In this lab activity fresh lamb kidneys will be dissected. Hygiene is crucial when dealing with fresh specimens. Vinyl gloves will be provided and hand washing with soap and warm water must be performed before leaving the class.

**Assessment**
You will be assessed based on the following criteria:

1. **Respect** for the specimen you are studying. If you treat the specimen in a disrespectful way, you will be removed from the lab.

2. **Safety.** Your lab tools should be cleaned, dried and returned at the end of the class. Your group is solely responsible for your scalpel. Show your equipment to the teacher before returning it to the cart. Always wash your hands and your work area when you are finished. Handle dissecting tools carefully (don’t cut directly towards yourself or your lab partner(s)). You should wear gloves and safety goggles. Lab aprons are available if you choose to use them.

3. **Participation.** Every member of your team should contribute to learning from the dissection.

4. **Careful dissection.** Try to follow all directions to the best of your ability, and to cut carefully in order to observe whole organs. Use your reference materials and/or the teacher to assist you.

5. **Disposal.** Any tissues removed should be placed in a special garbage bag, not down the sink or in the regular garbage.

6. **Checkup questions.** At the end of the activity, the teacher will have questions to ask you about the actual dissection. (e.g., Where is the renal capsule? What is this dark red area?) Each person in your group will have to answer one or more questions. Call the teacher over by raising your hand when your group is ready for the questions.
   *It is YOUR GROUP’S RESPONSIBILITY to ensure that you get a chance to answer these questions before you dispose of your specimen!*

7. **Lab report.** For this activity, the report will consist only of biological drawings and answers to questions in this handout. Each student will hand in their own report.

**Background Information**
The human urinary system consists of two kidneys, two ureters, one urinary bladder, and one urethra. This system has two basic functions, both of which occur in the kidneys. The first function is to remove nitrogenous wastes (such as creatinine, urea, and uric acid) from the body. The second function is to maintain the ion, pH, and water levels in the blood.

One product of these processes is urine, a pale yellow fluid containing water, and particles such as urea, sodium, potassium, creatinine, and uric acid. Urine moves from the kidneys to the urinary bladder via the ureters, which are essentially tube shaped extensions of the renal pelvis. Urine is stored in the urinary bladder until it leaves the body via the urethra.
Basic Kidney Anatomy

There are four primary components to a kidney:

1. **Renal Capsule**: A smooth semitransparent membrane that adheres tightly to the outer surface of the kidney.

2. **Renal Cortex**: The region of the kidney just below the capsule. In a fresh kidney the colour of the cortex will be reddish brown.

3. **Renal Medulla**: The region deeper into the kidney, beneath the cortex layer. In a fresh kidney it is more red in colour than the cortex. It is segregated into triangular and columnar regions. The triangular regions are the **renal pyramids**, which should be striated (or striped) in appearance due to the collecting ducts running through them. The **renal medulla** contains the structures of the **nephron**, which is the basic functional filtration unit of the kidney. The kidney contains up to 1.5 million nephrons! Its chief function is to regulate the concentration of water and soluble substances like sodium salts by filtering the blood, reabsorbing what is needed and excreting the rest as urine. The columnar regions between the pyramids are the **renal columns**. These renal columns are where the interlobar arteries are located.

4. **Renal Pelvis**: A cavity within the kidney that is continuous with the ureter, which exits from the hilus. The pelvis has portions that extend towards the apexes of the renal pyramids. The primary (large) extensions are the **major calyces** and the smaller extensions are the **minor calyces**.
Procedure

1. Collect dissecting tools, a ruler, toothpicks, masking tape and a tray for your lab group. Obtain a fresh lamb kidney.

2. Observe the whitish adipose (fat) tissue clinging to the renal capsule (this may or may not be present depending on how the kidney was prepared). These are remnants of the adipose capsule. Use your scissors to remove excess adipose tissue around the hilus region, and the probe to help you identify the ureter and any blood vessels located in the hilus region. **Complete a labeled biological drawing of the exterior view of the kidney. Include measurements.**

3. Cut the kidney in half longitudinally using the knife or with short repeated strokes of the scalpel.

4. Examine the interior structure of the kidney. **Using the toothpicks and masking tape, identify and label** the cortex, medulla, renal pelvis, renal pyramids, renal columns, the major calyx and minor calyces, the ureter and any blood vessels present. It may be useful to trace the vessels from the hilus region with a blunt probe to help with identification.
5. Complete a labeled biological drawing of the interior of one half of the kidney. Include measurements. Call your teacher over for checkpoint questions when ready.

6. Dispose of the kidney in the waste bag provided. Wash all dissecting equipment and return. Wash your hand thoroughly with warm soap and water.

Possible Checkup Questions:

1. What is the smooth semitransparent membrane that adheres tightly to the outer surface of the kidney?
2. What are the two primary functions of the urinary system?
3. What structure allows urine to move from the kidneys to the urinary bladder?
4. What gives the renal pyramids their striped appearance?
5. What are the calyces?
6. What structures are found in the renal columns?
7. What is the cavity within the kidney that is continuous with the ureter?
8. Why do you think there would have been adipose tissue surrounding the renal capsule?

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<th>Assessment Chart</th>
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<tr>
<td>Respect, safety, participation, careful dissection, disposal</td>
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<td>Diagrams (x2, fully labeled)</td>
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<td>Checkpoint questions answered successfully</td>
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