

## Section 9.2: Review Answers

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#### 1. Parts of the nephron and their function

Part of the Nephron	Function
glomerulus	Filtration <ul style="list-style-type: none"> <li>■ Glomerular blood pressure forces some of the water and dissolved substances from the blood plasma through the pores of the glomerular walls</li> </ul>
Bowman's capsule	Receives filtrate from the glomerulus
proximal tubule	Reabsorption <ul style="list-style-type: none"> <li>■ Active reabsorption of all nutrients, including glucose and amino acids</li> <li>■ Active reabsorption of positively charged ions such as sodium, potassium, calcium</li> <li>■ Passive reabsorption of water by osmosis</li> <li>■ Passive reabsorption of negatively charged ions such as chloride and bicarbonate by electrical attraction to positively charged ions</li> </ul> Secretion <ul style="list-style-type: none"> <li>■ Active secretion of hydrogen ions</li> </ul>
Descending nephron loop	Reabsorption <ul style="list-style-type: none"> <li>■ Passive reabsorption of water by osmosis</li> </ul>
Ascending nephron loop	Reabsorption <ul style="list-style-type: none"> <li>■ Active reabsorption of sodium ions</li> <li>■ Passive reabsorption of chloride and potassium ions</li> </ul>
Distal tubule	Reabsorption <ul style="list-style-type: none"> <li>■ Active reabsorption of sodium ions</li> <li>■ Passive reabsorption of negatively charged ions such as chloride and bicarbonate</li> <li>■ Passive reabsorption of water by osmosis</li> </ul> Tubular Secretion <ul style="list-style-type: none"> <li>■ Active secretion of hydrogen ions from the blood into the tubule</li> <li>■ Passive secretion of potassium ions by electrical attraction to chloride ions</li> </ul>
Collecting duct	Reabsorption <ul style="list-style-type: none"> <li>■ Passive reabsorption of water by osmosis</li> </ul>

2. The sketch of the simplified nephron should show the incoming arteriole, the Bowman's capsule, the outgoing arteriole, the proximal tubule, the loop of Henle, the distal tubule, the surrounding capillaries, and the collecting duct.

- (a) The movement of sodium ions from the nephron to the surrounding capillaries takes place in the ascending limb of the nephron loop.
  - (b) The movement of water from the nephron to the surrounding capillaries takes place in the descending loop of the nephron and from the collecting duct as it passes through the renal medulla.
  - (c) The movement of glucose out of the nephron takes place in the proximal tubule. This is a selective process because only the molecules recognized by a specific carrier molecule are actively reabsorbed.
  - (d) Potassium ions are actively secreted into the distal tubule from the blood. Penicillin and other drugs are also secreted into the distal tubule.
3. Students may answer this question using a variety of formats (for example, paragraph, point form, tabular, Venn diagram). The substance of students' answers likely will focus on comparing and contrasting the composition of blood and of urine, although some students might also refer to where in the body the two fluids are found, as well as the fact that some substances enter and leave blood and urine through the same mechanisms (i.e., diffusion, active transport). In terms of composition, which is the principal context for answering the question, suitable points of comparison could include the presence of protein and glucose in blood, as opposed to urine, and the relatively higher concentration of sodium in urine compared to blood. Water should be noted as a primary constituent of both fluids.
4. Reabsorption refers to both the passive and active transport of molecules and ions from the filtrate (nephron) back into the capillary network (blood). Certain molecules (potassium ions and some drugs for example) are actively secreted from the capillary network into the distal tubule for excretion.
5. Most students should realize that the body will try to conserve water by reducing the amount of urine it produces. The volume of the urine would decrease, which would increase the concentration of the molecules and ions being expelled (deeper yellow colour).