ABO Blood Type Game
The following lesson is adapted from the Red Cross ABO Blood Type Game

Materials
8 3.5 oz cups labeled “A”
8 3.5 oz cups labeled “B”
8 3.5 oz cups labeled “AB”
8 3.5 oz cups labeled “O”
32 pipettes
1 250 ml bottle water plus 15 drops red food coloring, labeled “A”
1 250 ml bottle water plus 10 drops blue food coloring, labeled “B”
1 250 ml bottle water plus 7 drops red + 5 drops blue food coloring, labeled “AB”
1 250 ml bottle water, labeled “O”
15 12-well plates
30 worksheets

Color Concentration for food coloring:
I use the ratio of 5 drops of food coloring for every 100 mL water. So a 1,000ml beaker or flask would have 50 drops. Set these up ahead of time. For purple do half red and half blue drops, for green I would just use the green food coloring at 5/100mL.

Blood Type A is Red (*or Blue)
Blood Type B is Blue (*or Yellow)
Blood Type AB is Purple (*or Green)
Blood Type O is Clear

Background Information
The following information is from the Red Cross

- Almost 40% of the population has O+ blood
- Patients with Type O blood must receive Type O blood
- About half of all blood ordered by hospitals in our area is Type O
- Type O blood is the universal blood type and is the only blood type that can be transfused to patients with other blood types
- Only about 7% of all people have Type O negative blood
- Type O negative blood is the preferred type for accident victims and babies needing exchange transfusions
- There is always a need for Type O donors because their blood may be transfused to a person of any blood type in an emergency
If your blood type is:

<table>
<thead>
<tr>
<th>Type</th>
<th>You Can Give Blood To</th>
<th>You Can Receive Blood From</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>A+ AB+</td>
<td>A+ A- O+ O-</td>
</tr>
<tr>
<td>O+</td>
<td>O+ A+ B+ AB+</td>
<td>O+ O-</td>
</tr>
<tr>
<td>B+</td>
<td>B+ AB+</td>
<td>B+ B- O+ O-</td>
</tr>
<tr>
<td>AB+</td>
<td>AB+</td>
<td>Everyone</td>
</tr>
<tr>
<td>A-</td>
<td>A+ A- AB+ AB-</td>
<td>A- O-</td>
</tr>
<tr>
<td>O-</td>
<td>Everyone</td>
<td>O-</td>
</tr>
<tr>
<td>B-</td>
<td>B+ B- AB+ AB-</td>
<td>B+ O-</td>
</tr>
<tr>
<td>AB-</td>
<td>AB+ AB-</td>
<td>AB+ A- B- O-</td>
</tr>
</tbody>
</table>

Out of 100 donors . . . .

<table>
<thead>
<tr>
<th></th>
<th>84 donors are RH+</th>
<th>16 donors are RH-</th>
</tr>
</thead>
<tbody>
<tr>
<td>38 are O+</td>
<td></td>
<td>7 are O-</td>
</tr>
<tr>
<td>34 are A+</td>
<td></td>
<td>6 are A-</td>
</tr>
<tr>
<td>9 are B+</td>
<td></td>
<td>2 are B-</td>
</tr>
<tr>
<td>3 are AB+</td>
<td></td>
<td>1 is AB-</td>
</tr>
</tbody>
</table>

**Experiment.**

**Tell students that:**
- If the color of the “blood” changes, it is not compatible.
- If the “blood” color stays the same, then it is compatible.

**A. Patient #1 is Type A.**
Patient #1 needs a transfusion. Ask students what blood types can this patient receive?

For patient #1, tell students to:
1) Pipette 3 squirts of liquid from Type A into the 1st well.
2) Do a “transfusion” by adding 3 more squirts of Type A to the 1st well and note if there is any change in color. (There is no change.)
   Explain that No change = Safe, Change = unsafe.
3) Now pipette another 3 squirts of type A from patient #1 into the second well on row 1
4) This time, add 3 squirts of Type B to the patient for the "transfusion."
   a. Students will notice a color change and see the change means that this is Unsafe,
   b. 5) Add 3 squirts of Type A to wells 3 and 4 on Row 1 and add Type AB and O to determine if these blood types are safe for patient 1.
B. **Patient #2 is Type B.**

C. **Patient #3 is Type AB.**

D. **Patient #4 is Type O.**

Tell students to make an hypothesis as to which blood types the patients #2, 3 and 4 could safely receive in a transfusion and then test it. Follow the same procedure as above.

Results and conclusions:

- Blood type A can only be given to type A and AB patients.
- Blood type B can only be given to type B and AB patients.
- Blood type AB individuals can receive blood from everyone, but they can only donate to other AB blood type patients.
- Blood type O individuals can only receive type O blood, but they can donate blood to every other type.

Adapted from the Red Cross Blood Typing game
## Blood Type Chart:

<table>
<thead>
<tr>
<th>Patient #1</th>
<th>Type A</th>
<th>Color change (yes/no)?</th>
<th>A added</th>
<th>Color change (yes/no)?</th>
<th>B added</th>
<th>Color change (yes/no)?</th>
<th>AB added</th>
<th>Color change (yes/no)?</th>
<th>O added</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient #2</td>
<td>Type B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient #3</td>
<td>Type AB</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Patient #4</td>
<td>Type O</td>
<td></td>
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</tr>
</tbody>
</table>

### Conclusions

Blood type A can only be given to type ________________ patients.
Blood type A patients can only receive ________________ type blood.

Blood type B can only be given to type ________________ patients.
Blood type B patients can only receive ________________ type blood.

Blood type AB can only be given to type ________________ patients.
Blood type AB patients can only receive ________________ type blood.

Blood type O can only be given to type ________________ patients.
Blood type O patients can only receive ________________ type blood.