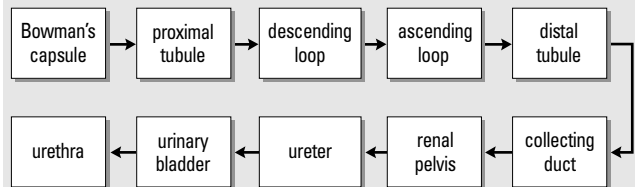## Section 9.1: Review Answers

Student Textbook page 310

1. Urine (nephric filtrate) first forms in Bowman's capsule, so the pathway shown in the following flow chart begins there.

Bowman's capsule → proximal tubule → descending loop → ascending loop → distal tubule → collecting duct → renal pelvis → ureter → urinary bladder → urethra

2. The main structures of the human excretory system and their functions are shown in the table below.

Structure	Function
kidney	■ primary organs of the urinary system ■ removes metabolic wastes from the blood and produces urine
ureters	■ peristalsis pushes urine from the kidneys into the urinary bladder
urinary bladder	■ temporarily stores urine until it can be expelled from the body
urethra	■ extends from the urinary bladder to an external opening
renal artery	■ transports unfiltered blood to the kidney
renal vein	■ returns filtered blood to the circulatory system

3. The basic function of the excretory system is to regulate the volume and composition of body fluids by removing metabolic wastes and returning needed substances to the body for reuse.

4. (a) The sketch should resemble Figure 9.2 on page 307. It should show labels for the renal cortex, the renal medulla, and renal pelvis.

   (b) The glomerulus, proximal tubule and distal tubule, and the "top" parts of the loop of Henle are found in the renal cortex. Most of the descending and ascending loops of Henle and the collecting ducts are found in the renal medulla. The collecting ducts empty into the renal pelvis.

5. Student answers' should resemble the Figure 9.3 on page 308. Labels on the student sketch should show (a) blood entering the kidney via the renal artery, (b) filtrate being formed in the glomerulus and Bowman's capsule, and (c) urine being excreted via the collecting duct.

6.

Term	Explanation
a filter	The filtration structure at the top of each nephron is a cap-like formation called the glomerular capsule. The renal artery enters the kidney and splits into a fine network of capillaries called a glomerulus. The walls of the glomerulus act as a filtration device. They are impermeable to proteins, other large molecules, and red blood cells, so these remain within the blood. Water, small molecules, ions, and urea (waste) pass through the walls and proceed further into the nephron. The filtered fluid that proceeds from the glomerulus into the glomerular capsule is referred to as filtrate.
a tubule	The glomerular capsule is connected to a small, long, narrow tubule that is twisted back on itself to form a loop. This long, hairpin loop is a reabsorption device. The tubule has three sections: the proximal tubule, the loop of the nephron, and the distal tubule. This tubule absorbs substances that are useful to the body, such as glucose and ions, from the filtrate passing through it. The tubule also secretes substances into the tissues surrounding it.
a duct	The tubule empties into a larger pipe-like channel called a collecting duct. The collecting duct functions as a water-conservation device, reclaiming water from the filtrate passing through it so little water is lost from the body. The filtrate that remains in the collecting duct is a suspension of water and various solutes and particles (urine)

7. The following is a sample answer.

All of the systems mentioned are part of the excretory system. The respiratory system excretes carbon dioxide and small amounts of other gases, including water vapour. The skin excretes water, salts, and some urea in perspiration. The digestive system excretes water, salts, lipids, and a variety of pigments and other cellular chemicals. (Note that the elimination of food residue—feces—is not considered to be a process of excretion.) Most metabolic wastes, however, are dissolved or suspended in solution and are excreted by the excretory (urinary) system. The circulatory system (blood) transports metabolic wastes to the kidneys for excretion.