

Potter Pedigrees: Tracing genetic traits over the generations

It is no secret that magic runs in some families over countless generations. Though some have claimed that the gene for magical ability is dominant, is this truly the case? As we know, science always begins and ends with questions. Let's first start with a list of individuals who vary in this ability. Discuss these individuals with your group and describe their magical ability below:

<i>Individual's Name</i>	<i>Individual's Phenotype (Level of magical ability)</i>
<i>Harry Potter</i>	
<i>Hermione Granger</i>	
<i>Ronald Weasley</i>	
<i>Mr. Argus Filch</i>	
<i>Professor Dumbledore</i>	
<i>Mrs. Arabella Figg</i>	
<i>Ms. Dolores Umbridge</i>	
<i>Ariana Dumbledore</i>	
<i>Tom Riddle, Sr.</i>	

With this information, discuss with your group what you know of each individual's familial background. We know that muggles have given birth to people with magical ability and that those who are magical have produced squibs without it. You may use resources to complete your research as long as the information from which you cite is a reliable resource. If you have questions as to whether a resource is appropriate, please consult your professor.

Based on your research, write below whether these individuals were magical, squibs or muggles.

<i>Individual's Name</i>	<i>Individual's Phenotype</i>	<i>Mother's Phenotype</i>	<i>Father's Phenotype</i>
<i>Harry Potter</i>			
<i>Hermione Granger</i>			
<i>Ronald Weasley</i>			
<i>Mr. Argus Filch</i>			
<i>Professor Dumbledore</i>			
<i>Mrs. Figg</i>			
<i>Ms. Umbridge</i>			
<i>Ariana Dumbledore</i>			
<i>Tom Riddle, Sr.</i>			

Now that you have assessed the phenotypes for these individuals, let's assign genotypes. What have you determined the magical gene to be based on their familial history? Use the letters M/m.

My claim is that magical ability is a _____ trait.

<i>Individual's Name</i>	<i>Individual's Genotype</i>	<i>Mother's Genotype</i>	<i>Father's Genotype</i>
<i>Harry Potter</i>			
<i>Hermione Granger</i>			
<i>Ronald Weasley</i>			
<i>Mr. Argus Filch</i>			
<i>Professor Dumbledore</i>			
<i>Mrs. Figg</i>			
<i>Ms. Umbridge</i>			
<i>Ariana Dumbledore</i>			
<i>Tom Riddle, Sr.</i>			

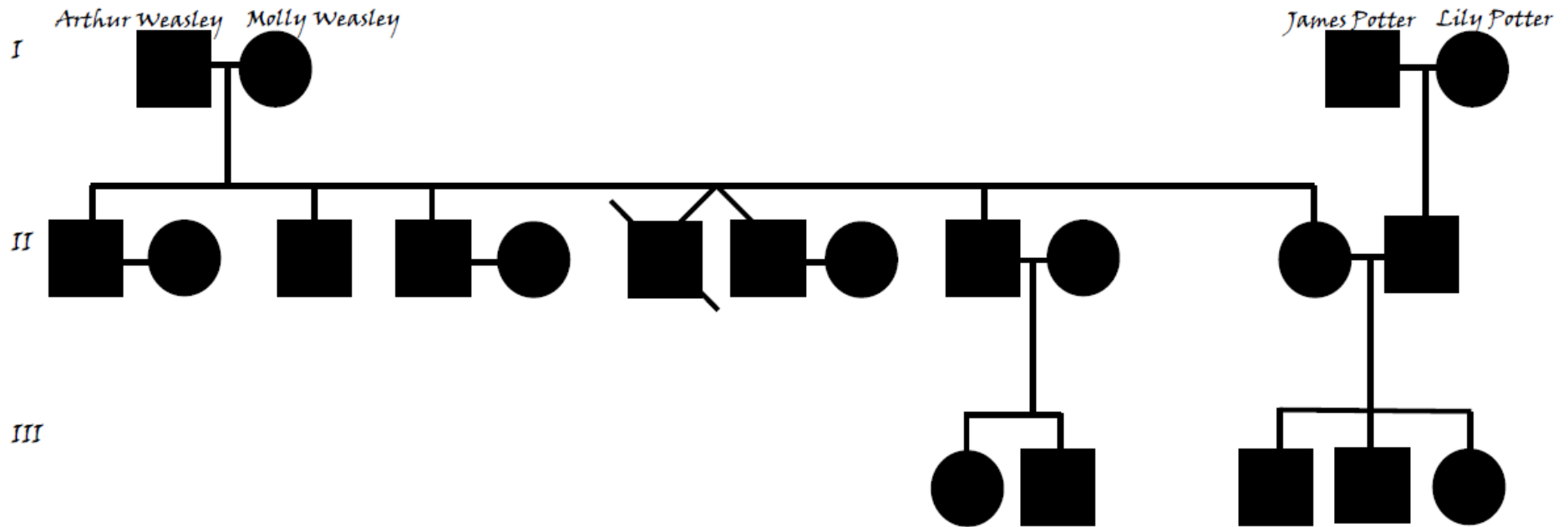
Let's do some sample crosses to determine if this data works out.

Cross Hermione Granger's parents below and circle Hermione's genotype within the square.

Cross Mr. Filch's parents below and circle Mr. Filch's genotype within the square.

Let's now step back and look at entire family trees to see how this gene may be passed down. Below, you'll see the Potter/Weasley family tree. Analyze the pedigree and determine the patterns that exist in the symbols that will help you create your own pedigree later. Note that this is only a partial tree; some of the older Weasley siblings went on to have families but their children are not shown in this pedigree. Fill out the rest of the names above the symbols as well.

Answer the following questions:



- 1) What do the circles mean? _____
 - a. What is your evidence for your answer? _____
- 2) What do the squares mean? _____
 - a. What is your evidence for your answer? _____
- 3) All symbols are shaded in this pedigree. What do you think this means? _____
- 4) Individual II-6 has a line through the symbol. What do you think this means? _____
- 5) Individual II-6 and II-7 are connected to the parental line at the same point. What do you think this means? _____
- 6) What pattern did you observe as you read from left to right? _____

Constructing a Pedigree: The Noble and Most Ancient House of Black

Even in families of the “purest” of blood, one will find individuals without highly prized traits. The Black Family was no exception. The tapestry that hung at the Black Family home detailed the generations of purebloods though those with undesirable traits were removed from the pedigree. Provided below is a narrative that details some of the Black Family members and, based on this information, you will construct a pedigree and identify those with magical ability as individuals were in the Weasley pedigree provided. Though you may want to use quill and ink, a muggle pencil may be more appropriate as mistakes are often made but are easily erased... much like Sirius was by his mother on the tapestry!

And the story begins...

Phineas Nigellus Black, former headmaster of Hogwarts School of Witchcraft and Wizardry, married Ursula Flint, a pureblood witch, some time after he completed his schooling. They had five children. The first was Sirius II, born in 1877, followed by Phineas, Jr. Arcturus I was then born in 1884, followed by his sister Belvina in 1886, and finally their youngest brother Cygnus I in 1889. All were recognized for their magical ability though son Phineas, Jr. was disowned by the family for supporting muggle rights. All but Phineas, Jr. married and had children. The eldest son Sirius II married Hesper Gamp, a pureblood witch, who had three children. The first was Arcturus II in 1901 who was recognized with the Order of Merlin though possibly only because of his political connections. The next was his sister Lycoris who was followed by her younger brother Regulus I, neither of whom married nor had children.

Arcturus I, brother of Sirius II, married a witch named Lysandra Yaxley and they had three children. Their sister Belvina had two sons and a daughter and youngest brother Cygnus I married a witch named Violetta Bulstrode and they had four children. Arcturus I had three daughters: Callidora, Cedrella, and Charis, in that order. Though all witches, Cedrella was disowned for marrying Septimus Weasley who the family considered a “blood traitor.” Her older sister married Harfang Longbottom and younger sister Charis married Caspar Crouch. Though Belvina’s three children are not on record, Cygnus I’s children consisted of eldest son Pollux, then daughter Cassiopeia, son Marius, and lastly daughter Dorea. All were born with magical ability except for Marius who was born a squib and disowned later because of this condition.

Arcturus II, son of Sirius II, married witch Melania MacMillan and they had two children, older sister Lucretia and younger son Orion. Pollux, son of Cygnus I, married a witch named Irma Crabbe and they had three children. The only other child of Cygnus I that had children was youngest Dorea who married Charlus Potter and had a son. Orion married Walburga, a pureblood witch and oldest daughter of Pollux and Irma. Walburga also had two younger brothers, Alphard followed by Cygnus II. Orion and Walburga had two sons, Sirius Black, godfather to Harry Potter, and his younger brother Regulus II.

Walburga’s younger brother Cygnus II married pureblood witch Druella Rosier. They had three daughters, all witches. The first was Bellatrix followed by Andromeda and then Narcissa. Bellatrix married Rodolphus LeStrange but they had no children together. Andromeda married muggle Ted Tonks, for which she was disowned, and they had a witch daughter named Nymphadora. Lastly, Narcissa married pureblood Lucius Malfoy and they had one son, Draco. Though many claimed to be pureblood throughout this family tree, it is unclear if they truly were. It is clear, however, that the trait for magical ability was passed on through the generations.

On a separate piece of parchment...

Now that you have read through the Black Family history, construct a pedigree on a separate sheet of paper. Be sure to include individuals’ names above the symbols, appropriately shaded symbols to represent the magical ability gene, and genotypes below each symbol that represent their phenotype as described. If it is not explicitly stated, you can assume each individual possesses magical ability in their phenotype. Otherwise, they would have probably been disowned!

After constructing the pedigree, answer the following questions:

1) Who lacks the magical ability trait in the pedigree? _____

2) Explain how this serves as evidence for your claim. _____

3) Was there evidence of inbreeding within this family? YES NO NOT ENOUGH INFO
(Circle One)

4) Provide evidence for your answer to the question above. _____

5) Are there heterozygotes in this pedigree? YES NO NOT ENOUGH INFO
(Circle One)

6) Provide evidence for your answer to the question above. _____

7) How many generations exist in this pedigree once you have completed it? _____

8) Though this family claims to be pureblood, we know individuals like Hermione Granger is a witch with muggle parents. Explain how this might occur and how it is supported with the evidence in your Black Family pedigree.

9) A **de novo mutation** is an alteration in a gene that is present for the first time in one family member as a result of a **mutation** in a germ cell (egg or sperm) of one of the parents or in the fertilized egg itself. How could this type of mutation play a role in magical ability? Provide an example.

Using Pottermore or any other reliable Harry Potter resources, choose another trait and create a pedigree that shows how that trait has been passed from one generation to the next. It should involve at least two generations and more than 5 individuals.

Claim: The trait of _____ is a _____ trait.

Evidence: Cite specific evidence from the pedigree you've drawn on the next page. _____

Reasoning: How do your evidence support your claim? _____

Draw pedigree here. Don't forget to label all individuals and be sure your symbols properly represent the trait or lack of trait in each individual.

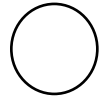
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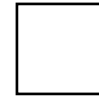
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