Glue this page into your notebook & glue the Instruction page tab here

http://tinyurl.com/sexlinkedtraitslab

1. Visit the website above to open the "Sex-Linked Traits" virtual lab.
2. The virtual lab simulation will be on the right side of the page, in the laboratory scene. The left side of the page contains background information and instructions in the "Questions" area. On the bottom of the page are the following icons for your use: "Journal" (these are questions that may be answered/submitted to your instructor), "Calculator" (working calculator function), "Data Table" (where you may be submitting your collected data from the exercise), "Audio" (turns sound on/off) and "Print" (prints the screen).
3. Read the background information found under the "Questions" area first, and then continue on to reading the procedure information posted there as well.
4. When you are ready, please click on the monitor in the laboratory scene on the right side of the page. Watch and listen to the information in the video presented to you. Next, click the "Information" button on the bottom of the laboratory scene page and read the additional background information on sex-linked traits.
5. Next, please click on the laboratory notebook visible in the laboratory scene. This will allow you to practice analyzing a cross for a sex-linked trait. To begin, click on the arrow below the male fruit fly and then on the arrow below the female fruit fly to select and establish their genotypes on the Punnett square. You can then drag your selection from the fruit fly choices below the Punnett square to complete the analysis of the potential offspring. When you are through, click "Check" to evaluate your answers. If you are correct, click "Return" to go back to the laboratory scene and begin the lab exercise. Please note that you can repeat the Punnett square exercise by clicking "Reset" and selecting different parental genotypes if you wish.
6. At this point, you are ready to begin the lab exercise. When you are ready, please click on the vials of fruit flies as directed in order to begin the activity. Remember to follow the directions given to you in the "Questions" as well as in the "Worksheet" areas, and refer back to your notes in the "Information" area if necessary.
7. Complete the exercise as directed, recording any data or information needed in your "Data Table" (icon on the bottom of the page) and/or your Worksheet.
8. When you are finished, please answer all of the questions found at the end of the Worksheet.

Sex-Linked Virtual Lab Instructions

1. Please make sure you have read through all of the information in the "Questions" and "Information" areas.
2. Next, complete the Punnett square activity by clicking on the laboratory notebook. Please be sure to note the possible genotypes of the various flies:

Female, red eyes	Female, red eyes	Female, white eyes	Male, red eyes	Male, white eyes

When you have completed the Punnett square activity, return to the laboratory scene to begin the actual laboratory activity.

3. In this exercise, you will perform a *Drosophila* mating in order to observe sex-linked trait transmission. Please click on the shelf in the laboratory. Here you will find vials of fruit flies. On the TOP shelf, please click on one of the female vials (on the left side) and then drag it to the empty vial on the shelf below. Please repeat this step using one of the male vials (on the right side). These flies will be used as the parental (P) generation. You may switch your parent choices at any time by dragging out old selections and dragging in new flies. Use the Punnett square below to predict the genotypes/phenotypes of the offspring (Note: refer to the genotype table you created above if needed):

Genotype: Phenotype:	Genotype: Phenotype:
Genotype: Phenotype:	Genotype: Phenotype:

_____% Female, red eye _____% Female, white eye _____% Male, red eye _____% Male, white eye

When you are finished, click "Mate and Sort".

1. You will now see information appear in the vials sitting on the next shelf below. These are the offspring of the parent flies you selected above, and they represent the first filial (F1) generation. In your "Data Table" on the bottom of the page and/or on Table 1 found at the end of this Worksheet, please input the numbers of each sex and phenotype combination for the F1 generation. These numbers will be placed into the first row marked "P generation Cross".
2. You will next need to select one of the F1 female flies and one of the F1 male flies to create the second filial (F2) generation. Drag your selections down to the empty vial on the next shelf below and fill in the Punnett square below to predict the offspring:

Genotype: Phenotype:	Genotype: Phenotype:
Genotype: Phenotype:	Genotype: Phenotype:

_____% Female, red eye _____% Female, white eye _____% Male, red eye _____% Male, white eye

Sex Linked Traits Virtual Lab Report

After clicking "Mate and Sort", you will now have information on their offspring (the F2 generation) to input into your "Data Table" or Worksheet below. This information will be placed into the second row marked "F1 generation Cross".

NOTE: There are additional lines remaining to use if your instructor requires the analysis of additional crosses. Please finish this exercise by opening the "Journal" link at the bottom of the page and answering the questions.

Table 1:

Cross Type	Phenotype of Male Parent	Phenotype of Female Parent	# of Red eye, Male Offspring	# of White eye, Male Offspring	# of Red eye, female Offspring	# of White eye, Female Offspring
P Generation Cross						
F1 Generation Cross						
P Generation Cross						
F1 Generation Cross						

Post-laboratory Questions:

1. Through fruit fly studies, geneticists have discovered a segment of DNA called the homeobox which appears to control:
   a. Sex development in the flies
   b. Life span in the flies
   c. Final body plan development in the flies

2. The genotype of a red-eyed male fruit fly would be:
   a. X^RX^R b. X^RX^r c. X^rX^r d. A or B e. None of the above

3. Sex-linked traits:
   a. Can be carried on the Y chromosome
   b. Affect males and females equally
   c. Can be carried on chromosome 20
   d. A and B
   e. None of the above

4. A monohybrid cross analyzes:
   a. One trait, such as eye color
   b. Two traits, such as eye color and wing shape
   c. The offspring of one parent

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5. A female with the genotype "X^RX^r":
   a. Is homozygous for the eye color gene
   b. Is heterozygous for the eye color gene
   c. Is considered a carrier for the eye color gene
   d. A and B
   e. B and C

6. A female with the genotype "X^RX^r":
   a. Is homozygous for the eye color gene
   b. Is heterozygous for the eye color gene
   c. Is considered a carrier for the eye color gene
   d. A and B
   e. B and C

7. A monohybrid cross analyzes:
   a. One trait, such as eye color
   b. Two traits, such as eye color and wing shape
   c. The offspring of one parent

8. A female with the genotype "X^RX^r":
   a. Is homozygous for the eye color gene
   b. Is heterozygous for the eye color gene
   c. Is considered a carrier for the eye color gene
   d. A and B
   e. B and C

9. In T.H. Morgan's experiments:
   a. He concluded that the gene for fruit fly eye color is carried on the X chromosome
   b. He found that his F1 generation results always mirrored those predicted by Mendelian Laws of Inheritance
   c. He found that his F2 generation results always mirrored those predicted by Mendelian Laws of Inheritance
   d. A and B
   e. All of the above

10. In this laboratory exercise:
   a. The Punnett square will allow you to predict the traits of the offspring created in your crosses
   b. X^R will represent the recessive allele for eye color, which is white
   c. X^r will represent the dominant allele for eye color, which is red
   d. All of the above

11. In a cross between a homozygous red-eyed female fruit fly and a white-eyed male, what percentage of the female offspring is expected to be carriers?
   a. 0% b. 25% c. 50% d. 75% e. 100%

12. In a cross between a white-eyed female and a red-eyed male:
   a. All males will have red eyes
   b. 50% of males will have white eyes
   c. All females will have red eyes
   d. 50% of females will have white eyes

13. In human diseases that are X-linked dominant, one dominant allele causes the disease. If an affected father has a child with an unaffected mother:
   a. All males are unaffected
   b. Some but not all males are affected
   c. All females are unaffected
   d. Some but not all females are affected