

Chromobug

Chronicle

Name

Period

Part 1-

- Discuss the chromobug genetic code with your group. Why do the body traits vary? (hint: think about *meiosis*) Write your explanation here:

Part 2-

- Is it possible for two parents who have the same phenotype (look the same) to have different genotypes? Explain your answer.

Use the chromobug genetic code to fill in the phenotype and possible genotypes. 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				

- Check your predictions. Do these parents each have a genotype that matches one of the possible genotypes that you listed in the chart?

- Record the actual genotype for each chromobug parent in the chart.

Analysis:

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

- Explain where these genes come from.

Part 3-

- How many traits does a Chromobug have? _____
- How many genes are in the mother cell? _____
- How many genes are in the father cell? _____
- Why do you think there a different number of genes and traits?

- 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?

- As a group, discuss what must happen so that the baby Chromobug will have all of the genes it needs. Write the steps.

Part 4-

- Randomly choose one chromosome (gene) for each trait. You should have half the number of your Mother or Father chromosomes (genes). If you did this again, would you end up with the same number of genes? Explain your answer. (If you are not sure, try it and find out!)

- Pretend you repeated this 50 times. What would be the chance or probability of selecting the same two genes for each trait?

Part 5-

- What do you need to know to find out what your baby will look like?

- Using the chromobug genetic code, fill in the baby's genotype and 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		

- Compare your baby with the other babies. Explain why you think there is such diversity. Use a dictionary to define diversity if needed.

- Draw and color a picture of your baby Chromobug.

Part 6-

- Can you predict the leg color of their babies? Explain your answer.

- What genes for leg color does the father have? _____
- What genes for leg color does the mother have? _____
- When an egg cell is made, what gene for leg color could the egg cell have?

- 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

- Are there any babies that have exactly the same genes? If so, why are they on different lines in the chart?

- This chart can be used to figure out the probability of having red-legged or blue-legged babies. Describe how you would figure the probability as a ratio.

- Describe how you would figure the probability as a percent.

Part 7-

- Use the Punnett Square to figure out the probability of these parents having off spring with curly tails. Show the genotype and phenotype as a ratio. List the Homozygous Dominant, Heterozygous Dominant, and Homozygous Recessive genotypes.

TT X Tt		

- What is the probability of these parents having offspring with two or three body segments? Show the genotype and phenotype as a proportion. List the Homozygous Dominant, Heterozygous Dominant, and Homozygous Recessive genotypes.

Ss x ss		

- One or two eyes? Show the genotype and phenotype as percents. List the Homozygous Dominant, Heterozygous Dominant, and Homozygous Recessive genotypes.

Ee x Ee		

- One, two, or three humps? Show the genotype and phenotype as a ratio. List the Homozygous Dominant, Heterozygous Dominant, and Homozygous Recessive genotypes.

HH x hh		

- Red, orange, or yellow nose? Show the genotype and phenotype as a proportion. List the Homozygous Dominant, Heterozygous Dominant, and Homozygous Recessive genotypes.

NN x Nn		

Think!

- What are all the possible genotypes and phenotypes for the offspring of a father who is Aa and Ll and a mother who is AA and ll. Show how you found the answer below.

Part 10 -

- Fill in the chart to show which combinations of alleles cause which colors of skin in chromobugs.

Chromobug Color	Gene Combinations
Green	
Red	
Yellow	
Orange	

- Can two red chromobugs mate and have green offspring? Explain your answer.

- Can two orange chromobugs mate and have red offspring? Explain your answer.

- Can two green chromobugs mate and have orange offspring? Explain your answer.

- Record the gene combination and color in the 1st generation column.
- Record the gene combination and color in the 2nd generation column.
- Record the gene combination and color in the 3rd generation column.
- Record the gene combination and color in the 4th generation column.

Table 1	1 st Generation		2 nd Generation		3 rd Generation		4 th Generation	
	Gene Pair	Color	Gene Pair	Color	Gene Pair	Color	Gene Pair	Color
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

- Count how many chromobugs you have of each color and record this number in Table 2 in the 1st generation row.
- Add up the number of each color and record this number in Table 2 in the 2nd generation row.
- Add up the number of each color and record this number in Table 2 in your *Chromobug Chronicle* in 3rd generation row.
- Record the surviving offspring (all but the green) in the last row.

Table 2 - Colored Chromobug Offspring by Generation					
Environment	Generation	Green	Red	Orange	Yellow
Many green plants and ground cover. Many different types of green plants everywhere.	1 st				
	2 nd				
	3 rd				
T o x i c S p i l l F r o m F a c t o r y					
Toxic spill from nearby factory destroys most green plant life. Rock & sand left behind.	4 th				
	4 th Survivors				

Discuss these questions with your group,

- Have all the yellow genes disappeared?
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- Has the population size changed? How? Would you expect this to occur in nature? Explain your answer.

- How does the population of the third generation compare to the earlier generations?

- Collect the data from your classmates to get the total class count of the Chromobug genes and colors.

4th Generation Survivors	Green	Red	Orange	Yellow

Discuss these questions with your group,

- Has the population changed compared to earlier generations? Explain your answer.

- Have any genes disappeared entirely?

- Yellow genes are recessive to green; green genes are dominant to both red and yellow. Which color of genes disappeared faster when the environment was hostile to them? Explain your answer.

- If the chromobugs from a particular environment become genetically adapted to this environment over many generations, what could happen if their fertilized eggs are used to "restock" a different environment?

- Real populations change much more slowly than our Chromobug population. Why?

Part 11-

Science Vocabulary

Define / describe each of the following terms in your own words:

Adaptation -

Alleles -

Asexual -

Chromosome -

Dominant -

Fertilization -

Gametes -

Genes -

Gene Pool -

Genotype -

Heterozygous -

Homozygous -

Meiosis -

Mitosis -

Phenotype -

Population -

Probability -

Punnett Square -
