**Student Lab Handout Answer Key**

**Recall the simulation protocol we decided on:**

Fibrous tomato (V8 drink) = Erythrocytes

Olive oil = Plasma

Butter = Globulins

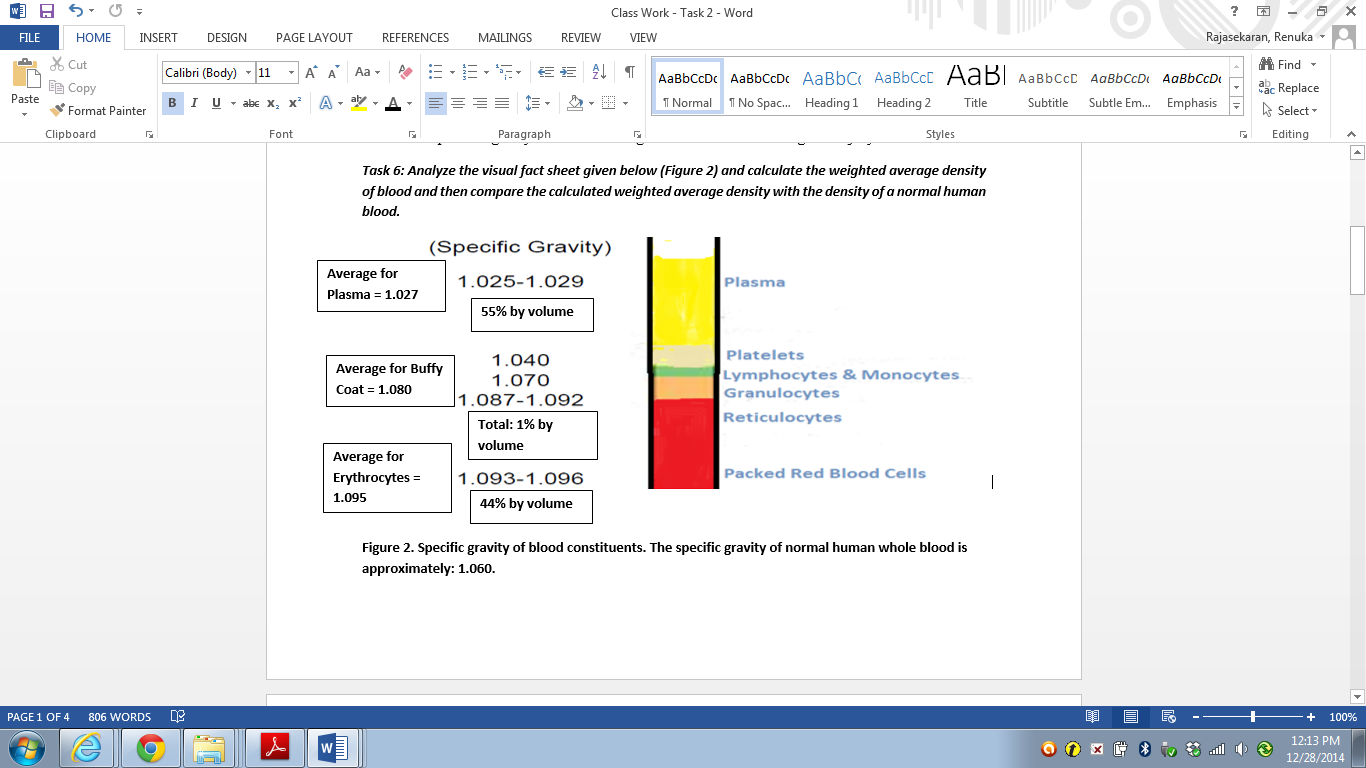
Petroleum jelly = Fibrinogen

Beet extract containing salt = Reduced protein concentration by increasing the electrolyte content

Starch solution = White blood cells

Beet shavings = Sickle cell

**For your reference:**

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**Figure 1.** Percent composition and specific gravity of separated layers of blood obtained by the centrifugation process. The average specific gravity of normal human blood is 1.060.

*Source*: Adapted with permission from Stec, Theresa C. "What is in the Bag?" Accessed December 2014. (34-slide PDF file; an overview of blood and blood products), page 19. <http://c.ymcdn.com/sites/www.apheresis.org/resource/collection/387FC8D3-D586-4DC2-A60D-EA1A83285A68/Fri_1515._2_ES_V_Stec_Seacliff_A_&_B_update.pdf>

**Lab Work**

**Your Task:** Each team member makes one of the five sample blood models required. However, all group members note the composition for each sample blood model.

**Sample Blood Model for Normal Blood**

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| --- |
| In a graduated test tube with screw cap, mix 4.5 ml of V8 drink, 5.5 ml of olive oil containing 1% petroleum jelly.  Shake the sample well.  Let it stand for 60 minutes on a flat surface with no vibrations or disturbances nearby.  At the 60th minute, note the height in cm of the clear liquid on the top of the sediment. |

**Sample Blood Model for High ESR-1: Rheumatoid Arthritis**

(Note: This ESR value should be higher than the ESR value for the normal sample blood model.)

|  |
| --- |
| In a graduated test tube with screw cap, mix 4.5 ml of V8 drink, 5.0 ml of olive oil containing 1% petroleum jelly and 0.5 ml of olive oil containing 0.5% butter.  Shake the sample well.  Let it stand for 60 minutes on a flat surface with no vibrations or disturbances nearby.  At the 60th minute, note the height in cm of the clear liquid on the top of the sediment. |

**Sample Blood Model for High ESR-2: Anemia**

(Note: This ESR value should be higher than the High ESR-1.)

|  |
| --- |
| In a graduated test tube with screw cap, mix 3.0 ml of V8 drink, 6.0 ml of olive oil containing 1% petroleum jelly, and 1.0ml of olive oil containing 1.0% butter.  Shake the sample well.  Let it stand for 60 minutes on a flat surface with no vibrations or disturbances nearby.  At the 60th minute, note the height in cm of the clear liquid on the top of the sediment. |

**Sample Blood Model for Low ESR – 1: Leukocytosis**

(Note: This ESR value should be lower than the ESR value for the normal sample blood model.)

|  |
| --- |
| In a graduated test tube with screw cap, mix 4.0 ml V8 drink, 5.5 ml of olive oil containing 1% petroleum jelly, and 0.5 ml of 5% starch solution.  Shake the sample well.  Let it stand for 60 minutes on a flat surface with no vibrations or disturbances nearby.  At the 60th minute, note the height in cm of the clear liquid on the top of the sediment. |

**Sample Blood Model for Low ESR – 2: Sickle-Cell Anemia**

(Note: This ESR value should be lower than the ESR value for the normal sample blood model.)

|  |
| --- |
| In a graduated test tube with screw cap, take 2.0 ml V8 drink, 2.0 ml beet extract; using very small tweezers, add a very small amount of beet shaving, shake well and add 5.5 ml of olive oil containing 1% petroleum jelly.  Shake the sample well.  Let it stand for 60 minutes on a flat surface with no vibrations or disturbances nearby.  At the 60th minute, note the height in cm of the clear liquid on the top of the sediment. |

**Data Collection**

**At the 60th minute, record below the ESR test values of the sample blood models.**

|  |  |  |
| --- | --- | --- |
| **#** | **Blood Model Composition** | **ESR Value (mm/hr)** |
| 1 | 4.5 ml of V8 drink, 5.5 ml of olive oil containing 1% petroleum jelly. | 20 |
| 2 | 4.5 ml of V8 drink, 5.0 ml of olive oil containing 1% petroleum jelly and 0.5 ml of olive oil containing 0.5% butter. | 28 |
| 3 | 3.0 ml of V8 drink, 6.0 ml of olive oil containing 1% petroleum jelly, and 1.0 ml of olive oil containing 1.0% butter. | 34 |
| 4 | 4.0 ml V8 drink, 5.5 ml of olive oil containing 1% petroleum jelly, and 0.5 ml of 5% starch solution. | 14 |
| 5 | 2.0 ml V8 drink, 2.0 ml beetroot extract, using very small tweezers, add a very small amount of beet shaving, shake well and add 5.5 ml of olive oil containing 1% petroleum jelly. | 9 |

**Analyze and Summarize Findings**

From the ESR values, predict which sample blood model closely corresponds to the blood characteristics of which disease.

|  |  |  |
| --- | --- | --- |
| **#** | **Blood Model Composition** | **Probable Disease Condition** |
| 1 | 4.5 ml of V8 drink, 5.5 ml of olive oil containing 1% petroleum jelly. | none and normal |
| 2 | 4.5 ml of V8 drink, 5.0 ml of olive oil containing 1% petroleum jelly and 0.5 ml of olive oil containing 0.5% butter. | rheumatoid arthritis |
| 3 | 3.0 ml of V8 drink, 6.0 ml of olive oil containing 1% petroleum jelly, and 1.0 ml of olive oil containing 1.0% butter. | anemia |
| 4 | 4.0 ml V8 drink, 5.5 ml of olive oil containing 1% petroleum jelly, and 0.5 ml of 5% starch solution. | leukocytosis |
| **5** | 2.0 ml V8 drink, 2.0 ml beetroot extract, using very small tweezers, add a very small amount of beet shaving, shake well and add 5.5 ml of olive oil containing 1% petroleum jelly. | sickle-cell anemia |