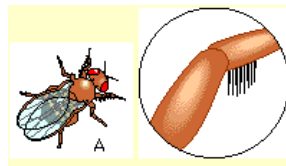Name_____Period_____Assignment #_____

Genetics of Organisms Virtual Lab

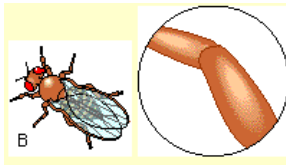http://www.phschool.com/science/biology_place/labbench/lab7/intro.html

Define the following
1) Genotype

2) Phenotype

3) Parental generation

4) F_1

5) F_2

6) Monohybrid cross

7) Dihybrid cross

8) Sex-linked traits

9) Crossing over

10) Linked genes
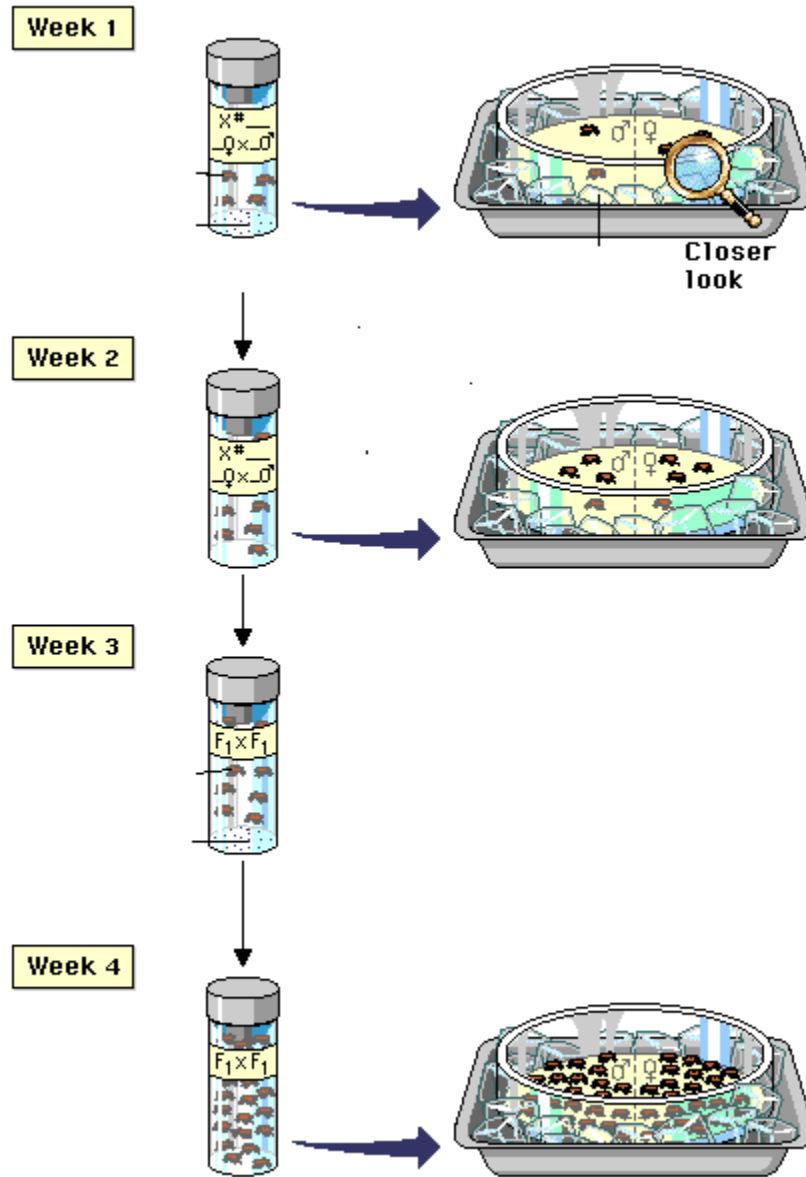

11) Is 'A' a male or female fly?

12) Is 'B' a male of female fly?

13) Label the experimental design below

Week 1

X#
_Q×_♂

♂|♀

Closer look

Week 2

X#
_Q×_♂

♂|♀

Week 3

F₁×F₁

Week 4

F₁×F₁

♂|♀

14) When eggs and larvae appear, remove adult flies from the vial. Why is this important?

15) Where do the F₁ flies come from?

16) Where do the F₂ flies come from?

17) Based on the results to the right, is this a monohybrid or dihybrid cross?

18) Explain your answer to the previous question

F₁ RESULTS	OBSERVED PHENOTYPES AND NUMBERS
	Red eyes
♂ MALES	12
♀ FEMALES	8

19) Is this a sex-linked or autosomal inheritance pattern?

20) Explain your answer to the previous question

F₂ RESULTS	OBSERVED PHENOTYPES AND NUMBERS	
	Red eyes	Sepia eyes
♂ MALES	19	4
♀ FEMALES	12	9

21) Based on the data obtained from Case 2, is this an autosomal or sex-linked pattern of inheritance pattern?

22) Explain your reasoning for the previous question

Case 2

F₁ RESULTS	OBSERVED PHENOTYPES AND NUMBERS
	Red eyes
♂ MALES	12
♀ FEMALES	8

23) From the data presented, determine the genotype of the parental (before the F₁ generation; not shown here) generation.

+ = wild type (red eyes)
w = white eyes

F₂ RESULTS	OBSERVED PHENOTYPES AND NUMBERS	
	Red eyes	White eyes
♂ MALES	12	8
♀ FEMALES	21	

24) Explain your reasoning for the previous question

Chi Square (χ^2) Analysis of Data

25) The apparent 3 to 1 ratio in the F_2 generation from Case 1 was caused by a cross between heterozygous F_1 individuals. What is the null hypothesis

In a cross between two heterozygous individuals, the offspring would be expected to show a 3 : 1 ratio. For example, in Case 1, three-fourths of the individuals would have red (wild-type) eyes, and one-fourth would have sepia eyes.

26) If there are 44 offspring, how many are expected to have red eyes? Show your work

27) If there are 44 offspring, how many are expected to have sepia eyes? Show your work

28) Make a data table based on the formula for Chi Square (χ^2) and determine the Chi square statistic based on the data from Case 1

Chi-Square

$$\chi^2 = \sum \frac{(o - e)^2}{e}$$

29) How are the degrees of freedom determined?

CHI-SQUARE TABLE								
Degrees of Freedom								
p	1	2	3	4	5	6	7	8
0.05	3.84	5.99	7.82	9.49	11.07	12.59	14.07	15.51
0.01	6.64	9.21	11.34	13.28	15.09	16.81	18.48	20.09

30) What are the degrees of freedom for Case 1?

31) Explain how you know

32) What does the p-value mean?

33) What is the p-value for Case 1?

34) Explain why you should accept or reject the null hypothesis (H₀) for Case 1.

35) What does accepting the null hypothesis (H₀) mean?

36) What does rejecting the null hypothesis (H₀) mean?

37) What type of inheritance pattern does the data table appear to show?

You have been given a vile containing the fruit flies shown below.
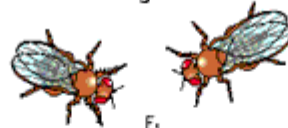
After two weeks, you collect the offspring from this pair and obtain the results show in the following table.

38) Explain how you know the inheritance pattern

F₂ RESULTS	OBSERVED PHENOTYPE AND NUMBERS			
	Red eyes normal wings	Red eyes no wings	Sepia eyes normal wings	Sepia eyes no wings
♂ MALES	48	13	16	4
♀ FEMALES	50	9	10	10

39) What phenotypic ratio does the data table appear to show?

40) State the null hypothesis (H₀) you will use to test your proposed inheritance pattern

41) Construct a data table based on the Chi square formula to test the null hypothesis

42) What is the Chi square (χ^2) statistic?

43) What are the degrees of freedom for your Chi square (χ^2) statistic?

44) What is the p-value

45) Explain why you should you accept or reject the null hypothesis (H_0)

46) Explain what the Chi square (χ^2) results mean