Pre-lab Quiz Results
You scored 100% by answering 4 out of 4 questions correctly.

1. Hematocrit
   You correctly answered: b. of 40 means that 40% of the volume of blood consists of RBCs.

2. A buffy coat layer
   You correctly answered: d. is all of the above.

3. The diagnosis of anemia indicates
   You correctly answered: a. a lower-than-normal hematocrit.

4. Polycythemia refers to
   You correctly answered: c. a significant increase in RBCs.
Experiment Results

Predict Question: Predict how the hematocrits of the patients living in Denver, Colorado (approximately one mile above sea level), will compare with the hematocrit levels of the patients living in Boston, Massachusetts (at sea level).

Your answer: c. The hematocrits of the Denver residents will be higher than those of the Boston residents.

Stop & Think Questions:
Why would the hemoglobin levels of an anemic patient be lower than the hemoglobin levels of a normal, healthy individual?
You correctly answered: c. Because hemoglobin resides in RBCs, you would anticipate a low hematocrit level to coincide with a low hemoglobin level.

Experiment Data:

<table>
<thead>
<tr>
<th>Blood sample</th>
<th>Height of column of blood</th>
<th>Height of red blood cell layer</th>
<th>Height of buffy coat (white blood cells)</th>
<th>Hematocrit</th>
<th>% WBC</th>
</tr>
</thead>
<tbody>
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<td>1</td>
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<td>48 mm</td>
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<td>48</td>
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<td>32 mm</td>
<td>1 mm</td>
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</tr>
</tbody>
</table>

Sample 1: healthy male living in Boston
Sample 2: healthy female living in Boston
Sample 3: healthy male living in Denver
Sample 4: healthy female living in Denver
Sample 5: male with aplastic anemia
Sample 6: female with iron-deficiency anemia
Post-lab Quiz Results
You scored 100% by answering 4 out of 4 questions correctly.

1. Anemia refers to
You correctly answered: c. a lower-than-normal hematocrit.

2. To complete the blood test to measure hematocrit, you must seal the blood-containing capillary tubes on one end with a clay material so that
You correctly answered: d. the blood sample can be centrifuged without having the blood spray out of the tube.

3. Possible causes of polycythemia include
You correctly answered: b. living at high altitudes.

4. You would expect anemia to develop in a person
You correctly answered: c. who has abnormally shaped hemoglobin in their RBCs.
Review Sheet Results

1. List the hematocrits for the healthy male (sample 1) and female (sample 2) living in Boston (at sea level) and indicate whether they are normal or whether they indicate anemia or polycythemia.
   
   Your answer:
   Sample 1 - healthy living in Boston - hematocrit 48%
   Sample 2 - healthy female living in Boston - hematocrit 44%

2. Describe the difference between the hematocrits for the male and female living in Boston. Why does this difference between the sexes exist?
   
   Your answer:
   The hematocrit for the male and female in Boston is higher for the male than the female. The reason for the difference between the male and female is that testosterone increase the production of red blood cells.

3. List the hematocrits for the healthy male and female living in Denver (approximately one mile above sea level) and indicate whether they are normal or whether they indicate anemia or polycythemia.
   
   Your answer:
   Sample 3 - healthy male living in Denver - hematocrit 55%
   Sample 4 - healthy female living in Denver - hematocrit 53%

   They have a higher level than those living in Boston, but they are still normal because they live higher above sea level. Normally it could indicate polycythemia - high level hematocrit, but because they live above the sea level, they have more red blood cell because of the high oxygen.

4. How did the hematocrit levels of the Denver residents differ from those of the Boston residents? Why? How well did the results compare with your prediction?
   
   Your answer:
   As I predicted, Denver residents had a higher level of hematocrits, because the higher hematocrit, the more RBC are present in the blood, and the greater oxygen-carrying potential of the blood.

5. Describe how the kidneys respond to a chronic decrease in oxygen and what effect this has on hematocrit levels.

   Your answer:
   The bone marrow produces sufficient blood cells. When there is a chronic decrease, the kidneys release a hormone called erythropoietin, which acts on the bone marrow to produce more red blood cells, which can bind to more oxygen and take it up.

6. List the hematocrit for the male with aplastic anemia (sample 5) and indicate whether it is normal or abnormal. Explain your response.

   Your answer:
   Sample 5 - male with aplastic anemia - this is not normal. From the experiments results, we see that the level of RBC, WBC and hematocrit (from RBC) is a lower than normal. This is because of a failure in the bone marrow to produce adequate blood cells.

7. List the hematocrit for the female with iron-deficiency anemia (sample 6) and indicate whether it is normal or abnormal. Explain your response.

   Your answer:
   Sample 6 - female with iron-deficiency anemia - this is not normal. Red blood cells contain iron, which can bind to oxygen. In this deficiency, the red blood cells are smaller, so the iron cannot bind to it, and therefore, oxygen cannot bind, and this is damaging for the patient.