replacement of worn-out cells

The type of cell division involved is called mitosis. The diagram shows how it works. Mitosis produces two genetically identical cells in which the number of chromosomes is the same as in the original cell.

### MEIOSIS

Meiosis is the type of cell division that produces gametes. A human body cell contains 46 chromosomes arranged in 23 pairs. Human gametes are haploid so their nucleus only contains a single set of 23 unpaired chromosomes.

Meiosis produces four genetically different haploid cells. Unlike mitosis, meiosis is a reduction division - the chromosome number is halved from diploid (46 chromosomes in 23 pairs in humans) to haploid (23 chromosomes in humans).

# **GENETIC DIAGRAMS AND PEDIGREE ANALYSIS**

Parent cell

For humans to reproduce, fertilisation needs to happen. Gametes are produced by meiosis. As a result of this type of cell division, each gamete is haploid. It contains just one of the chromosomes from each pair, and half the genetic information of a body cell (which is diploid). Fertilisation leads to genetic variation because:

- two gametes combine to form a diploid zygote
- alleles on the chromosomes control the characteristics of the zygote •

# INHERITANCE OF BIOLOGICAL ORDER

Human body cells have 23 pairs of chromosomes in the nucleus. One of these taip control the inheritance of biological gender - whether offspring are male or female:
Males, X and Y
Females XX

CODOMINANCE
Some alleles are both expressed in the same phenotype: a situation called codominance. Both exclusion ender the same phenotype of the same phenot

Some alleles are both expressed in the same phenotype, a situation called codominance. Both codominant alleles are shown with upper case letters in genetic diagrams, but the letters used are different. For example, feather colour in hens may be white, black or speckled (it has both white feathers and black feathers). The alleles can be shown as W for white and B for black.

# **BLOOD GROUPS**

The gene controlling human ABO blood groups has three alleles, not just two:

- IA and IB are not dominant over one another •
- both are dominant over IO

The table shows the possible genotypes (alleles present) and phenotypes (blood group).