

# Excretion

## Question Paper 2

Level	A Level
Subject	Biology
Exam Board	OCR
Module	Communication, homeostasis and energy
Topic	Excretion
Booklet	Question Paper 2

**Time allowed:** 54 minutes

**Score:** /40

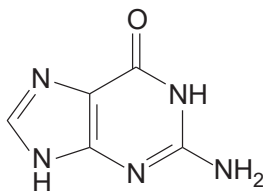
**Percentage:** /100

### Grade Boundaries:

A*	A	B	C	D	E
>69%	56%	50%	42%	34%	26%

## Question 1

The image below shows the structure of the nucleotide base guanine.



Bird droppings are known as *guano* because they contain a high proportion of guanine. Unlike mammals, birds excrete nitrogenous waste as guanine instead of urea. Guanine is synthesised from ammonia in the liver.

The following statements relate to guanine:

- 1 ammonia is more toxic than guanine
- 2 urea is more soluble in water than guanine
- 3 guanine has a high proportion of nitrogen

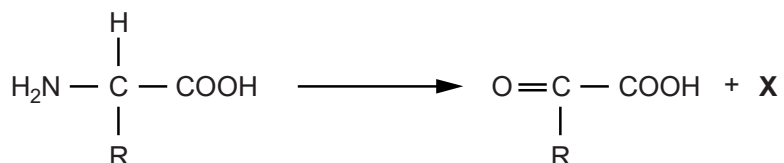
Which of the statements correctly explains why birds excrete guanine?

- A. 1, 2 and 3
- B. Only 1 and 2
- C. Only 2 and 3
- D. Only 1

**[Total: 1 ]**

Most excess amino acids are metabolised in the liver, resulting in products that are relatively harmless to the body.

(a) Fig. 6.1 outlines the first step in the metabolism of amino acids in the liver.



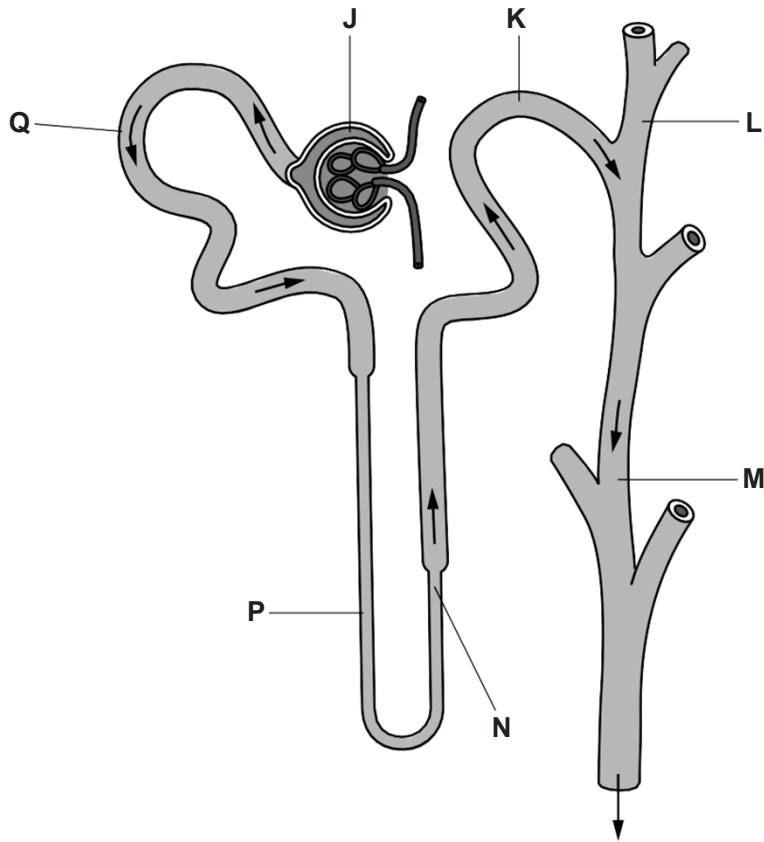
**Fig. 6.1**

- (i) State the name given to this reaction. [1]
- (ii) Identify the toxic product of the reaction. [1]
- (b) Complete the following passage by inserting the **most suitable** word or term.
- Fig. 6.1 shows the first step in the metabolism of amino acids in the liver. The next step involves a series of reactions known as the ..... cycle. The toxic product **X** enters the cycle together with ....., resulting in the formation of the final nitrogenous product ..... The nitrogenous product is transported to the ..... and then via the ureter to the ..... where it is stored as ..... before leaving the body. [6]
- (c) In addition to the reaction shown in Fig. 6.1, liver cells also use amino acids for protein synthesis. Suggest **one** other use of amino acids in liver cell metabolism. [1]

**[Total : 9]**

### Question 3

Fig. 6.1 is a diagram that represents the nephron in a mammalian kidney.



**Fig. 6.1**

(a) Use the letter or letters from Fig. 6.1 to identify:

- (i) the region or regions where glucose is selectively reabsorbed into the blood capillaries [1]
- (ii) the region or regions present in the cortex [1]
- (iii) the region or regions where podocytes are located. [1]

- (b) The desert kangaroo rat, *Dipodomys deserti*, lives in dry and hot conditions. It excretes a very small volume of urine relative to its size.

The loops of Henle in the kidneys of these mammals are longer than those found in mammals of a similar size that do not live in desert conditions.

Explain how the longer loop of Henle is able to assist the desert kangaroo rat in preventing excessive water loss. **[2]**

- (c) Urine can be tested to detect a person's misuse of certain drugs in body-building.

State the **type** of drug that can be misused in this way. **[1]**

**[Total: 6]**

The kidney is composed of many nephrons.  
 Fig. 2.1 is a diagrammatic representation of a nephron. The numbers represent the relative concentrations of solutes in the tubule and the tissue fluid surrounding the tubule.

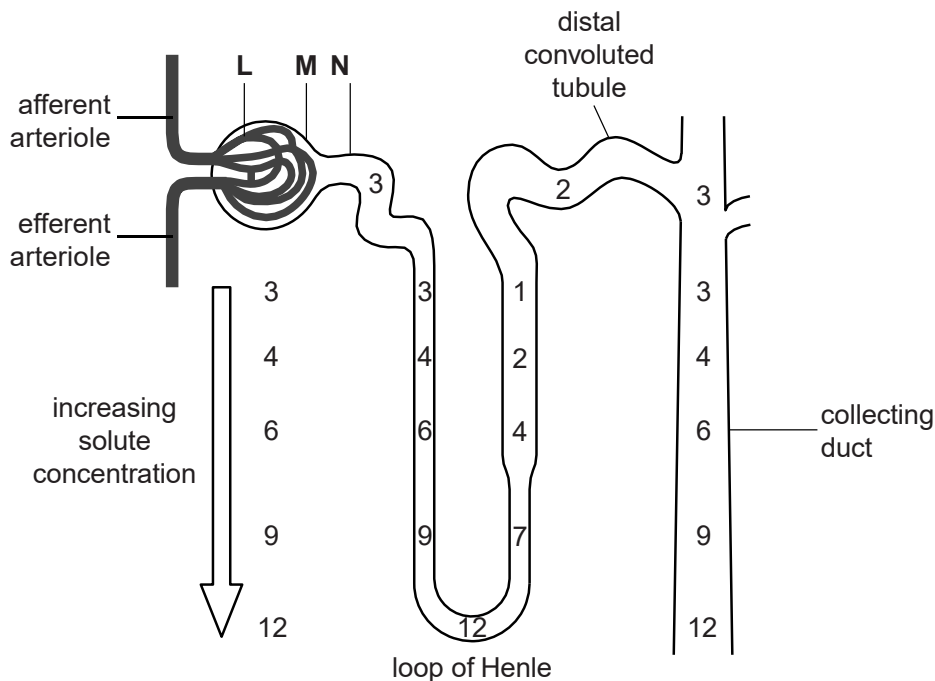


Fig. 2.1

- (a) Name the parts of the nephron labelled L, M and N. [3]
- (b) Which part(s) of the nephron corresponds to each of the statements in the table below?

statement	part(s) of the nephron
walls are impermeable to water	
glucose is reabsorbed into the blood	
ADH acts on the walls	
contains podocytes	
most of the water is reabsorbed into the blood	

[5]

- (c) With reference to Fig. 2.1, explain the role of the loop of Henle in the production of urine.



In your answer, you should use appropriate technical terms, spelt correctly.

[5]

[Total: 13]

## Question 5

The kidney is a vital organ in the body and is responsible for excretion. It also plays an important role in homeostasis.

(a) Complete the passage, using the **most suitable** term in each case. **[5]**

The blood in the glomerulus has a high ..... pressure, which forces small molecules, such as glucose and ....., out of the glomerulus and into the lumen of the Bowman's capsule. This process is known as .....

In the proximal convoluted tubule, the glucose, most of the ..... and some of the salts are reabsorbed into blood ..... that surround the nephron at this point.

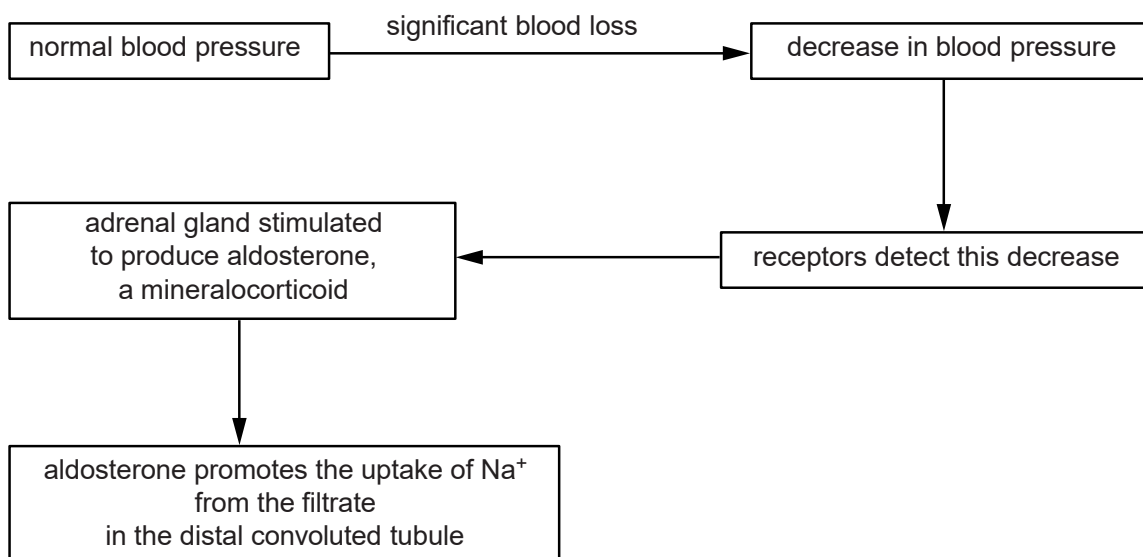
(b) One aspect of the kidney's homeostatic role is the ability of anti-diuretic hormone (ADH) to increase the number of aquaporins in the plasma membranes of the cells lining the collecting duct. This increases the amount of water reabsorbed.

ADH is released in response to a decrease in the water potential of the blood plasma.

(i) State precisely where the cells that detect a decrease in the water potential of the blood plasma are found. **[1]**

(ii) Name the cells that detect this decrease. **[1]**

(c) Fig. 6.1 outlines some of the events that take place if the blood volume decreases, for example, due to a significant loss of blood.



**Fig. 6.1**

(i) Name the part of the adrenal gland that releases aldosterone. [1]

(ii) Suggest **and** explain what effect the action of aldosterone will have on the secretion of ADH. [2]

(iii) As the action of aldosterone takes effect, this is detected by receptors in the body and secretion of aldosterone decreases.

State the name of the mechanism that results in this decrease in aldosterone secretion.

[1]

[Total: 11]