**Worksheet #3: Beyond Mendel**

Complete the questions below following the FULL format shown in class *when applicable*. Answers are bolded in a smaller font at the bottom of the page for *most* questions.

1. What is the probable phenotypic ratio among children born to a mother having the genotype IAi and a father with type AB blood?
2. One parent has type A blood and the other parent has type B blood. What are their genotypes if they produce a large number of children whose blood types were all;
3. All AB b. ½ AB and ½ B c. ½ AB and ½ A d. ¼ AB, ¼ A, ¼ B, ¼ O
4. A women with blood type B has a child with blood type O. What are the genotypes of the mother and child? What blood type could the father not have?
5. A man of blood type O marries a woman of blood type A. The woman’s father was blood type O. What are the chances that their children will have blood type O?
6. In the following case of disputed paternity, which of the possible fathers can be excluded as the real father? The mother is of blood group B, the child is of blood group O, one possible father is of blood group A, and the other is of blood group AB. Explain.
7. Four babies were born in a hospital on a night in which an electrical blackout occurred. In the confusion that followed, their identification bracelets were mixed up. Conveniently, the babies are of four different blood groups: O, A, B, AB. The four pairs of parents have the following blood groups: O & O, AB & O, A & B, B & B.
8. If a man with type O blood, has parents who both have type B blood, marries a woman with type AB blood, what will be the theoretical percentage of their children with type B blood?
9. In a paternity law suit a woman with type AB blood sues a man with type O blood. The child has the same blood type as the mother. Could this male be the father? Explain.
10. In some cats the gene for tail length shows incomplete dominance. Cats with long tails and those with no tails are homozygous for their respective alleles, while heterozygous cats have short tails. Predict the phenotypic ratio of crosses between;
11. A long-tailed cat with a cat with no tail b. a long-tailed cat and a short-tailed cat

c. a short-tailed cat with a cat with no tail d. two short-tailed cats

1. In the four o’clock plant the allele for red flower colour is incompletely dominant over the allele for white flower colour.
2. Show the genotypes of the parents and the F1 generation of a cross between a red and a white four o’clock plant.
3. What would be the anticipated offspring if the F1 plant were; i) test crossed to a red parent? ii) test crossed to a white parent.
4. Coat colour in shorthorn cattle is an example of codominance. The two homozygous genotypes produce red and white coats while the heterozygous genotypes produce a roan coat (a mixture of red and white hairs). Use Punnett square to show the results in the F1 and F2 generations when a white and a red shorthorn are crossed. State the phenotypic ratios.

**1a.** **(50% type A: 25% Type AB, 25% Type B), 2a. (IAIA X IBIB), 2b. (IAi X IBIB), 2c. (IAIA X IBi), 2d. (IAi X IBi), 3. (mother: IBi, child: ii, father could NOT be type AB), 4. (50% chance), 5. ( type AB because father must carry one recessive allele), 6. (type O baby🡪O & O, type A baby🡪AB & O, type B baby🡪B & B, type AB baby 🡪A & B), 7. (50% type B), 8. (no because the man only carries recessive alleles), 9. A. (100% short tailed), 9b. (50% short tailed, 50 % long tailed), 9c. (50% no tail, 50% short tailed), 9d. (25% long tailed, 25% no tail, 50% short tailed), 10a. (Parents🡪 RR X R’R’, F1 offspring🡪100% RR’), 10b. (i: (50% red, 50% pink), ii: (50% white, 50% pink)), 11. (F1🡪100% roan coat, F2🡪50% roan coat, 25% red coat, 25% white coat)**