Pre-lab Quiz Results
You scored 100% by answering 3 out of 3 questions correctly.

1. A protein found in red blood cells, ____________, is necessary for the transport of oxygen from the lungs to the cells of the body.
   You correctly answered: a. hemoglobin (Hb)

2. Anemia results when
   You correctly answered: e. Both b and c are correct.

3. How much hemoglobin does normal adult human blood contain?
   You correctly answered: c. 12-18 g/100 ml
Experiment Results

Predict Question: How will the hemoglobin levels for the female Olympic athlete (sample 5) compare with the hemoglobin levels for the healthy female (sample 2)?
Your answer: c. The hemoglobin levels for the female Olympic athlete will be greater than those for the healthy female.

Stop & Think Questions:
Why is the average hematocrit higher in males than in females?
You correctly answered: c. Higher testosterone levels in males promotes more RBC production.

Experiment Data:

<table>
<thead>
<tr>
<th>Blood sample</th>
<th>gm Hb per 100 ml blood</th>
<th>Hematocrit (PCV)</th>
<th>Ratio of PCV to Hb</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16</td>
<td>48</td>
<td>3:1</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>44</td>
<td>3.14:1</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>40</td>
<td>5:1</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
<td>60</td>
<td>3:1</td>
</tr>
<tr>
<td>5</td>
<td>22</td>
<td>60</td>
<td>2.73:1</td>
</tr>
</tbody>
</table>

Sample 1: healthy male
Sample 2: healthy female
Sample 3: female with iron-deficiency anemia
Sample 4: male with polycythemia
Sample 5: female Olympic athlete
Post-lab Quiz Results
You scored 100% by answering 3 out of 3 questions correctly.

1. To determine the amount of hemoglobin in a blood sample
   You correctly answered: e. All of these answers are correct.

2. Which of the following diseases is known to increase hemoglobin levels in an individual?
   You correctly answered: c. polycythemia.

3. Which of the following is known to decrease hemoglobin levels in an individual?
   You correctly answered: a. cirrhosis of the liver
Review Sheet Results

1. Is the male with polycythemia (sample 4) deficient in hemoglobin? Why?
   Your answer:
   Sample 4 - male with polycythemia - 20 Hb/100 ml blood. This patient does not have a deficiency in hemoglobin, but too much. In a patient with polycythemia, the patient has too much red blood cells. red blood cells consists of hemoglobin, which means there is too much of it.

2. How did the hemoglobin levels for the female Olympic athlete (sample 5) compare with the hemoglobin levels for the healthy female (sample 2)? Is either person deficient in hemoglobin? How well did the results compare with your prediction?
   Your answer:
   As I predicted, the female Olympic athlete - 20, has a higher level of hemoglobin than the healthy man - 16. Both of them are normal, but the athlete has higher uptake of oxygen (because of the exercise - more blood cells - more hemoglobin.

3. List conditions in which hemoglobin levels would be expected to decrease. Provide reasons for the change when possible.
   Your answer:
   Anemia - a disease of low levels of blood cells, which means there will be a low level of hemoglobin.
   Hypothyroidism - the thyroid hormones stimulates the production of erythropoesis, which increases the production of erythrocytes in the bone marrow.
   Cirrhosis of liver - the liver produces proteins - hemoglobin will therefore be decreased.
   Systemic lupus erythematosus - erythrocytes are destroyed in pancreas - hemolytic anemia.
   Severe hemorrhage - when you loose a lot of blood cells, you also loose hemoglobins as it is a part of erythrocytes.

4. List conditions in which hemoglobin levels would be expected to increase. Provide reasons for the change when possible.
   Your answer:
   Polycythemia - because there is too much blood cells - too much hemoglobin
   Congestive heart failure - when there is congestive heart failure the patient does not get sufficient oxygen to the heart, so to compensate, there will be higher amounts of blood - hemoglobin.

5. Describe the ratio of hematocrit to hemoglobin for the healthy male (sample 1) and female (sample 2). (A normal ratio of hematocrit to grams of hemoglobin is approximately 3:1.) Discuss any differences between the two individuals.
   Your answer:
   The female has a ratio of 3,14>1, while the male has a 3:1 ratio. They are very close, so normal.

6. Describe the ratio of hematocrit to hemoglobin for the female with iron-deficiency anemia (sample 3) and the female Olympic athlete (sample 5). (A normal ratio of hematocrit to grams of hemoglobin is approximately 3:1.) Discuss any differences between the two individuals.
   Your answer:
   The ratio of patient with iron-deficiency anemia, is 5:1, this is not normal, because as we see from the experiment result, the hemoglobin is only 8 gm Hb/100 blood. This is because in iron-deficiency anemia, the patient has erythrocytes that are smaller. So the ratio between hemoglobin and hematocrit will be larger.