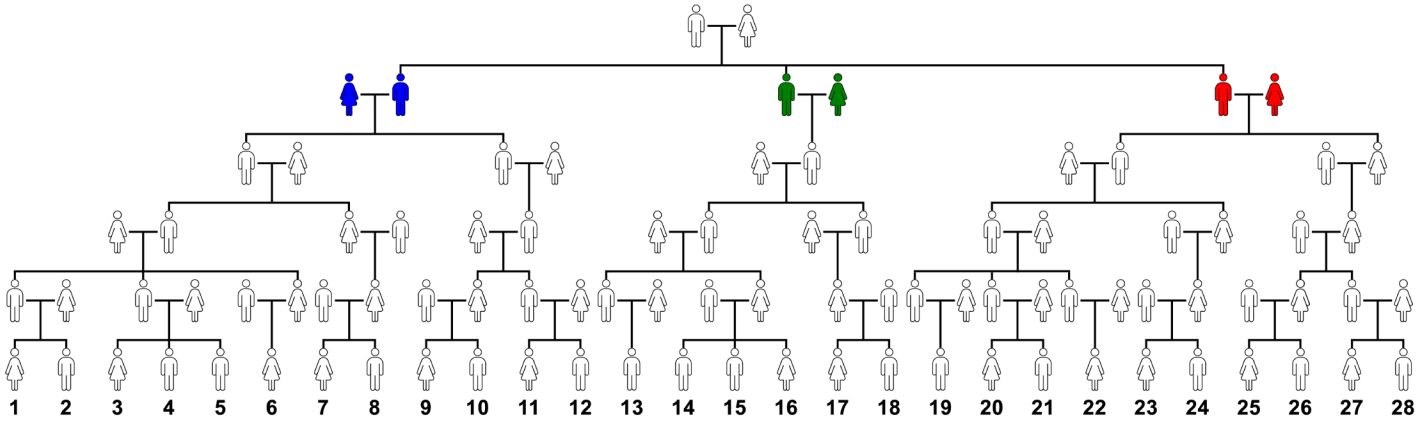
# SGS & SIGS DNA Learning Series

## Homework for Class 2: Y-DNA, mtDNA and X-DNA Testing

Use this tree for Questions 1 through 4




1. Identify all persons in the lowest generation who should carry the Y-DNA of the male in the ancestral couple at the top of the tree.

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2. Assume that only people in the lowest generation are still living. Of the people listed in Question 1, who, if any, should be the prefered person to be Y-DNA tested? Why? If there is should be no preference, why not?

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3. If the Y-DNA of a male-line descendant of the son in blue does not match the Y-DNA of a male-line descendant of the son in red, can the correct Y-DNA of the ancestral male at the top be determined? Why or why not? If not, could it be solved by additional testing within this tree and who should be tested?

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4. Another male-line descendant of the son in blue is tested and he matches the Y-DNA of the tested male line descendant of the son in red. What does this tell us about the discontinuity in the line of the son in blue?

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| Kit | Paternal Ancestor Name | Haplogroup | DYS385 | DYS447 | DYS464 | DYS456 | DYS576 | CDY | DYS413 | DYS557 | DYS534 | DYS446 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MIN** | | | 13-13 | 23 | 12-14-14-16 | 14 | 17 | 33-34 | 22-23 | 15 | 16 | 13 |
| **MAX** | | | 13-15 | 24 | 12-15-15-17 | 15 | 19 | 35-36 | 22-25 | 16 | 17 | 14 |
| **MODE** | | | 13-14 | 23 | 12-14-15-16 | 14 | 17 | 33-35 | 22-25 | 15 | 17 | 14 |
| 624333 | Elihu Williams (d.1743) through son Bazel | I-M253 | 13-13 | 23 | 12-14-15-16 | 14 | 17 | 35-36 | 22-25 | 15 | 17 | 14 |
| 124567 | Elihu Williams (d.1743) through son Phineas | I-M253 | 13-14 | 23 | 12-14-14-16 | 14 | 17 | 33-35 | 22-25 | 16 | 17 | 13 |
| 371648 | Elihu Williams (d.1743) through son Phineas | I-M253 | 13-14 | 23 | 12-14-14-16 | 14 | 17 | 33-35 | 22-25 | 16 | 17 | 13 |
| 221756 | Elihu Williams (d.1743) through son Phineas | I-M253 | 13-14 | 23 | 12-14-15-16 | 14 | 17 | 33-35 | 22-25 | 16 | 17 | 13 |
| 754697 | Elihu Williams (d.1743) through son Zebulon | I-M253 | 13-14 | 23 | 12-14-15-16 | 14 | 17 | 35-35 | 22-25 | 15 | 16 | 14 |
| 38456 | Elihu Williams (d.1743) through son Enoch | I-A6227 | 13-14 | 23 | 12-14-15-16 | 14 | 19 | 33-35 | 22-25 | 15 | 17 | 14 |
| 124699 | Elihu Williams (d.1743) through son Zebulon | I-Z60 | 13-14 | 23 | 12-14-15-16 | 15 | 17 | 33-35 | 22-25 | 15 | 16 | 14 |
| 401771 | Elihu Williams (d.1743) through son Enoch | I-M253 | 13-14 | 23 | 12-14-15-16 | 15 | 19 | 33-35 | 22-25 | 15 | 17 | 14 |
| 754695 | Elihu Williams (d.1743) through son Enoch | I-M253 | 13-14 | 23 | 12-14-15-17 | 14 | 17 | 33-34 | 22-25 | 15 | 17 | 14 |
| 371647 | Elihu Williams (d.1743) through son Phineas | I-A6227 | 13-14 | 23 | 12-15-15-16 | 14 | 17 | 33-34 | 22-25 | 16 | 17 | 13 |
| 83945 | Elihu Williams (d.1743) through son Ezekiel | I-BY63 | 13-14 | 23 | 12-15-15-16 | 14 | 17 | 33-35 | 22-23 | 15 | 17 | 14 |
| 402674 | Elihu Williams (d.1743) through son Bazel | I-M253 | 13-14 | 24 | 12-14-15-16 | 14 | 17 | 33-35 | 22-25 | 15 | 17 | 14 |
| 74912 | Elihu Williams (d.1743) through son Bazel | I-BY63 | 13-14 | 24 | 12-14-15-16 | 14 | 17 | 35-36 | 22-25 | 15 | 17 | 14 |
| 754696 | Elihu Williams (d.1743) through son Ezekiel | I-M253 | 13-15 | 23 | 12-14-15-16 | 14 | 17 | 33-35 | 22-23 | 15 | 17 | 14 |
| 568103 | Elihu Williams (d.1743) through son Ezekiel | I-M253 | 13-15 | 23 | 12-14-15-16 | 14 | 17 | 34-35 | 22-23 | 15 | 17 | 14 |
| 75411 | Elihu Williams (d.1743) through son Ezekiel | I-Z60 | 13-15 | 23 | 12-14-15-16 | 15 | 17 | 33-35 | 22-23 | 15 | 17 | 14 |
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| 847125 | Josiah Williams (1837-1899) | I-M253 | 13-14 | 23 | 12-15-15-16 | 15 | 17 | 33-35 | 22-25 | 15 | 16 | 14 |

5. You want to explore the Y-DNA of your Williams line and join the Williams Surname Project. Your brickwall on the Williams line is Josiah Williams, who was born in 1837. When the results of your Y-DNA tester come back, he is found to match a known cluster and grouped with the male-line descendants of Elihu Williams, who died in 1743. This cluster has 16 people known to descend from Elihu Williams' five sons. The chart above shows only the markers where members of the cluster diverge from the mode (most frequent value). Based on the marker values of your tester, from which of Elihu's sons does Josiah most liekly descend? Why?

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6. As with other members of this cluster, your tester is, based on his STR haplotype, predicted to be in Y-DNA Haplogroup I-M253 (as indicated in red). Other members of the cluster have done SNP testing to confirm the haplogroup to a more specific SNP. Using the Family Tree DNA public Y-DNA Haplotree (https://www.familytreedna.com/public/y-dna-haplotree/I;name=I-A6227), which of the green confirmed SNPs is furthest down the tree? What is the path of SNPs to get from I-M253 to the most specific SNP?

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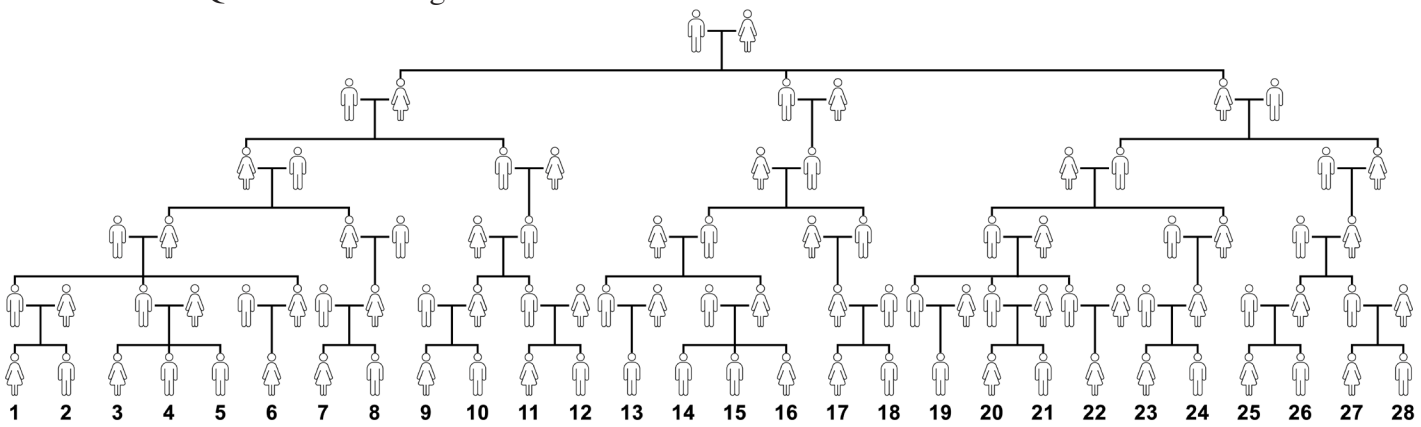
Use this tree for Questions 7 through 10




7. Which of the numbered descendants of the woman in the ancestral couple should carry the same mtDNA?

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8. The younger daughter of the ancestral couple may actually be the daughter of the man's second wife because only her approximate birth year is known from census records and the time between the first wife passing away and marriage to the second wife was only four months. If a mtDNA descendant of the first wife matches a mtDNA descendant of the younger daughter, can you conclude the younger daughter was from the first wife? Why or why not?

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9. Two cousins from the elder daughter in Question 7 both have their mtDNA tested and they are identical except for one additional mutation as shown in the tables of their HVR1 mutations. Given the tree, how many generations back could the mutation have been?

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10. A man passes down his entire X chromosome to all his daughters while a woman passes down an X chromosome that is usually a recombination of both her X chromosomes (though she can also pass down one of her X chromosomes whole). Given this information, which of the bottom generation of descendants may have X-DNA from the ancestral father? Which may have X-DNA from the ancestral mother?

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