**ASSIGNMENT # 1****DEADLINE: RETURN AT THE END OF THE LABORATORY SESSION****OPTION 1:** Deposit a physical copy in the cart (front of the lab)**OPTION 2:** Submit an electronic copy (i.e., PDF file) through the LMS platform (Canvas)

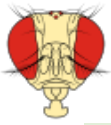
NAME: _____ STUDENT #: _____ DATE: _____

***Drosophila* GENETICS NOTATION**

1. Based on the **notation used in *Drosophila*** research, please provide the genotypes of the following **hypothetical** flies. Please fill the boxes with the corresponding symbols.

Hint: Use the **first letter(s) of the mutation's name** as the main **symbol** for the notation. For example, if the mutation is called "**sepia**", you should use "**se**" for the **mutant** type and "**se⁺**" for **wild-type** flies. Keep in mind the location of the genes on the chromosomes (autosomes vs. sex-linked) and the nature of the mutation (dominant vs. recessive).

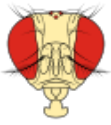
Phenotype			Genetic basis		Notation (<u>homozygous</u> or <u>pure breeding</u>)			
Body part	Wild type	Mutation	Mutation Type	Location	Male wild	Male mutant	Female wild	Female mutant
Eye	Red	Sepia	Recessive	Autosome				
Eye	Red	White	Recessive	X (sex-linked)				
Wing	Straight /long	Curly	Dominant	Autosome				
Wing	Straight /long	Vestigial	Recessive	Autosome				
Body	Grey	Yellow	Recessive	X (sex-linked)				
Abdomen	Normal	Abnormal	Dominant	X (sex-linked)				



2. Based on the previous information, please assign the **genotypes** to the different **phenotype** combinations. Assume that all individuals are **pure breeding lines** (i.e., **homozygous**).

Hint: Carefully consider the nature of the mutation: Dominant vs. Recessive; Autosomal vs. Sex-linked.

Phenotype	Genes are genetically linked (same chromosome)?	Sex	Genotype
Sepia eyes, Curly wings	No	Male	
Sepia eyes, yellow body	No (Sepia on autosome, Yellow on the X chromosome)	Female	
Sepia eyes, yellow body	No (Sepia on autosome, Yellow on the X chromosome)	Male	
White eyes, normal Abdomen	Yes (both in the X chromosome)	Female	
White eyes, abnormal Abdomen	Yes (both in the X chromosome)	Male	
Vestigial wings, grey body	No	Female	
Sepia eyes, vestigial wings	No	Male	

**IDENTIFICATION OF PHENOTYPES**

3. A **wild-type** *Drosophila* fly has dull-red eyes, brownish body color and long wings (about twice the length or longer than the abdomen). Please provide the **most probable phenotype** and **sex** of the following flies. **Tip:** please refer to the “Morphology of a wild-type *Drosophila*” section in the lab manual for the possible phenotypes.



Eye: _____
Body: _____
Wing: _____
Sex: _____



Eye: _____
Body: _____
Wing: _____
Sex: _____



Eye: _____
Body: _____
Wing: _____
Sex: _____



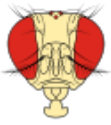
Eye: _____
Body: _____
Wing: _____
Sex: _____



Eye: _____
Body: _____
Wing: _____
Sex: _____



Eye: _____
Body: _____
Wing: _____
Sex: _____



Eye: _____
 Body: _____
 Wing: _____
 Sex: _____



Eye: _____
 Body: _____
 Wing: _____
 Sex: _____



Eye: _____
 Body: _____
 Wing: _____
 Sex: _____

**IN-PERSON LABORATORY WORK AND IDENTIFICATION OF PHENOTYPE
 WORTH 20% OF ASSIGNMENT GRADE (Q#4)**

4. After observing the **P1 and P2 flies** under the dissecting scope, please summarize the obtained data in the table below. WT=Wild-type.

Sex	Amount	Body: Yellow/WT	Eye: White/Sepia/WT	Wing: Mini/WT
Female				
Male				

Considering that the **main cross** that you will analyze during the **next labs** is:

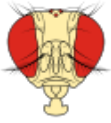


P1 Female: yellow body,
white eyes, miniature wing



P2 Male: Sepia eyes (wild
type for the other traits)

Did you get the **right parental** flies in your vial? YES _____ No _____

**GENETICS-MODEL DETERMINATION**

5. In the following question, you need to determine the **genetics model** of the wing-shape trait in *Drosophila* (I.e., Dominant vs. Recessive; Autosomal vs. Sex-linked). Please consider the following information:

A cross between a P₁ **wild-type male** and a P₂ **vestigial-wing female** fly produced a **proportion** of ½ wild-type; ½ vestigial-wing flies and **no difference between sexes** (same number of males – females for the two phenotypes). Another cross between a P₃ **wild-type male** and a P₄ **vestigial-wing female** fly produced **all wild-type** flies. Please fill the templates and blank spaces.

Please use the *Drosophila* notation to represent the traits. For example, if you assume that the vestigial phenotype is recessive, you should use lower-case symbols (vg). Then, the wild-type phenotype should contain the “+” character (vg⁺)

P₁ possible genotype(s): _____

P₂ possible genotype(s): _____

P₃ possible genotype(s): _____

P₄ possible genotype(s): _____

Illustrate the two crosses using the Punnet square templates.

P₁ x P₂ Cross

Gametes		

½ wild-type : ½ vestigial-wing

P₃ x P₄ Cross

Gametes		

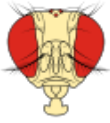
All wild-type flies.

-Based on your analysis, the **most probable** genetics model for the trait is (fill with an “X”):

Wild-type wing shape is: **Dominant:** _____ **Recessive:** _____

Vestigial wing shape is: **Dominant:** _____ **Recessive:** _____

The wing-shape trait is: **Autosomal:** _____ **Sex-linked:** _____



VIRTUAL GENETICS LAB

For the next set of questions, you will use the “**Monohybrid Inheritance Analyzer**” tool available online (www.ampossot.com/mono).

**All crosses performed at the Virtual Lab correspond to hypothetical simulated and randomized data. The actual genetics basis of the genes/traits in nature may be different*.*

To obtain **phenotypic ratios**, divide the **highest-class number** by the **lowest-class number**. Example: If you get 60 wildtype and 19 vestigial flies, the ratio will be 60/19 wildtype: 19/19 vestigial flies. That is 3.15 wildtype: 1 vestigial flies. **If only one phenotypic class is present, the ratio would be 1:0.**

6. Perform **three** independent crosses between a **wild-type female** and a **wild-type male**. Record the data in the scoring tables.

Vial #: _____

Wing shape	F	M	Total
Wild-type			
Vestigial			
Phenotypic Ratio			
Wild Type:		Vestigial:	

Vial #: _____

Wing shape	F	M	Total
Wild-type			
Vestigial			
Phenotypic Ratio			
Wild Type:		Vestigial:	

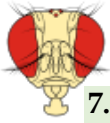
Vial #: _____

Wing shape	F	M	Total
Wild-type			
Vestigial			
Phenotypic Ratio			
Wild Type:		Vestigial:	

Is there any **major difference (i.e. bias)** between the phenotype numbers of male vs. female flies? _____

For example: All males vestigial (none wild-type); All females wild-type (none vestigial).

This may be considered evidence of the presence of sex-linkage



7. Perform **three** independent crosses between a **wild-type female** and a **vestigial-wing male**. Record the data in the scoring tables.

Vial #: _____

Wing shape	F	M	Total
Wild-type			
Vestigial			
Phenotypic Ratio			
Wild Type:		Vestigial:	

Vial #: _____

Wing shape	F	M	Total
Wild-type			
Vestigial			
Phenotypic Ratio			
Wild Type:		Vestigial:	

Vial #: _____

Wing shape	F	M	Total
Wild-type			
Vestigial			
Phenotypic Ratio			
Wild Type:		Vestigial:	

Is there any **major difference (i.e. bias)** between the phenotype numbers of male vs. female flies? _____

For example: All males vestigial (none wild-type); All females wild-type (none vestigial).
This may be considered evidence of the presence of sex-linkage

8. Perform **three** independent crosses between a **vestigial-wing female** and a **wild-type male**. Record the data in the scoring tables.

Vial #: _____

Wing shape	F	M	Total
Wild-type			
Vestigial			
Phenotypic Ratio			
Wild Type:		Vestigial:	

Vial #: _____

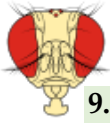
Wing shape	F	M	Total
Wild-type			
Vestigial			
Phenotypic Ratio			
Wild Type:		Vestigial:	

Vial #: _____

Wing shape	F	M	Total
Wild-type			
Vestigial			
Phenotypic Ratio			
Wild Type:		Vestigial:	

Is there any **major difference (i.e. bias)** between the phenotype numbers of male vs. female flies? _____

For example: All males vestigial (none wild-type); All females wild-type (none vestigial).
This may be considered evidence of the presence of sex-linkage



9. Perform **three** independent crosses between a **vestigial-wing female** and a **vestigial-wing male**. Record the data in the scoring tables.

Vial #: _____

Vial #: _____

Vial #: _____

Wing shape	F	M	Total
Wild-type			
Vestigial			
Phenotypic Ratio			
Wild Type:		Vestigial:	

Wing shape	F	M	Total
Wild-type			
Vestigial			
Phenotypic Ratio			
Wild Type:		Vestigial:	

Wing shape	F	M	Total
Wild-type			
Vestigial			
Phenotypic Ratio			
Wild Type:		Vestigial:	

Is there any **major difference (i.e. bias)** between the phenotype numbers of male vs. female flies? _____

For example: All males vestigial (none wild-type); All females wild-type (none vestigial).

This may be considered evidence of the presence of sex-linkage

10. Based on the phenotypic analysis of the previous twelve crosses, does the results support the **genetics model proposed in question #5**? YES: _____ NO: _____

Explain:

***IMPORTANT NOTE*:**

Return your assignment at the **END** of the lab session or submit an electronic copy (i.e., scanned PDF file) through CANVAS.