

Pipe Cleaner Babies

Name: _____

Date: _____ Period: _____



INTRODUCTION:

In this activity you will play the role of parent and your lab partner will play the role of the other parent. You will use chromosome and gene models to create four offspring and determine their genotypes and phenotypes. Then mathematically, you will determine the probability of having offspring with different traits. The objective is to examine how alleles are inherited in an organism

HOW TO USE THE MODEL:

You will receive a baggie with pipe cleaners and beads. The pipe cleaners represent chromosomes and the beads represent genes located on the chromosomes. In humans, there are 23 pairs of chromosomes and thousands of genes, but for this exercise, we will only focus on a few.

In your bags, notice that you have four white and two colored pipe cleaners (chromosomes). If you have two pink chromosomes, you will play the role of the female (XX). If you have one pink and one blue chromosome, you are to play the role of the male (XY).

- _____ 1) What do the pipe cleaners represent?
- _____ 2) What do the beads represent?
- _____ 3) Humans have how many pairs of chromosomes?
- _____ 4) The blue pipe cleaner represents which chromosome?

FIGURE OUT THE PARENT'S TRAITS:

Remove the two sets of chromosomes from the bag and make sure you do not mix up your chromosomes with your partner's chromosomes. Keep each of the two sets separated. Arrange the chromosomes in order of size. You should have two long white pipe cleaners, two short white pipe cleaners, and two colored pipe cleaners in each set.

The white pairs represent AUTOSOME chromosomes and the colored pairs represent SEX Chromosomes.

EYE COLOR	HAIR COLOR	HEMOPHILIA
Dominant = Brown Bead = Brown Recessive = Blue Bead = Blue BB = Brown Bb = Brown bb = Blue	Dominant = Dark Bead = Black Recessive = Blonde Bead = Ivory DD = Dark Dd = Dark dd = Blonde	Dominant = Normal Bead = Red Recessive = Hemophiliac Bead = Orange HH = Normal in females Hh = Normal (carrier) in females hh = Hemophiliac in females H = Normal in males h = Hemophiliac in males

- _____ 5) What color eyes does the mom have?

- _____ 6) What is the mom's genotype for eye color?

- _____ 7) What color eyes does the dad have?

- _____ 8) What is the dad's genotype for eye color?

- _____ 9) What color hair does the mom have?

- _____ 10) What is the mom's genotype for hair color?

- _____ 11) What color hair does the dad have?

- _____ 12) What is the dad's genotype for hair color?

- _____ 13) What is mom's genotype for hemophilia?

- _____ 14) Is mom a carrier for hemophila?

- _____ 15) What is dad's genotype for hemophilia?

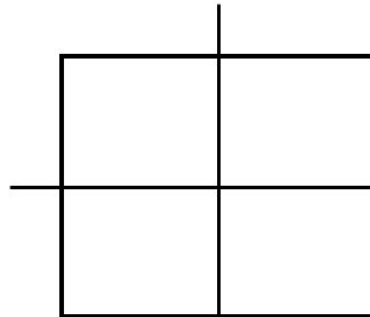
- _____ 16) Why doesn't dad get 2 alleles for this trait?

- _____ 17) Explain what is hemophilia? (Do some research)

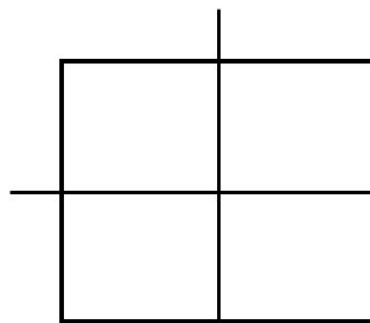
MAKE YOUR PREDICTIONS:

With the parents genotypes identified, predict the phenotypic ratios for each of the traits using the Punnett square method.

Make a Punnett square for each of the traits (eye, hair color, and hemophilia).



Genotypes	Phenotypes



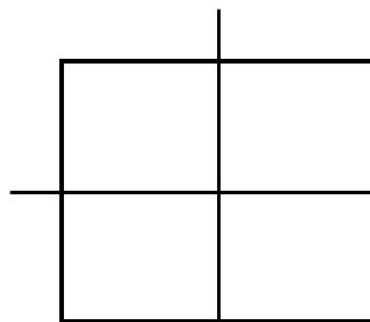
Genotypes	Phenotypes

_____ 18) What percentage % of the offspring will have brown eyes?

_____ 19) What percentage % of the offspring will have blue eyes?

_____ 20) What percentage % of the offspring will have dark hair?

_____ 21) What percentage % of the offspring will have blonde hair?



Genotypes	Phenotypes

_____ 22) What percentage % of the offspring will have hemophilia?

_____ 23) What percentage % of the offspring will be carriers?

TIME TO START A FAMILY:

The partner playing the role of the dad places one set of homologous chromosomes (long white pair) behind his/her back with a chromosome in each hand. The partner playing the role of the mom picks a hand at random to see what chromosome and trait is donated to the first offspring. Lay this chromosome on the table in front of you and set the other chromosome aside.

Repeat this procedure for the other homologous pair (short white pair) and for the sex chromosomes. Note: if the blue chromosome gets selected from the sex chromosomes, the child in this cross is going to be a boy.

Now the partner playing the role of the mom places one set of the homologous chromosome pairs behind his/her back and chooses.

The chromosomes chosen represent the genes of the first child.

Record your data (results) in the data table for your first child. Repeat the process three more times for a total of four offspring. When you have finished, post your data on the board. The other groups will also post their offspring data. Record the data for the other groups to get a total data set.

REPLACE ALL CHROMOSOMES BACK INTO THE CORRECT BAGGIE.

COMPILE DATA:

_____	Total number of babies?	
_____	_____	Total number of girls and % of total?
_____	_____	Total number of boys and % of total?
_____	_____	Total number of offspring with brown eyes and % of total?
_____	_____	Total number of offspring with blue eyes and % of total?
_____	_____	Total number of offspring with dark hair and % of total?
_____	_____	Total number of offspring with blonde hair and % of total?
_____	_____	Total number of offspring females with hemophilia and %?
_____	_____	Total number of offspring males with hemophilia and %?

DATA TABLE

	Eye Color	Hair Color	Hemophilia	Sex
Group 1 Your Group				
Group 2				
Group 3				
Group 4				
Group 5				
Group 6				
Group 7				
Group 8				
Group 9				
Group 10				

ANALYSIS QUESTIONS:

Each person will now answer the following analysis questions. Please write in complete sentences and explain your answers thoroughly.

24) Compare the total data actual results for each of the 3 traits with the predicted percentages (Punnett square).

25) Explain why women are carriers for the disease for hemophilia.

26) Describe the difference between how normal traits are inherited and how sex linked traits are inherited.
