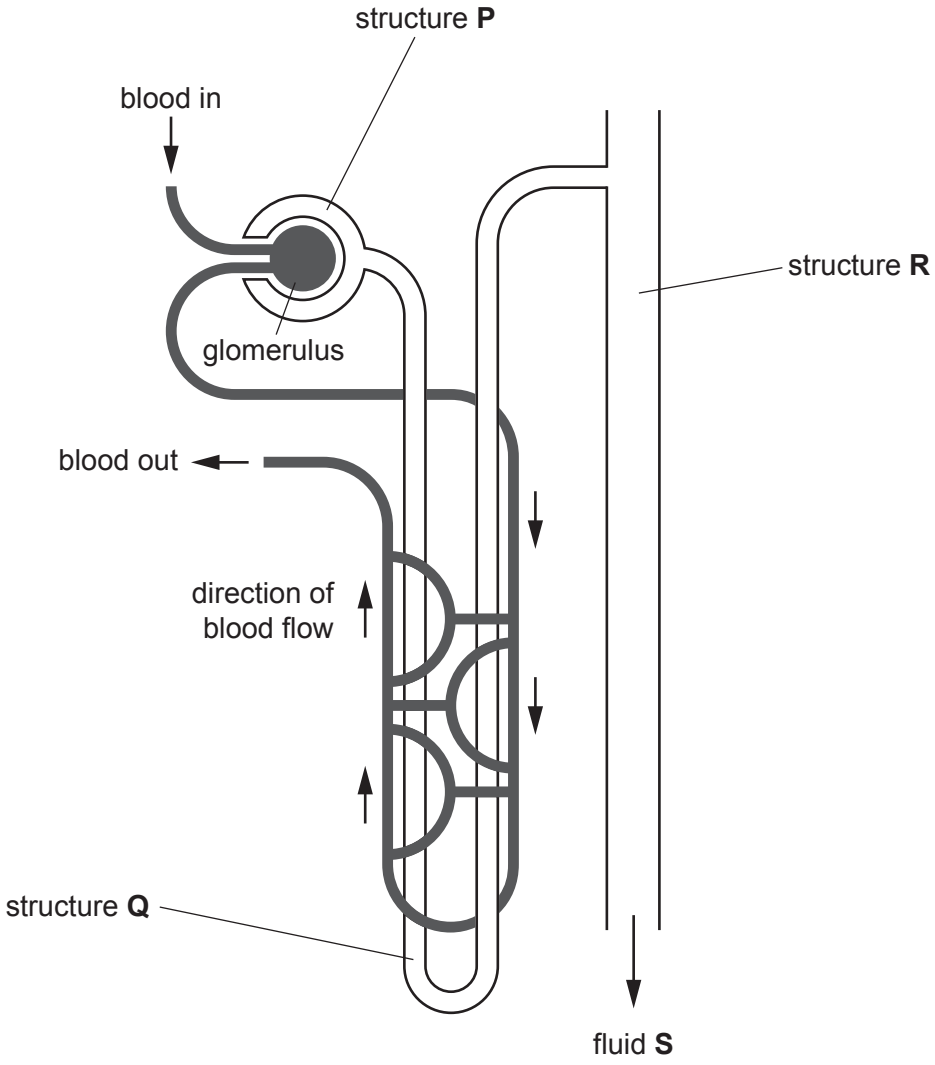

Fig. 4.1

(a) (i) Identify each of the structures labelled **P**, **Q** and **R** in Fig. 4.1.

P .....

Q .....

R .....

[3]

(ii) Name the organ which contains many nephrons.

..... [1]

(iii) Name the organ that stores fluid **S** before it is released from the body.

..... [1]

1. Question part 2/2 | 5090 May-June 2024 P2 V2 Q4

(b) Table 4.1 shows the composition of a sample of fluid **S** from a healthy person.

The person that provided the sample of fluid **S** eats a balanced diet.

Table 4.1

component	concentration / arbitrary units
glucose	0.00
protein	0.00
ions	1.50
urea	2.00

(i) State why it is important that urea is removed from the blood in fluid **S**.

..... [1]

(ii) Use your knowledge of the function of a nephron to explain the concentration of each of the following components of fluid **S**.

glucose

.....

.....

.....

.....

protein

.....

.....

.....

[5]

(iii) Explain what would happen to the concentration of ions in fluid **S** if the person drank a large volume of water several hours before the sample was collected.

.....

.....

.....

..... [3]

[Total: 14]

2. Question | 5090 Oct-Nov 2024 P2 V1 Q4

4 Living organisms excrete carbon dioxide.

(a) **(i)** Describe the meaning of the term excretion.

.....

.....

..... [2]

(ii) Name the process which produces carbon dioxide in living organisms and state how carbon dioxide is excreted by humans.

.....

.....

..... [2]

(b) The volume of carbon dioxide excreted varies over a 24-hour period and the factors that affect this are different for animals and plants.

Suggest and explain reasons why the volume of carbon dioxide excreted varies for both animals and plants.

animals .....

.....

.....

plants .....

.....

.....

[4]

(c) Explain the effect of an increasing concentration of carbon dioxide in the atmosphere.

.....

.....

.....

..... [2]

[Total: 10]

3 **(a)** Fig. 3.1 shows a summary of protein metabolism in the body.

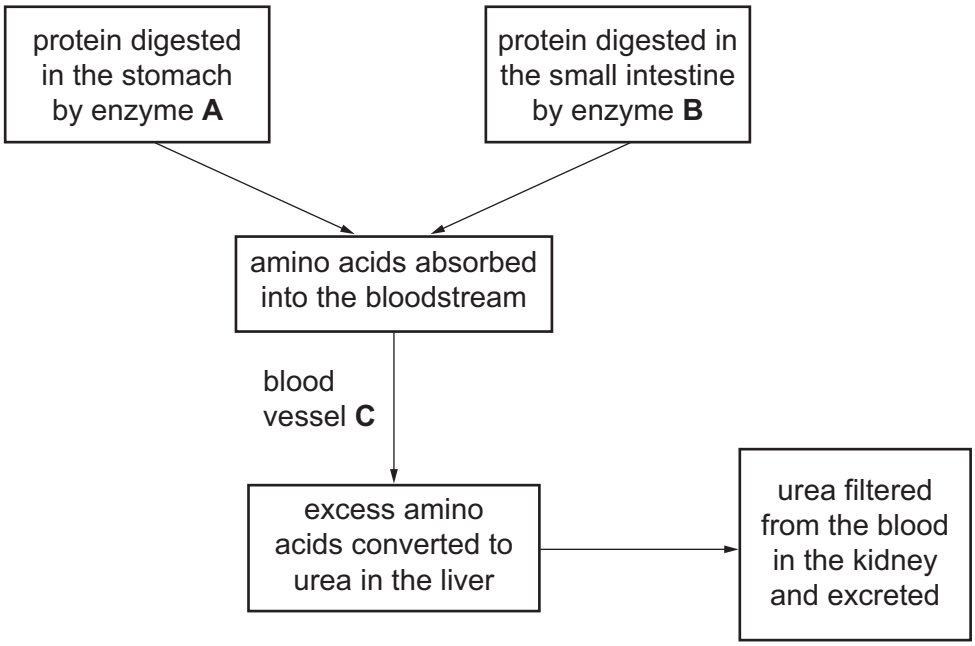

Fig. 3.1

Use Fig. 3.1 to answer these questions.

(i) State the name of enzyme **A** and enzyme **B**.

enzyme **A** .....

enzyme **B** .....

[2]

(ii) State the name of blood vessel **C**.

..... [1]

(iii) Name the capillary structures in the kidney that filter urea from the blood.

..... [1]

(b) Two groups of students, **X** and **Y**, investigate the effect of different diets on the concentration of urea in their urine.

For one day, the two groups eat different foods:

- group **X** eat bread, jam, orange juice, lettuce, fruit
- group **Y** eat nuts, milk, bread, cheese, meat.

Early the next morning, they collect and analyse their urine to measure the concentration of urea.

Table 3.1 shows their results.

Table 3.1

	concentration of urea / g per 100 cm^3 of urine	
	individual students	**mean**
group **X**	1.5, 1.7, 2.3, 1.6, 2.1, 1.4	1.8
group **Y**	1.8, 1.9, 2.3, 2.5, 1.9, 2.4	

(i) Calculate the mean concentration of urea for the students in group **Y**.

Give your answer to **two** significant figures.

Space for working.

mean concentration of urea = ... g per 100 cm^3 of urine [2]

(ii) Explain the difference in the mean concentration of urea for the two groups of students.

.....

.....

.....

.....

.....

..... [3]

(iii) One of the students said: 'To make a fair comparison, we should have made sure that the students in each group drank the same volume of water'.

Explain why this student is correct.

.....

.....

.....

.....

..... [2]

[Total: 11]

7 **(a)** Different structures in the excretory system transport different substances.

Draw a line from each **structure** to the substance that it **transports**.

structure	transports
renal artery	urine to the bladder
renal vein	urine from the bladder
ureter	deoxygenated blood
urethra	oxygenated blood

[3]

(b) Figure 7.1 shows one kidney nephron that has been stretched out. It also shows changes in the composition of fluid inside this nephron.

Lines **X** and **Y** show how two different environmental conditions affect the composition of the fluid inside this nephron.

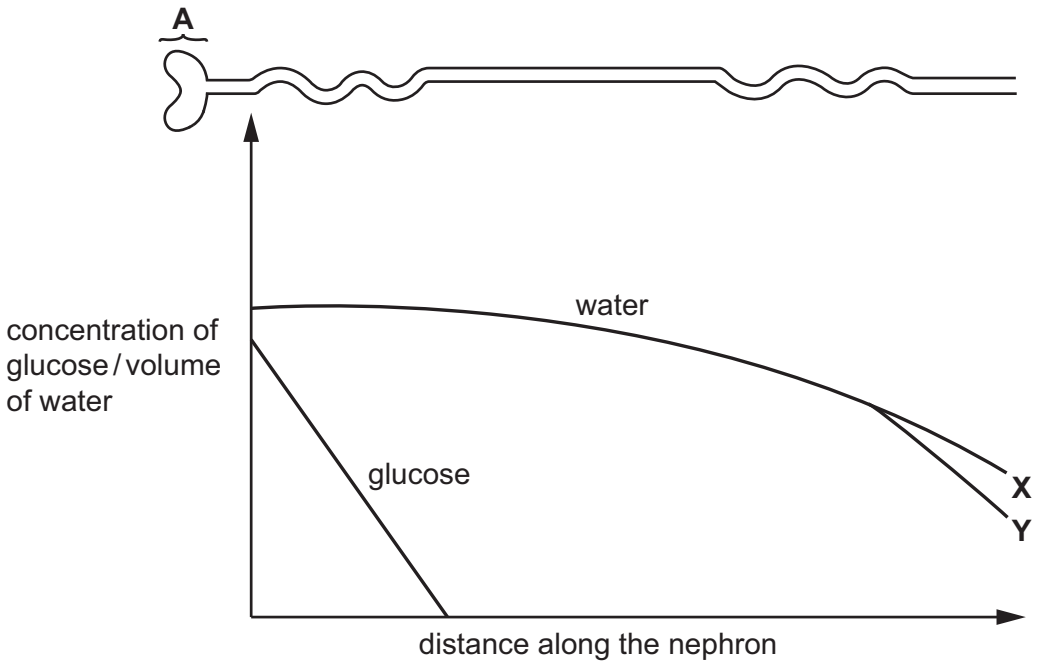

Figure 7.1

4. Question part 2/2 | 5090 May-June 2026 P2 V1 Q7

(i) Name the part of the nephron labelled **A**.

..... [1]

(ii) Explain the change in the concentration of glucose as it passes down the nephron.

.....

.....

.....

..... [2]

(iii) Line **X** shows the volume of water in the fluid when the person is in an area where the temperature is low.

Line **Y** shows the volume of water in the fluid when the person is in an area where the temperature is high.

Suggest why there is a difference between line **X** and line **Y**.

.....

.....

.....

..... [2]

[Total: 8]