Probability: 50:50 Chances__ Team members:______________________

The chance of a flipped coin landing with the "heads" side up rather than the "tails" side is 50:50. Does that mean that for every two times a coin is flipped, heads will turn up once and tails will turn up once? The chance of a boy rather than a girl being born in a family is also 50:50. Does that mean that in a family with six children, three are boys and three are girls? You know the answer to both of these questions is no. What is the value, then, of saying the chances are 50:50?

Strategy

You will compare the chances of a boy or girl being born with the chances of a flipped coin landing on one side or the other.
You will flip a coin six times to represent the sexes of the children in one family
You will record your results and compare the sexes of the children in 15 families. THEN you will compare with the other teams in the classroom.

Materials: **1 coin**

Procedure:

1. Let the heads side of the coin represent the girls. Let the tails side represent the boys. Flip the coin 6 times and record the data in Table 1 -trial1.
2. Continue to flip the coin 6 more times for each of the remaining 15 trials in Table 1.

DATA & OBSERVATIONS:

1.Record the results of the 15 groups of 6 coin flips in the columns of Table 1

Table 1

Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Girls (Head)															
Boys (Tails)															

2.Using the data from Table 1 record the combinations in Data table 2. When you are done. Record the data from 4 other groups in the classroom.

Table 2

Possible Combinations	6 girls 0 boys	5 girls 1 boy	4 girls 2 boys	3 girls 3 boys	2 girls 4 boys	1 girl 5 boys	0 girls 6 boys
YOUR Number of Combinations							
Group 1							
Group 2							
Group 3							
Group 4							

Questions & Conclusions:

1. Why can you use coin flips to represent sex combinations which may occur in families?

2. According to your results, is it possible to have a family of exactly 3 boys and 3 girls>

Do you know any family where there are exactly three boys and three girls? ___________

3. According to your results, is it possible to have a family of 6 children wher the ratio of boys is NOT exactly 50:50? ____________________________ Do you know any family where this is true? ________

4. According to your results, which combination of boys and girls occurred most often?

Does this agree with what you had expected? ________________________

5. According to your classmates results, which combination of boys and girls occurred most often?
Tm1______________________________________ Tm2_______________________________________
Tm3______________________________________ Tm 4______________________________________
Does this agree with what you had expected? ____

6. Explain how one can make a statement that you expect 3 boys and 3 girls in every family of 6 children, but yet you may not get this ratio in an actual family.

7. Out of the 90 total children (coins) counted by your group, how many were boys?_____girls?______
Is your answer close to half boys and half girls?_______________ Explain what you think happened:

8. In a single family, the ratio may or may not be half boys and half girls. When do you begin to show that an equal number of booys and girls occurs in families?

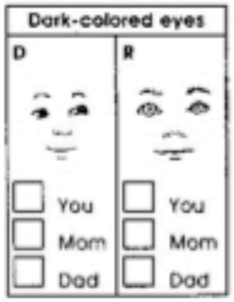
9. In 5 sentences write a conclusion about what you learned in this lab:

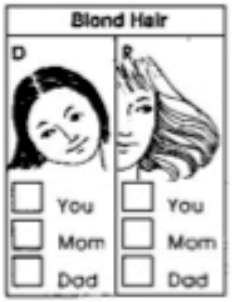
Designer "Genes"

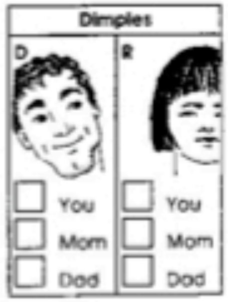
There are more than 40,000 **genes** that determine traits each person has. These traits such as dark hair, blue eyes, etc are inherited from parents. There are two strengths of traits: **dominant** – being the strongest and **recessive**- the weakest.

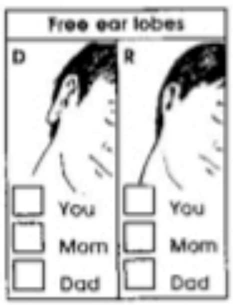
Place checks in each chart to show who would have the dominant and/or recessive genes in each category

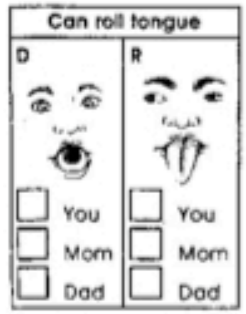
D = Dominant R = Recessive

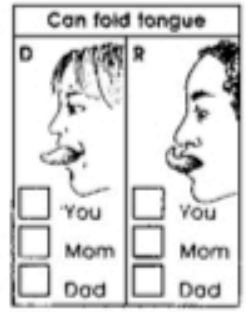


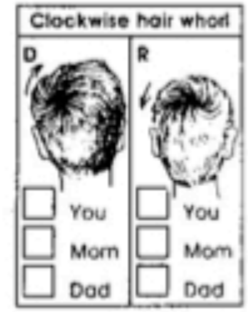


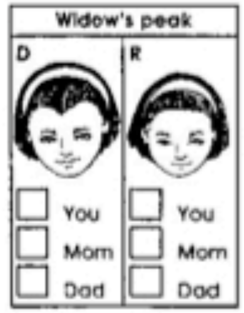


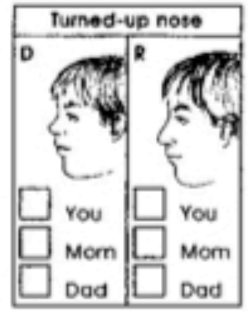


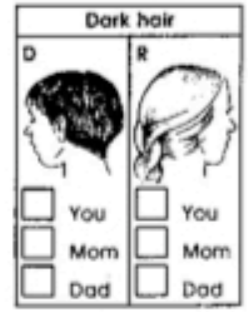


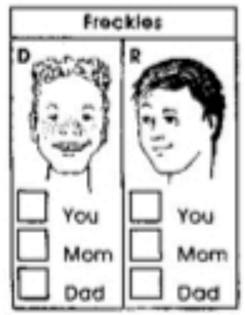


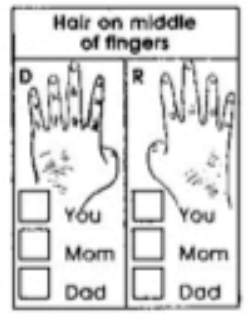


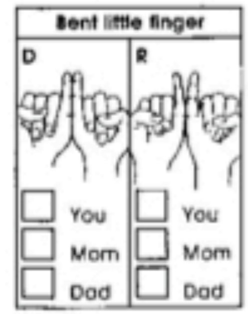












1. How many traits do you and your mother share? ___________ You and your father: __________

2. How many traits do you share with both parents: ______________

3. List all traits that you show but are not shown by either parent: ______________________________

4. How might it be possible to show a trait both when parents do not show it: ______________________________

____

5. What proof do you have that all of your genes did not come from only one parent?

____

____

Data table:

Trait	Description	You	Father	Mother	Sis/bro EC	Sis/bro EC	Grandma/ Grandpa EC
Eye color	Blue (r) or not blue						
Hair color	Blond (r) or not blond						
Dimples	Yes or no (r)						
Ear Lobes	Free or attached (r)						
Ear point	Yes or no (r)						
Tongue	Roller or nonroller (r)						
Tongue	Nonfolder or folder (r)						
Hair Whorl	Clockwise or counterclockwise (r)						
Widow's peak	Present or not present (r)						
Turned up nose	Yes or no (r)						
Hair color	Dark or blond (r)						
Freckles	Present or not present (r)						
Hair on middle of fingers	Present or not present (r)						
Bent little finger	Straight or bent (r)						

Conclusion: (5 sentences)What did you learn about the genes you have expressed and the genes expressed by your parents:

Heredity Lab:The Passing of Traits from Grandparent to Grandchild

Objectives:

- To simulate the transmission of genetic information from grandparents to parents to children.
- To collect and interpret data on the diversity of patterns possible from such a transmission.
- To relate the physical attributes of humans to the genetic information received from previous generations.

Materials: 24 candies in a zip lock baggie

6 labeled cups (numbered 1-6) grandparents are 1-4, father is 5 mother is 6

colored pencils/ crayons

Procedure:

1. Working in teams of 2: Place the cups labeled Grandfather 1, Grandmother 1, Grandfather 2, Grandmother 2, Father and Mother in the same arrangement on your desk as shown on the Generations Diagram. The person who will be picking the genes (candies) must wash their hands.

2. Place the following candies in the corresponding cups:

cup1: Grandfather 1 -**3 green** and **3 orange**

cup 2: Grandmother 1 -**3 dark purple** and **3 pink (mauve)**

cup 3: Grandfather 2 - **3 blue** and **3 light blue**

cup 4: Grandmother 2 - **3 red** and **3 yellow**

Each cup should have a total of six candies, three of each of the two colors per cup. The candies represent the **genes** of each of the grandparents...those portions of the chromosome which determine the characteristics (traits) that the grandparents will pass on to their children and grandchildren.

Color the diagram to show the colors used for each grandparent.

3. **Without looking,** the student who has washed their hands should pick up 3 candies (genes) from the Grandfather 1 cup and 3 candies from the Grandmother 1 cup (these are cups 1&2). These genes represent the son of the first grandparents; the son who will grow up to become a father himself. Place them in the cup marked cup 5 (Father). The father now has six genes, just as did each of his parents.

COLOR FATHER'S DIAGRAM

4. Without looking, take three genes each from the Grandfather 2 and Grandmother 2 cups (cups 3&4). Place them in the cup marked cup 6 (Mother). The mother should now have six genes, just as did each of her parents. . **COLOR MOTHER'S DIAGRAM.** Place the grandparent cups aside. (you get to eat them later!)

5. Assume that the father and mother have four children, Alan, Betty, Carl and Debbie. To find Alan's genes draw without looking, three genes each from the Father and Mother cups. Record his skittle colors. **Color the diagram** to show the genes that were picked for Alan. THEN **return all genes to the parent's cups**.

6. **Re: returning all genes to the parent's cups**. Check your Father/mother diagrams to be sure you have all the right colors in the right cups. Remember that each child of father & mother still has all the genes available each time! Gently shake the cups to mix up the genes. Without looking, select three genes from each cup to represent Betty's genes. **Color the diagram** to show the genes for Betty.
THEN **return all genes to the parent's cups again.**

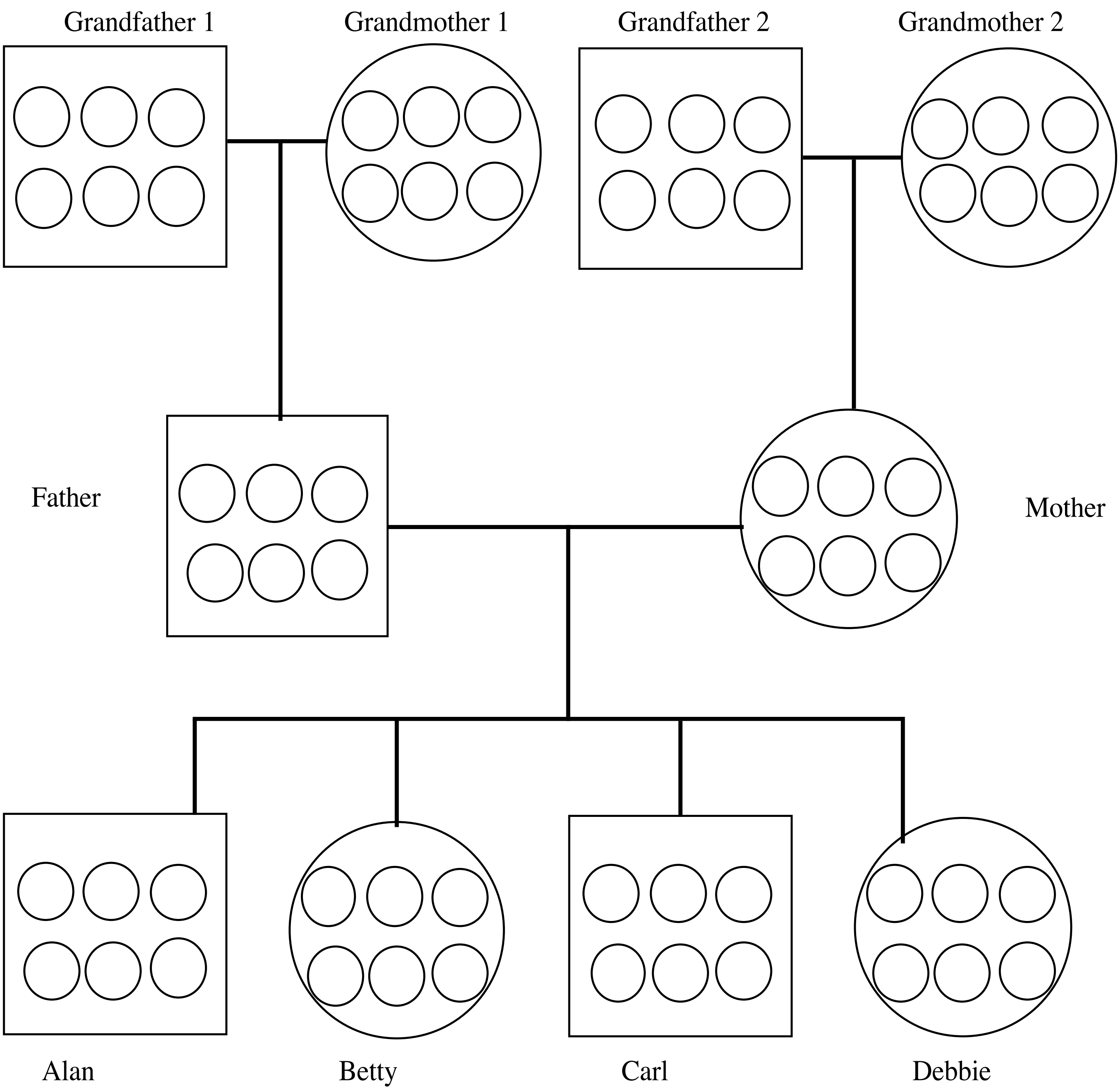
7. Repeat step #6 for each of the remaining two children, Carl and Debbie.
Color the diagram for these two children.

8. Summarize your data in the table under the coloring. In each box, write the number of genes each child received from each grandparent. (The total should always be six.)

You may divide up and eat the candies after you have filled out the data table! Enjoy!!

<u>Heredity Lab: The Passing of Traits from Grandparent to Grandchild</u>

Data: **Generations Diagram: Color and Complete as you go**



Once you have all the grandchildren colored, complete this data table with their information.
Write the number of skittles they have of each color. Which grandparent do they look like the most?

		Alan	Betty	Carl	Debbie
Grandfather 1-	green				
	orange				
Grandmother 1-	purple				
	pink				
Grandfather 2-	blue				
	white				
Grandmother 2-	red				
	yellow				
	TOTAL	6	6	6	6

Data table:

SUMMARY QUESTIONS:

1. Were any of the four children exactly alike? ________

If your answer was "yes", what do you think would have happened if you had been working with many hundreds of genes instead of only six?

If your answer was "no", why do you think it turned out that way?

2. Why was it necessary to take three genes from the Mother cup and three from the Father cup to make the total of six genes in each child?

3. Why was it necessary to **return** the genes to the cups of the Mother and Father each time?

4. Suppose the candies actually were genes that controlled some very obvious characteristics. Which of the children you created would look the most alike?

Why?

5. Which of the children you created would most resemble...

Mother?
Father?
A Grandparent (...which one?)

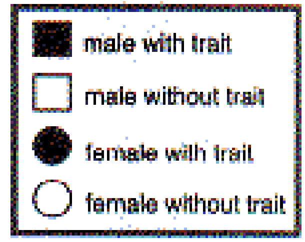
Conclusion: 5 sentences:

____
____
____
____
____

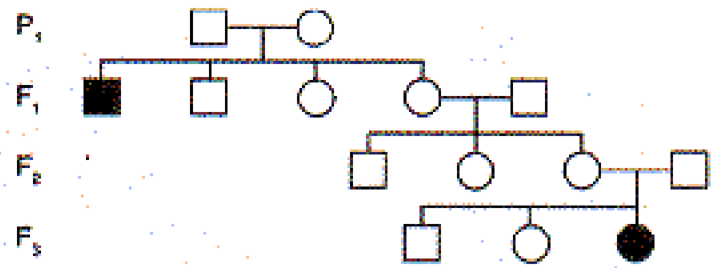
HUMAN PEDIGREES

Name ____________________

By studying a human pedigree, you can determine whether a trait is dominant or recessive. To interpret the three pedigrees below, use the same key shown at the right. Of course, the individual with the trait could be homozygous dominant or heterozygous dominant.



A. The pedigree shows the inheritance of attached earlobes for four generations.

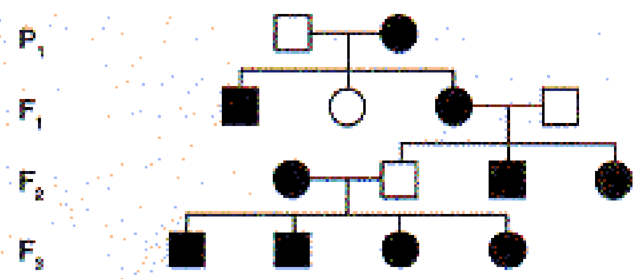


Is the trait for attached earlobes, versus free earlobes, dominant or recessive?

____________________ How do you know? ____

____

B. The pedigree shows the inheritance of tongue rolling.

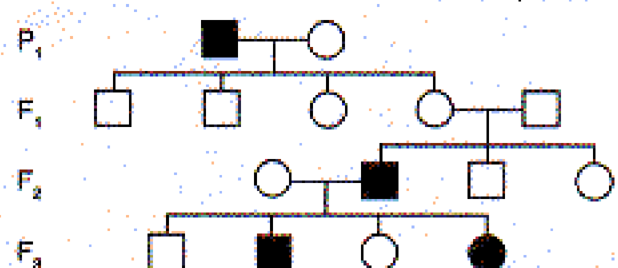


Is this trait dominant or recessive? ____________________ Explain. ____________________

____

____

C. This pedigree shows the inheritance of colorblindness, a sex-linked trait.



Is this trait dominant or recessive? ____________________ Is the mother of the colorblind girl in the F_3 generation colorblind, a carrier, or a person with normal color vision?

____________________ Explain. ____

____