Hydrostatic Pressure

* Define the term hydrostatic pressure.  
  Hydrostatic pressure is a force exerted from the pressure of the blood vessel itself.
* Explain how hydrostatic pressure results in the movement of molecules from the glomerulus in to the Bowman’s capsule.   
  Hydrostatic pressure within the glomerulus is the driving force that pushes one fifth of blood plasma out through the capillary walls into the Bowman’s capsule. The blood plasma forced out through the glomerulus carries all molecules small enough to pass through it, including urea, glucose, amino acids, and minerals.

Movement of Molecules

* Name 3 mechanisms used in the process of reabsorption and secretion.   
  The mechanisms of reabsorption and secretion include passive diffusion, active transport, and cotransport.
  + Passive diffusion: passing through plasma membranes of the kidney epithelial cells using concentration gradients.
  + Active transport: membrane-bound pumps (such as Na+ / K+ pumps) with carrier proteins that carry substances across the plasma membrane.
  + Cotransport: this process is particularly important for the reabsorption of water. Water can follow other molecules that are actively transported, particularly glucose and sodium ions in the nephron.

Check for Understanding

* Describe the trend in osmolarity of filtrate as it passes through the nephron.   
  The osmolarity of filtrate changes as ions and water are reabsorbed. Beginning at 300 entering the Loop, it increases to 600 as the filtrate passes through the cortex portion of the nephron into the outer medulla and continues to increase to 1200 as it goes into the inner medulla (descending Loop of Henle). As the filtrate passes back up into the outer medulla and cortex its osmolarity decreases to 300 and then 100 (ascending Loop of Henle).

Reabsorption

* Explain how the active transport of minerals in the ascending Loop of Henle helps concentrate the urine.   
  In the ascending Loop of Henle, minerals are moved out of the thick-walled section of the tubule and into the interstitial fluid through active transport. This serves as the primary mechanism for the concentration of urine.

Renal Secretion

* Outline the role of the peritubular capillaries.   
  The network of peritubular capillaries allows some substances to be removed from the blood and into the collecting duct during excretion.
* List the 3 examples of molecules that are secreted.  
  Substances secreted by the peritubular capillaries include hydrogen ions, creatinine, and drugs.

Production of Urine

* Construct a flow chart to show the path of urine from the kidney to the urethra.