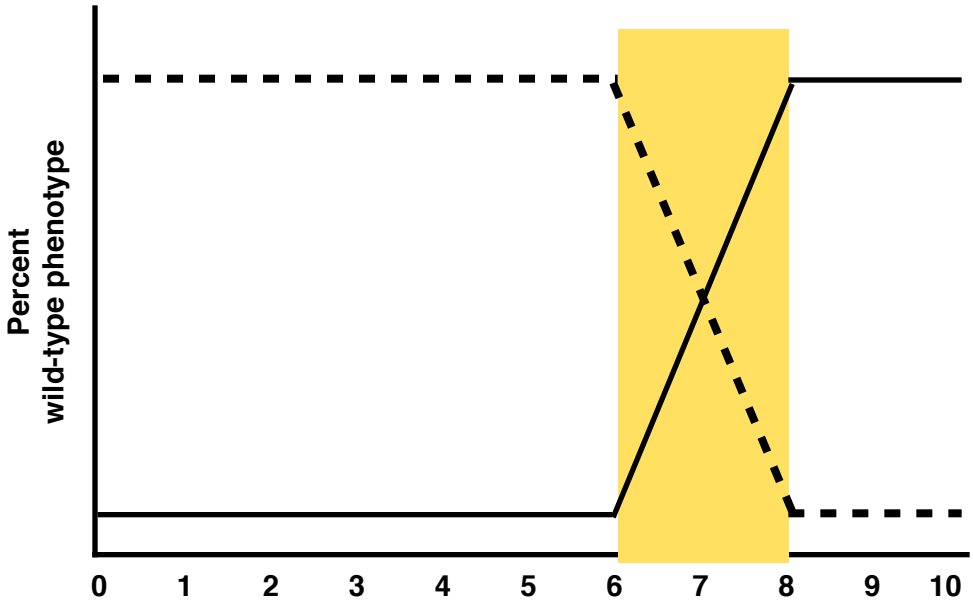
Bio393: Genetic Analysis **Name:**_____
Quiz #3 - Friday May 8, 2015

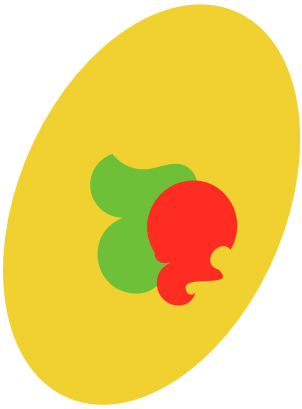
Question 1 (4 pts):
How can you tell the difference between maternal effect inheritance and cytoplasmic inheritance? Hint: think about multiple generations.

With traits that show cytoplasmic inheritance, every offspring from an affected mother will be affected. The trait will be passed in each generation from mother to child.

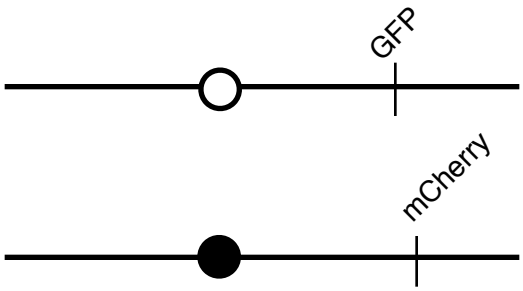
With traits that show maternal-effect inheritance, the offspring's phenotype is dependent on the maternal genotype. Some mothers might not have the alleles that confer the dominant or recessive mutant phenotype so the offspring will be unaffected.

Question 2 (6 pts):
Using a temperature-sensitive allele, you perform upshift and downshift experiments over the course of ten hours with a shift every hour. After the ten hours is complete, you measure the penetrance of the mutant phenotype. You find that the temperature-sensitive period is between six and eight hours. Please draw the upshift (solid line) and downshift (dotted line) on the graph below.





Question 3 (6 pts):
In *Drosophila*, you can generate twin spots using cell-specific markers. In the example below, red ommatidia are homozygous for the mCherry gene, green ommatidia are homozygous for the GFP gene, and yellow ommatidia are heterozygous for mCherry and GFP. Draw out the diploid homologous chromosomes with centromeres demarcated as open and closed circles and locations of the GFP and mCherry insertions that would lead to this mitotic recombination result.



Question 4 (4 pts):
In another animal with GFP and mCherry markers integrated into a different chromosome than in question #3, you only observe animals with GFP clones. No animals have twin spots or mCherry clones. What could cause this lack of twin spots. Hint: GFP and mCherry markers randomly insert into the genome. They can land anywhere!

It is likely that the P element carrying mCherry inserted into a gene required for viability. Any clone generated with mCherry homozygous would also be homozygous for a mutation causing recessive lethality.

Alternatively, the P element carrying mCherry inserted into a silent chromatin region effectively turning off expression.

The P element insertion of GFP did not land into a gene required for viability or into a silent chromatin region.

Please go to www.andersenlab.org/bio393 to fill out the post-quiz survey.
We are looking to improve the course! Your feedback is appreciated.