Each kidney contains many tiny tubules that empty into a cavity drained by the ureter. Each of the tubules receives a blood filtrate from a capillary bed called the glomerulus. The filtrate is similar to tissue fluid but is modified as it passes through the tubules and is thereby changed into urine. The tubules and associated blood vessels thus from the functioning units of the kidneys, which are known as nephrons.
• The urinary system consists of two kidneys, two ureters, the urinary bladder and the urethra.

Major functions of the urinary system include:
• Removal of wastes such as minerals, urea, uric acid, etc.
• Maintaining water levels
  – An increase in water intake results in increased urination that becomes more clear, indicating dilution of waste in the urine
  – Dehydration results in less frequent urination, with darker coloured urine, indicating more concentrated waste in the urine.
• Maintaining vitamin and mineral levels
• Monitor and maintain blood pH levels.
Kidneys

- Fist-sized, paired organ.
- Located next to lumbar vertebrae, just below rib cage, on sides of body.
- Shaped like a kidney bean.
- Body can function with only one kidney.
- Produces urine.
- Contains nephrons, which are the structures that actually produce urine.
Ureters

- Are tubes.
- Carry urine from kidneys to the bladder.
- Urine is pushed along by peristalsis.
Urinary Bladder

- Stores urine until it’s ready to be excreted.
- When the bladder is full, it becomes distended, nerve receptors sense this distension and tell the brain that it’s time to empty the bladder.
- Urination is also known as micturition.
Urethra

- Tube leading from bladder to outside of body.
- Shorter in females than in males, which makes females more susceptible to urinary tract infections.
- In females, the urethra is only used for urination, while in males it is also used in ejaculation of sperm.
Position and Structure of the Kidney

- Kidneys are reddish-brown.
- Right kidney is usually 1.5 to 2 cm lower than the left due to its position below the liver.
- The **hilum** of the kidney is the depression along the medial border, through which the **renal artery** and nerves enter, and the **renal vein** and **ureter** exit.
- Each kidney is embedded in a fatty fibrous pouch consisting of three layers.
  - The **renal capsule** is the innermost layer that forms a strong, transparent, fibrous attachment to the kidney. It protects the kidney from trauma and risk of infection.
  - The second layer, the **adipose capsule**, is formed by a firm protective layer of adipose tissue. Adipose tissue is a loose, connective tissue, made up of adipose cells, which contain fat droplets in their cytoplasm. Essentially, this layer is a layer of fat, that cushions and protects the kidney.
  - The outermost third layer, called the **renal fascia**, is a supportive layer that anchors the kidney to the peritoneum and abdominal wall.
• The kidney is a lima-bean shaped organ that has two distinct regions and a major cavity.

• The outer renal cortex, which is in contact with the renal capsule, is reddish brown and granular in appearance because of its many capillaries.

• The deeper region, called the renal medulla, is darker in colour and looks like it’s striped, because of its microscopic tubules and blood vessels.

• The renal medulla is composed of 8 to 15 conical renal pyramids separated by renal columns. The renal papillae are the apexes of the renal pyramids. These nipple-like projections are directed toward the large cavity of the kidney called the renal pelvis.

• The cavity of the kidney collects and transports urine from the kidney to the ureter. It is divided into several portions.
  – Each papilla of a renal pyramid projects into a small depression called the minor calyx (calyces plural).
  – Several minor calyces untie to form a major calyx.
  – The major calyces join to form the funnel-shaped renal pelvis, which collects urine from the calyces and transport it to the ureter.