

Solutions

2.1

- Mitochondrial inheritance.

2.2

- Maternal (UBE3A region).

2.3

- Earlier and/or more severe disease in successive generations as the repeat expands.

3.1

- Mitochondrial (MELAS-pattern) inheritance.
- Each child samples a different fraction of mutant mtDNA at the meiotic bottleneck: severity varies from deafness/diabetes to encephalopathy.
- Each child is at risk; the probability of severe disease depends on the mother's mutant load and the sampled bottleneck.

3.2

- Repeats expand through female transmission: 70 → 150 → >200 crosses from premutation to full mutation.
- Expansion risk rises with maternal repeat length; daughters inherit the expanded allele.
- Huntington: paternal CAG expansion gives juvenile onset – the parent-of-sex direction differs by disease.