

**Name:**

**Period:**

### **Pedigree Chart Activity**

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Purpose: Describe Genetic Traits looking at pedigrees and karyotypes.

Activity: Handout pedigree charts for individual seat work.

#### Pedigree Charts

All living things have pedigrees. A pedigree is a diagram that shows the occurrence and appearance (phenotype) of a particular genetic trait, as it is passed from one generation to the next in a given family. From this information, along with an understanding of inheritance, genotypes of individuals can often be determined.

Part 1: How to make a Pedigree Chart.

Symbols:

1. Boxes represent males.  $\square$

2. Circles represent females.  $\circ$

Note: Filled in squares and circles indicate particular traits expressed in those individuals

Relationships:

3. A horizontal line connecting a male and female indicates a mating.

$\square \text{---} \circ$

a. A vertical line from this type of horizontal line indicates offspring.

$\square \text{---} \circ$

$\circ$

b. If there are several offspring, indicate this by a second horizontal line with a vertical line extending from it for each offspring.

\_ O

\_\_\_\_\_

O O \_ \_

oldest to youngest

4. Twins are indicated as shown below.

\_ O

^

\_ \_

Space the offspring at equal distances along this second horizontal line for neatness.

Where two families intermarry, the corresponding generations should always be in line with each other.

If there has been a divorce or other circumstance which has produced a person with multiple spouses, the chart is completed as shown below.

Generations should be numbered at the left of the chart ( using Roman numerals). This simplifies any explanations you will make.

Number each individual in a generation from left to right (1,2...) to again simplify explanations.

I 1 O 2 \_ 3 O

^ \_ \_

/ \

II 1 \_ 2 O 3 O 4 O

Now, follow the story, and make the appropriate pedigree chart.

*This is the story of Grandma and Grandpa Flipnob, and their clan! They were married way back in 1933, and have been just like newlyweds ever since. From their union, 4 individuals were created. Elizabeth, the eldest, was born in 1935. Fred soon followed in 1936. In 1939 Michelle was brought into this world. Mickey (a surprise to the whole family was the baby of the family, not being born until 1950.*

*Elizabeth fell in love at a young age, and wed her high school sweetheart, David, in 1954. From this marriage, two bundles of joy came about (at the same time):*

*John and Sonny - 1955 (twins)!*

*It took Fred a little longer to find his soul mate. Finally in 1970, Fred found the woman of his dreams, Wilma, and they were married. Since they married so late in life, they only brought one new person into this world:*

*Barney - 1972*

*Michelle was a hard working woman, and never found time in her schedule for love. She led a very productive and fulfilling life, but she never did marry and have children.*

*Mickey was a wild one!! After a long string of girlfriends, he finally chose Monica to spend the rest of his life with. They were wed in 1975 and brought two girls into this world:*

*Krista - 1977*

*Janet - 1979*

Answer the following questions regarding your pedigree:

1. Who are the inlaws?

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2. What is the relationship between the people in the third generation?

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Now that you have your pedigree chart together, shade the appropriate circles and squared from the information to follow. Remember that individuals who possess the RECESSIVE trait are to be filled in. Those individuals not filled in possess at least one dominant trait.

#### Dominant/Recessive Inheritance - Freckles

*Not having freckles is a recessive trait.*

*Grandpa Flipnob did not have freckles, but his beautiful bride did.*

*Fred and Michelle were the only two of their siblings to have freckles.*

*Of the grandchildren, the twins did not have freckles, and neither did Barney, but the two girls did.*

Now: Using the guide provided, determine the genotypes of all individuals in this pedigree chart for freckles. Remember, having no freckles is a RECESSIVE trait.

## GUIDE

### STEP 1

Assign two recessive genes to any person on the pedigree whose symbol is shaded. Small letters are written below the person's symbol.

### STEP 2

Assign one dominant gene to any person on the pedigree whose symbol is unshaded. A capital letter is written below the person's symbol.

### STEP 3

Use the information given to you to determine the second alleles for each person with the dominant phenotype.

Example: We know that Grandpa Flipnob does not have freckles. If Grandma were BB, could any bb children be produced from Grandma and Grandpa? If Grandma were Bb, could any bb children be produced from them? Do Punnett squares below to determine your answer.

From your results, what is Grandma's genotype? \_\_\_\_\_

What must be the genotypes of their children? \_\_\_\_\_

(2nd generation)

Fill in these genotypes (along with Grandpa's) beside the appropriate circles and squares.

Complete this process until the entire pedigree is completed.

## Sex-Linked Inheritance - Colourblindness

To complete this part of the activity, you will need to make a copy of your pedigree chart. There is no guide to go along with this section. Just remember to determine the genotypes of those possessing the sex-linked trait first. From there, using Punnett squares, you should be able to determine the genotypes of most, if not all of the family.

*Neither Grandma or Grandpa Flipnob are colourblind.*

*All of their children have normal colour vision, except for Mickey.*

*Of the grandchildren, the twins both inherited colourblindness, as did their cousins, Barney and Janet.*

*There still remains one colourblind person in this clan, however, that is up to you to determine who.*

What are the genotypes of the individuals in the Flipnob family for colourblindness?

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