Introduction:

Human blood tells a lot about its owner. Doctors examine blood to determine whether or not a person has had a heart attack. Police (forensics) scientists use blood to aid in identifying potential suspects. Courts sometimes use blood to aid in determining the father of a child in paternity suits.

Blood is composed of living cells in a complex liquid called serum. The most abundant type of cell found in the blood is the red blood cell or erythrocyte. Red blood cells contain iron, which gives blood its characteristic color. The function of red blood cells is oxygen and carbon dioxide transport.

Attached to the surface of the red blood cells are proteins called antigens. These proteins are made by the cell under the control of its genes. Strangely, just before a red blood cell reaches maturity it “spits out” its nucleus containing the cell’s chromosomes. The result is that at maturity, red blood cells have functional gene products (the antigens), but the genes that were responsible for producing them are no longer present.

There is one particular gene for red blood cell protein that is of special interest. In every person this gene produces either A, B, or no protein. People are classified into ABO blood groups corresponding to the type of protein antigen they have on the surface of their red blood cells. Those who are type A have A antigens on their red blood cells; type B have B antigens; type AB have both A and B antigens; and type O produce neither A nor B antigens.

In addition to cells, blood contains many other materials, including proteins that fight disease called antibodies. Antibodies are manufactured by specific types of cells and recognize and attach to specific “foreign” materials that enter the blood stream. When the viruses responsible for mumps enter the blood, the body recognizes them as foreign and begins synthesizing antibodies that combine only with specific antigens of the virus. Antibody-coated viruses are readily “eaten” by white blood cells in the blood. In this way the illness is fought. Should the individual again be exposed to mumps the antibodies are able to prevent a repetition of the illness. In some instances antibody-coated cells and viruses will tend to clump, a phenomenon called agglutination.

Curiously, blood contains antibodies against A or B proteins if they are not present on its red blood cells. Thus a person with type B blood has B antigens on its red blood cells and anti-A antibodies in the blood serum. Type AB blood contains neither anti-A nor anti-B antibodies.

Purpose:

- To determine who can donate blood to whom
- To determine blood type of an accident victim for transfusion purposes.
Background Information:

One sunny afternoon Wiley Smith was roller blading in his community with his brother David. They stopped at the Tastee Freeze and ate a banana split then headed toward the park. Wiley wasn't careful when he left the Tastee Freeze parking lot & rolled out into the path of an automobile. Wiley was badly hurt and lost a significant amount of blood. He was rushed to the hospital where he waits in need of a blood transfusion. Which one of his siblings, David, Jane, or John can donate blood to their desperate brother?

Materials:

- Hema-tag
- One microscope slide
- Two toothpicks

Procedure:

1. Perform test at room temperature. Lay a microscope slide over the anti-A and anti-B circles on a hema-tag. Place 1 drop of anti-A and anti-B in their respective circles on the microscope slide.

2. Add 1 drop of blood cells being tested to each drop of anti-serum (4 will be tested, representing the four Smith children).

3. Mix the simulated cells and the anti-sera with appropriate toothpick within their respective circles, scraping the toothpick firmly against the microscope slide in the process. Continue stirring for two minutes or until agglutination is noted.

4. Read for gross agglutination and record test results in the data table. Note that in this simulation precipitations are recorded as agglutinations (clumping).

   Positive (+) = Agglutinated within two minutes.
   Negative (-) = No agglutination within two minutes.

5. Determine what type of blood each Smith has and record it in the data table.

Results:

<table>
<thead>
<tr>
<th>SAMPLE</th>
<th>RESULTS (+ or -)</th>
<th>BLOOD TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jane</td>
<td></td>
<td></td>
</tr>
<tr>
<td>John</td>
<td></td>
<td></td>
</tr>
<tr>
<td>David</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wiley</td>
<td>Anti A</td>
<td>Anti B</td>
</tr>
</tbody>
</table>


Conclusion:

1. What type of blood does the accident victim have? ______________. __________

2. Who can donate blood to help save the victim? ____________________________

3. If David were injured who could donate blood to him? ______________________

4. What blood type can receive any of the four blood types? ____________________

5. What blood type can donate to any of the four blood types? _________________

6. Why is it important to know a person's blood type? ________________________