Name _____ Period _____ Date _____

# Codominance Worksheet (Blood types)

Human blood types are determined by genes that follow the **CODOMINANCE** pattern of inheritance. There are two dominant alleles (A & B) and one recessive allele (O).

| Blood Type (Phenotype) | Genotype | Can donate blood to: | Can receive blood from: |
|---|---|---|---|
| O | ii (OO) | A,B,AB and O (universal donor) | O |
| AB | $I^AI^B$ | AB | A,B,AB and O (universal receiver) |
| A | $I^AI^A$ or $I^Ai$ ($I^AO$) | AB, A | O,A |
| B | $I^BI^B$ or $I^Bi$ ($I^BO$) | AB,B | O,B |

**Write the genotype for each person based on the description:**

- Homozygous for the "B" allele $I^B\ I^B$
- Heterozygous for the "A" allele $I^A\ i$
- Type O $i\ i$
- Type "A" and had a type "O" parent $I^A\ i$
- Type "AB" $I^A\ I^B$
- Blood can be donated to anybody O
- Can only get blood from a type "O" donor O

Pretend that Brad Pitt is homozygous for the type B allele, and Angelina Jolie is type "O."
**What are all the possible blood types of their baby?** *(Do the Punnett square)*

B

| | $I^B$ | $I^B$ |
|---|---|---|
| i | $I^B\ i$ | $I^B\ i$ |
| i | $I^B\ i$ | $I^B\ i$ |

Complete the Punnett square showing all the possible blood types for the offspring produced by a type "O" mother and an a Type "AB" father. **What are the percentages of each offspring?**

50% A; 50% B

| | $I^A$ | $I^B$ |
|---|---|---|
| i | $I^A\ i$ | $I^B\ i$ |
| i | $I^A\ i$ | $I^B\ i$ |

Mrs. Essy is type "A" and Mr. Essy is type "O." They have three children named Matthew, Mark, and Luke. Mark is type "O," Matthew is type "A," and Luke is type "AB." Based on this information:

- Mr. Essy must have the genotype: $i\ i$
- Mrs. Essy must have the genotype: $I^A\ i$
- Luke cannot be the child of these parents because neither parent has the allele: B

| | $I^A$ | i |
|---|---|---|
| i | $I^A\ i$ | $i\ i$ |
| i | $I^A\ i$ | $i\ i$ |

Two parents think their baby was switched at the hospital. It's 1968, so DNA fingerprinting technology does not exist yet. The mother has blood type "O," the father has blood type "AB," and the baby has blood type "B."

- Mother's genotype: $i\ i$
- Father's genotype: $I^A\ I^B$
- Baby's genotype: $I^B\ i$ or $I^B\ I^B$
- Complete a Punnett square with all possible genotypes for children produced by this couple.

| | i | i |
|---|---|---|
| $I^A$ | $I^A\ i$ | $I^A\ i$ |
| $I^B$ | $I^B\ i$ | $I^B\ i$ |

- Was the baby switched? No

Two other parents think their baby was switched at the hospital. Amy, the mother, has blood type "A," Linville, the father, has blood type "B," and Priscilla, the baby, has blood type "AB."

- Mother's genotype: $I^A I^A$ or $I^A i$
- Father's genotype: $I^B I^B$ or $I^B i$
- Baby's genotype: $I^A I^B$
- Complete a Punnett square that shows the baby's genotype as a possibility.
- Could the baby actually be theirs? Yes_____

| | $I^A$ | i |
|---|---|---|
| $I^B$ | $I^A I^B$ | $I^B i$ |
| i | $I^A i$ | i i |

Based on the information in this table, which men **could not** be the father of the baby? *(hint… look at the baby's blood type only…)*____

_____

**You can use the Punnett square if you need help figuring it out.**

| Name | Blood Type |
|---|---|
| Mother | Type A |
| Baby | Type B |
| The mailman | Type O |
| The butcher | Type AB |
| The waiter | Type A |
| The cable guy | Type B |

Mother can be $I^A I^A$ or $I^A i$ . Baby does not get a B allele from Mother.

The waiter can be $I^A I^A$ or $I^A i$. He does not have a B allele to give to Baby.

The mailman's genotype is i i. The baby's genotype is B. The mailman does not have a B allele to give to the baby.

| | $I^A$ | i |
|---|---|---|
| $I^A$ | $I^A I^A$ | $I^A i$ |
| i | $I^A I^A$ | i i |

The sister of the mom above also had issues with finding out who the father of her baby was. She had the state take a blood test of potential fathers. Based on the information in this table, why was the baby taken away by the state after the test? *(hint… look at the baby's blood type only…)*_____

| Name | Blood Type |
|---|---|
| Mother | Type O |
| Baby | Type AB |
| Bartender | Type O |
| Guy at the club | Type AB |
| Cabdriver | Type A |
| Flight attendant | Type B |

The mother is homozygous recessive for Type O (i i or O O) blood. She does not have a dominant A ($I^A$) or B ($I^B$) allele to give to any offspring.