

# Concept Development 1B - Part 2: PREDICTING THE INHERITANCE OF TRAITS WHEN ALLELES DEMONSTRATE CODOMINANCE!!

1. For the blood phenotypes listed below, list all the possible genotypes which may produce that particular phenotype. Remember - ABO protein types, and Rh factor are two different traits. See the first example done for you:

<p>Allele Key: (either symbol is ok to use)</p> <p><math>I^A = A</math> <math>I^B = B</math> <math>i = o</math></p> <p>+ = Rh positive - = Rh negative</p>	<p style="text-align: center;"><b>A+</b></p> <p><math>I^A I^A, ++</math>   <math>I^A I^A, +-</math> <math>I^A i, ++</math>   <math>I^A i, +-</math> (OR) <math>AA, ++</math>   <math>AA, +-</math> <math>Ao, ++</math>   <math>Ao, +-</math></p>	<p style="text-align: center;"><b>B+</b></p> <p><math>BB, ++</math> <math>BB, +-</math> <math>Bo, ++</math> <math>Bo, +-</math></p>	<p style="text-align: center;"><b>AB+</b></p> <p><math>AB, ++</math> <math>AB, +-</math></p>
		<p style="text-align: center;"><b>B-</b></p> <p><math>BB, --</math> <math>Bo, --</math></p>	<p style="text-align: center;"><b>AB-</b></p> <p><math>AB, --</math></p>
	<p style="text-align: center;"><b>A-</b></p> <p><math>AA, --</math> <math>Ao, --</math></p>	<p style="text-align: center;"><b>O+</b></p> <p><math>oo, ++</math> <math>oo, +-</math></p>	<p style="text-align: center;"><b>O-</b></p> <p><math>oo, --</math></p>

2. For this question, consider only the ABO blood group alleles! What genotypes would you expect from the parents of the following 5 offspring? You must include a punnet square as evidence for your answer!!

- 1- Child with Type A blood
- 2- Children with Type AB blood
- 1- Child with Type B blood
- 1- Child with Type O blood

PARENTAL GENOTYPES

**Ao x Bo**

	<b>A</b>	<b>O</b>
<b>B</b>	<b>AB</b>	<b>Bo</b>
<b>O</b>	<b>Ao</b>	<b>oo</b>

3. Blood typing may be used in some cases to solve paternity cases. A mother (Rene') with blood phenotype B+ has a son (William) with blood phenotype O-. The alleged father (John) has blood type B+ also. Provide evidence which either supports or refutes the allegation that John is the father of William. You must include a punnet square as evidence for your answer!! (This is a two trait cross!!)

Remember that ABO follows co-dominance and that + is dominant to -.

John

B +      B -      O +      O -

<u>B</u> <u>+</u>				
<u>B</u> <u>-</u>				
<u>O</u> <u>+</u>				
<u>O</u> <u>-</u>	IF John and Rene are both B0+-			$\frac{1}{16}$ chance <u>OO</u> <u>- -</u>

RENE

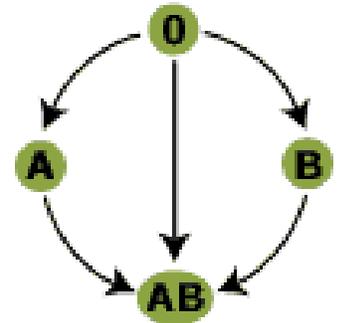
Could John be the father of William??  
Yes

If yes, what is John's genotype?  
B0+-

4. Recall the blood typing game simulation and consider the patients and their blood phenotypes below. What blood types would not be successfully received by each patient? You must provide a reason for why the transfusion would be unsuccessful in your answer!!

*Remember this??*

UNIVERSAL DONOR



UNIVERSAL RECEIVER

a) Patient A who has type O+ blood

HAS A and B antibodies

So can't receive

A+, A-, B+, B-, AB+, AB-

b) Patient B who has type AB- blood

Just has + antibodies

Can't receive

A+, B+, AB+, O+

c) Patient C who has type A+ blood

has B antibodies

Can't receive

B+, B-, AB+, AB-

5. Blood Type is determined by alleles which code for A, B, or no antigen on the surface of red blood cells. The A and B alleles are dominant over the O(no antigen) allele. Use this information in order to **complete the pedigree** below. Be sure to label each individual with the **correct Pedigree nomenclature**. Additionally, label each individual with their known **genotype** or **possible genotype with percentages**.

*\*Shaded individuals have type O blood\**

*\*The phenotype for some individuals is also given to you\**

