

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>$I^A = A$ $I^B = B$ $i = o$</p> <p>+ = Rh positive - = Rh negative</p> | <p>A+</p> <p>$I^A I^A, ++$ $I^A I^A, +-$ $I^A i, ++$ $I^A i, +-$ (OR) $AA, ++$ $AA, +-$ $Ao, ++$ $Ao, +-$</p> | <p>B+</p> <p>$BB, ++$ $BB, +-$ $Bo, ++$ $Bo, +-$</p> | <p>AB+</p> <p>$AB, ++$ $AB, +-$</p> |
| | | <p>B-</p> <p>$BB, --$ $Bo, --$</p> | <p>AB-</p> <p>$AB, --$</p> |
| | <p>A-</p> <p>$AA, --$ $Ao, --$</p> | <p>O+</p> <p>$oo, ++$ $oo, +-$</p> | <p>O-</p> <p>$oo, --$</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

$Ao \times Bo$

| | | |
|----------|----------|----------|
| | A | O |
| B | AB | Bo |
| O | Ao | oo |

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 B+ - | | $\frac{1}{16}$ chance | <u>O</u> <u>O</u> <u>-</u> <u>-</u> |

RENE

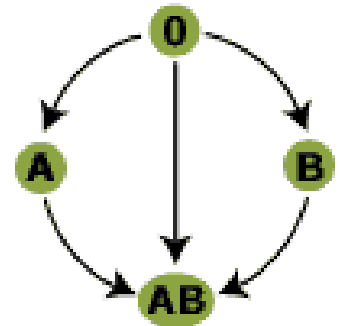
Could John be the father of William??
Yes

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

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

