Sesame Street Genetics Project

Introduction

Much is known about the genetics of *Sesamus streetus*. Karyotyping reveals that Sesame Street characters have six chromosomes: two homologous pairs and one pair of sex chromosomes.

Sex is determined by an X and a Y chromosome, just as it is in the related species, *Homo sapiens*. Through the process of gene mapping, geneticists have found the specific locations of the genes for eye shape, nose color, body color, and hair type. By observing the offspring of many crosses, geneticists also have determined the types of inheritance that several of these genes exhibit.

**Objective**

In this lab you will determine the genotypes and phenotypes of nine Sesame Street characters, and map the known genes for two of them.
Requirements

1. **Completion of “Phenotype & Genotype Table”**  
   a. For each Sesame Street character, describe each of the traits on table A.  
   b. Use this information to fill in both genotype and phenotype on our table.  

2. **Completion of “Sesame Street’s Characteristics”**  
   a. Includes answering the questions that go along with it  

3. **Production of the Zygote**  
   a. Follow the procedure as described on Page 5.  

4. **Completion of “Punnett Squares AND Probabilities”**  
   Use the five Punnett Squares to show the possible outcomes for male and female characters in your project. The probabilities, expressed as ratios AND percents, must be listed for each possible trait.  

5. **Completion of “Sesame Seeds’ Characteristics**  

6. **Family Portrait**  
   Create a family portrait of your male, female, and both offspring. The portrait should match the genetic description of your characters.  

7. **Pedigree**  
   Create a pedigree of your male, female and both offspring tracing a trait. Include two additional possible offspring your family could have.  

8. **Karyotype**  
   Answer the following questions about the provided karyotype.  

   Total: ________________/ 200
### Genetics of Sesame Street Characters Table A

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Phenotype</th>
<th>Genotype</th>
<th>Type of Inheritance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye Shape</td>
<td>Exo (pops out)</td>
<td>EE, Ee</td>
<td>Dominant</td>
</tr>
<tr>
<td></td>
<td>Endo (flat)</td>
<td>ee</td>
<td>Recessive</td>
</tr>
<tr>
<td>Nose Color</td>
<td>Pink</td>
<td>PP, Pp, Pg</td>
<td>Dominant</td>
</tr>
<tr>
<td></td>
<td>Orange</td>
<td>pp</td>
<td>Recessive</td>
</tr>
<tr>
<td></td>
<td>No nose</td>
<td>gg</td>
<td>Recessive</td>
</tr>
<tr>
<td></td>
<td>Tan</td>
<td>pg</td>
<td>Incomplete Dominance</td>
</tr>
<tr>
<td>Body Color</td>
<td>Red</td>
<td>RR</td>
<td>Multiple Alleles: R, B, &amp; O.</td>
</tr>
<tr>
<td></td>
<td>Purple</td>
<td>RB</td>
<td>Incomplete Dominance</td>
</tr>
<tr>
<td></td>
<td>Yellow</td>
<td>RO</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Blue</td>
<td>BB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pink</td>
<td>BO</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Orange</td>
<td>OO</td>
<td></td>
</tr>
<tr>
<td>Hair Type</td>
<td>Hairy</td>
<td>HH, Hh</td>
<td>Dominant</td>
</tr>
<tr>
<td></td>
<td>Bald</td>
<td>hh</td>
<td>Recessive (sex-linked)</td>
</tr>
</tbody>
</table>
Rubric Grade

1. Completion of “Phenotype & Genotype Table” 90 pts.
   - Lists of the genotypes of all the nine characters _____/45
   - Lists of the phenotypes of all nine characters _____/45

2. Completion of “Sesame Street’s Characteristics” and answering the questions that go along with it 36 pts.
   - Drawing of the chromosome map for 2 characters _____/14
   - Answering the questions that are included _____/22

3. Production of the Zygote 12 pts.
   - Filled in the two blanks and have drawn in the gametes _____/12

   - Completion of the Punnett Squares _____/5 pts
   - Completion of all the Ratios for Phenotypes _____/5 pts
   - Completion of all the percentages for phenotypes _____/5 pts

5. Completion of “Sesame Seeds’ Characteristics” _____/10 pts.

6. Family Portrait _____/20 pts.
   - Create a family portrait of your male, female, and both offspring. The portrait should match the genetic description of your characters (5 points for each character).

7. Pedigree _____/13 pts.
   - Create a pedigree of your male, female and both offspring tracing a trait. Include two additional possible offspring your family could have (2 points per family member, 1 point for providing a key).

8. Karyotype _____/4 pts.
   - Answer the following questions about the provided karyotype.

Total: ________________/ 200