

14.1 Homeostasis in Mammals

Question Paper

Course	CIEA Level Biology
Section	14. Homeostasis
Topic	14.1 Homeostasis in Mammals
Difficulty	Easy

Time allowed: 40
Score: /28
Percentage: /100

Question 1a

Blood undergoes ultrafiltration in the kidney.

Define ultrafiltration.

[2 marks]

Question 1b

Outline the composition and role of the basement membrane in ultrafiltration.

[2 marks]

Question 1c

Explain the ways in which the following adaptations of the proximal convoluted tubule (PCT) help the PCT to carry out its function.

1.	Microvilli on the inner surface	
2.	Many mitochondria in epithelial cells	
3.	Tightly-packed cells in the epithelium	

[3 marks]

Question 1d

Distinguish between the afferent and efferent arterioles in the kidney.

[2 marks]

Question 2a

The names of six blood vessel types that carry blood in and around the kidney are shown below as A – F.

A. Efferent arteriole

B. Renal vein

D. Renal artery

C. Afferent arteriole

E. Capillaries alongside nephron

F. Glomerulus

Place these blood vessels into the correct order through which blood passes during normal circulation.

[3 marks]

Question 2b

Maintaining water levels in cells and tissues is an example of a negative feedback system.

Define the term 'negative feedback'.

[2 marks]

Question 2c

State the name of the hormone that controls the level of water that is excreted via the kidney.

[1 mark]

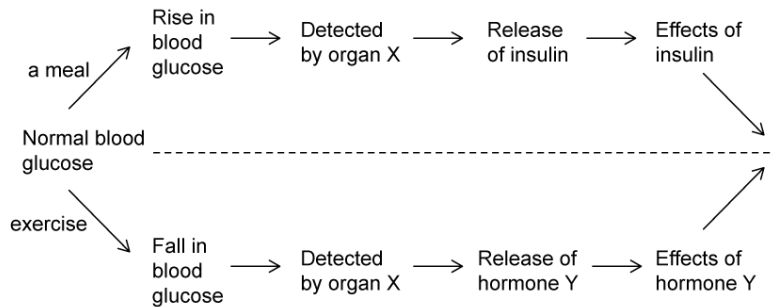
Question 2d

Explain how the hormone named in part (c) affects the collecting ducts of the kidney as part of osmoregulation.

[3 marks]

Question 3a

The diagram below shows some of the events that take place during the regulation of blood glucose.



(i)
Identify organ X.

[1]

(ii)
Identify hormone Y.

[1]

[2 marks]

Question 3b

One of the effects of hormone Y is the formation of the second messenger, cyclic AMP.

(i)

State the definition of the term 'second messenger'.

[1]

(ii)

Describe the sequence of events that leads up to the formation of cyclic AMP, following the release of hormone Y.

[3]

[4 marks]

Question 3c

When cyclic AMP is released it triggers an enzyme cascade which amplifies the signal throughout the cell.

Explain the benefit to the cell of having the signal amplified in this way.

[2 marks]

Question 3d

Urine test strips can be used to test for the presence of glucose in the urine of diabetics.

Explain the chemical reactions that occur on the strip in the presence of glucose.

[2 marks]