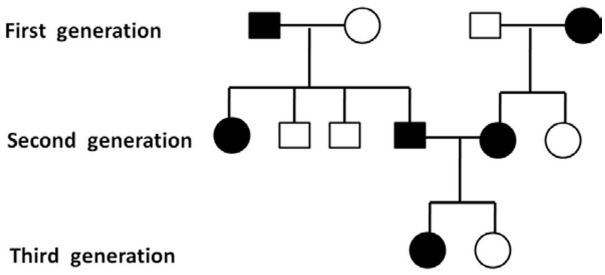
Graphing a Pedigree with the Microbit

Guiding Question:How can a pedigree be used to analyze human inheritance?

Student Objectives: By the end of activity, students will be able to:

- Explain purpose of a pedigree, to trace passage of genetic traits over generations.
- Read and interpret a pedigree chart.
- Construct a pedigree chart given sufficient information.
- Use a pedigree chart to identify the behavior of a particular allele.
- Construct a Punnett square for a particular pedigree chart crossing.



Background Information:
A pedigree is a diagram that shows how traits are passed. It is chart that shows the presence or absence of a trait within a family across generations. Every person carries two copies of genes—one from each parent. Your traits are controlled by these genes. During reproduction, you get one gene from your mother and one gene from your father. For each trait there are two forms, a dominant and a recessive. Whenever a dominant form is passed down, it will mask the recessive gene.

In this exercise we will use the BBC Microbit and some python code to demonstrate how sex chromosomes and one gene pair is passed down to offspring over generations. This activity can be completed with a coin flip, however, the reason why we use code and a microprocessor is so that we can iterate and demonstrate reproduction in a larger quantity faster.

Directions for flashing the program on the Microbit:

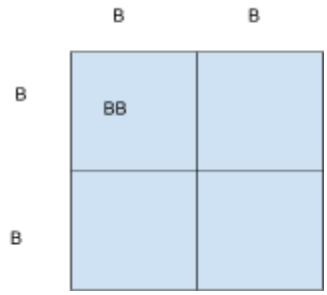
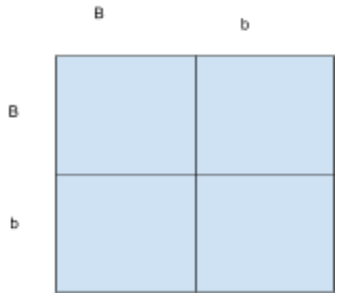
1. Every student should work in a pair.
2. One student needs to have Mu installed on their computer. Go to https://codewith.mu/en/download and download it. (Try to find a "friend" who has had computer science already.)
3. Open Mu and select the Microbit Mode
4. Grab a Microbit and a cable
5. Plug the Microbit into the USB
6. Click REPL button.
7. You should be able to see the reproduction data on the bottom window in Mu.
8. You will collect data from this screen.

ON Microbit Key (Your Microbit will scroll a message on the grid.)
G - gender (either XX or XY)
C- color (BB, Bb, bb)
R - means the Microbit is ready mode
W - means the microbit has to wait
X- means no reproduction (failed reproduction)
✔- means reproduction happened

A button - shows the gender and the genotype of the Color BB, Bb, bb
B button - allows the microbit to reproduce (after a one minute wait time)

NAME: PERIOD: DATE:

DIRECTIONS: Draw Punnett Squares showing the different possibilities from a single trait.

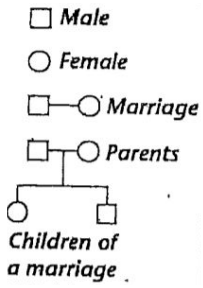
		MALE (XY)		
		BB	Bb	bb
FEMALE (XX)	BB			
	Bb			
	bb			

My Microbit:
Organism 125
Gender: XX
Color: Bb

DIRECTIONS: Record the outcomes from the **five** generations that occured on your microbit.

Genesis (Generation 1)	Parent 1	**Parent 2**
Generation 2 Organism 91 Gen 1 P1: 125 P2: 220 Gender: XY Color: bb	Parent 1 #_____	Parent 2 # _____
Generation 3	Parent 1 #_____	Parent 2 # _____
Generation 4	Parent 1 #_____	Parent 2 # _____
Generation 5	Parent 1 #_____	Parent 2 # _____

Draw the pedigree that resulted from your Microbit reproduction events.



Use the data from the Microbit reproduction events. Fill in the chart based on the offspring produced during the first five(5) generations of reproduction. Provide the count for how many of each were produced.

Male BB	Male Bb	Male bb	Female BB	Female Bb	Female bb

Can you make a prediction on what would happen with 10 generations? 50 generations? 100 generations? Explain your answer.