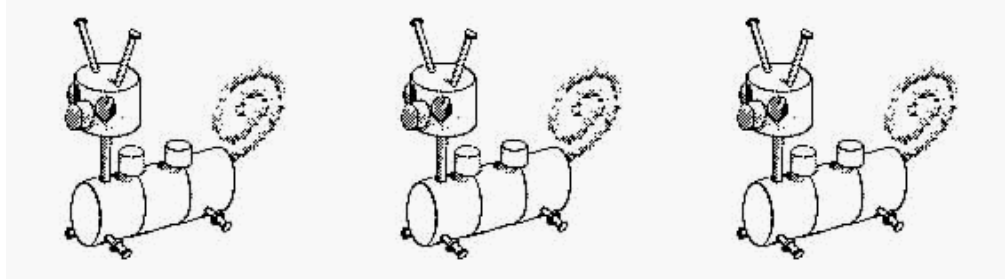


Name _____

Chromobugs



Problem: To demonstrate how genes are passed from parent to offspring.

Background Information:

Chromobugs are make-believe organisms. You will use these to model how inherited traits are passed from parents to offspring. Chromobugs are not exactly like living organisms because they only have one gene on each chromosome. Real living things can have thousands of genes on one single chromosome. However, both Chromobugs and real-life organisms both have dominant and recessive genes.

Chromobugs reproduce sexually to create new offspring. This means that they need both a male and a female parent. Sexual reproduction requires a sperm cell from the father and an egg cell from the mother.

Materials:

Large white marshmallows	Pipe cleaners	Colored toothpicks
Small colored marshmallows	Colored thumbtacks	Colored push pins
Mother "cell"	Father "cell"	

Chromobugs have 14 chromosomes (7 pairs).
The genetic code for Chromobugs is:

Chromobugs can have one, two, or no antennae; red or blue legs, one or two eyes, and one, two, or three humps. Their tails may be straight or curly; their noses may be red, orange or yellow and they may have two or three body segments.

CHROMOBUG GENETIC CODE

Body Part	Variations in Trait	Phenotype	Genotype
Antennae	Number	Two One None	AA Aa aa
Legs	Color	Blue Red	LL or Ll ll
Eyes	Number	Two One	EE or Ee ee
Humps	Number	One Two Three	HH Hh hh
Tail	Shape	Curly Straight	TT or Tt tt
Nose	Color	Red Orange Yellow	NN Nn nn
Body Segments	Number	Three Two	SS or Ss ss

In chromobugs, the blue leg color is dominant. This means that a chromobug with a genotype of LL will have blue legs. It also means that a chromobug with a genotype of Ll will have blue legs too. Blue legs are the phenotype for chromobugs with these two genotypes. However, a chromobug with a genotype of ll will have a phenotype of red legs because it inherited the red leg gene from both parents.

Examine the nose color of chromobugs. Co - dominance is shown in this trait. Two N forms of each gene (NN) will result in a red nose phenotype. Two n forms of the gene will show a yellow nose phenotype. A genotype of Nn will show an orange nose phenotype.

Procedure:

1. Discuss the chromobug genetic code with your group. Why do the body traits vary? _____
2. Use the chromobug genetic code to fill in the **phenotype and possible genotypes** of the parent chromobugs [drawn on the board] in the chart. You will complete the actual genotype columns later.

Body Part	Variation / Trait	Phenotype	Possible Genotypes for Parent Phenotypes	Actual Genotype	
				Mother	Father
Legs	Color	<i>Blue</i>	<i>LL, Ll</i>		
Antennae	Number				
Eyes	Number				
Humps	Number				
Tail	Shape				
Nose	Color				
Body Segments	Number				

4. Get out your chromobug mother and father "cells". Examine the cells and find the set of genes. Do these parents each have a genotype that matches one of the possible genotypes that you listed in the chart?

5. Record the actual genotype [from the information in the "cells"] for each chromobug parent in the chart.
6. How many of the genes will be passed on by each parent to the baby Chromobug? _____ How many chromosomes will a baby Chromobug cell have? _____
7. Arrange your Mother **or** Father (not both) chromosome (genes) in pairs by trait, with the code letters facing down. For example, both leg genes will be placed side by side. The chromosome pairs for a trait will be the same length. Randomly choose one chromosome (gene) for each trait. You

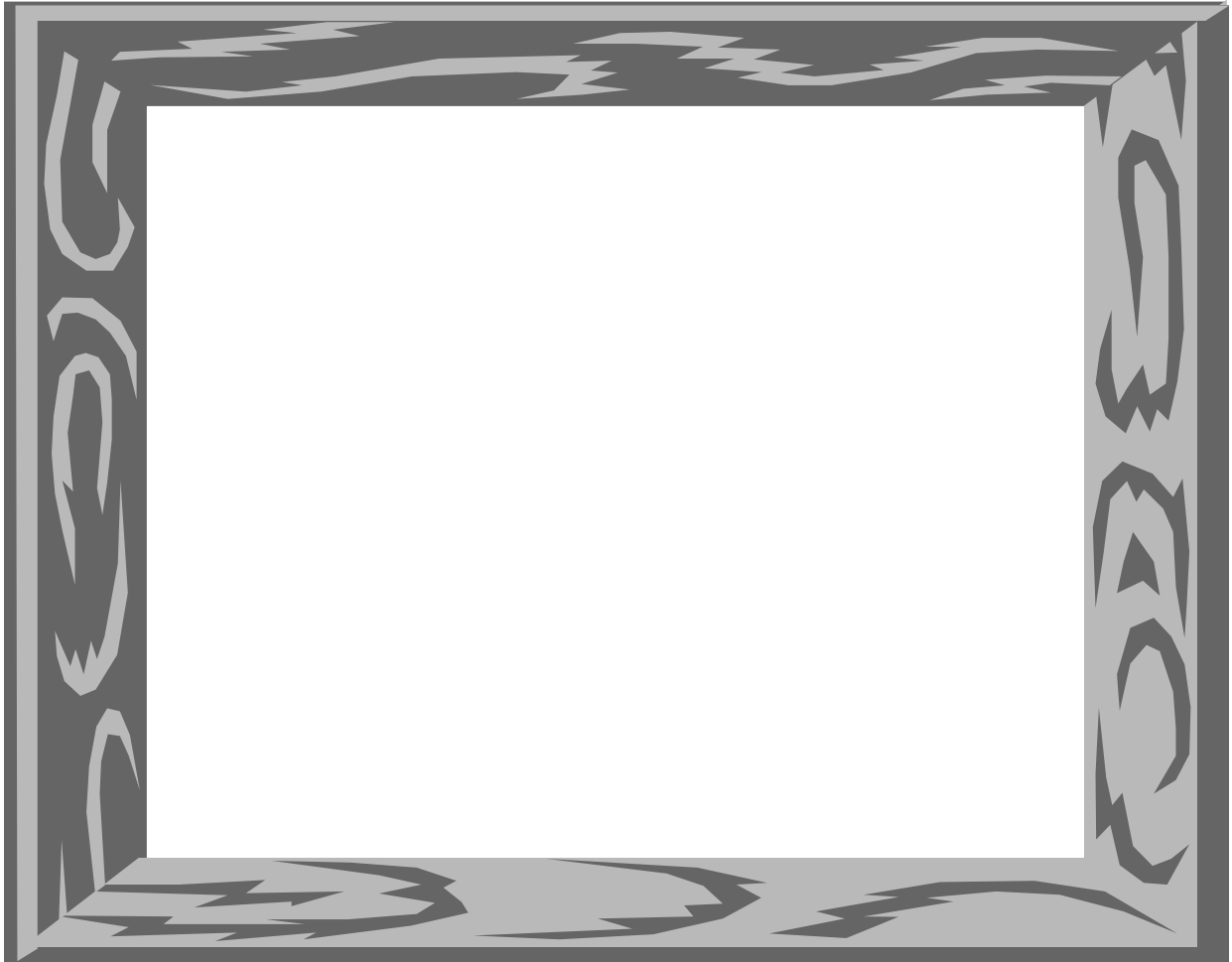
should have half the number of your Mother or Father chromosomes (genes). Repeat with the other parent cell.

8. Place the chromosomes that you did not use back in the "Mother" and "Father" cell envelopes.
9. Match up [by size] the chromosome received from the parents. **This is your baby chromobugs genotype.**
10. Examine your baby's chromosomes and **fill in its genotype in the table below.** Using the chromobug genetic code, fill in the baby's phenotype.

Your Chromobug Baby			
Body Part	Variation / Trait	Genotype	Phenotype
Legs	Color		
Antennae	Number		
Eyes	Number		
Humps	Number		
Tail	Shape		
Nose	Color		
Body Segments	Number		

11. Working with your partner, follow the phenotype to create a baby chromobug using marshmallows, toothpicks, pipe cleaners, and toothpicks.
12. Compare your baby with the other babies. Explain why there is such diversity.

13. Draw and color a picture of your chromobug baby.



Conclusions:

1. What is the total number of genes for each chromobug?
2. How many traits does each chromobug have?
3. Explain why there are a different number of genes and traits.

4. Explain where these genes come from.

5. Look back at the genes and genotypes of the mother and father chromobugs. In the chart below, list all the possible combinations of genes, genotypes, and phenotypes for **leg color** that a baby could have.

Gene From Mother	Gene From Father	Genotype of Baby	Phenotype of Baby