Name _____________________________

Blood Typing Lab

Pre-lab work

Site #1: Introduction to Blood: https://www.nobelprize.org/prizes/medicine/1930/speedread/

1. Who discovered blood groups? ___________________________ When? _______________________

2. How much blood does the average adult have inside his/her body? _________________

3. What are the four components of blood?
   a. __________ blood cells – Contain hemoglobin, carries oxygen to cells and removes wastes
   b. ___________ blood cells – Helps our bodies fight infection
   c. ________________ - Liquid that makes up 55% of blood; contains salts and proteins
   d. ______________ - Helps blood clot

4. What causes the differences between human blood groups? ______________________

5. Complete the chart based on the information provided on the webpage

<table>
<thead>
<tr>
<th>Blood Type</th>
<th>Antigens on the Red Blood Cells</th>
<th>Antibodies in plasma</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. What is the Rh factor? _______________________________________________________

7. Look at the picture and complete this statement: A person with Rh + blood may receive blood that is _____ or _____, while a person with Rh - blood can only receive _____ blood.

8. What happens if a person with A + blood receives B + blood? ______________________

9. Complete the diagram to show how blood can be donated and then answer the questions.
   a. What blood type is known as the "Universal Donor"? Type ______
   b. What blood type is known as the "Universal Recipient"? Type ______
Blood Typing Lab:
Background: There are protein markers, called antigens, on the surface of red blood cells. You inherit these proteins, which define your blood type, from your parents. Blood type is particularly important when people give or receive blood for transfusions.

The immune system uses different types of proteins to fight off foreign cells. Antibodies are one of these types of proteins. Antibodies might cause foreign cells, such as foreign red blood cells, to clump together. If you receive blood with a protein marker different from your own, your immune system will use antibodies as part of its attack against the foreign blood cells. The antibodies will cause the red blood cells to clump together. Blood cannot flow through the vessels, and death can result.

There are two protein markers, A and B, and four blood groups, A, B, AB, and O, known as the ABO blood group. Type O blood has no protein markers and can be donated to a person with any other blood type. A person with Type O blood however, can only accept Type O blood.

Before a patient receives a transfusion, blood must be matched for both the ABO group and the Rh group.

Part 1 -
2. Click on “Educational” (it’s near the top of the page in the menu bar)
3. To the right side, click “The Blood Typing Game”
4. Click “Play blood typing game”.
5. Choose quick game “random”
6. Choose a patient
7. Click on the syringe and then hold it to the patients arm to take some blood. Hover the syringe over each of the three test tubes to add blood to them.
8. Record what happens in each of the test tubes in the chart below.

<table>
<thead>
<tr>
<th>Tube A (Anti–A)</th>
<th>Tube B (Anti–B)</th>
<th>Tube Rh (Anti–Rh)</th>
<th>Blood type of patient</th>
<th>Blood patient can receive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Part 2
2. Read the problem:
   a. What must doctors do before the transfusion? __________________________________________
3. Follow the steps and answer the questions:
   a. What is the function of the following
      i. Anti – A serum ___________________________________________________________________
      ii. Anti – B serum ___________________________________________________________________
      iii. Anti – Rh serum ___________________________________________________________________
   b. What are protein markers? ___________________________________________________________
   c. Where do you get them from? _________________________________________________________
   d. What are the four main blood types? _________________________________________________
   e. What does the immune system create to fight against foreign blood cells? ______________
5. Write your **predictions** in the *lab notebook* and here – Does the antibody attach (clump) or not attach (no clump/mix) with the blood type?

<table>
<thead>
<tr>
<th>Blood Type</th>
<th>Anti- A antibody</th>
<th>Anti- B antibody</th>
<th>Anti-Rh antibody</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
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<td>AB</td>
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<td></td>
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<tr>
<td>O</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rh +</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rh -</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Follow instructions to add serum to each of the trays and record what happened in each scenario. You will need to record in the online lab notebook otherwise the lab will not allow you to proceed to next steps.

<table>
<thead>
<tr>
<th>Tray 1</th>
<th>Tray 2</th>
<th>Tray 3</th>
<th>Tray 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood Type: _____</td>
<td>Blood Type: _____</td>
<td>Blood Type: _____</td>
<td>Blood Type: _____</td>
</tr>
</tbody>
</table>

Analyze and conclude

1. Which, if any, of the blood samples tested can the patient with type B+ receive? Why?

2. If a person has type A blood, he or she would have antibodies for what blood type?

3. Why is O negative the universal donor?

4. Is knowing the ABO blood type of a potential blood donor enough to determine a suitable match? Explain.

5. What might happen if someone with type A received a transfusion of type AB blood?
CRIME SCENE INVESTIGATION

Summary: A small puddle of blood and a weapon was found near a garbage can. After examining the area, the CSI on the scene discovered a body in the garbage can and identified him as Earnest “One-Eyed” Earl. Earl had a wound to his chest that will be analyzed by the medical examiner. The CSI tested blood samples from the puddle and weapon at the crime scene and determined that it was human blood, but he needs to know the blood type to help identify if it was from the victim or the person who murdered him. He has come up with three suspects that either knew the victim or were seen in the area before the body was discovered.

Procedure:
• Step 1: Using a pipette, drop about 10 drops of the “blood” into the three spots on the spot plate. Should fill the spot plate about 1/3 of the way.
• Step 2: Using another pipette, drop about 5 drops of anti-A serum into the first well. Gently stir the mixture and return the pipette to the water cup to rinse and clean the pipette.
• Step 3: Using another pipette, drop about 5 drops of anti-B serum into the second well. Gently stir the mixture and return the pipette to the water cup to rinse and clean the pipette.
• Step 4: Using another pipette, drop about 5 drops of anti-Rh serum into the third well. Gently stir the mixture and return the pipette to the water cup to rinse and clean the pipette.
• Step 5: Let mixtures settle and observe your results. Record your results in the spaces provided.
  ▪ If the mixture has clumps or becomes thick, it is a positive (+) reaction.
  ▪ If the mixture doesn’t seem to have clumps and just thins slightly, it is a negative (-) reaction.
• Step 6: Determine the blood type of all the samples based on your results.

Analysis Questions:
Who killed One eyed earl? ____________________________ How do you know that?____________________________________

What should investigators do next?