Pre-requisites: The class period before, we filled out excretory notes and discussed the major functions of the excretory system. The excretory system involves many systems including, the urinary system. Students should be familiar with the key functions of the urinary system in filtering our blood. Today’s lesson will expand upon what we discussed prior.

Instructional Objectives:

- Students will be able to investigate the function of a human kidney by constructing a model.
- Students will understand the mechanism of urine formation in the kidney.
- Students will observe osmosis as it relates to kidney function.

Materials:

- 1 clear plastic cup
- 1 dialysis tube (semi-permeable)
- disposable gloves
- plastic pipets
- 10 mL of simulated blood
- string to tie off dialysis tubing
- salt test strips (2)
- PowerPoint Slides
- Student worksheet

Instructional Procedures:

1. Students will enter the classroom and read the procedure provided on the Smart Board.
2. They will write down the word of the day: “Simulate.” This word will relate to the day’s lesson. We will briefly discuss the word and its relation to the simulation we will actually be completing today.
3. I will be taking attendance at this time. I will also collect the homework from yesterday to be graded.
4. To start class off, I will present a couple slides to review the urinary tract vocabulary from the day before.
5. I will start to set up and explain the demonstration. I will take a piece of wet dialysis and ask for a lab helper. I will have one student hold the tubing and I will tie a knot around the bottom portion.
6. I will then ask the volunteer to measure 10 mL of “blood” into a graduated cylinder. I will make sure the student puts on a pair of disposable gloves to enforce safety concerns that may be associated with actual blood. I will also remind students of proper lab measuring technique (i.e.: meniscus, slowly pour over sink)
7. The student can then help me by holding the tubing. I will tie off the top portion of the tubing. We will discuss how the filled tubing simulates that of a nephron—one of the students vocabulary words. I will show a slide of nephrons under the microscope. I will ask students what the purpose of the nephron is and where they are found.
8. I will rinse off the tubing and pour water into a labeled cup that indicates the class period. I will then insert the filled tubing into the water. We will discuss diffusion.
9. I will have another student come up and take a salt measurement, using test strips of the water. The strip should test negative and should remain yellow. I will then go into a discussion of what test strips allow scientists to interpret. I will show a slide that visually represents the color changes that would be associated with different levels of salt.
10. We will put aside the filled cup and I will show the students a video clip from Brain Pop to reinforce the lessons on the urinary system. Students will need to predict what should happen on their activity sheets.
11. If time allows, I will have an interactive slide on the Smart Board and call students to arrange the parts of the urinary tract.
12. We will return to the demo and observe the changes. Students should fill in the chart provided and then answer the questions on their sheets. I will have one student use a test strip to test the cup again.
13. At the end of the class, we will regroup and discuss what should happen if 24 hours to go by.
14. I will recap the demo and ask students if they have any questions.

**Evaluation:** Students will be evaluated based upon participation. I will let the students know that they should be following along on the lab sheets. They will not be collected; however, I will keep a tally and enter a grade in their class work section that they completed the work for the day’s lesson. I want to make sure that students are following along and paying attention. This hopefully will hold them accountable for the lesson.

**Gardner’s Multiple Intelligences:** Audio/Visual, Natural, Verbal/Linguistic

**New York State Standards:**

**Content Standard 4: Performance indicator 1.2:** The excretory system functions in the disposal of dissolved waste molecules, the elimination of liquid and gaseous wastes, and the removal of excess heat energy.