

Scientific Foundations of Genealogy

Genealogy · Answer Key · 12 Questions

1. Which specific mitochondrial DNA (mtDNA) haplogroup is considered the most common root for the 'Mitochondrial Eve' lineage in anatomically modern humans?

- A) Haplogroup L0**
- B) Haplogroup R0
- C) Haplogroup J
- D) Haplogroup U

2. In autosomal DNA testing, what is the maximum number of centimorgans (cM) typically shared between a full sibling pair?

- A) 1500 cM
- B) 2600 cM
- C) 3400 cM**
- D) 4200 cM

3. The 'Great Filter' in Y-chromosome diversity refers to a demographic bottleneck that occurred approximately 5,000-7,000 years ago. Which event is most strongly correlated with this genetic signal?

- A) The rise of pastoralist hierarchies**
- B) The Neolithic Revolution
- C) The widespread adoption of bronze metallurgy
- D) The expansion of the Silk Road

4. Which form of genetic inheritance is utilized to track the direct paternal lineage through successive generations?

- A) X-chromosome transmission
- B) Autosomal recombination
- C) Y-chromosome STR markers**
- D) Mitochondrial DNA sequencing

5. What is the term for a segment of DNA that is identical in two individuals because it was inherited from a single common ancestor without any intervening recombination?

- A) Identical by State (IBS)
- B) Identical by Descent (IBD)**
- C) Single Nucleotide Polymorphism (SNP)
- D) Copy Number Variant (CNV)

6. In the context of genealogical dating, what is the average mutation rate of the Y-chromosome per generation for stable markers?

- A) 1 in 500
- B) 1 in 1000**
- C) 1 in 50
- D) 1 in 250

7. Which of the following describes the 'founder effect' in genetic genealogy?

- A) The survival of the fittest in small isolated populations
- B) Loss of genetic variation that occurs when a new population is established by a very small number of individuals**
- C) The accumulation of mutations due to environmental radiation
- D) The deliberate breeding of specific lineages for hereditary titles

8. What is the scientific significance of 'runs of homozygosity' (ROH) in a person's autosomal genome?

- A) They indicate high levels of endogamy or consanguinity**
- B) They denote recent migration from sub-Saharan Africa
- C) They identify the specific HLA alleles for disease resistance
- D) They suggest a lack of X-chromosome inactivation

9. Which statistical model is most commonly employed to estimate the time to the most recent common ancestor (TMRCA)?

- A) Bayesian phylogenetic inference**
- B) Linear regression analysis
- C) K-means clustering
- D) Principal component analysis

10. Approximately what percentage of a person's autosomal DNA is typically shared with a second cousin?

- A) 12.5%
- B) 6.25%
- C) 3.125%**
- D) 1.56%

11. What does the 'Admixture' analysis in genetic genealogy primarily measure?

- A) The proportion of ancestral components from distinct population groups**
- B) The total number of mutations in the germline
- C) The level of mitochondrial mutation accumulation
- D) The physical traits inherited from maternal ancestors

12. Why are 'phased' DNA results more useful for genealogical research than unphased results?

A) They allow the separation of paternal and maternal alleles

B) They increase the total count of SNPs detected

C) They eliminate the need for reference populations

D) They simplify the calculation of mitochondrial haplogroups