**Web Technology for bioinformatics**

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**Aim :**

To create an online web application using Javascript event handling.

**Procedure:**

i. Create a HTML form as shown in the Figure

ii. Create a onclick event handler for calculating the Child Blood type calculation using

the Blood Type Genetic basis.

**Blood Type Genetic Basis:**

There are four types of blood groups i.e. A, B, AB, and O blood group. Each of the groups has different antigens like (carbohydrates and proteins) combined on the surface membrane of the red blood cell.

Your blood group can be found out by the presence or absence of these antigens and the presence of some specific antibodies in the blood plasma.

Your blood type combination is in the genetics; every person inherits from their parents. Blood

group is determined by a single gene, each person has two alleles that can describe your blood

**type:**

Blood type A: either AA or A0

Blood type B: either BB or B0

Blood type AB: alleles AB

Blood type O: alleles OO

Here is a blood type inheritance chart for further understanding:

The Alleles AB are dominant, O allele is recessive and people with OO allele are going to have O blood group only.

**Which parent determines the blood type of the child ?**

Are you already thinking about what type of blood group your baby will have?

The child gets one allele from each parent and just like if you have A and your partner is having an AB blood group that means you have AA or AO allele and your partner has BB or BO. You can use our blood type Punnett square calculator to calculate the genotype of your offspring. Otherwise, here is how you can calculate your baby’s blood type manually:

Write down your blood type and your type’s allele like AA or AO. According to your allele, your child will probably have A-type (75% chance) or O type (25% chance).

Write down your partner’s blood type and alleles which will be AB.

The child will have a 50% chance of A blood type and 50% B type.

1. After that calculate the chances of genotypes:

Chances of your Child#39;s genotype is AA is 75% \* 50% = 37.5%.

Chances of your Child#39;s genotype is AB is 75% \* 50% = 37.5%.

Chances of your Child#39;s genotype is A0 is 25% \* 50% = 12.5%.

Chances of your Child#39;s genotype is B0 is 25% \* 50% = 12.5%.

1. Afterward, add the values of AA and AO and AB and BO together.

37.5% + 12.5%&#39; = 50%.chance for A blood group

12.5%chance for B blood group

37.5%.chance for AB blood group

**Another example:**

If both parents have type A blood, then the alleles could be AA or AO, thus the allele A

frequency is 75%, allele O frequency is 25% for both parents.

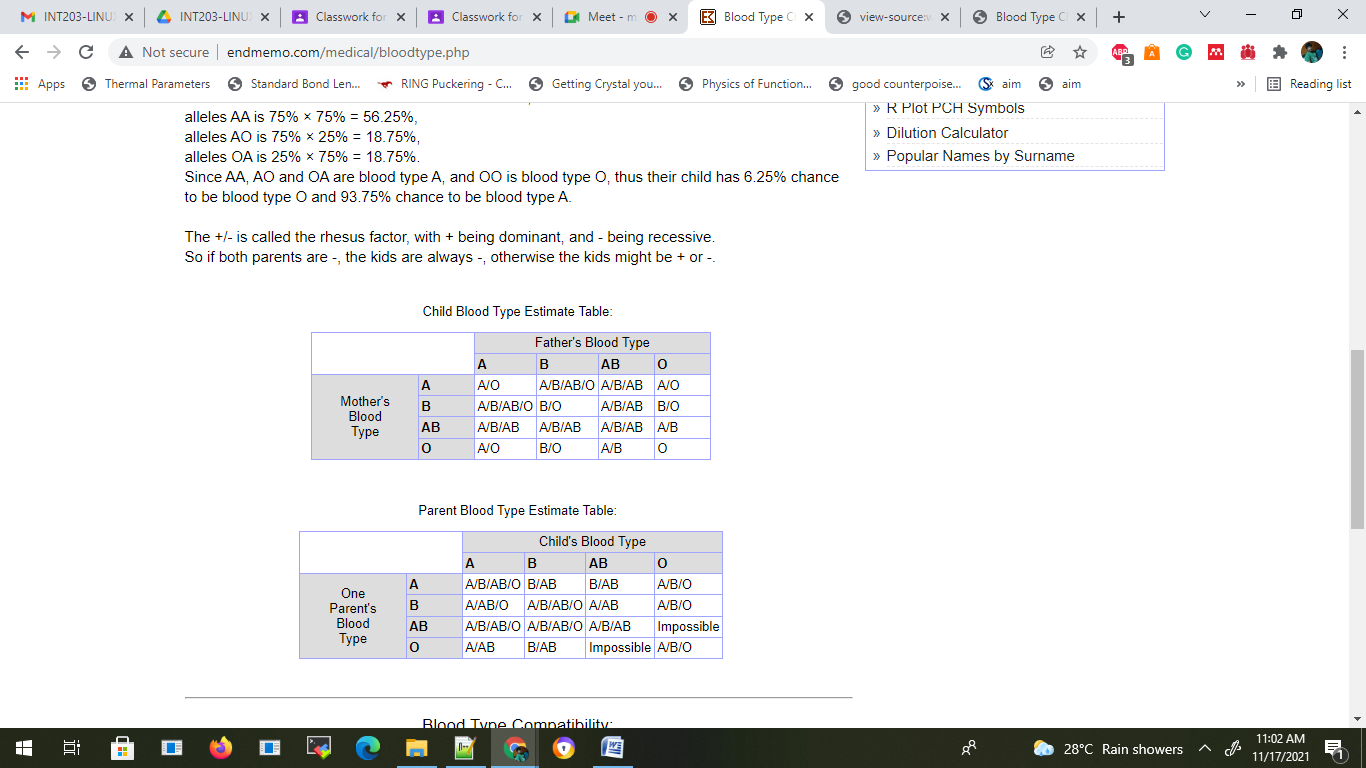
So the chance of alleles OO is 25% × 25% = 6.25%,

alleles AA is 75% × 75% = 56.25%,

alleles AO is 75% × 25% = 18.75%,

alleles OA is 25% × 75% = 18.75%.

Since AA, AO and OA are blood type A, and OO is blood type O, thus their child has 6.25% chance to be blood type O and 93.75% chance to be blood type A.



**Program:**

**The code below is written in a html:**

**<!DOCTYPE html>**

**<html>**

**<head>**

**<title>Child blood type calculator</title>**

**<meta content="text/html;charset=utf-8" http-equiv="Content-Type">**

**<meta content="utf-8" http-equiv="encoding">**

**</head>**

**<!--**

**Author : Dharineesh K S**

**regno : 123013012**

**-->**

**<body>**

**<script type="text/javascript" defer>**

**function calculate\_blood\_type()**

**{**

**var mother\_type = document.getElementById("mother").value;**

**var father\_type = document.getElementById("father").value;**

**if (father\_type == "A" && mother\_type == "A")**

**{**

**f\_possible = ['AO','AA'];**

**m\_possible = ['AO','AA'];**

**var AA = 0;**

**var AO = 0;**

**var OA = 0;**

**var OO = 0;**

**var tot = 0;**

**for (let f\_ch of f\_possible)**

**{**

**for (let m\_ch of m\_possible)**

**{**

**for (let i = 0;i < 1;i++)**

**{**

**if (f\_ch[i] == 'A' && m\_ch[i] == 'A')**

**{**

**AA = AA + 1;**

**} // AA**

**if (f\_ch[i] == 'A' && m\_ch[i+1] == 'A')**

**{**

**AA = AA + 1;**

**} // AA**

**if (f\_ch[i+1] == 'A' && m\_ch[i] == 'A')**

**{**

**AA = AA + 1;**

**} // AA**

**if (f\_ch[i+1] == 'A' && m\_ch[i+1] == 'A')**

**{**

**AA = AA + 1;**

**} // AA**

**if (f\_ch[i] == 'A' && m\_ch[i+1] == 'O')**

**{**

**AO = AO + 1;**

**} // AO**

**if (f\_ch[i+1] == 'A' && m\_ch[i+1] == 'O')**

**{**

**AO = AO + 1;**

**} // AO**

**if (f\_ch[i+1] == 'A' && m\_ch[i] == 'O')**

**{**

**AO = AO + 1;**

**} // AO**

**if (f\_ch[i+1] == 'O' && m\_ch[i+1] == 'A')**

**{**

**OA = OA + 1;**

**} // OA**

**if (f\_ch[i+1] == 'O' && m\_ch[i] == 'A')**

**{**

**OA = OA + 1;**

**} // OA**

**if (f\_ch[i] == 'O' && m\_ch[i+1] == 'A')**

**{**

**OA = OA + 1;**

**} // OA**

**if (f\_ch[i+1] == 'O' && m\_ch[i+1] == 'O')**

**{**

**OO = OO + 1;**

**} // OO**

**}**

**}**

**}**

**tot = AA + AO + OA + OO;**

**var A = 0;**

**var B = 0;**

**var A\_B = 0;**

**var O = 0;**

**A = ((AA + AO + OA)/tot)\*100;**

**O = (OO/tot)\*100;**

**document.getElementById("AAAA").innerHTML = A;**

**document.getElementById("BBBB").innerHTML = B;**

**document.getElementById("ABAB").innerHTML = A\_B;**

**document.getElementById("OOOO").innerHTML = O;**

**}**

**else if (father\_type == "B" && mother\_type == "B")**

**{**

**f\_possible = ['BO','BB'];**

**m\_possible = ['BO','BB'];**

**var BB = 0;**

**var BO = 0;**

**var OB = 0;**

**var OO = 0;**

**var tot = 0;**

**for (let f\_ch of f\_possible)**

**{**

**for (let m\_ch of m\_possible)**

**{**

**for (let i = 0;i < 1;i++)**

**{**

**if (f\_ch[i] == 'B' && m\_ch[i] == 'B')**

**{**

**BB = BB + 1;**

**} // BB**

**if (f\_ch[i] == 'B' && m\_ch[i+1] == 'B')**

**{**

**BB = BB + 1;**

**} // BB**

**if (f\_ch[i+1] == 'B' && m\_ch[i] == 'B')**

**{**

**BB = BB + 1;**

**} // BB**

**if (f\_ch[i+1] == 'B' && m\_ch[i+1] == 'B')**

**{**

**BB = BB + 1;**

**} // BB**

**if (f\_ch[i] == 'B' && m\_ch[i+1] == 'O')**

**{**

**BO = BO + 1;**

**} // BO**

**if (f\_ch[i+1] == 'B' && m\_ch[i+1] == 'O')**

**{**

**BO = BO + 1;**

**} // BO**

**if (f\_ch[i+1] == 'B' && m\_ch[i] == 'O')**

**{**

**BO = BO + 1;**

**} // BO**

**if (f\_ch[i+1] == 'O' && m\_ch[i+1] == 'B')**

**{**

**OB = OB + 1;**

**} // OB**

**if (f\_ch[i+1] == 'O' && m\_ch[i] == 'B')**

**{**

**OB = OB + 1;**

**} // OB**

**if (f\_ch[i] == 'O' && m\_ch[i+1] == 'B')**

**{**

**OB = OB + 1;**

**} // OB**

**if (f\_ch[i+1] == 'O' && m\_ch[i+1] == 'O')**

**{**

**OO = OO + 1;**

**} // OO**

**}**

**}**

**}**

**tot = BB + BO + OB + OO;**

**var A = 0;**

**var B = 0;**

**var A\_B = 0;**

**var O = 0;**

**B = ((BB + BO + OB)/tot)\*100;**

**O = (OO/tot)\*100;**

**document.getElementById("AAAA").innerHTML = A;**

**document.getElementById("BBBB").innerHTML = B;**

**document.getElementById("ABAB").innerHTML = A\_B;**

**document.getElementById("OOOO").innerHTML = O;**

**}**

**else if (father\_type == "AB" && mother\_type == "AB")**

**{**

**f\_possible = ['AB'];**

**m\_possible = ['AB'];**

**var AA = 0;**

**var AB = 0;**

**var BB = 0;**

**var tot = 0;**

**for (let f\_ch of f\_possible)**

**{**

**for (let m\_ch of m\_possible)**

**{**

**for (let i = 0;i < 1;i++)**

**{**

**if (f\_ch[i] == 'A' && m\_ch[i] == 'A')**

**{**

**AA = AA + 1;**

**}**

**if (f\_ch[i] == 'A' && m\_ch[i+1] == 'B')**

**{**

**AB = AB + 1;**

**}**

**if (f\_ch[i+1] == 'B' && m\_ch[i] == 'A')**

**{**

**AB = AB + 1;**

**}**

**if (f\_ch[i+1] == 'B' && m\_ch[i+1] == 'B')**

**{**

**BB = BB + 1;**

**}**

**}**

**}**

**}**

**tot = AA + AB + BB;**

**var A = 0;**

**var B = 0;**

**var A\_B = 0;**

**var O = 0;**

**A = (AA/tot)\*100;**

**B = (BB/tot)\*100;**

**A\_B = (AB/tot)\*100;**

**document.getElementById("AAAA").innerHTML = A;**

**document.getElementById("BBBB").innerHTML = B;**

**document.getElementById("ABAB").innerHTML = A\_B;**

**document.getElementById("OOOO").innerHTML = O;**

**}**

**else if (father\_type == "O" && mother\_type == "O")**

**{**

**f\_possible = ['OO'];**

**m\_possible = ['OO'];**

**var OO = 0;**

**var tot = 0;**

**for (let f\_ch of f\_possible)**

**{**

**for (let m\_ch of m\_possible)**

**{**

**for (let i = 0;i < 1;i++)**

**{**

**if (f\_ch[i] == 'O' && m\_ch[i] == 'O')**

**{**

**OO = OO + 1;**

**}**

**if (f\_ch[i] == 'O' && m\_ch[i+1] == 'O')**

**{**

**OO = OO + 1;**

**}**

**if (f\_ch[i+1] == 'O' && m\_ch[i] == 'O')**

**{**

**OO = OO + 1;**

**}**

**if (f\_ch[i+1] == 'O' && m\_ch[i+1] == 'O')**

**{**

**OO = OO + 1;**

**}**

**}**

**}**

**}**

**tot = OO;**

**var A = 0;**

**var B = 0;**

**var A\_B = 0;**

**var O = 0;**

**O = (OO/tot)\*100;**

**document.getElementById("AAAA").innerHTML = A;**

**document.getElementById("BBBB").innerHTML = B;**

**document.getElementById("ABAB").innerHTML = A\_B;**

**document.getElementById("OOOO").innerHTML = O;**

**}**

**else if ((father\_type == "A" && mother\_type == "B") || (father\_type == "B" && mother\_type == "A"))**

**{**

**f\_possible = ['AO','AA'];**

**m\_possible = ['BO','BB'];**

**var AB = 0;**

**var AO = 0;**

**var BO = 0;**

**var OO = 0;**

**var tot = 0;**

**for (let f\_ch of f\_possible)**

**{**

**for (let m\_ch of m\_possible)**

**{**

**for (let i = 0;i < 1;i++)**

**{**

**if (f\_ch[i] == 'A' && m\_ch[i] == 'B')**

**{**

**AB = AB + 1;**

**} // AB**

**if (f\_ch[i] == 'A' && m\_ch[i+1] == 'O')**

**{**

**AO = AO + 1;**

**} // AO**

**if (f\_ch[i+1] == 'O' && m\_ch[i] == 'B')**

**{**

**BO = BO + 1;**

**} // BO**

**if (f\_ch[i+1] == 'O' && m\_ch[i+1] == 'O')**

**{**

**OO = OO + 1;**

**} // OO**

**if (f\_ch[i] == 'A' && m\_ch[i] == 'B')**

**{**

**AB = AB + 1;**

**} // AB**

**if (f\_ch[i] == 'A' && m\_ch[i+1] == 'B')**

**{**

**AB = AB + 1;**

**} // AB**

**if (f\_ch[i+1] == 'B' && m\_ch[i] == 'O')**

**{**

**BO = BO + 1;**

**} // BO**

**if (f\_ch[i+1] == 'B' && m\_ch[i+1] == 'O')**

**{**

**BO = BO + 1;**

**} // BO**

**if (f\_ch[i] == 'A' && m\_ch[i] == 'B')**

**{**

**AB = AB + 1;**

**} // AB**

**if (f\_ch[i+1] == 'A' && m\_ch[i] == 'B')**

**{**

**AB = AB + 1;**

**} // AB**

**if (f\_ch[i] == 'A' && m\_ch[i+1] == 'O')**

**{**

**AO = AO + 1;**

**} // AO**

**if (f\_ch[i+1] == 'A' && m\_ch[i+1] == 'O')**

**{**

**AO = AO + 1;**

**} // AO**

**if (f\_ch[i] == 'A' && m\_ch[i] == 'B')**

**{**

**AB = AB + 1;**

**} // AB**

**if (f\_ch[i+1] == 'A' && m\_ch[i] == 'B')**

**{**

**AB = AB + 1;**

**} // AB**

**if (f\_ch[i] == 'A' && m\_ch[i+1] == 'B')**

**{**

**AB = AB + 1;**

**} // AB**

**if (f\_ch[i+1] == 'A' && m\_ch[i+1] == 'B')**

**{**

**AB = AB + 1;**

**} // AB**

**}**

**}**

**}**

**tot = 16;**

**var A = (3/tot)\*100;**

**var B = (3/tot)\*100;**

**var A\_B = (9/tot)\*100;**

**var O = (OO/tot)\*100;**

**document.getElementById("AAAA").innerHTML = A;**

**document.getElementById("BBBB").innerHTML = B;**

**document.getElementById("ABAB").innerHTML = A\_B;**

**document.getElementById("OOOO").innerHTML = O;**

**}**

**else if ((father\_type == "A" && mother\_type == "O") || (father\_type == "O" && mother\_type == "A") || (father\_type == "B" && mother\_type == "O") || (father\_type == "O" && mother\_type == "B"))**

**{**

**f\_possible = ['AO','AA'];**

**m\_possible = ['OO'];**

**var AO = 0;**

**var OO = 0;**

**var tot = 0;**

**for (let f\_ch of f\_possible)**

**{**

**for (let m\_ch of m\_possible)**

**{**

**for (let i = 0;i < 1;i++)**

**{**

**if (f\_ch[i] == 'A' && m\_ch[i] == 'O')**

**{**

**AO = AO + 1;**

**}**

**if (f\_ch[i+1] == 'O' && m\_ch[i+1] == 'O')**

**{**

**OO = OO + 1;**

**}**

**if (f\_ch[i+1] == 'O' && m\_ch[i] == 'O')**

**{**

**OO = OO + 1;**

**}**

**if (f\_ch[i] == 'A' && m\_ch[i+1] == 'O')**

**{**

**AO = AO + 1;**

**}**

**if (f\_ch[i+1] == 'A' && m\_ch[i] == 'O')**

**{**

**AO = AO + 1;**

**}**

**if (f\_ch[i+1] == 'A' && m\_ch[i+1] == 'O')**

**{**

**AO = AO + 1;**

**}**

**}**

**}**

**}**

**tot = OO + AO;**

**var A = 0;**

**var B = 0;**

**var A\_B = 0;**

**var O = 0;**

**if ((father\_type == "A" && mother\_type == "O") || (father\_type == "O" && mother\_type == "A"))**

**{**

**A = (AO/tot)\*100;**

**O = (OO/tot)\*100;**

**document.getElementById("AAAA").innerHTML = A;**

**document.getElementById("BBBB").innerHTML = B;**

**document.getElementById("ABAB").innerHTML = A\_B;**

**document.getElementById("OOOO").innerHTML = O;**

**}**

**else**

**{**

**B = (AO/tot)\*100;**

**O = (OO/tot)\*100;**

**document.getElementById("AAAA").innerHTML = A;**

**document.getElementById("BBBB").innerHTML = B;**

**document.getElementById("ABAB").innerHTML = A\_B;**

**document.getElementById("OOOO").innerHTML = O;**

**}**

**}**

**else if ((father\_type == "A" && mother\_type == "AB") || (father\_type == "AB" && mother\_type == "A") || (father\_type == "B" && mother\_type == "AB") || (father\_type == "AB" && mother\_type == "B"))**

**{**

**f\_possible = ['AO','AA'];**

**m\_possible = ['AB'];**

**var AA = 0;**

**var AB = 0;**

**var AO = 0;**

**var BO = 0;**

**var tot = 0;**

**for (let f\_ch of f\_possible)**

**{**

**for (let m\_ch of m\_possible)**

**{**

**for (let i = 0;i < 1;i++)**

**{**

**if (f\_ch[i] == 'A' && m\_ch[i] == 'A')**

**{**

**AA = AA + 1;**

**} // aa**

**if (f\_ch[i] == 'A' && m\_ch[i+1] == 'B')**

**{**

**AB = AB + 1;**

**} // ab**

**if (f\_ch[i+1] == 'O' && m\_ch[i] == 'A')**

**{**

**AO = AO + 1;**

**} // ao**

**if (f\_ch[i+1] == 'O' && m\_ch[i+1] == 'B')**

**{**

**BO = BO + 1;**

**} // bo**

**if (f\_ch[i+1] == 'A' && m\_ch[i] == 'A')**

**{**

**AA = AA + 1;**

**} // aa**

**if (f\_ch[i+1] == 'A' && m\_ch[i+1] == 'B')**

**{**

**AB = AB + 1;**

**} // ab**

**}**

**}**

**}**

**tot = AA + AO + BO + AB;**

**var A = 0;**

**var B = 0;**

**var A\_B = 0;**

**var O = 0;**

**if ((father\_type == "A" && mother\_type == "AB") || (father\_type == "AB" && mother\_type == "A"))**

**{**

**A = ((AO+AA)/tot)\*100;**

**B = ((BO)/tot)\*100;**

**A\_B = ((AB)/tot)\*100;**

**document.getElementById("AAAA").innerHTML = A;**

**document.getElementById("BBBB").innerHTML = B;**

**document.getElementById("ABAB").innerHTML = A\_B;**

**document.getElementById("OOOO").innerHTML = O;**

**}**

**else**

**{**

**B = ((AO+AA)/tot)\*100;**

**A = ((BO)/tot)\*100;**

**A\_B = ((AB)/tot)\*100;**

**document.getElementById("AAAA").innerHTML = A;**

**document.getElementById("BBBB").innerHTML = B;**

**document.getElementById("ABAB").innerHTML = A\_B;**

**document.getElementById("OOOO").innerHTML = O;**

**}**

**}**

**else**

**{**

**f\_possible = ['OO'];**

**m\_possible = ['AB'];**

**var AO = 0;**

**var BO = 0;**

**for (let f\_ch of f\_possible)**

**{**

**for (let m\_ch of m\_possible)**

**{**

**for (let i = 0;i < 1;i++)**

**{**

**if(f\_ch[i] == 'O' && m\_ch[i] == 'A')**

**{**

**AO = AO + 1;**

**}**

**if(f\_ch[i+1] == 'O' && m\_ch[i] == 'A')**

**{**

**AO = AO + 1;**

**}**

**if(f\_ch[i] == 'O' && m\_ch[i+1] == 'B')**

**{**

**BO = BO + 1;**

**}**

**if(f\_ch[i+1] == 'O' && m\_ch[i+1] == 'B')**

**{**

**BO = BO + 1;**

**}**

**}**

**}**

**}**

**tot = AO + BO ;**

**var A = 0;**

**var B = 0;**

**var A\_B = 0;**

**var O = 0;**

**A = ((AO)/tot)\*100;**

**B = ((BO)/tot)\*100;**

**document.getElementById("AAAA").innerHTML = A;**

**document.getElementById("BBBB").innerHTML = B;**

**document.getElementById("ABAB").innerHTML = A\_B;**

**document.getElementById("OOOO").innerHTML = O;**

**}**

**}**

**</script>**

**<form>**

**<table align="center">**

**<tr><th></th><th>Child Blood type calculator</th></tr>**

**<tr><th align="right">Mother Blood type:</th>**

**<th align="left">**

**<select name="mother" id="mother">**

**<option value="A" >A</option>**

**<option value="B" >B</option>**

**<option value="O" >O</option>**

**<option value="AB">AB</option>**

**</select>**

**</th>**

**</tr>**

**<tr><th align="right">Father Blood type:</th>**

**<th align="left">**

**<select name="father" id="father">**

**<option value="A">A</option>**

**<option value="B">B</option>**

**<option value="O">O</option>**

**<option value="AB">AB</option>**

**</select>**

**</th>**

**</tr>**

**<tr><th align="right">Type A Chance:</th><th align="left"> <p><b id="AAAA"></b>%</p></th></tr>**

**<tr><th align="right">Type B Chance:</th><th align="left"> <p><b id="BBBB"></b>%</p></th></tr>**

**<tr><th align="right">Type AB Chance:</th><th align="left"><p><b id="ABAB"></b>%</p></th></tr>**

**<tr><th align="right">Type O Chance:</th><th align="left"> <p><b id="OOOO"></b>%</p></th></tr>**

**<tr><th></th>**

**<th>**

**<input type="button" value="calculate" onclick="calculate\_blood\_type()">**

**<input type="reset" value="Reset all" >**

**</th>**

**</tr>**

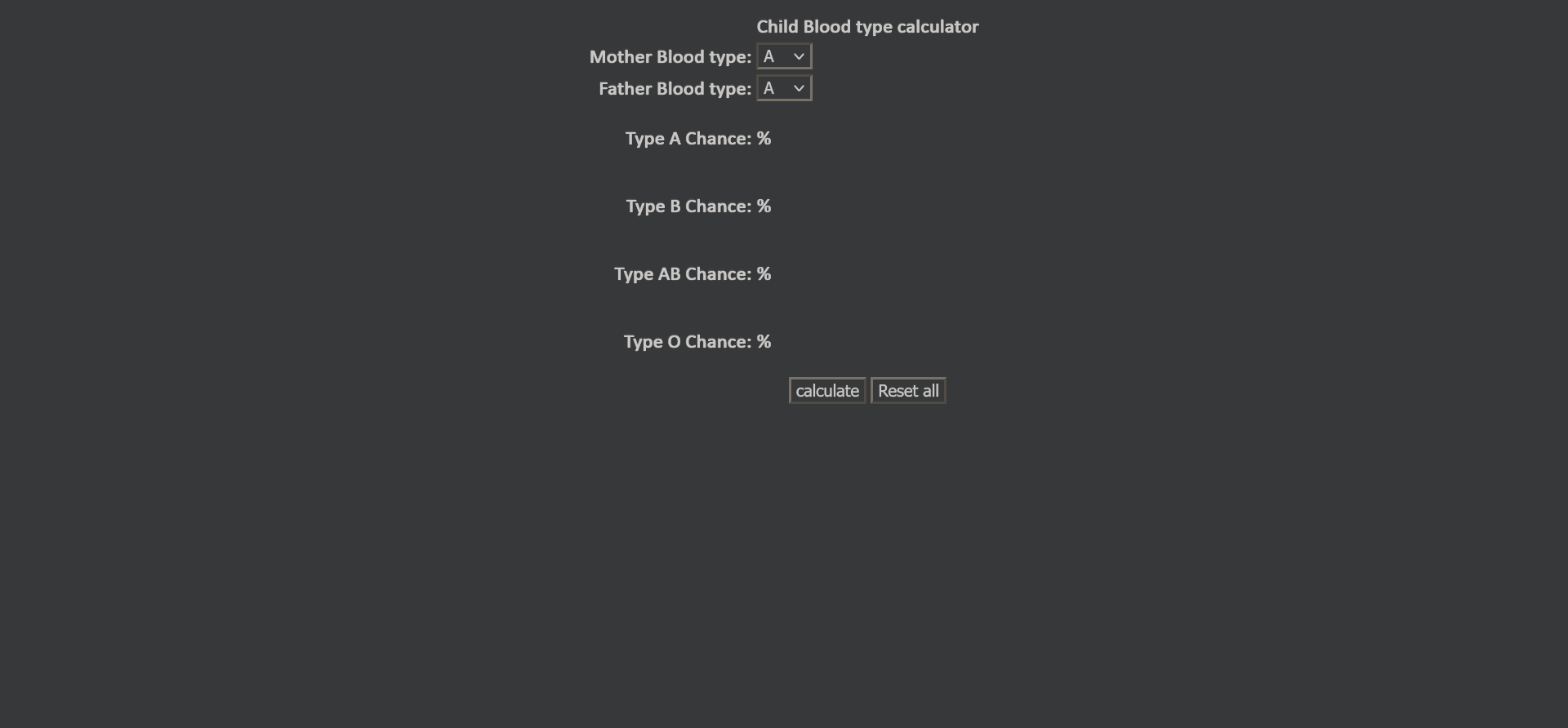
**</table>**

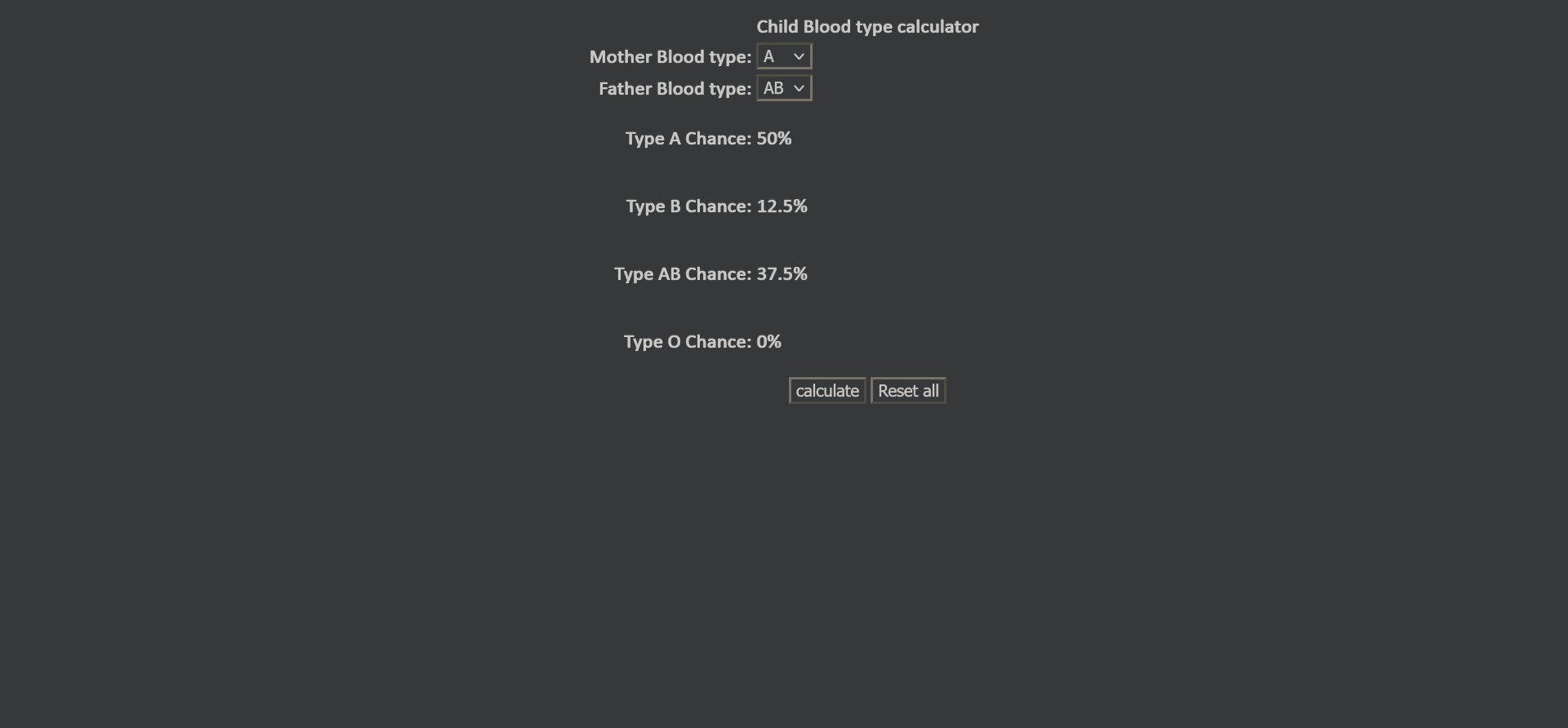
**</form>**

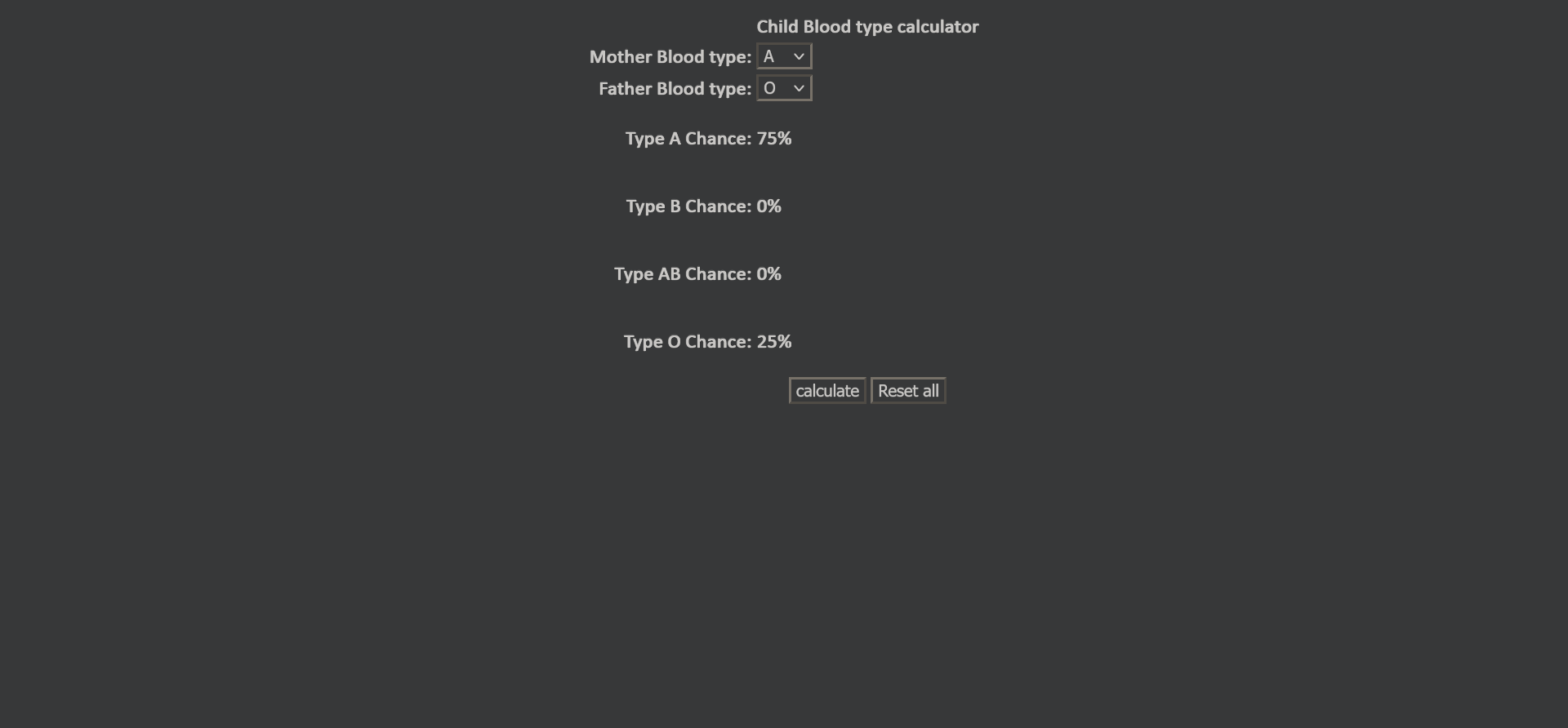
**</body>**

**</html>**

**Output:**

****

****

****

**Result:**

The given task is successfully executed.