Determining Paternity Using ABO

**Brief Background:** In 1901, Karl Landsteiner made one of the most significant discoveries of the century—the typing of blood. It was Landsteiner who first recognized that all human blood was not the same; instead, he found blood to be distinguishable by its group or type. Out of Landsteiner’s work came the classification system that we presently call the A-B-O system. By 1937, the Rh factor in blood was demonstrated.

The problem of identifying most blood factors in whole blood is in itself a difficult task. As blood dries, some of its characteristic blood factors are destroyed; and as the stain continues to age, then destruction slowly extends to the basic A-B-O system. It is up to the serologist, a person who tests specific antigen and serum antibodies, to pursue the detection and identification of various blood characteristics.

In humans, the population distribution of blood types varies with location and race throughout the world. In the United States, a typical distribution is as follows:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>AB</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>43%</td>
<td>42%</td>
<td>12%</td>
</tr>
<tr>
<td>AB</td>
<td></td>
<td></td>
<td>3%</td>
</tr>
</tbody>
</table>

In order to be a specific blood type, you must receive half of your genetic characteristic from your mother and the other half from your father. Because of this basic understanding of human genetics, it is then possible to determine (with some accuracy) if a child was conceived by the “natural” parents. Each blood type has the following possible genetic combination(s):

<table>
<thead>
<tr>
<th>O</th>
<th>A</th>
<th>B</th>
<th>AB</th>
</tr>
</thead>
<tbody>
<tr>
<td>OO</td>
<td>AA or AO</td>
<td>BB or BO</td>
<td>AB</td>
</tr>
</tbody>
</table>

**Case Description:** You are a legal assistant who has been given the following paternity cases to review. It is your job to screen each case to see if there is any validity to the claim of an “illegitimate” child and then make your recommendation to the lawyer you work for. Proceed with your recommendations, indicating a “yes” or “no” result on the Case Analysis form for each potential case. Also, write out the genetic make-up (letter combinations) for each case indicating why you choose “yes” or “no”.

Case 1.
Mother: A
Grandmother: O
Grandfather: AB
Father: B
Grandmother: O
Grandfather: B
Children: None
Child in Question: O

Case 2.
Mother: AB
Grandmother: A
Grandfather: B
Father: A
Grandmother: A
Grandfather: A
Children: A six year old girl with “AB” and a two year old boy with “A”
Child in Question: O

Case 3.
Mother: B
Grandmother: B
Grandfather: O
Father: B
Grandmother: AB
Grandfather: AB
Children: A three year old boy and a two year old boy both with “B”
Child in Question: O

Case 4.
Mother: O
Grandmother: A
Grandfather: B
Father: O
Grandmother: A
Grandfather: O
Children: None
Child in Question: O

Case 5.
Mother: B
Grandmother: B
Grandfather: A
Father: A
Grandmother: A
Grandfather: A
Children: A six year old girl with “B”
Child in Question: A

Case 6.
Mother: O
Grandmother: B
Grandfather: B
Father: O
Grandmother: A
Grandfather: O
Children: None
Child in Question: A

Case 7.
Mother: AB
Grandmother: A
Grandfather: AB
Father: AB
Grandmother: AB
Grandfather: B
Children: A 13 year old girl with “AB”, a 9 year old girls with “AB”, a 7 year old boy with “B”, and a 3 year old with “AB”
Child in Question: A