El Camino Real High School **Sodek**
Biology

Genetic Creature Scrapbook

Students will complete and present a series of activities that document the inheritance of traits in a fictitious animal. Students will assemble the activities listed below into a mock scrapbook that describes the genotypes and phenotypes of the parents and their potential offspring. The scrapbook should include:

- **Cover Page**
  The cover page should have your complete heading in the lower right hand corner with the name of your family album displayed in the center of the page. Be creative with the look and feel of the cover page as it represents the cover of your mock family album.

- **Creature Fact Sheet**
  On this page, you will exercise your own creativity to name and describe your fictitious animals. You may present basic physical descriptions, species facts, describe habitats, explain the discovery of your species, etc. Look at examples of actual photo albums, baby books, wedding albums, or scrapbooking techniques for ideas. Think about decorating your page with stickers, clipart, or special paper to give it the look and feel of a family album.

- **Male Parent Genotype & Phenotype Worksheet**
  Use a coin (or two) to assign traits. Record the results of your coin flips, the resulting genotype,s and the phenotypes of the parent.

- **Male Parent Karyotype Worksheet**
  Color all chromosomes with a single background color. Use a different color when drawing the pairs of alleles on the chromosomes. Be sure to label the alleles.

- **Female Parent Genotype & Phenotype Worksheet**
  Use a coin (or two) to assign traits. Record the results of your coin flips, the resulting genotypes and phenotypes of the parent.

- **Female Parent Karyotype Worksheet**
  Color all chromosomes with a single background color. Be sure to use a different background color than the male chromosomes. Use a different color when drawing the pairs of alleles on the chromosomes. Label the alleles.

- **Offspring Genotype & Phenotype Worksheet**
  Use a coin and the parent genotypes to determine the genotype and phenotype of the offspring.

- **Offspring Karyotype Worksheet**
  Use the offspring's genotype and the parent karyotype worksheets to draw each of the chromosomes that the offspring inherited. Label the alleles.

- **Picture of Offspring**
  Be sure that this picture is large, neatly drawn, and colored with all traits labeled.

- **Genetics Problems**
  Problems should be extremely neat and clearly labeled.

Project is worth 100 points. Project will be graded on:
Completeness: *All of the pages above must be complete and should adhere to the instructions provided.*
Accuracy: *Students must demonstrate their ability to express the genotypes and phenotypes accurately.*
Creativity: *Students should be creative in the design and decoration of their family album.*
Neatness and Effort: *All parts of the project, including worksheets, drawings, and problems should reflect the student's best efforts. All work should be neat, clear, and organized.*

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Biology

Female Parent Genotype & Phenotype

Trait	Chromosome #	Coin Flip H=Dom.; T=Recess.		Genotype	Phenotype
Freckles FF, Ff= freckles ff= no freckles	9	1st flip	2nd flip		
Dimples DD, Dd= dimples dd= no dimples	8				
Cleft Chin CC, Cc= cleft cc= no cleft	16				
Mid-knuckle Hair KK, Kk= hair kk= no hair	10				
Eyelashes LL, Ll= long ll= short	17				
Knee Claw JJ, Jj= claw jj= no claw	7				
Ears EE, Ee= large ee= small	21				
Tusks TT, Tt= point tt= straight	5				
Shoulder Spikes SS, Ss= no spikes ss= spikes	3				
Gliding Wings WW, Ww= no wings ww= wings	14				
Tail ZZ, Zz= no tail zz= tail	19				
Whiskers YY= long Yy= medium yy= no whiskers	4				
Eye Color II= brown Ii= hazel/green ii= blue	2				
Hair Color VV= black Vv= brown vv= red	11				
Webbed Hands/Feet RR,Rr= not webbed rr=webbed	6				
Gender	23			**XX**	**Female**

**The inheritance of some of the above traits has been simplified for the purpose of this activity. Not all of the traits above are inherited as a simple monohybrid cross, and involve the interactions of multiple genes.*

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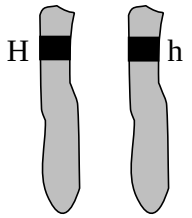
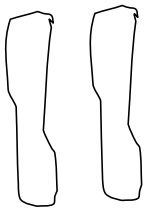
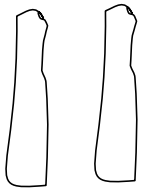
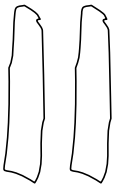
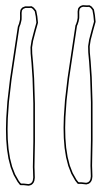
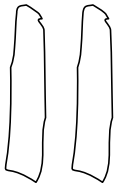
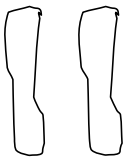
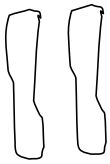
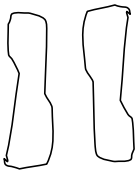
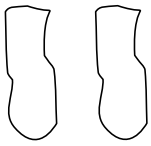
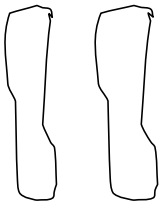
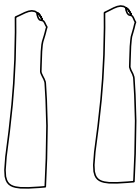
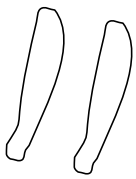
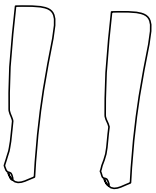
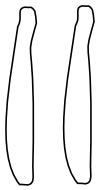
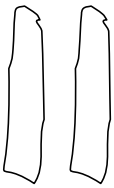
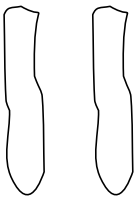
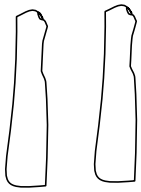
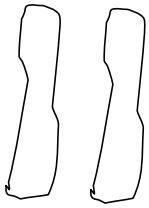
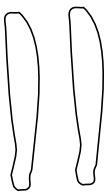
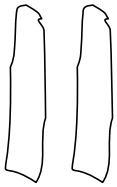
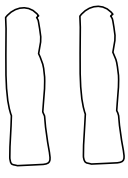
Biology

Female Parent Karyotype Worksheet

Gently fill-in each of the female parent's 23 pairs of chromosomes using a light pink. Then, using the trait location on previous forms, color bands that show the allele locations on the appropriate chromosome pairs. Label the alleles as shown in the example. *Remember, the allele location for each pair of chromosomes must be consistant on all karyotypes.* The karyotype below depicts the chromosomes that the female parent will donate to the offspring (*only one from each pair*).

 **Example**	 **1**	 **2**	 **3**	 **4**
 **5**	 **6**	 **7**	 **8**	 **9**
 **10**	 **11**	 **12**	 **13**	 **14**
 **15**	 **16**	 **17**	 **18**	 **19**
 **20**	 **21**	 **22**	 **X X** **23**	

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Biology

Male Parent Genotype & Phenotype

Trait	Chromosome #	Coin Flip H=Dom.; T=Recess.		Genotype	Phenotype
Freckles FF, Ff= freckles ff= no freckles	9	1st flip	2nd flip		
Dimples DD, Dd= dimples dd= no dimples	8				
Cleft Chin CC, Cc= cleft cc= no cleft	16				
Mid-knuckle Hair KK, Kk= hair kk= no hair	10				
Eyelashes LL, Ll= long ll= short	17				
Knee Claw JJ, Jj= claw jj= no claw	7				
Ears EE, Ee= large ee= small	21				
Tusks TT, Tt= point tt= straight	5				
Shoulder Spikes SS, Ss= no spikes ss= spikes	3				
Gliding Wings WW, Ww= no wings ww= wings	14				
Tail ZZ, Zz= no tail zz= tail	19				
Whiskers YY= long Yy= medium yy= no whiskers	4				
Eye Color II= brown Ii= hazel/green ii= blue	2				
Hair Color VV= black Vv= brown vv= red	11				
Webbed Hands/Feet RR,Rr= not webbed rr=webbed	6				
Gender	23			**XY**	**Male**

**The inheritance of some of the above traits has been simplified for the purpose of this activity. Not all of the traits above are inherited as a simple monohybrid cross, and involve the interactions of multiple genes.*

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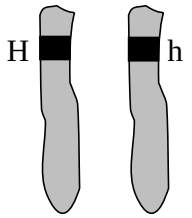
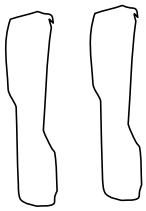
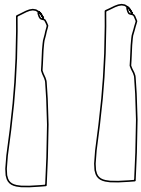
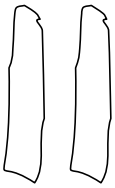
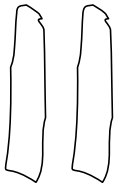
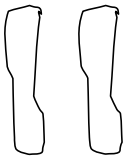
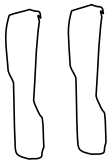
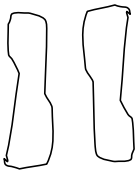
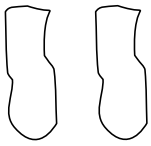
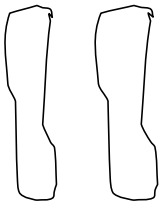
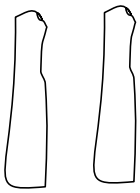
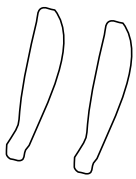
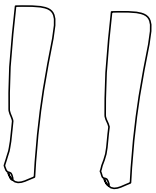
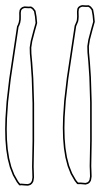
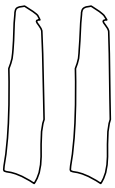
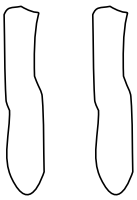
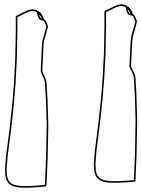
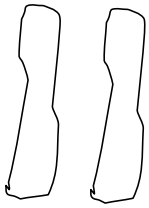
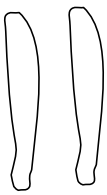
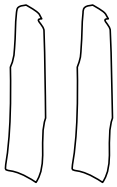
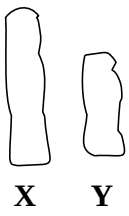
Male Parent Karyotype Worksheet

Gently fill-in each of the male parent's 23 pairs of chromosomes using a light blue. Then, using the trait location on previous forms, color bands that show the allele locations on the appropriate chromosome pairs. Label the alleles as shown in the example. *Remember, the allele location for each pair of chromosomes must be consistant on all karyotypes.* The karyotype below depicts the chromosomes that the male parent will donate to the offspring (*only one from each pair*).

 **Example**	 **1**	 **2**	 **3**	 **4**
 **5**	 **6**	 **7**	 **8**	 **9**
 **10**	 **11**	 **12**	 **13**	 **14**
 **15**	 **16**	 **17**	 **18**	 **19**
 **20**	 **21**	 **22**	 **X** **Y** **23**	

El Camino Real High School **Sodek**
Biology

Determining Offspring Genotype & Phenotype

1. Segregating Male Alleles Into Male Gamete

Genotype of Male Parent	Coin Flip *H or T*	Male Gamete *H=1st allele T= 2nd allele*

2. Segregating Female Alleles Into Female Gamete

Genotype of Female Parent	Coin Flip *H or T*	Female Gamete *H= 1st allele T= 2nd allele*

3. Combine Gametes to Produce Offspring

Offspring Genotype	Offspring Phenotype

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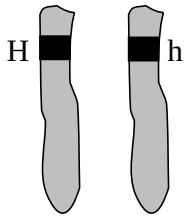
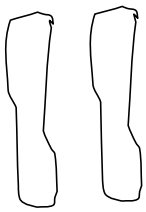
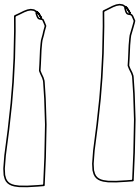
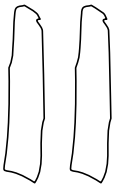
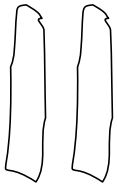
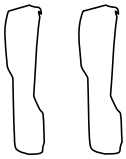
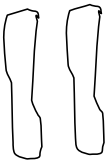
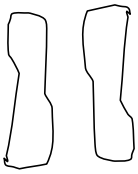
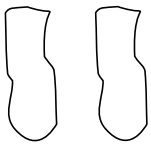
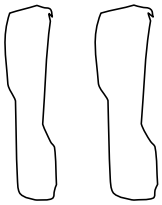
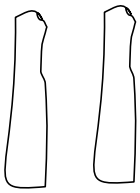
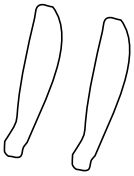
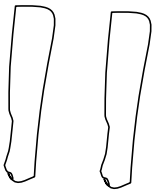
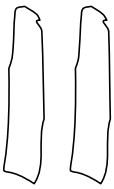
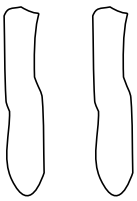
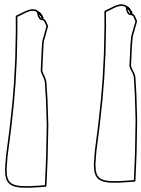
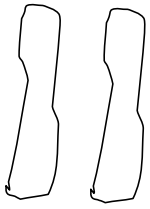
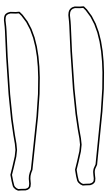
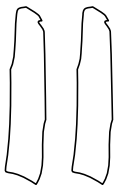
Offspring Karyotype

Using the parent karyotype forms and the offspring genotype form, draw the chromosomes inherited from each parent into the appropriate box to display all 23 pairs of the offspring's chromosomes. For each pair, draw the donated female chromosome (pink) on the left and the male chromosome (blue) on the right. ***Be sure to keep the allele labels as shown in the example. Also, you must draw in the second sex chromosome on the 23rd pair.***

 **Example**	 **1**	 **2**	 **3**	 **4**
 **5**	 **6**	 **7**	 **8**	 **9**
 **10**	 **11**	 **12**	 **13**	 **14**
 **15**	 **16**	 **17**	 **18**	 **19**
 **20**	 **21**	 **22**	 **X** **23**	

El Camino Real High School **Sodek**
Biology

Genetics Problems

Solve the following genetic crosses and clearly summarize the genotypes and phenotypes of the resulting offspring. Problems should be neat and labeled.

For the trait of "freckles", cross your offspring with one that is heterozygous for the condition.	**For the trait of "mid-knuckle hair", cross your offspring with one that is homozygous dominant for the condition.**
For the trait of "shoulder spikes", cross your offspring with one that is homozygous recessive for the condition.	**For the trait of "whiskers", cross your offspring with one that is heterozygous for the condition.**
For the trait of "hair color", cross the parents to determine all possible offspring.	**For the trait of "eyecolor", cross the parents to determine all possible offspring.**