*This is the **Higher Combined** version — includes Higher Tier content. Some Separate-only details are omitted.*

Meiosis is the cell division producing gametes (sex cells). It generates genetic variation essential for evolution.

- Meiosis: 2 divisions → 4 haploid cells, all genetically different
- Haploid: 23 chromosomes (in humans). Fertilisation → diploid (46)

★ **HT** Crossing over (prophase I): homologous chromosomes exchange DNA segments → new allele combinations

★ **HT** Independent assortment: random orientation of chromosome pairs → 2^{23} possible combinations

★ **HT** Protein synthesis: Transcription (DNA → mRNA in nucleus), Translation (mRNA → protein at ribosome)

★ **HT** Codon: triplet of mRNA bases coding for one amino acid

Key Terms

Meiosis	Cell division producing 4 different haploid cells for sexual reproduction
Haploid	Half the chromosome number — 23 in human gametes
Crossing over	Exchange of DNA between homologous chromosomes — generates variation
Codon	Three mRNA bases coding for one amino acid

■ **Exam Tip:** Meiosis: 4 cells, haploid, DIFFERENT. Mitosis: 2 cells, diploid, IDENTICAL. In an exam, if asked which division produces gametes, always say MEIOSIS.