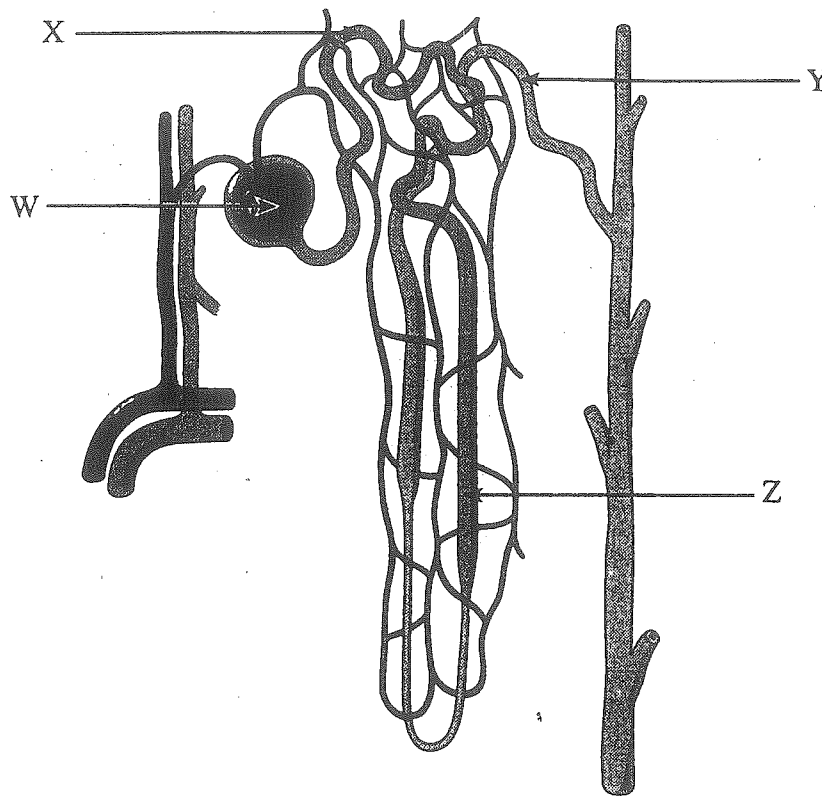


# O. URINARY SYSTEM

Use the following diagram to answer questions 1 and 2



1. The process that occurs at W is

- A. tubular excretion.
- B. pressure filtration.
- C. reabsorption of water.
- D. selective reabsorption.

2. The permeability of which structure is altered by secretions from the adrenal cortex?

- A. W
- B. X
- C. Y
- D. Z

3. The concentration of urea is lower in the renal vein than in the renal artery because

- A. the kidneys add urea to the blood.
- B. little reabsorption of urea occurs in the nephron.
- C. Bowman's capsule removes water from the filtrate.
- D. the peritubular capillary network passes urea to the loop of Henle.

4. When proteins are broken down, urea is produced and enters the blood plasma. Which of the following processes would account for the presence of urea in the nephron?
- A. pressure filtration at the glomerulus
  - B. tubular excretion in the distal tubule
  - C. active transport in the collecting duct
  - D. facilitated transport in the proximal tubule
5. Which of the following structures would have cells with the greatest concentration of mitochondria in their cytoplasm?
- A. glomerulus
  - B. collecting duct
  - C. Bowman's capsule
  - D. proximal convoluted tubule
6. Low levels of sodium ions ( $\text{Na}^+$ ) in the body result in the secretion of
- A. adrenalin.
  - B. aldosterone.
  - C. insulin.
  - D. thyroxin.

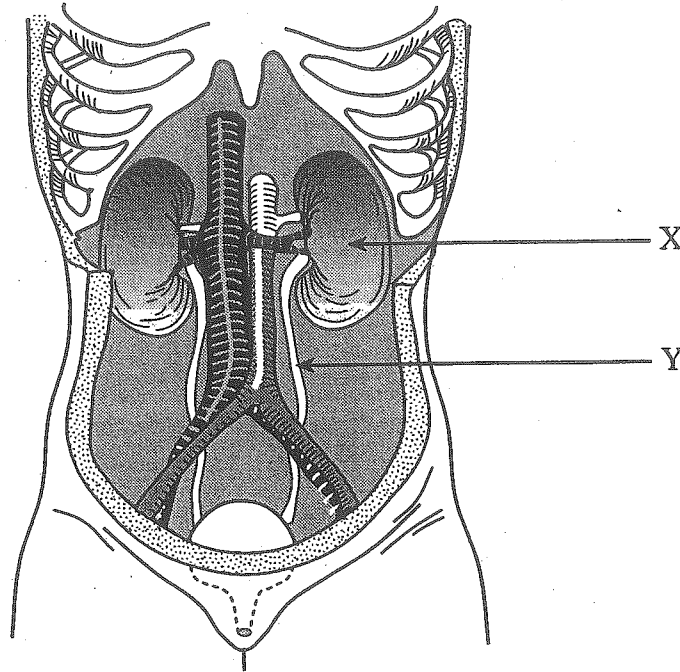
Use the following components of blood plasma to answer question 7.

- |  |
|--|
| <ul style="list-style-type: none"><li>• urea</li><li>• water</li><li>• glucose</li><li>• proteins</li><li>• antibodies</li><li>• hydrogen ions</li></ul> |
|--|

7. How many of these components of blood plasma are excreted or reabsorbed by the kidneys?
- A. two
  - B. three
  - C. four
  - D. five

8. The glomerulus is located between the
- A. efferent arteriole and renal vein.
  - B. renal artery and afferent arteriole.
  - C. afferent arteriole and efferent arteriole.
  - D. efferent arteriole and peritubular capillaries.

Use the following diagram to answer questions 9 and 10



9. The function of structure X is to

- A. produce bile.
- B. produce urine.
- C. produce ADH.
- D. carry urine to the bladder.

10. Structure Y is the

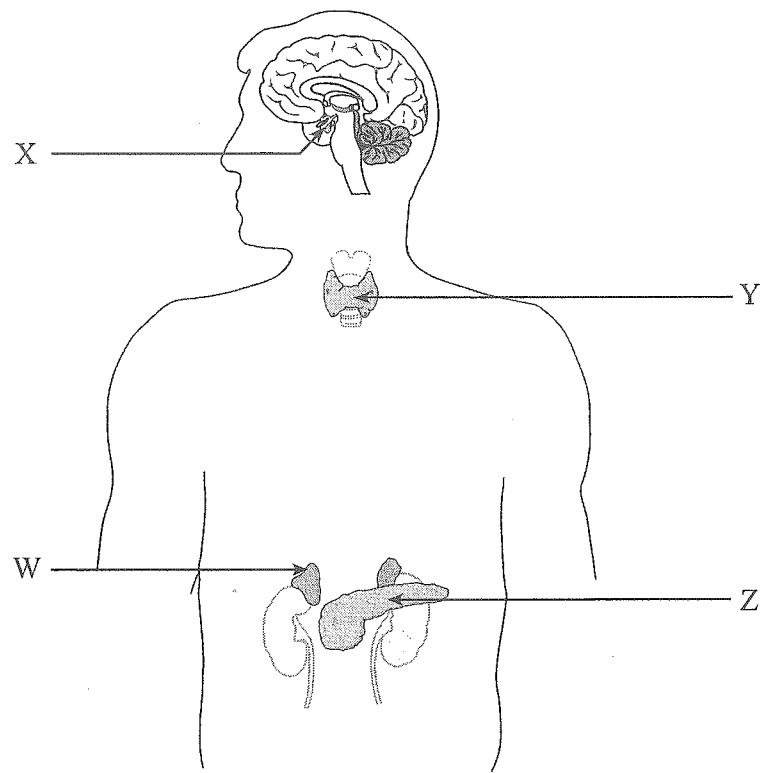
- A. ureter.
- B. urethra.
- C. bladder.
- D. afferent arteriole.

---

11. Uric acid is a waste produced during the breakdown of nucleic acids. Higher than normal levels of uric acid that build up in the joints indicate a malfunction of the

- A. lungs.
- B. colon.
- C. kidneys.
- D. pancreas.

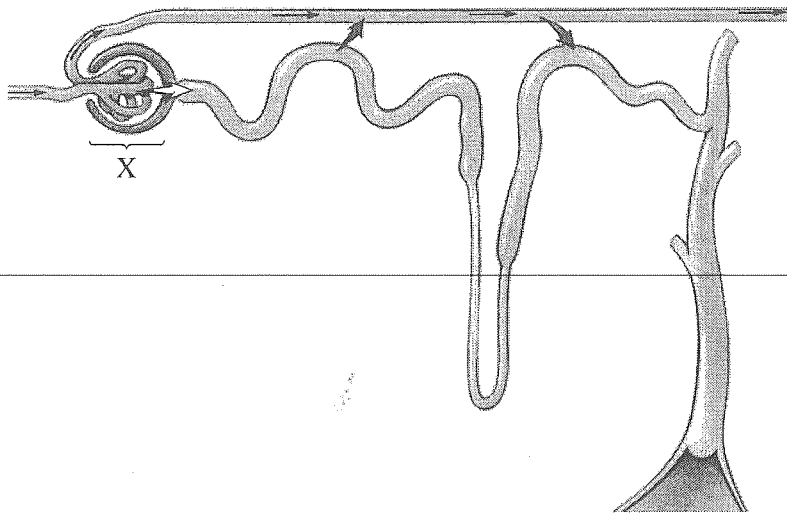
Use the following diagram to answer question 12.



12. Which of the following glands produces aldosterone?

- A. W
- B. X
- C. Y
- D. Z

Use the following diagram to answer question 13.



13. During the process occurring at X, some nutrients are separated from

- A. salts.
- B. water.
- C. wastes.
- D. proteins.

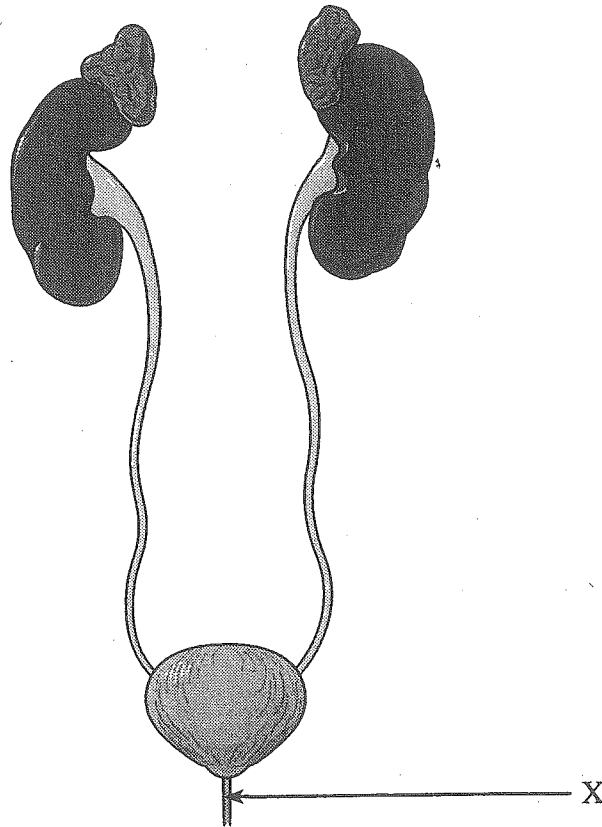
14. Which of the following is a true statement about the collecting duct?

- A. Water diffuses into it.
- B. It responds to aldosterone.
- C. It is the site of tubular excretion.
- D. The fluid in it becomes hypertonic to blood.

15. In the nephron, the highest concentration of salt is found surrounding the

- A. loop of Henle.
- B. Bowman's capsule.
- C. distal convoluted tubule.
- D. proximal convoluted tubule.

Use the following diagram to answer question 16.



16. The structure labelled X is the

- A. ureter.
- B. urethra.
- C. collecting duct.
- D. urinary bladder.

17. Identify the correct order of structures through which urine passes on its way out of the body.

- A. renal pelvis → collecting duct → ureter → bladder → urethra
- B. collecting duct → renal pelvis → ureter → bladder → urethra
- C. bladder → collecting duct → urethra → renal pelvis → ureter
- D. urethra → ureter → bladder → renal pelvis → collecting duct

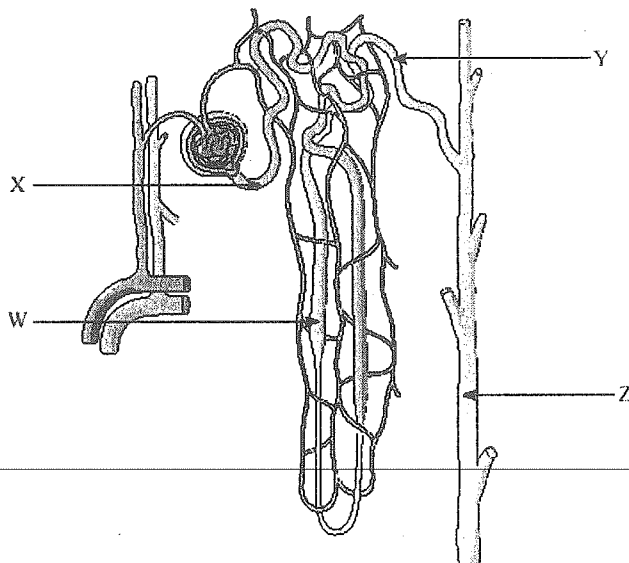
18. Which of the following will cause the kidneys to reabsorb more sodium ions?

- A. a decrease in blood pressure
- B. an increase in the volume of blood
- C. constriction of the afferent arterioles
- D. a decrease in the amount of ADH secreted

19. If a drop in the pH of the blood occurs, the kidneys will

- A. increase the absorption of urea.
- B. decrease the absorption of sodium ions.
- C. decrease the secretion of hydrogen ions.
- D. increase the reabsorption of bicarbonate ions.

Use the following diagram to answer question 20.



20. At which location would the greatest concentration of glucose be found?

- A. W
- B. X
- C. Y
- D. Z

21. The inability to regulate the concentration of sodium ions in the blood could be due to improper functioning of the

- A. adrenal cortex, since it produces ADH.
- B. adrenal cortex, since it produces aldosterone.
- C. adrenal medulla, since it produces ADH.
- D. adrenal medulla, since it produces aldosterone.

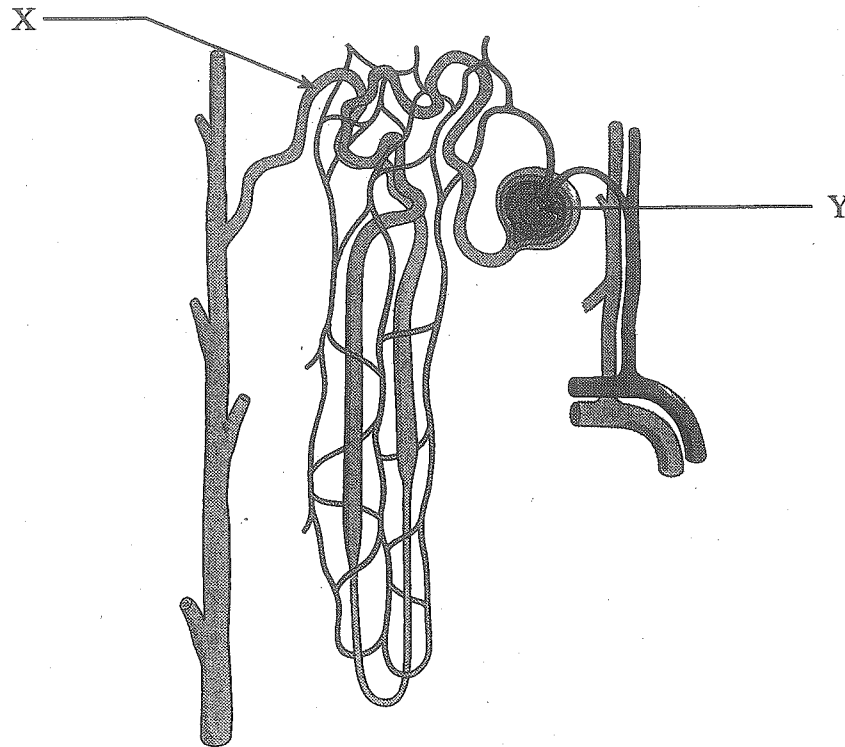
22. When blood volume increases beyond normal levels, the release of hormone H is inhibited. As a result, the reabsorption of water decreases. Hormone H is
- A. insulin.
  - B. thyroxin.
  - C. aldosterone.
  - D. antidiuretic hormone (ADH).

Use the following information to answer question 23.

Relative Concentrations in a Human Nephron			
water	glucose	hydrogen ions	urea
low	low	high	high

23. Where in the kidney could the conditions indicated in the table above be found?
- A. distal tubule
  - B. proximal tubule
  - C. afferent arteriole
  - D. Bowman's capsule
- 
24. An increase of ADH in the blood affects the water content of the blood plasma by
- A. changing the permeability of Bowman's capsule.
  - B. increasing the permeability of the collecting duct.
  - C. stimulating the loop of Henle to reabsorb more salt.
  - D. making the filtrate in the proximal tubule more concentrated.
25. The movement of urine from the kidney to the urinary bladder is a function of the
- A. ureter.
  - B. urethra.
  - C. renal pelvis.
  - D. collecting duct.
- 
26. The greatest salt concentration in the kidney is found in the
- A. glomerulus.
  - B. renal pelvis.
  - C. renal cortex.
  - D. renal medulla.

Use the following diagram to answer questions 27 and 28



27. Which process occurs at X?

- A. tubular excretion
- B. pressure filtration
- C. selective reabsorption
- D. antidiuretic hormone (ADH) secretion

28. The structure labelled Y is the

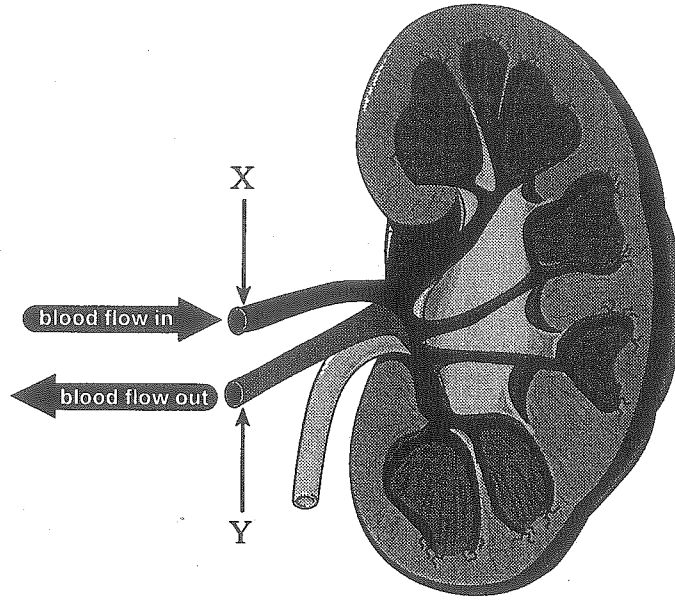
- A. glomerulus.
- B. loop of Henle.
- C. Bowman's capsule.
- D. proximal convoluted tubule.

29. If the blood becomes acidic, the kidneys will maintain homeostasis by actively excreting

- A. penicillin.
- B. histamine.
- C. calcium ions.
- D. hydrogen ions.



Use the following diagram to answer question 30.



30. Which of the following statements comparing blood in X to blood in Y is true?

- A. The concentration of urea is higher in X.
- B. The concentration of oxygen is lower in X.
- C. The concentration of glucose is higher in Y.
- D. The concentration of carbon dioxide is lower in Y.

31. Consuming alcohol inhibits the release of a hormone, resulting in the production of dilute urine. This occurs because the alcohol is affecting the

- A. thyroid gland.
- B. adrenal cortex.
- C. adrenal medulla.
- D. posterior pituitary.

32. After penicillin is administered for an infection in the urinary bladder, what pathway would penicillin take out of the body?

renal artery → afferent arteriole →

- A. distal convoluted tubule → loop of Henle → ureter
- B. glomerulus → efferent arteriole → ureter → renal vein
- C. efferent arteriole → distal convoluted tubule → collecting duct → urethra
- D. glomerulus → proximal convoluted tubule → loop of Henle → distal convoluted tubule → collecting duct → urethra

Use the following table to answer question 33.

BLOOD FLOW TO	NORMAL (mL/min.)	STRENUOUS EXERCISE (mL/min.)
brain	750	750
kidney	1 100	600
skeletal muscle	850	12 500

33. Secretions from which of the following glands would cause the effects shown in the table?

- A. thyroid
- B. adrenal
- C. anterior pituitary
- D. posterior pituitary

34. Movement of fluids from the glomerulus to Bowman's capsule is due to

- A. osmosis.
- B. secretion.
- C. active transport.
- D. pressure filtration.

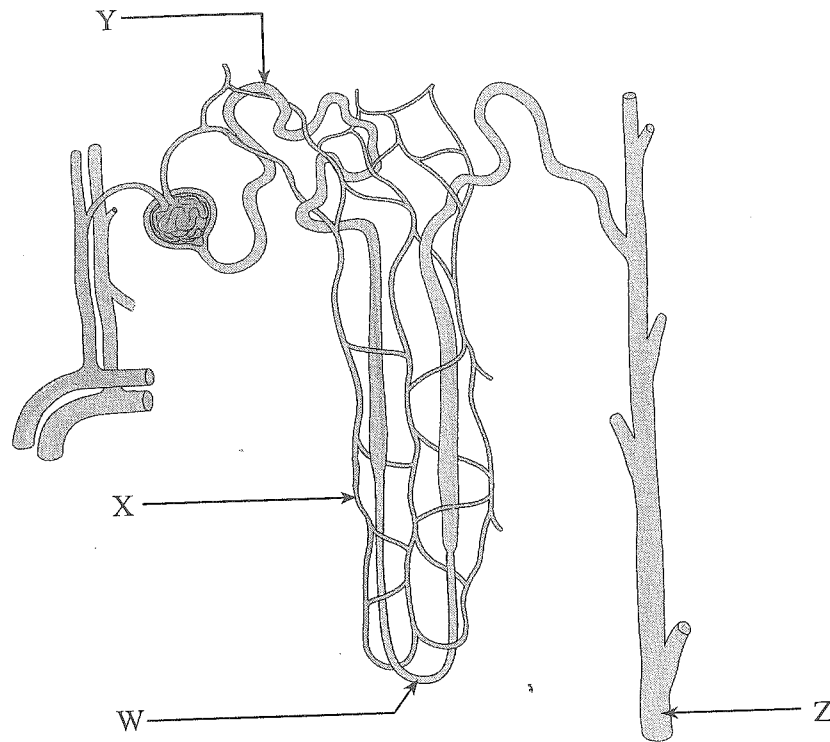
35. The site of tubular excretion is the

- A. loop of Henle.
- B. Bowman's capsule.
- C. distal convoluted tubule.
- D. proximal convoluted tubule.

36. The concentration of sodium in the blood would increase with increased plasma levels of a hormone from the

- A. thyroid gland.
- B. adrenal gland.
- C. prostate gland.
- D. anterior pituitary gland.

Use the following diagram to answer question 37.



37. Which of the following structures has receptor sites for ADH and aids in the reabsorption of water?

- A. W
- B. X
- C. Y
- D. Z

38. The loop of Henle is found in the

- A. ureter.
- B. urethra.
- C. renal pelvis.
- D. renal medulla.

39. The tube that carries urine out of the bladder is the

- A. ureter.
- B. urethra.
- C. distal tubule.
- D. collecting duct.

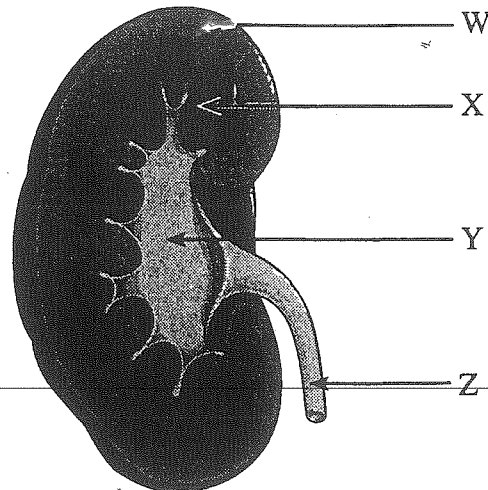
40. As filtrate moves through the nephron it becomes increasingly hypertonic because of the

- A. diffusion of glucose.
- B. pressure filtration of the blood.
- C. active transport of sodium ions.
- D. reabsorption of bicarbonate ions.

41. Which of the following is **not** a characteristic of the glomerulus?

- A. It is composed of capillaries.
- B. It surrounds the Bowman's capsule.
- C. Its blood pressure promotes filtration.
- D. It is connected to arterioles at both ends.

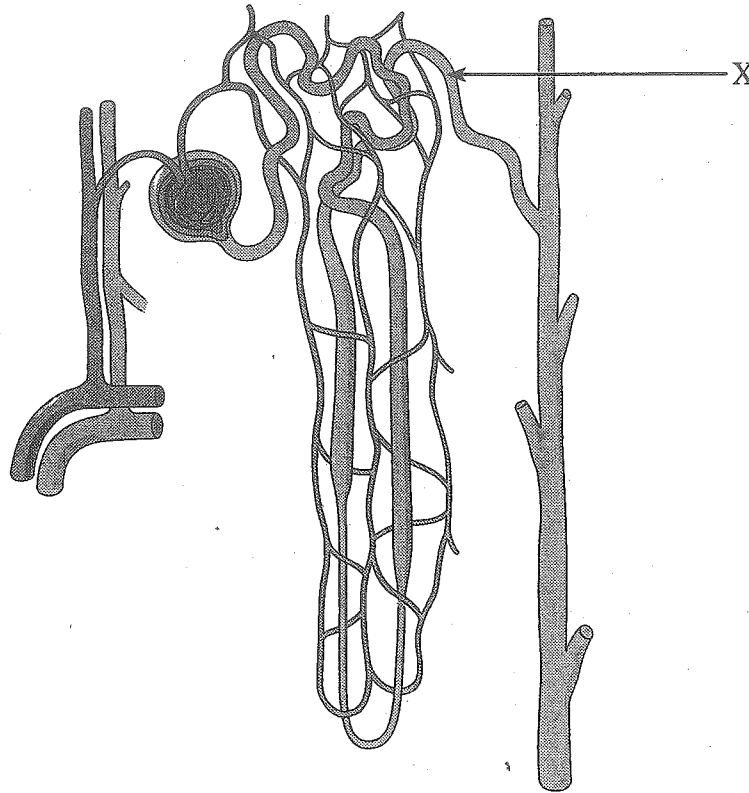
Use the following diagram to answer question 42



42. Which of the labelled structures is the renal cortex?

- A. W
- B. X
- C. Y
- D. Z

Use the following diagram to answer question 43.



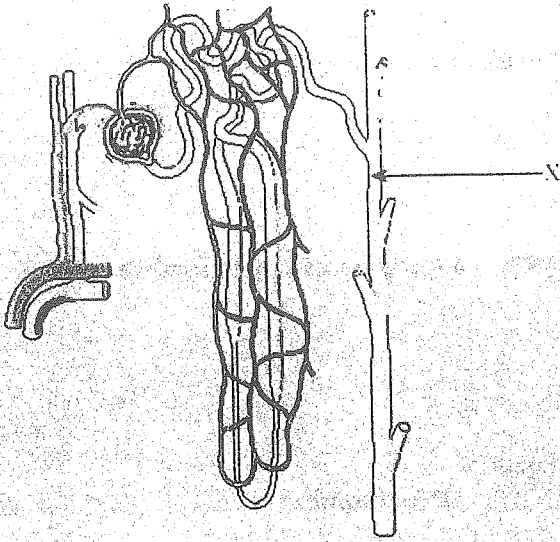
43. The structure labelled X is the
- A. loop of Henle.
  - B. distal convoluted tubule.
  - C. proximal convoluted tubule.
  - D. peritubular capillary network.

Use the following information to answer question 44.

- |   |
|---|
| <ol style="list-style-type: none"><li>1. proximal tubule</li><li>2. renal artery</li><li>3. collecting duct</li></ol> |
|---|

44. Which of the following is the correct sequence of structures from highest to lowest concentration of urea?
- A. 2, 1, 3
  - B. 2, 3, 1
  - C. 3, 1, 2
  - D. 3, 2, 1

Use the following diagram to answer question 45.



45. The structure labelled X is the
- A. renal vein.
  - B. glomerulus.
  - C. collecting duct.
  - D. peritubular capillary network.

46. The collecting ducts are located in which of the following structures?

- A. ureter
- B. urethra
- C. renal pelvis
- D. renal medulla

47. Active transport of glucose into the blood occurs in the

- A. glomerulus.
- B. collecting duct.
- C. Bowman's capsule.
- D. proximal convoluted tubule.

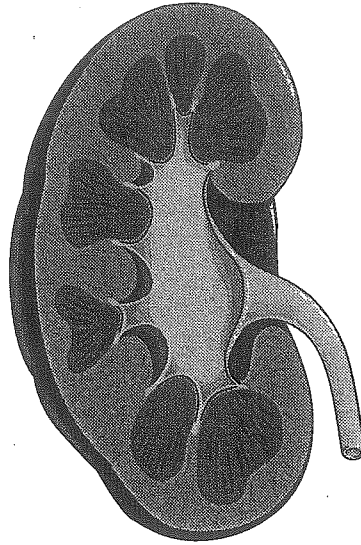
48. Damage to the glomerulus could lead to the presence of

- A. excess glucose in the urine.
- B. red blood cells in the filtrate.
- C. an increase of urea in the renal cortex.
- D. a decrease of nitrogenous waste in the filtrate.

49. Which of the following structures responds to low sodium levels in the blood?

- A. liver
- B. thyroid
- C. adrenal
- D. pancreas

Use the following diagram to answer question 50.



50. Which of the following is **not** a function of the organ shown?

- A. to produce urea
  - B. to excrete metabolic wastes
  - C. to regulate the acidity of the blood
  - D. to maintain a constant blood volume
- 

51. Filtrate enters the Bowman's capsule by

- A. active transport.
- B. tubular excretion.
- C. pressure filtration.
- D. selective reabsorption.

52. Where is most of the glucose in the nephron reabsorbed?

- A. Loop of Henle.
- B. Collecting duct.
- C. Distal convoluted tubule.
- D. Proximal convoluted tubule.

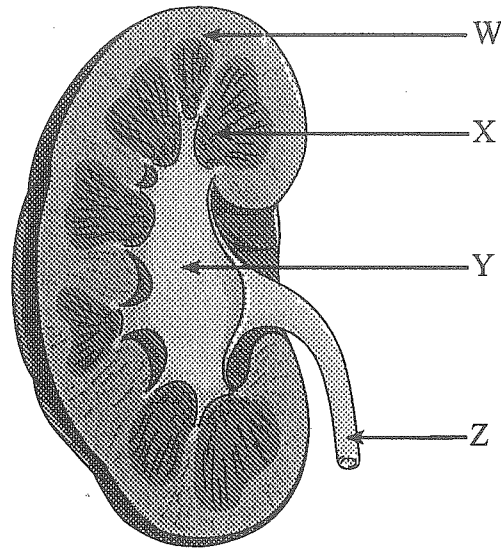
53. Which of the following would increase as ADH levels rise?

- A. Blood volume.
- B. Glucose levels in the plasma.
- C. Amount of urine in the bladder.
- D. Urea concentration in the plasma.

54. Which of the following is the source of aldosterone?

- A. Pancreas.
- B. Thyroid gland.
- C. Adrenal gland.
- D. Anterior pituitary.

Use the following diagram to answer questions 55 and 56.



55. Which structure is the renal cortex?

- A. W
- B. X
- C. Y
- D. Z

56. The function of the structure labelled Y is to

- A. collect urine.
- B. protect the kidney.
- C. adjust the pH of the blood.
- D. supply blood to the kidney.

57. High salt concentration in the blood is detected by the

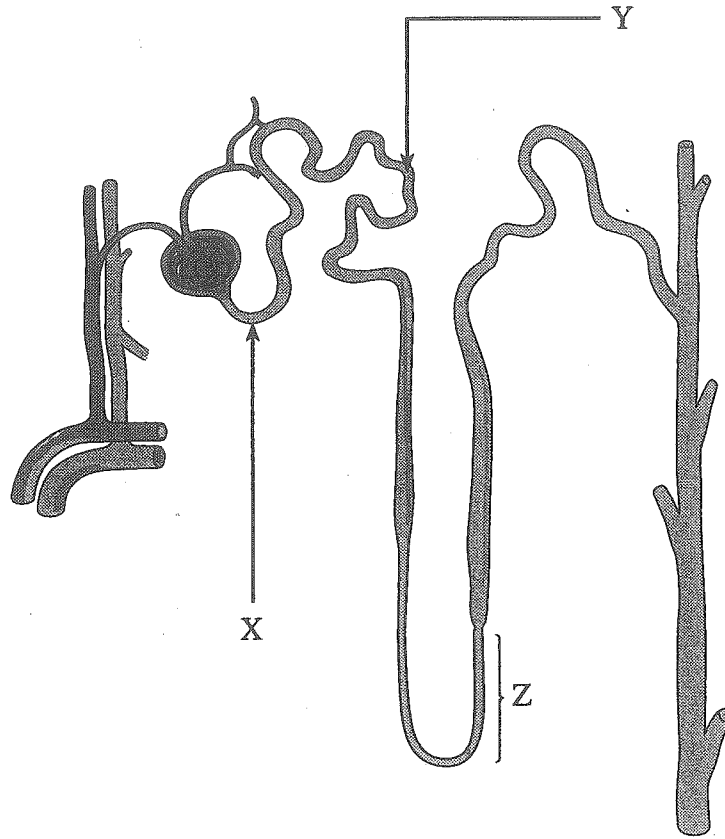
- A. glomerulus.
- B. hypothalamus.
- C. medulla oblongata.
- D. distal convoluted tubule.

58. Which of the following would cause increased water reabsorption by the kidneys?

- A. increased blood volume
- B. increased cardiac output
- C. decreased blood pressure
- D. decreased ADH secretion



Use the following diagram to answer questions 59 and 60.



59. When compared to location X, the filtrate at location Y would be highest in its concentration of

- A. urea.
- B. water.
- C. glucose.
- D. blood proteins.

60. Which of the following describes the tissues surrounding Z?

- A. low water content, low salt concentration
- B. low water content, high salt concentration
- C. high water content, low salt concentration
- D. high water content, high salt concentration

61. Antidiuretic hormone (ADH) is released by the

- A. kidneys.
- B. pancreas.
- C. anterior pituitary.
- D. posterior pituitary.

62. In a healthy person, the following substances enter the kidneys via the renal arteries in the amounts shown:

UREA (grams/day)	GLUCOSE (grams/day)	WATER (litres/day)
54	180	180

Which of the following describes the amounts of each substance leaving the kidneys in the renal veins?

	UREA (grams/day)	GLUCOSE (grams/day)	WATER (litres/day)
A.	10	100	170
B.	24	180	178
C.	54	178	177
D.	70	180	180

63. Give two functions of each of the following urinary system structures. (6 marks)

Kidney:

i) \_\_\_\_\_  
\_\_\_\_\_

ii) \_\_\_\_\_  
\_\_\_\_\_

Collecting duct:

i) \_\_\_\_\_  
\_\_\_\_\_

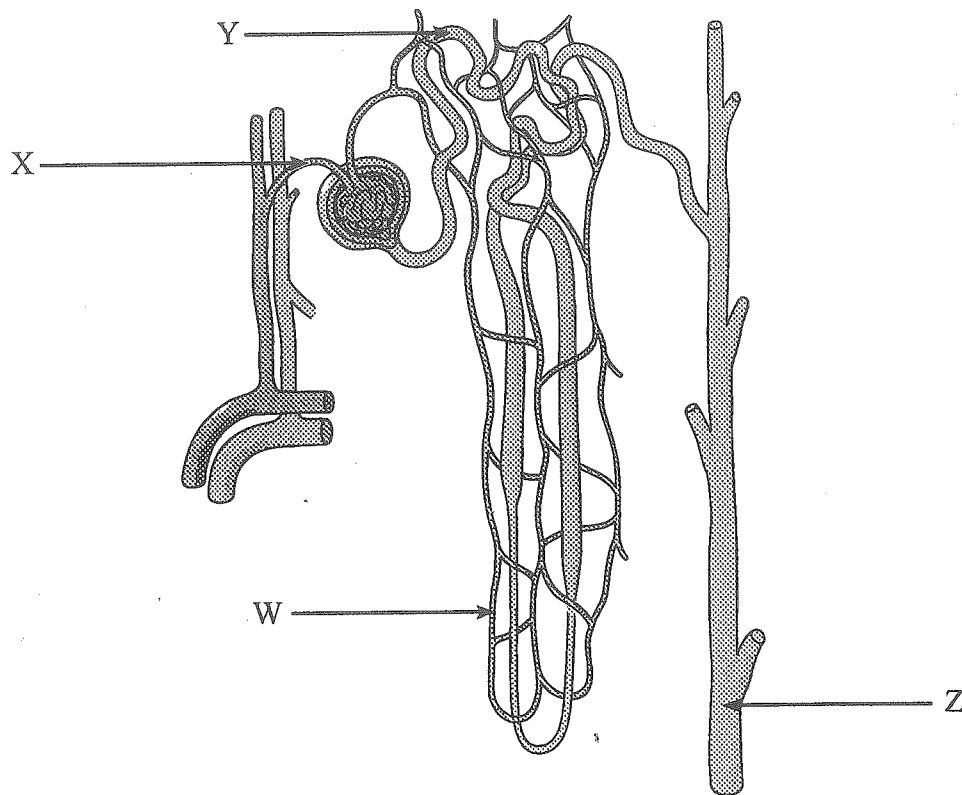
ii) \_\_\_\_\_  
\_\_\_\_\_

Proximal tubule:

i) \_\_\_\_\_  
\_\_\_\_\_

ii) \_\_\_\_\_  
\_\_\_\_\_

Use the following diagram to answer questions 64. and 65



64. A function of the structure labelled X is to

- A. collect urine.
- B. excrete sodium.
- C. reabsorb glucose.
- D. bring urea to the nephron.

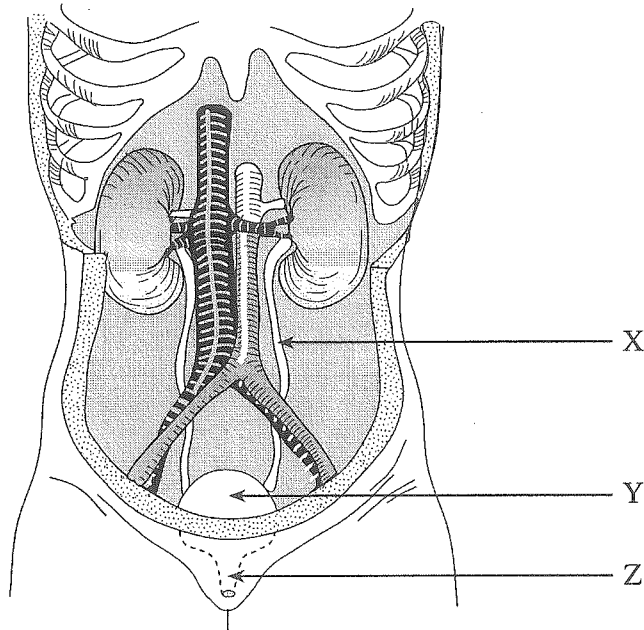
65. The structure labelled W is the

- A. glomerulus.
- B. loop of Henle.
- C. proximal tubule.
- D. peritubular capillary network.

66. Which of the labelled structures in the diagram above responds to ADH (antidiuretic hormone)?

- A. W
- B. X
- C. Y
- D. Z

Use the following diagram to answer question 67.



67. Identify and give **one** function of each of the following structures.  
(6 marks: 1 mark each for name; 1 mark each for function)

Structure X:

Name: \_\_\_\_\_

Function: \_\_\_\_\_

\_\_\_\_\_

Structure Y:

Name: \_\_\_\_\_

Function: \_\_\_\_\_

\_\_\_\_\_

Structure Z:

Name: \_\_\_\_\_

Function: \_\_\_\_\_

\_\_\_\_\_

68. Explain how each of the following structures contributes to the formation of urine.

Bowman's capsule:

(1 mark)

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proximal convoluted tubule:

(2 marks)

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loop of Henle:

(2 marks)

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distal convoluted tubule:

(1 mark)

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collecting duct:

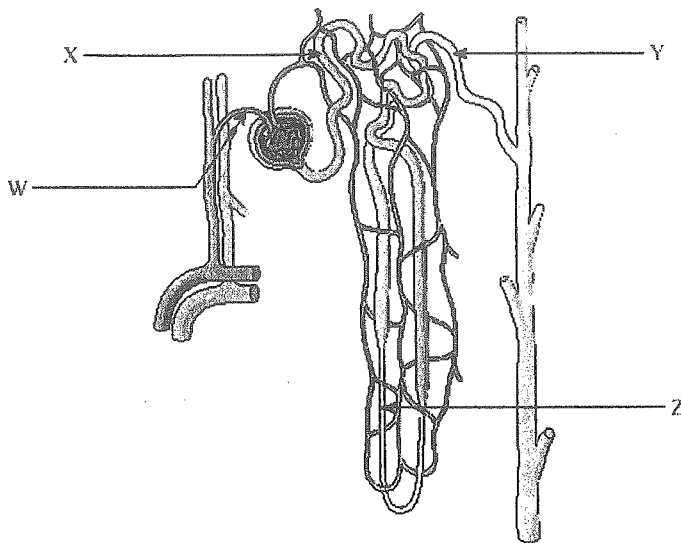
(1 mark)

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Use the following diagram to answer question 69.



69. Identify the following structures and give a different function of each structure.

(8 marks: 1 mark each for name; 1 mark each for function)

Structure W: \_\_\_\_\_

Name: \_\_\_\_\_

Function: \_\_\_\_\_

Structure X: \_\_\_\_\_

Name: \_\_\_\_\_

Function: \_\_\_\_\_

Structure Y: \_\_\_\_\_

Name: \_\_\_\_\_

Function: \_\_\_\_\_

Structure Z: \_\_\_\_\_

Name: \_\_\_\_\_

Function: \_\_\_\_\_

70. Explain what happens in the kidneys in response to each of the following conditions.

a decrease in blood pressure:

(2 marks)

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a decrease in blood pH:

(2 marks)

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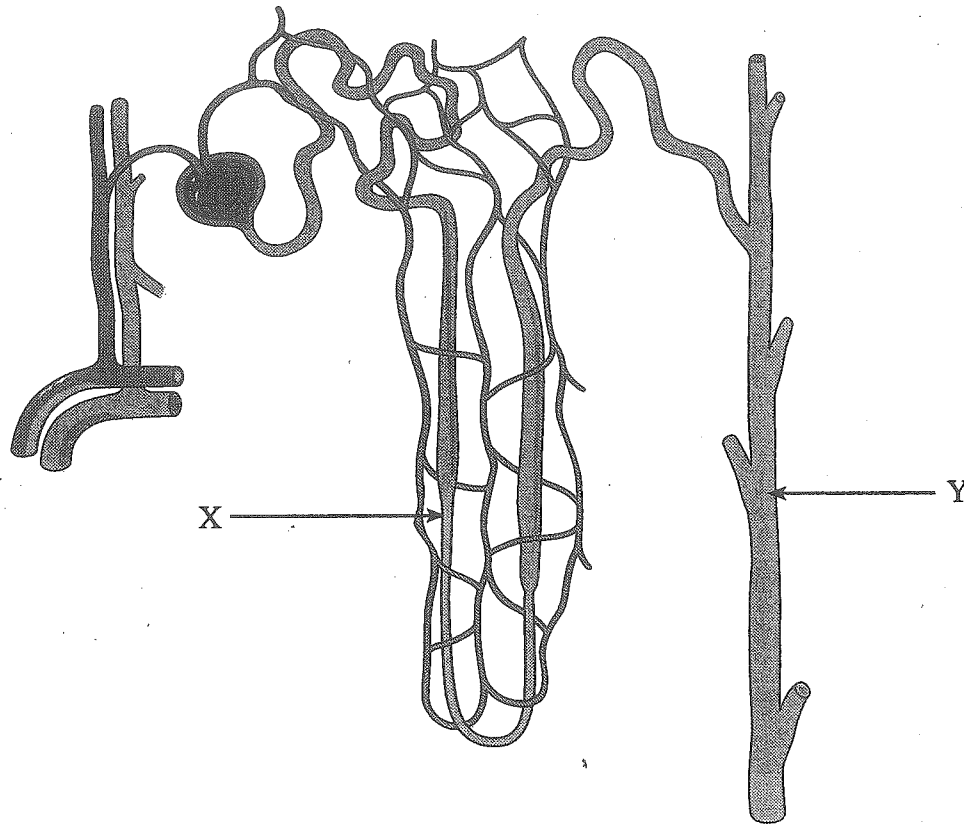
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Use the following diagram to answer question 71.



71. a) Explain why it would be abnormal to find glucose in structure Y. (1 mark)

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b) Explain why structure X is longer in an animal that lives in the desert. (1 mark)

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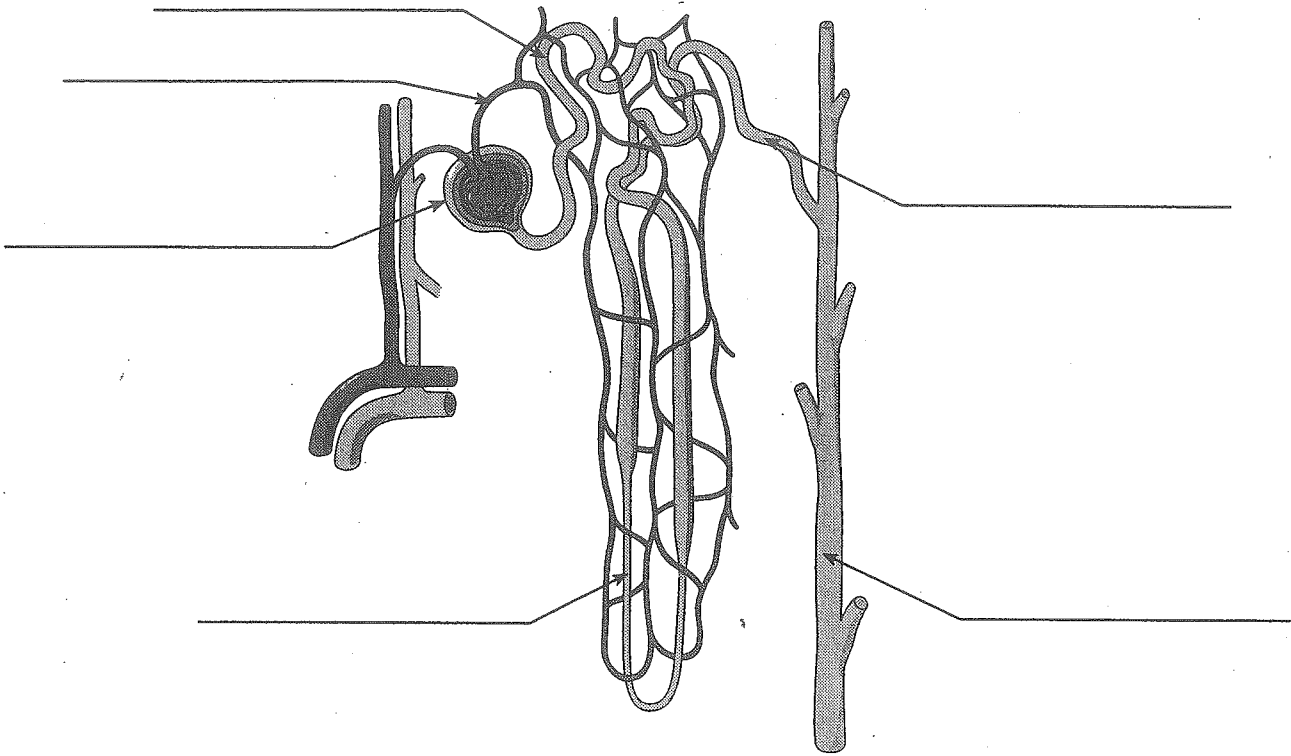
72. State one function of each of the following. (8 marks: 1 mark each)

- i) Glomerulus: \_\_\_\_\_
- ii) Aldosterone: \_\_\_\_\_
- iii) Ureter: \_\_\_\_\_
- iv) Distal convoluted tubule: \_\_\_\_\_
- v) Urinary bladder: \_\_\_\_\_
- vi) Peritubular capillary network: \_\_\_\_\_
- vii) Renal pelvis: \_\_\_\_\_
- viii) Afferent arteriole: \_\_\_\_\_





75 a) Using the following diagram, label the parts of a nephron in the blanks provided.  
 (3 marks:  $\frac{1}{2}$  mark each)



b) Identify **one** hormone that responds to a decrease in blood volume and explain how this hormone functions to return blood volume to normal levels.  
 (4 marks: 1 mark for name; 3 marks for explanation)

Name: \_\_\_\_\_

Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

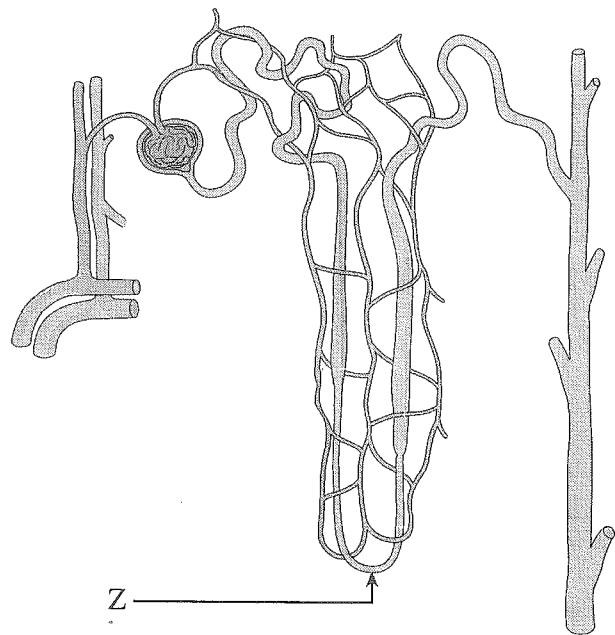
\_\_\_\_\_

76. Name **two** substances that are actively excreted during the process of tubular excretion.  
 (2 marks)

i) \_\_\_\_\_

ii) \_\_\_\_\_

Use the following diagram to answer question 77.



c) Identify structure **Z** and describe two characteristics that assist in its function.  
(3 marks: 1 mark for name; 2 marks for characteristics)

Name: \_\_\_\_\_

Characteristic 1: \_\_\_\_\_

\_\_\_\_\_

Characteristic 2: \_\_\_\_\_

\_\_\_\_\_

78. Describe the process which occurs at each of the following structures.  
(4 marks: 1 mark each)

Bowman's capsule:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

proximal convoluted tubule:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

collecting duct:

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loop of Henle:

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b) Give a function of each of the following in the excretory system.

(4 marks: 1 mark each)

carrier proteins:

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peritubular capillary network:

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sodium bicarbonate:

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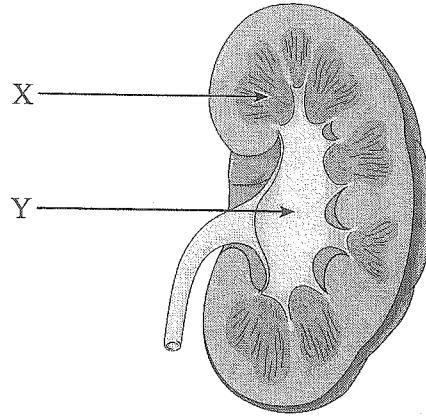
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aldosterone:

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Use the following diagram to answer questions 79a and 79b.



79 a) Identify structure X and describe the environment within the structure.

(2 marks: 1 mark for name; 1 mark for description)

Name: \_\_\_\_\_

Description: \_\_\_\_\_

\_\_\_\_\_

b) Identify structure Y and give its function.

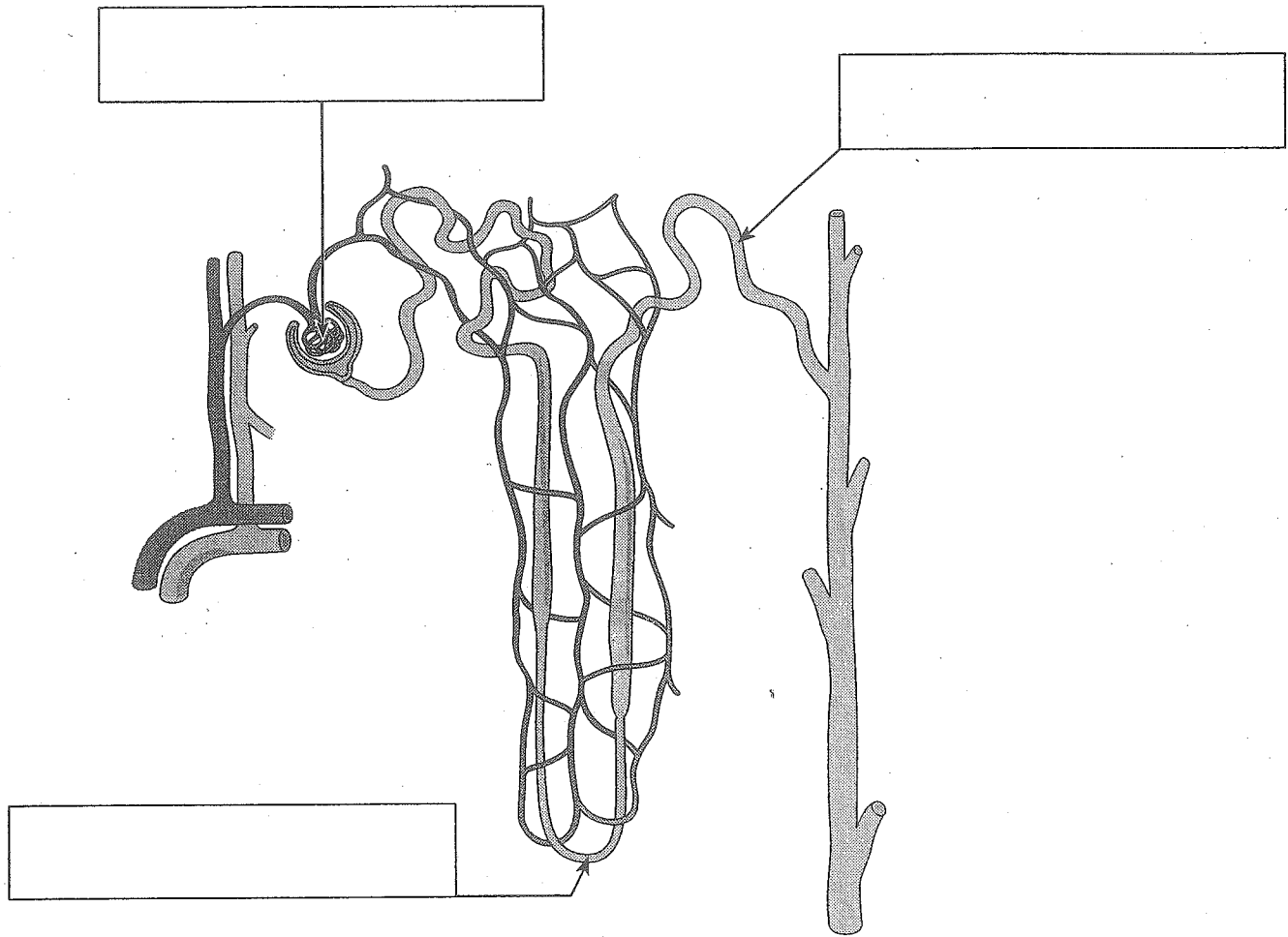
(2 marks: 1 mark for name; 1 mark for function)

Name: \_\_\_\_\_

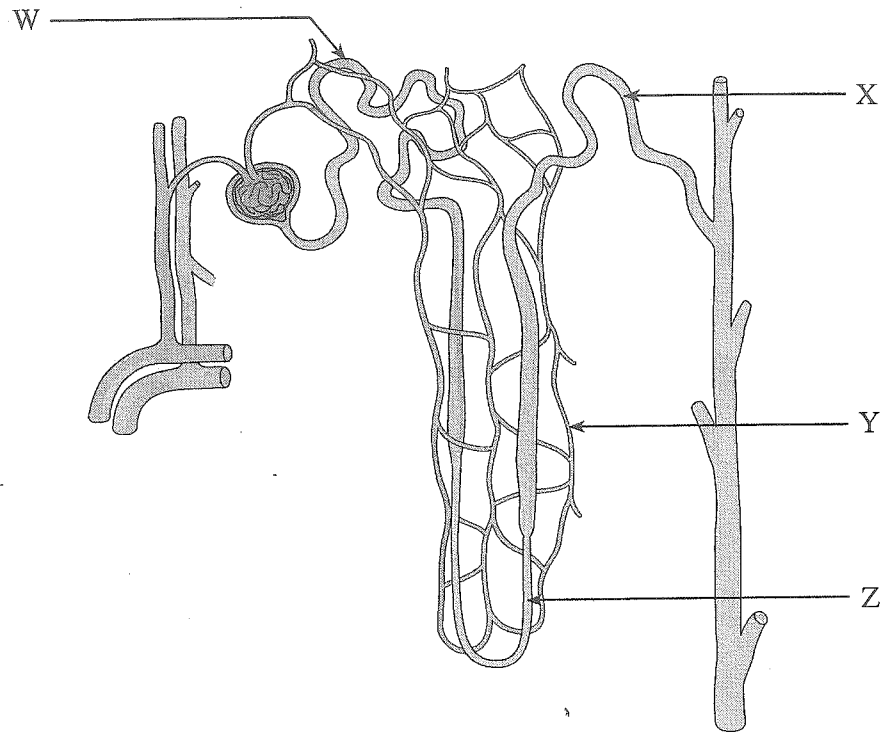
Function: \_\_\_\_\_

\_\_\_\_\_

80. a) Write the names of the structures indicated by each of the arrows in the boxes provided. (3 marks)



Use the following diagram to answer question a).



a) Give one different function of each of the following structures. (4 marks: 1 mark each)

Structure W: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Structure X: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Structure Y: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Structure Z: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Use the following table to answer question 8) b).

Filtrate	Urine
95% water	50% water

- b) Provide an explanation that accounts for the difference in the water content as shown in the table above. (2 marks)

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