# Week 2: Team B Template

Mr. K.B. is age 81 and has had gastritis with severe vomiting for 3 days. He has a history of heart problems and is presently feeling dizzy and lethargic. His eyes appear sunken, his mouth is dry, he walks unsteadily, and he complains of muscle aching, particularly in the abdomen. He is thirsty but is unable to retain food or fluid. A neighbor has brought Mr. K.B. to the hospital, where examination shows that his blood pressure is low, and his pulse and respirations are rapid. Laboratory tests demonstrate elevated hematocrit, hypernatremia, decreased serum bicarbonate, serum pH 7.35, and urine of high specific gravity (highly concentrated).

*Part 1: Day 1 – Early Stage*

Initially, Mr. K.B. lost water, sodium in the mucus content, and hydrogen and chloride ions in the hydrochloric acid portion of the gastric secretions. Alkalosis develops for two reasons, the first being the direct loss of hydrogen ions and the second being the effects of chloride ion loss. When chloride ion is lost in the gastric secretions, it is replaced by chloride from the serum (see Fig. 2.9 in your text). To maintain equal numbers of cations and anions in the serum, chloride ion and bicarbonate ion can exchange places when needed. Therefore, more bicarbonate ions shift into the serum from storage sites in the erythrocytes to replace the lost chloride ions. More bicarbonate ions in the serum raise serum pH, and the result is hyperchloremic alkalosis.

**Team B**

*Part 2: Days 2 to 3 – Middle Stage*

As Mr. K.B. continues to vomit and is still unable to eat or drink any significant amounts, loss of the duodenal contents, which include intestinal, pancreatic, and biliary secretions, occurs. No digestion and absorption of any nutrients occurs. Losses at this stage include water, sodium ions, potassium ions, and bicarbonate ions. Also, intake of glucose and other nutrients is minimal. Mr. K.B. shows elevated serum sodium levels.

1. What is the normal function of sodium in the body?
2. Explain why serum sodium levels appear to be high in this case.
3. Explain how high serum sodium levels might affect the intracellular fluid and extracellular fluid volumes.
4. Using your knowledge of normal physiology, explain how continued fluid loss is likely to affect the following:
   1. Blood volume
   2. Cell function
   3. Kidney function
5. State the primary location (compartment) of potassium.
6. How are sodium and potassium levels controlled in the body?
7. Given Mr. K.B.'s history, why might potassium imbalance have more serious effects on him?
8. State the normal range of pH for the following:
   1. Blood
   2. Urine