

- Re-assortment occurs due to the random distribution of maternal and paternal chromosomes on the spindle equator at metaphase I and the subsequent segregation into the two daughter nuclei at anaphase I
- Each gamete acquires a different mixture of maternal and paternal chromosomes e.g. one cell may get maternal 1 and 2 and paternal 3 and the other cell will get maternal 3 and paternal 1 and 2.
- If alleles are on the same chromosome, they will go into the same cell, so are inherited together, this is called linkage.
- Due to genetic recombination, crossing over a large number of genetically different gametes could be produced. 2^n is not accurate where the n is the number of haploid chromosomes therefore.

Re-assortment of chromatids

- This is the result of the random distribution on the spindle equator, of the sister chromatids at metaphase II
- Because of crossing over, sister chromatids are no longer genetically identical
- How they align at metaphase II determines how they segregate at anaphase II

Fertilisation

- In humans only one ovum (actually a secondary oocyte and has not completed the second meiotic division) is usually released from an ovary at a time
- There are about 300 million spermatozoa which are all genetically different and so any one of them can fertilise the secondary oocyte.
- Whichever fertilises the ovum, genetic material from the two unrelated individuals is combined via fusion to produce a zygote.

Mutation

- DNA mutation may also occur during interphase, when DNA replicates ((it can also occur in mitosis or binary fission))
- Chromosome mutations may also occur
- But, mutations do NOT increase genetic variation.
- If mutation occurs in the sperm or egg that are used in fertilisation then the mutated gene will be present in every cell of the offspring.