AP Lab 7 Genetics of Organisms- Virtual Fruit Fly LAB

Go to Fly Genetics: <u>http://www.sciencecourseware.org/vcise/drosophila/</u>

Cross 1: Wild Type Female × Vestigial Winged Male

PHENOTYPE	F ₁	Generation	F₂ Gene	ration	
Wild Type Males					
Vestigial Winged Males					
Wild Type Females					
Vestigial Winged Females					
These data for VESTIGIAL WINGS si	uggest this	pattern is charact	eristic of a	cene	
dominant rea	cessive	autosom	nal X-linke	gene. d	
I would expect this pattern in the F I would expect this pattern in the I	F ₁ offspring F ₂ offspring				
<u>Are the deviations for the phenotypic</u> To answer this question, statistically a Calculate the Chi-square statistic for t	ratio of the nalyze the o the F2 gene	<u>EF2 generation wit</u> data using the Chi- ration in the chart	<u>hin the limits (</u> square analysi below.	expected by s.	<u>chance?</u>
Observed Phenotypes (o)		Expected (e)	(o-e)	(o-e)²	<u>(о-е)²</u> е

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

X² =

How many degrees of freedom are there?

Chi-square (X²) = _____

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, do 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 autosomal or sex link	ed?	
Is the mutation dominant or recessive	e?	

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

Cross 2: White Eyed Female × Wild Type Male

	F1 Generation	F2 Generation
Wild Type Males		
White eyed Males		
Wild Type Females		
White Eyed Females		

These data for WHITE EYES suggest this pattern is characteristic of a

_____gene. dominant recessive autosomal X-linked

Write a NULL hypothesis that describes the mode of inheritance for the WHITE EYED trait. (See cross #1)

I would expect this pattern in the F1 offspring _____

I would expect this pattern in the F2 offspring _____

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

Observed Phenotypes (o)	Expected (e)	(o-e)	(0-e)²	<u>(o-e)²</u> e
			X ² =	

Chi-square (X ²) =	How many degrees of freedom are there?
Referring to the critical values chart, what is th	e probability (p) value for these data?

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
<u>How is this trait inherited?</u> Is the mutation autosomal or sex	inked?	
Is the mutation dominant or reces	sive?	

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

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

	F1 Generation	F ₂ Generation
Wild Type wings and eyes Males		
Wild Type wings and eyes Female		
Total Wild Types wings/eyes		
Dumpy Winged Males (WT eyes)		
Dumpy Winged Females (WT eyes)		
Total Dumpy Winged (WT eyes)		
Sepia eyed Males (WT wings)		
Sepia eyed Females (WT wings)		
Total Sepia eyes (WT wings)		
Dumpy Wings, Sepia eyed Males		
Dumpy Wings, Sepia eyed Females		
Total Dumpy Wings, Sepia eyed		

These data for DUMPY WINGS suggest this pattern is characteristic of a

dominant	recessive	autosomal	X-linked	-	
These data for SE	PIA EYED sugge	st this pattern is charac	teristic of a	oene	
dominant	recessive	autosomal	X-linked	_ yene	
These data are sug	gest this patter	n is characteristic of a _			_ cross.
			monohybrid	dihybrid	

Write a NULL hypothesis that describes the mode of inheritance for the traits (sepia eyes and dumpy wings) you studied. (See cross #1)

I would expect this pattern in the F_1 offspring	
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I would expect this pattern in the F2 offspring _____

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

Observed Phenotypes (o)	Expected (e)	(o-e)	(0-e)²	<u>(o-e)²</u> e
Wild type wings/WT eyes				
Dumpy wings/Wild type eyes				
Wild type wings/sepia eyes				
Dumpy wings/sepia eyes				
			X ² =	

Chi-square (X²) = _____ 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 P1 flies ? FEMALE MALE
What are the genotypes of the F1 flies? FEMALE MALE
How is this DUMY WINGS trait inherited?
Is the mutation autosomal or sex linked?
Is the mutation dominant or recessive?
How is this SEPIA EYED trait inherited?
Is the mutation autosomal or sex linked?
Is the mutation dominant or recessive?
Are these genes (DUMPY WINGS and SEPIA EYED) linked? How can you tell?

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

PHENOTYPE	F1 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 F1 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	<u>(о-е)²</u> е
			X ² =	

Chi-square (X²) = _____ 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.

How is this trait inherited?

Is the mutation dominant or recessive? _____

Is the mutation autosomal or sex linked?

Kelly Riedell/Brookings Biology

EXTRA CREDIT LINKED CROSS:

Make a cross between a WILD TYPE FEMALE and a HOMOZYGOUS SPINELESS BRISTLES and EBONY BODY MALE. WATCH BOZEMAN BIOLOGY VIDEO- LINKED GENES to see how to do this (Basically you will do a test cross between an F₁ female from this cross and a HOMOZYGOUS male fly with spineless bristles AND ebony body (<u>Use dad from the first cross</u>!!!!!!!!!!!!!)

PHENOTYPE	RESULTS
Wild Type Males	
Wild Type Female	
Total Wild Types	
Ebony body Males (WT bristles)	
Ebony body Females (WT bristles)	
Total Ebony body (WT bristles)	
Spineless bristle Males (WT body)	
Spineless bristle Females (WT body)	
Total spineless bristle (WT body)	
Ebony body spineless bristle Males	
Ebony body, spineless bristle Females	
Total Ebony body, spineless bristles	

Number of Recombinants? _____

Number of Parental? _____

Crossing over frequency? _____

What is the map distance between these genes (EBONY BODY and SPINELESS BRISTLES? _____