Name_____

AP Lab 7 Genetics of Organisms- Virtual Fruit Fly LAB
Go to Fly Genetics: http://www.sciencecourseware.org/vcise/drosophila/

Cross 1: Wild Type Female x Vestigial Winged Male

PHENOTYPE	F_1 Generation	F_2 Generation
Wild Type Males		
Vestigial Winged Males		
Wild Type Females		
Vestigial Winged Females		

Write a NULL hypothesis that describes the mode of inheritance for the trait(s) you studied.

There is no difference between the observed data and the data expected for a
_____ _____ *cross.*

I would expect this pattern in the F_1 offspring _____

I would expect this pattern in the F_2 offspring _____

Are the deviations for the phenotypic ratio of the F_2 generation within the limits expected by chance?
To answer this question, statistically analyze the data using the Chi-square analysis.
Calculate the Chi-square statistic for the F_2 generation in the chart below.

Observed Phenotypes (o)	Expected (e)	(o-e)	$(o-e)^2$	$\frac{(o-e)^2}{e}$
			X^2 =	

Chi-square (X^2) = _____

How many degrees of freedom are there? _____

Referring to the critical values chart, what is the probability (p) value for these data? _____

What is the significance? _____

Remember: The minimum value for rejecting the null hypothesis in the sciences is 0.05. This means that only 5% of the time would you expect to see similar data if the null hypothesis is correct OR you are 95% sure the data does not fit the expected ratio.

If the calculated X^2 value is greater than or equal to the critical value from the table, then the null hypothesis is REJECTED.

According to the probability (p) value, can you accept or reject your null hypothesis for this cross? Explain.

What are the genotypes of the P_1 flies ? FEMALE _____ MALE _____

What are the genotypes of the F_1 flies? FEMALE _____ MALE _____

How is this trait inherited?

Is the mutation dominant or recessive? _____

Is the mutation autosomal or sex linked? _____

Is this F_1 cross a monohybrid or dihybrid cross? _____

Make 2 Punnett squares showing parents and F_1 and F_2 offspring for this trait.

Cross 2: White Eyed Female x Wild Type Male

	F_1 Generation	F_2 Generation
Wild Type Males		
White eyed Males		
Wild Type Females		
White Eyed Females		

Write a NULL hypothesis that describes the mode of inheritance for the trait(s) you studied. (See cross #1)

I would expect this pattern in the F_1 offspring _____

I would expect this pattern in the F_2 offspring _____

Are the deviations for the phenotypic ratio of the F_2 generation within the limits expected by chance? Calculate the Chi-square statistic for the F_2 generation in the chart below.

Observed Phenotypes (o)	Expected (e)	(o-e)	$(o-e)^2$	$\frac{(o-e)^2}{e}$
			$X^2 =$	

Chi-square (X^2) = _____

How many degrees of freedom are there? _____

Referring to the critical values chart, what is the probability (p) value for these data? _____

What is the significance? _____

According to the probability value, can you accept or reject your null hypothesis for this cross? Explain.

What are the genotypes of the P_1 flies ? FEMALE _____ MALE _____

What are the genotypes of the F_1 flies? FEMALE _____ MALE _____

How is this trait inherited?

Is the mutation dominant or recessive? _____

Is the mutation autosomal or sex linked? _____

Is this F_1 cross a monohybrid or dihybrid cross? _____

Make 2 Punnett squares showing parents and F_1 and F_2 offspring for this trait.

Cross 3: Wild Type Female x Sepia Eyed, Vestigial Winged Male

	F_1 Generation	F_2 Generation
Wild Type Males		
Wild Type Female		
Total Wild Types		
Vestigial Winged Males (WT eyes)		
Vestigial Winged Females (WT eyes)		
Total Vestigial Winged (WT eyes)		
Sepia eyed Males (WT wings)		
Sepia eyed Females (WT wings)		
Total Sepia eyes (WT wings)		
Vestigial Wings, Sepia eyed Males		
Vestigial Wings, Sepia eyed Females		
Total Vestigial Wings, Sepia eyed		

Write a NULL hypothesis that describes the mode of inheritance for the trait(s) you studied. (See cross #1)

I would expect this pattern in the F_1 offspring _____

I would expect this pattern in the F_2 offspring _____

Are the deviations for the phenotypic ratio of the F_2 generation within the limits expected by chance? Calculate the Chi-square statistic for the F_2 generation in the chart below.

Observed Phenotypes (o)	Expected (e)	(o-e)	$(o-e)^2$	$\frac{(o-e)^2}{e}$
			X^2 =	

Chi-square (X^2) = _____ How many degrees of freedom are there? _____

Referring to the critical values chart, what is the probability (p) value for these data? _____

According to the probability value, can you accept or reject your null hypothesis? Explain.

What are the genotypes of the P_1 flies ? FEMALE _____ MALE _____

What are the genotypes of the F_1 flies? FEMALE _____ MALE _____

How is this trait inherited?

Is the mutation dominant or recessive? _____

Is the mutation autosomal or sex linked? _____

Is this F_1 cross a monohybrid or dihybrid cross? _____

Are these genes linked? _____

Cross 4: DESIGN YOUR OWN CROSS (Cross with a WT)

PHENOTYPE	F_1 Generation	F_2 Generation
Wild Type Males		
Males		
Wild Type Females		
Females		

Write a NULL hypothesis that describes the mode of inheritance for the trait(s) you studied. (See cross #1)

I would expect this pattern in the F_1 offspring _____

I would expect this pattern in the F_2 offspring _____

Are the deviations for the phenotypic ratio of the F_2 generation within the limits expected by chance? Calculate the Chi-square statistic for the F_2 generation in the chart below.

Observed Phenotypes (o)	Expected (e)	(o-e)	$(o-e)^2$	$\frac{(o-e)^2}{e}$
			X^2 =	

Chi-square (X^2) = _____ How many degrees of freedom are there? _____

Referring to the critical values chart, what is the probability (p) value for these data? _____

According to the probability value, can you accept or reject your null hypothesis? Explain.

What are the genotypes of the P_1 flies ? FEMALE _____ MALE _____

What are the genotypes of the F_1 flies? FEMALE _____ MALE _____

How is this trait inherited?

Is the mutation dominant or recessive? _____

Is the mutation autosomal or sex linked? _____

Make 2 Punnett squares showing parents and F_1 and F_2 offspring for this trait.

EXTRA CREDIT LINKED CROSS: Heterozygous Sepia Eyed, Ebony body F_1 Female X HOMOZYGOUS Male
Make a cross between WT female with Sepia Eyed, Ebony body male to get F_1 offspring
Do a test cross between the F_1 female and a HOMOZYGOUS Sepia Eyed, Ebony body male
WATCH BOZEMAN BIOLOGY VIDEO- LINKED GENES to see how to do this

	F_1 Generation	F_2 Generation
Wild Type Males		
Wild Type Female		
Total Wild Types		
Ebony body Males (WT eyes)		
Ebony body Females (WTeyes)		
Total Ebony body (WT eyes)		
Sepia eyed Males (WT body)		
Sepia eyed Females (WT body)		
Total Sepia eyed (WT body)		
Ebony body Sepia eyed Males		
Ebony body, Sepia eyed Females		
Total Ebony body, Sepia eyed		

What is the map distance between these genes? _____

EXTRA CREDIT LINKED CROSS: Heterozygous Sepia Eyed, Ebony body F_1 Female X HOMOZYGOUS Male
Make a cross between WT female with Sepia Eyed, Ebony body male to get F_1 offspring
Do a test cross between the F_1 female and a HOMOZYGOUS Sepia Eyed, Ebony body male

WATCH BOZEMAN BIOLOGY VIDEO- LINKED GENES to see how to do this

	F_1 Generation	F_2 Generation
Wild Type Males		
Wild Type Female		
Total Wild Types		
Ebony body Males (WT eyes)		
Ebony body Females (WTeyes)		
Total Ebony body (WT eyes)		
Sepia eyed Males (WT body)		
Sepia eyed Females (WT body)		
Total Sepia eyed (WT body)		
Ebony body Sepia eyed Males		
Ebony body, Sepia eyed Females		
Total Ebony body, Sepia eyed		

What is the map distance between these genes? _____

Practice Cross: Wild Type Female x LOBE EYED Male

PHENOTYPE	F_1 Generation	F_2 Generation
Wild Type Males		
Lobe eyed Males		
Wild Type Females		
Lobe eyed Females		

Write a NULL hypothesis that describes the mode of inheritance for the trait(s) you studied.

There is no difference between the observed data and the data expected for a
_____ _____ *cross.*

I would expect this pattern in the F_1 offspring _____

I would expect this pattern in the F_2 offspring _____

Are the deviations for the phenotypic ratio of the F_2 generation within the limits expected by chance?
To answer this question, statistically analyze the data using the Chi-square analysis.
Calculate the Chi-square statistic for the F_2 generation in the chart below.

Observed Phenotypes (o)	Expected (e)	(o-e)	$(o-e)^2$	$\frac{(o-e)^2}{e}$
			X^2 =	

Chi-square (X^2) = _____

How many degrees of freedom are there? _____

Referring to the critical values chart, what is the probability (p) value for these data? _____

What is the significance? _____

Remember: The minimum value for rejecting the null hypothesis in the sciences is 0.05. This means that only 5% of the time would you expect to see similar data if the null hypothesis is correct OR you are 95% sure the data does not fit the expected ratio.

If the calculated X^2 value is greater than or equal to the critical value from the table, then the null hypothesis is REJECTED.

According to the probability (p) value, can you accept or reject your null hypothesis for this cross? Explain.

What are the genotypes of the P_1 flies ? FEMALE _____ MALE _____

What are the genotypes of the F_1 flies? FEMALE _____ MALE _____

How is this trait inherited?

Is the mutation dominant or recessive? _____

Is the mutation autosomal or sex linked? _____

Is this F_1 cross a monohybrid or dihybrid cross? _____

Make 2 Punnett squares showing parents and F_1 and F_2 offspring for this trait.

PRACTICE CROSS 2: Wild Type Female x Ebony Body, Purple eyed male

	F_1 Generation	F_2 Generation
Wild Type Males		
Wild Type Females		
Total Wild Types		

Ebony body Males (WT eyes)		
Ebony body Females (WT eyes)		
Total Ebony body (WT eyes)		
Purple eyed Males (WT body)		
Purple eyed Females (WT body)		
Total Purple eyes (WT wings)		
Ebony body, Purple eyed Males		
Ebony body, Purple eyed Females		
Total Ebony body, Purple eyed		

Write a NULL hypothesis that describes the mode of inheritance for the trait(s) you studied. (See cross #1)

I would expect this pattern in the F_1 offspring _____

I would expect this pattern in the F_2 offspring _____

Are the deviations for the phenotypic ratio of the F_2 generation within the limits expected by chance? Calculate the Chi-square statistic for the F_2 generation in the chart below.

Observed Phenotypes (o)	Expected (e)	(o-e)	$(o-e)^2$	$\frac{(o-e)^2}{e}$
			X^2 =	

Chi-square (X^2) = _____ How many degrees of freedom are there? _____

Referring to the critical values chart, what is the probability (p) value for these data? _____

According to the probability value, can you accept or reject your null hypothesis? Explain.

What are the genotypes of the P_1 flies ? FEMALE _____ MALE _____

What are the genotypes of the F_1 flies? FEMALE _____ MALE _____

How is this trait inherited?

Is the mutation dominant or recessive? _____

Is the mutation autosomal or sex linked? _____

Is this F_1 cross a monohybrid or dihybrid cross? _____

Are these genes linked? _____