Name: _____   Period: _____

Biology – **Urinalysis, Blood Analysis, and Pulse Ox**

Problem: What happens when disease enters the body?

Background:
    When foods are broken down in the body, chemical wastes are formed. Carbon dioxide, water, urea, salt, protein, and glucose are waste chemicals. These waste chemicals may be found in your breath, sweat, and/or urine. When people visit the doctor, they give a urine sample. A urine sample can often be useful in detecting medical conditions that might not show other symptoms. Normal, healthy urine contains little or no protein or glucose.
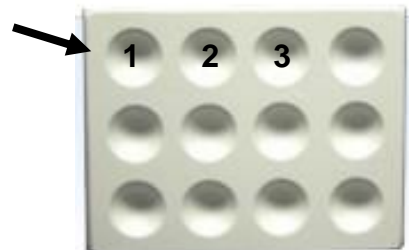   Blood is a tissue. It has many different cells with many different jobs. If you look at blood under microscope, you will find three different cell types – red blood cells, white blood cells, and platelets. In a normal person the numbers of types of blood cells are fairly constant (normal values in a sample for red blood cells is 45-60, white blood cells is 1-5, and platelets is 13-17). Sometimes, however, the number of cells will change due to a certain disease. Noticing this change in number can help a physician in the diagnosis of a person's disease.
    Another way that diseases are diagnosed is by using pulse oximetry (Pulse Ox). Pulse Ox levels are measured in order to determine the amount of oxygen in a person's circulatory system. A sensor is placed on a finger or toe, and levels are measured from there. Normal Pulse Ox levels are between 95-100%. Lower levels could indicate the presence of some kind of lung disease.

Safety: Use goggles and aprons.

Part A: Urinalysis - Knowns
1. _Glucose Test Strip test_: In your spot plate, put 5 drops of the urine labeled water into well 1; put 5 drops of the urine labeled glucose into well 2; put 5 drops of the urine labeled protein into well 3.
2. Take 3 glucose test strips and label them 1, 2, 3.
3. Dip the color portion of glucose test strip 1 into well 1 and take it out. Set it on a paper towel. Do this for each strip. Let the strips set while you are doing the next test (Biuret Test).
4. _Biuret Test_: Now, add 5 drops of Biuret solution to each well.
    Caution: Biuret solution is corrosive and can irritate skin, eyes, and respiratory tract. If contact occurs, flush the area with cold water. It can also stain clothing.
5. ***Gently*** shake the spot plate back and forth. Record the color in Data Table 1 – Biuret Test.
6. Now, record the color of the Glucose test strip in Data Table 1 – Glucose Test Strip.

DATA TABLE 1

Urine - Known	Color		What is Present? Glucose, Protein, both, or neither
	Glucose Test Strip	**Biuret Test**	
Water			
Glucose			
Protein			

A positive Biuret test color is _____ which means _____ is present

A positive Glucose test strip color is a shade of _____ which means _____ is present

Part B: Known Blood Counts and Pulse Ox Level
  1. Count and record each component found in a normal patient blood sample.

       a. Red Blood Cells _____

       b. White Blood Cells _____

       c. Platelets _____

  2. Record the Pulse Ox level. _____

RBC

Platelet   WBC

Normal Patient
Pulse Ox = 100%
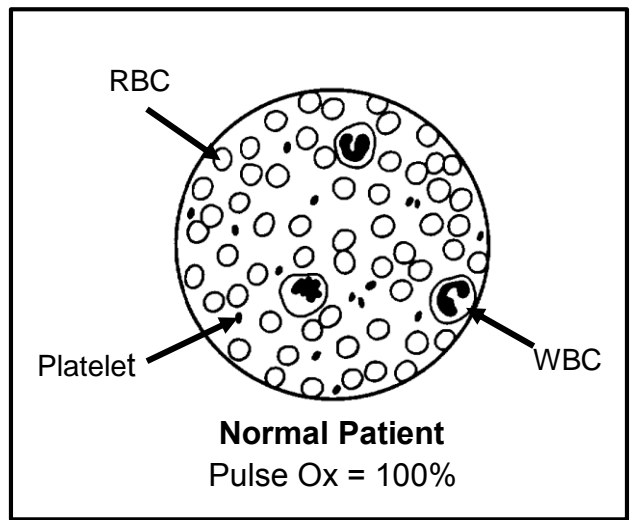
Directions: Using the data collected from Parts A and B, analyze the following 6 patients to determine their disease (what is wrong with them).
Patient Analysis
Part C: Urinalysis Procedure – testing urine for glucose and protein
  1. You will be given 6 patients' urine to analyze.
  2. *Glucose Test Strip test*: In your spot plate, put 5 drops of Patient 1 urine into well 1, put 5 drops of Patient 2 urine into well 2; put 5 drops of Patient 3 urine into well 3; put 5 drops of Patient 4 urine into well 4; put 5 drops of Patient 5 urine into well 5; and put 5 drops of Patient 6 urine into well 6.
  3. Take 6 glucose test strips and label them 1, 2, 3, 4, 5, 6.
  4. Dip the color portion of glucose test strip 1 into well 1 and take it out. Set it on a paper towel. Do this for each patient. Let the strips set while you are doing the next test (Biuret Test).
  5. *Biuret Test*: Add 5 drops of Biuret solution to each well. ***Caution: Biuret solution is corrosive and can irritate skin, eyes, and respiratory tract. If contact occurs, flush the area with cold water. It can also stain clothing.***
  6. ***Gently*** shake the spot plate back and forth. Record the color in Data Table 2 – Biuret Test.
  7. Record the color of the glucose strips in Data Table 2 – Glucose Test Strip.
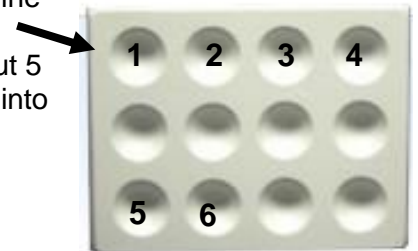
DATA TABLE 2

Patient	Biuret Test Color	Protein + or -	Glucose Test Strip Color	Glucose + or -
Patient 1				
Patient 2				
Patient 3				
Patient 4				
Patient 5				
Patient 6				

Part D: Blood Analysis
1. Analyze the following blood samples and record the number of red blood cells, white blood cells, and platelets.
2. Record the number of each in Data Table 3.
3. Record the Pulse Ox in Data Table 3.

Patient 1
Pulse Ox = 87%

Patient 2
Pulse Ox = 98%

Patient 3
Pulse Ox = 90%

Patient 4
Pulse Ox = 95%

Patient 5
Pulse Ox = 100%

Patient 6
Pulse Ox = 96%

DATA TABLE 3: (Hint: Normal values are in the Background)

Patient	Red Blood Cells	Normal, Low, High	White Blood Cells	Normal, Low, High	Platelets	Normal, Low, High	Pulse Ox	Normal, Low, High
Patient 1								
Patient 2								
Patient 3								
Patient 4								
Patient 5								
Patient 6								

Part E: Hey Doc, do I have a problem? Analyze the patients' results: Urinalysis, Blood analysis and Pulse Ox. Use the disease table to determine which disease each patient has. Give ***data*** (results of Urinalysis, Blood analysis, and Pulse Ox) to support your answer.

Patient 1: _____

_____

_____

_____

Patient 2: _____

_____

_____

Patient 3: _____

_____

_____

_____

Patient 4: _____

_____

_____

_____

Patient 5: _____

_____

_____

_____

Patient 6: _____

_____

_____

_____

Disease Table

Disease	Biuret Test	Glucose Test Strip	Blood Count	Pulse Ox Level
Amyloidosis	+	-	High platelets	95-100%
Asthma	-	-	Normal levels	Below 95%
Bronchitis	-	-	High white blood cells	95-100%
Cushing's disease	+	+	High white blood cells	95-100%
Diabetes	-	+	Normal levels	95-100%
Emphysema	-	-	High red blood cells	Below 95%
Lung Cancer	-	-	High platelet levels	Below 95%
Malaria	+	-	Parasite in red blood cells	95-100%
Pneumonia	-	-	High white blood cells	Below 95%
Sarcoidosis	+	-	High white blood cells and low red blood cells	95-100%
Thalassemia	+	+	Low red blood cells	95-100%