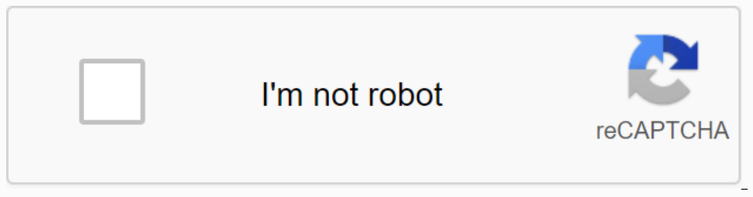
What is your grandma's brother to you



Continue

-A curious adult from Oklahoma December 16, 2014 In the simplest way, these genetic tests see how much DNA two people share. On average, the first cousins share 12.5% of their DNA for reasons covered here. This is usually (though not always) too little DNA for an uncle to share with a niece or nephew. On average, they would share about 25% of their DNA. But the first cousins aren't the only ones who share about 12.5% of their DNA. A half-uncle, great-uncle or great-grandparent-great-grandfather would too. And all this makes more sense giving the age difference. (Click here for a large list of relationships and common DNA.) To one of these tests, a great-uncle looks pretty much like a first cousin. That's why you often need something more than just the DNA results... a small family history can go a long way to finding out exact relationships. Unfortunately, we don't always have family history to keep going. Then you have to dig a little deeper and have a little bit of luck to find out. Grandpa's brother, who looks a little deeper at DNA results, doesn't always give you the right answer, but sometimes it can help to rule out some possibilities. For example, you can rule out that he is either your grandpa's brother or your grandma's brother. If he is her grandpa's brother, it might help to look at Y chromosomes. Only men have Y chromosomes and, more importantly, this chromosome is passed on unchanged from father to son. This means that a man who is supposed to be the father of a particular boy must both have the same Y chromosome. We may use and use this information to regulate or exclude certain possibilities. Imagine this family tree: men are represented by squares and women with circles. Since we only follow the Y chromosome, this is the only DNA I show. In this case, if you and the tested man share a Y chromosome, then he can be a great uncle on your father's side of the family. If not, he's not that great uncle. But this kind of analysis is not as powerful as you might think. For example, we can only say that if the two of you do not share the same Y, it is that he is not this great uncle. Here are a few examples where he is a great uncle, but not so special: in the example on the left, the great-uncle happens to be your grandma's brother. Its white Y is different from the red Y that your grandpa passed on to you. You couldn't get the white Y from your grandma's side because she didn't have one to give. Something similar is happening on the right. Here the great-uncle is still the brother of your grandpa, but he is on the maternal side of the In other words, he is the brother of your mother's father. Since you are related by your mother, you don't get the white Y from her side of the family. Instead, you get the red Y from your father's side. And that, of course, presupposes that you are a boy! If you want to use a then, to do such a thing, you need to find a male relative with a direct paternal connection back to the great uncle. Grandma's Brother In the previous examples, I pointed out how you can't use the Y to trace your mother's brother back to you. But you might be able to use another piece of DNA, the mitochondrial DNA (mtDNA). This type of DNA is passed from the mother to the children. What that means is that you don't have any of your father's side in terms of mtDNA. Here's an example where you can check if the man tested was your mother's brother: Here you share your mtDNA with your great uncle because you can follow your maternal line up to him. The white mtDNA goes unharmed from his sister to your mother to you. Note that it doesn't matter if you're a boy or a girl. Again, it's possible that you don't see a similar relationship, even if he's your grandma's brother. And surely it will be missed if he is the brother of your grandpa. This is what they would look like: On the left you are related to your great-uncle on the paternal side. This means that the two of you don't share mtDNA as you don't get your mom your mom. In the example on the right, your great-uncle is your grandpa's brother. Here also your parents do not share mtDNA with him. As you can see, this additional dig into your DNA only works under special circumstances. If you don't have family history information, you just have to accept most of the time that you're both related. That sounds like a bad result, but it really doesn't have to be. Just a few years ago, there is no way to find this man with just one DNA test. You would never have known that you were both related. Only recently are these tests precise and, yes, cheap enough to see something like a first cousin or great-uncle. If nothing else, it's a big leap from point to talk about what the possible relationships might be. Consequence: The person who asked this question found out that the related man is indeed a great uncle. This was due to family history and not a happy break with the Y chromosome or mtDNA. By Dr. Barry Starr, Stanford University – I am the former roommate of her father's nephew. What does this mean for us? Absolutely nothing! (Lord Dark Helmet and Lone Starr discuss family relationships in the Mel Brooks film Spaceballs.) Why is your great-grandmother great? Keeping track of family relationships can be difficult. If Edna marries your mother Charlie's uncle, what should you call her? If your father's daughter had only one little boy, how should you have two Be? Who is your great aunt and how can you find your first cousin twice away? Fortunately, a bit of mathematical logic can clarify who should be called what and why – and even measure Degree of genetic similarity between different relatives. To start at the beginning (well, your beginning, anyway), you certainly had two parents, a mother and a father: you each had two parents, who gave you a total of four grandparents: as you went back even further, each of your ancestors had two parents, each time predicting an extra big one. For example, your maternal ancestry: and so on (and similar for fathers rather than mothers at each level). Since each ancestor has two parents (one mother and one father), you have a total of 2n ancestors at level n: two parents, four grandparents, eight great-grandparents, sixteen great-grandparents, and so on. In summary, you have a total of 2+22 +23 +...+2n =2n+1 - 2 ancestors of level n or lower; For example, the total number of parents and grandparents and great-grandparents together is 23+1 x 2 = 16 x 2 = 14. In short, your ancestors form a perfect binary tree —simplicity itself. Legacy descendantIf you have children yourself, then your children are your grandchildren, and the children of your grandchildren are your great-grandchildren, etc.: (and similar for son instead of daughter at each level). Unlike ancestors, there is no simple formula for their number of offspring. Rather, you have to count all your children and all their children and so on. For example, even if you have five children, it is possible that none of them will have their own children, in which case your number of grandchildren will be zero. On the other hand, if you have five children of their own, you have 25 grandchildren – much more. Sideways, march! When people have more than one child, they fatten the family tree and create new relationships like sister and niece and great aunt and much more. First of all, if your parents have additional children next to you, then of course they are your siblings, these are your sisters and brothers: (Here and everywhere relationships with you are written in the boxes, and relationships between other pairs of individuals are indicated by connecting lines.) If you and your siblings have children, these children are the first cousins of each other. If the two first cousins each have children, then these children are second cousins of each other; and their children are third cousins, and so on: (and similar for son instead of daughter at each level). In general, cousins have two (n + 1) -level ancestors (but no n-level ancestors) at the n-level. So first two grandparents (but no parents) share, and second cousins share two great-grandparents (but no grandparents) and so on. It follows that if A and B are n-level cousins, then A's child and B s are child (n+1)-level cousins. Children of first cousins and children of second cousins are third cousins, and so on. In fact, if we consider siblings to be 0-level cousins, this argument also applies to siblings: children of 0-level cousins (i.e. siblings) are themselves first cousins. After all, your sibling's child is your niece (or nephew if male), and their child is your great-niece (or great-nephew), and so on: (and similar for nephew instead of niece at each level). Cry Uncle So we now know where the cousins of your offspring come from. To see where your cousins come from, we need to rise to the level of your parents. Your parents' siblings are your aunts and uncles, and their children are your first cousins (because you and they have the same grandparents, but not the same parents): If your cousins have children, what are they for you? Well, children of your first cousin are called your first-cousins-once-removed, and their children are your first cousins-twice removed, and so on: To see where your second cousins come from, we need to move another level up. The siblings of your grandparents are your great aunts and great-uncles. So your children (i.e. your parents' cousins) are your first cousins-once away. And their children are their second cousins: the same pattern continues for all previous generations. Once again, their n. cousins divide their ancestors at (n + 1) level, but not your ancestors at the level n.a. Siblings of your ancestors on the level are your-...- great aunts and-...- great uncle, where big n - 1 repeats. In addition, the nth cousins of your ancestors are removed on level level and also the descendants d' nth-level, your n. Cousins m-times. For example, with n = 3 and m = 2, this says that your grandparents' third cousins are your third cousins, and the grandchildren of your third cousins are also your third cousins twice away. Backtracking to n = 3 indicates: In this diagram, your third party (n = 3) divides two of your great-great-grandparents (level n + 1 = 4 ancestors), but none of your great-grandparents (level n = 3 ancestors). Your great-great-aunt is a sibling of your great-grandmother (n = 3). Your second cousin-once removed achieves this designation by reaching your mother's second cousin (n = 2) (level m = 1 ancestor), while your third cousin once remotely by reaching the daughter (level m = 1 offspring) of your third cousin (n = 3). Difficult! Thicker than water One of the reasons we care about pedigrees is the feeling that certain family relationships are more connected to us and should be supported and protected and loved on this basis. This attitude probably has an evolutionary basis: our genes survived over the centuries because our ancestors tried to help them by taking care not only of themselves, but also of their close relatives. In fact, is an old Bedouin Arab who says: I against my brother, my brothers and myself against my cousins, then my cousins and I against strangers, which beautifully illustrates the philosophy of caring for those closest to us genetically. This raises the question of how similar the genes of our relatives are to our own. Well, first of all, about 99.9% of our genetic material is common to all human beings (yes, even your in-laws), and indeed that is what makes us human. In addition, some people can share other genes with us only by chance; For example, when I meet a stranger whose eyes are brown like mine, it doesn't necessarily find that we're close relatives. In addition, there is much randomness in the way genes are passed on (each individual receives half of their genetic material from their mother and half from their father, but which bits come from which parent randomly selected and cannot be predicted), so we cannot draw precise conclusions with certainty. To cope with all this, we assign each pair of individuals a kinship coefficient representing the expected fraction (i.e. the average) of their genes, which are forced to be identical due to their family relationship. This approach averages all randomness, while focusing on genetic similarities specifically due to family connections. According to this definition, strangers have a kinship of zero (the smallest possible value). In contrast, your kinship with yourself is one (the greatest possible value). Other kinship coefficients lie between these two extremes. For example, your kinship with your mother is 1/2, as you get half of your genetic material from her. And your kinship with your father is also 1/2. From the same reasoning, your kinship with your child is back 1/2. So far so good: Next, consider your maternal grandmother. She gave half of her genes to her mother, and then her mother gave them half of her genes. It's possible that half you've taken is exactly the same as half your grandmother gave. It's also possible that half of you've taken have no overlap with half of your grandmother. But on average, that's, in anticipation, exactly half of the genetic material you've taken from your mother comes from your maternal grandmother. Your coefficient of kinship with your grandmother is therefore half of half, i.e. (1/2) × (1/2) or 1/4: if you climb the tree further, your kinship with your great-grandmother is half that, i.e. (1/2) (1/2) × (1/2) or 1/8: (and similar for father instead of mother at each level). In general, your kinship coefficient with your level-n ancestor is 1/2n. From the same reasoning, your relationship coefficient with your level-n offspring is also 1/2n. So, for example, your relationship coefficient with your daughter daughter 1/2; with your granddaughter is 1/4; and with your great-granddaughter is 1/8 (and similar for son instead of daughter). For siblings, the situation is a little more complex. First, think of the case of two half-siblings (half-sisters or half-brothers), i.e. people who share only one parent. Since they have each received half of their genetic material from a common parent, their kinship coefficient is half that, i.e. 1/4: Regular (complete) siblings also share 1/4 of their genetic material through their mother, but also share 1/4 of their genetic material through their father. This results in a total kinship coefficient of 1/4 + 1/4 = 1/2: (A special case is identical twins that have identical genes and thus a kinship coefficient of one. But fraternal twins have a coefficient of kinship 1/2, just like other siblings.) Since your mother and aunt are siblings, they have the relative coefficient 1/2. In the meantime, you and your mother have a kinship coefficient of 1/2. Together, you and your aunt (or uncle) have a relative coefficient (1/2) × (1/2) = 1/4: (and similar to Aunt's replaced by Uncle). And, your relationship coefficient with your niece or nephew is also 1/4. Since your first cousin has a coefficient of relatives 1/2 with your aunt, which in turn has a relative coefficient 1/4 with you, it follows that you and your first cousin share the coefficient 1/8: Now that your mother and her first cousin have a relative coefficient 1/8 and since you have the relative coefficient 1/2 with your mother, and since your mother's first cousin has a 1/2 relative coefficient with her own child (who is your second cousin), it follows that your relationship coefficient with your second cousin (1/2) × (1/8) × (1/2) = 1/32: In general, switching to level n cousins of level(s) 1) introduces cousins to two new factors. Since (1/2) × (1/2) = 1/4, this means that your kinship coefficient with your level-n-cousin is always 1/4 times your kinship coefficient with your level(n- 1) cousin. It follows that your kinship coefficient with your level-n-cousin is equal to 1/22n+1. So, your relationship coefficient with your first cousin is 1/8; with your second cousin is 1/32; with your third cousin is 1/128; And so on. What about first cousins once, and all that? Now that you and your first cousin have become related 1/8, and since your cousin and child (your first cousin once removed) have kinship 1/2, it follows that you and your first cousin have a relative coefficient (1/8) × (1/2) = 1/16: the pattern continues, with each new removed inserting an additional factor of 1/2 into the product. It follows that Your coefficient of kinship with your nth cousin, m times away, equals 1/22n+m+1. For Your coefficient of kinship with your third cousin (n = 3) twice removed (m = 2) is equal to 1/26+2+1 = 1/29 = 1/512 – not very close at all. We can summarize the relative coefficients of different relationships in a table: This table can be considered as an indication of your level of evolutionary imperative to protect and support your different relatives. This perspective was beautifully summed up by early evolutionary biologist J.B.S. Haldane when asked if he would give his life to save a drowning brother, and replied, No, but I would save two brothers or eight cousins. He merely observed that 2 × (1/2) = 8 × (1/8) = 1, i.e. that two brothers or eight cousins are equal (in evolutionary terms) to a copy of yourself. So what about this saying: I against my brother, my brothers, and myself against my cousins, then my cousins and I against strangers? Well, in relation to relatives coefficients, it is appropriate to observe that your coefficient of kinship is higher with yourself (1) than with your brother (1/2), higher with your brother (1/2) than with your first cousin (1/8) and higher with your first cousin (1/8) than with a stranger (0). That is: 1 > 1/2 > 1/8 > 0. It seems that these Bedouins knew their inequalities well! Families of all shapes and sizes Of course, the evolutionary imperative associated with relative coefficients does not tell the whole story. You would (hopefully) protect your spouse from your second-year husband, even though your relationship with your spouse is strictly zero (since you don't have an actual blood relationship). And parents of adopted children should certainly treat them like biological children, despite the lack of real genetic connection. Other family relationships can also arise. For example, when you get married, your spouse's relationships become your son-in-law – your husband's father is your father-in-law, your husband's cousin is your father-in-law, etc. The son-in-law suffix is also used for those who marry your relationships – for example, your brother's wife is your sister-in-law. (An exception is that your aunt's husband is called your uncle, even though he is really your uncle-in-law; and similarly your uncle's wife is called your aunt.) In the meantime, a woman who marries your father after your mother becomes your stepmother (or stepfather if the sexes are reversed). Your relationships become your own step-relationships – your father's brother is your step-uncle, and his children are your stepfathers, and so on. Of course, your genetic kinship coefficient is In-laws and your step relationships are null because your relationship is through marriage rather than actual bloodlines. Family relationships can lead to unexpected surprises. With a recent large family family I met a young man I didn't know. After some conversations, we realized that my great-grandfather was his great-grandmother's brother – and made us third cousins. My great-grandmother was also his great-grandfather's sister. That is, three generations earlier, a brother-sister couple had married with a sister-and-brother couple. That meant that he and I were third cousins in two different ways – we were double third cousins! As a result, our kinship coefficient was twice as high as that of the usual third cousins – i.e. 2 × (1/128) = 1/64 – still not very close, but still interesting. I wish I had the presence of the Spirit to immediately say to him: Please meet you, double-third cousin. It is an honor to share a sixty-fourth of your genes. About the author Jeffrey S. Rosenthal is a professor in the Department of Statistics at the University of Toronto and author of the popular book Struck by Lightning: The Curious World of Probabilities. Chances.