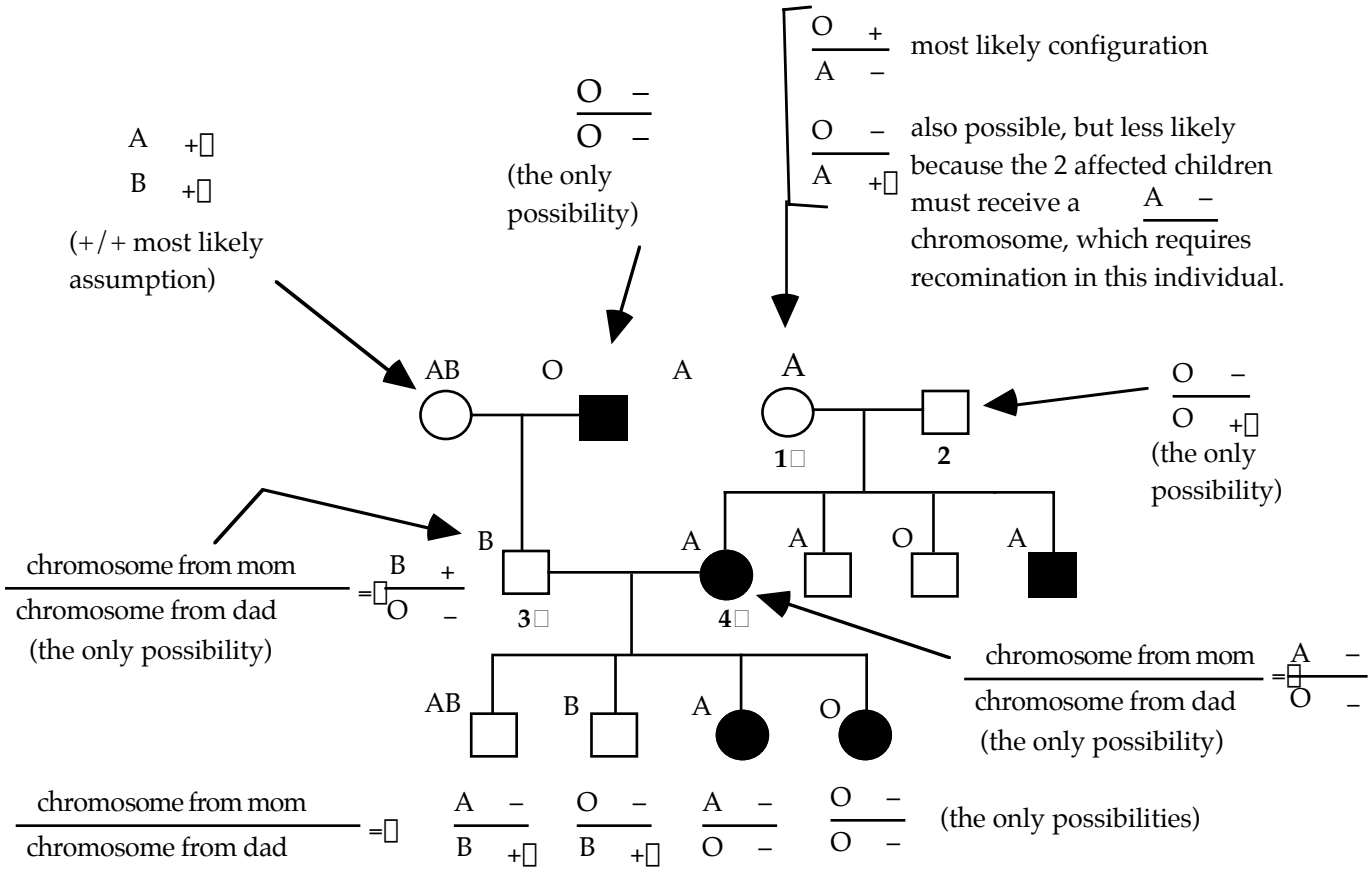
Solutions to Linkage & Pedigrees Problem

I.

a) & b) One way to solve this problem is to work out the genotypes of the individuals in the pedigree.



c) Individual 3 received an O – chromosome from dad and the B + chromosome from mom.

d) To have type B blood, the child must have gotten an O – chromosome from mom and a B ? chromosome from dad.

The recombination frequency (RF) gives the probability of crossover (genetic exchange) between two genes. In the case of individual (3), he can produce 4 types of gametes:

- B – recombinant
- O + recombinant
- B + parental
- O – parental

In order to be diseased **and** B, recombination must have occurred and since the recombinantion frequency is 11% (see first paragraph), the chance of being B and diseased is 11%.

II.

a) What are the genotypes of Phil and Ryan with respect to these two genes. Use the letter E for ear wiggling and the letter R for tongue rolling.

Phil	Ryan
E +	+ +
+ *R*	+ +

b) How do you account for the fact that Ryan is unable to roll his tongue or wiggle his ears?

During meiosis in Phil, there was recombination between the chromosome carrying the ability to wiggle gene and the one carrying the ability to roll gene.

E + / + *R* --> *E R* and + +

Ryan received the wildtype chromosome from his mother and the recombined completely wildtype chromosome from his father.