Mendel

Mitosis

Inheritance

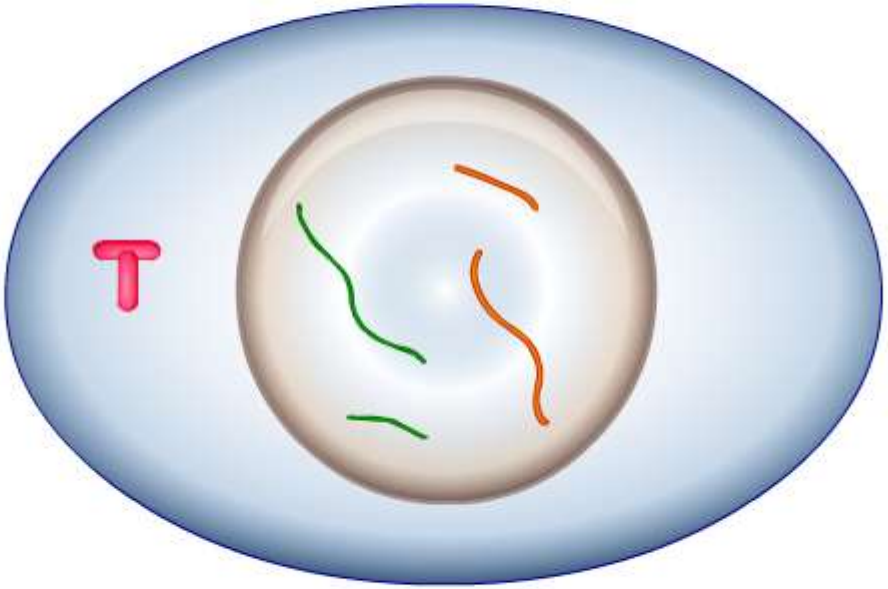
B2.5 Simple Inheritance in Plants and Animals

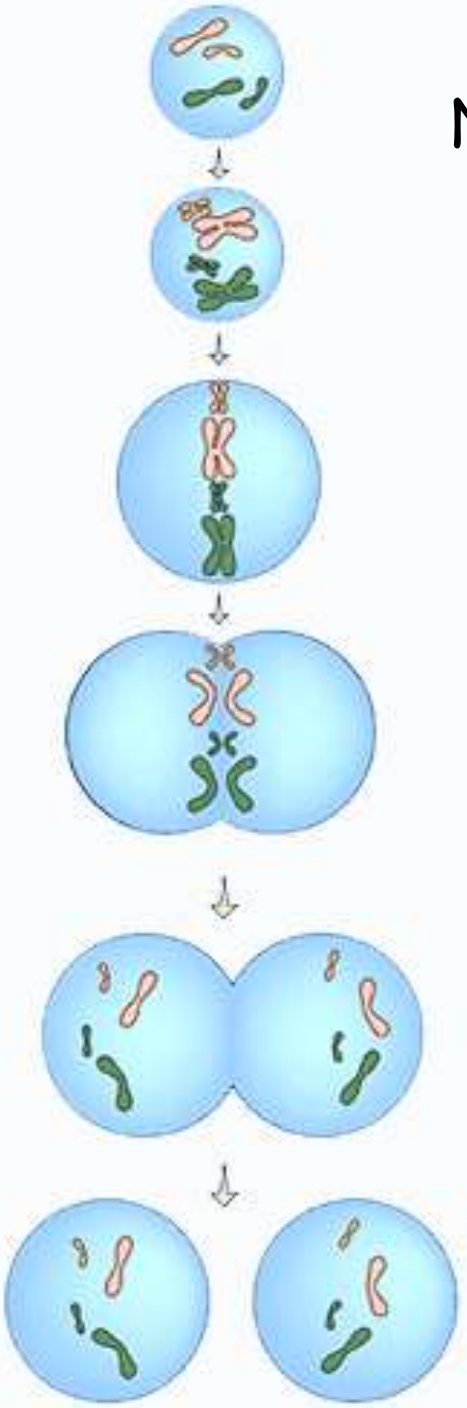
Meiosis

Stem cells

Punnett Squares

Click on the nucleus to start mitosis





Normal human cell has 23 pairs of chromosomes

↓

Chromosomes condense and duplicate and make exact copies of themselves

↓

Chromosomes line up in centre of the cell and separate as the nuclei divide

↓

Two genetically identical daughter cells are created

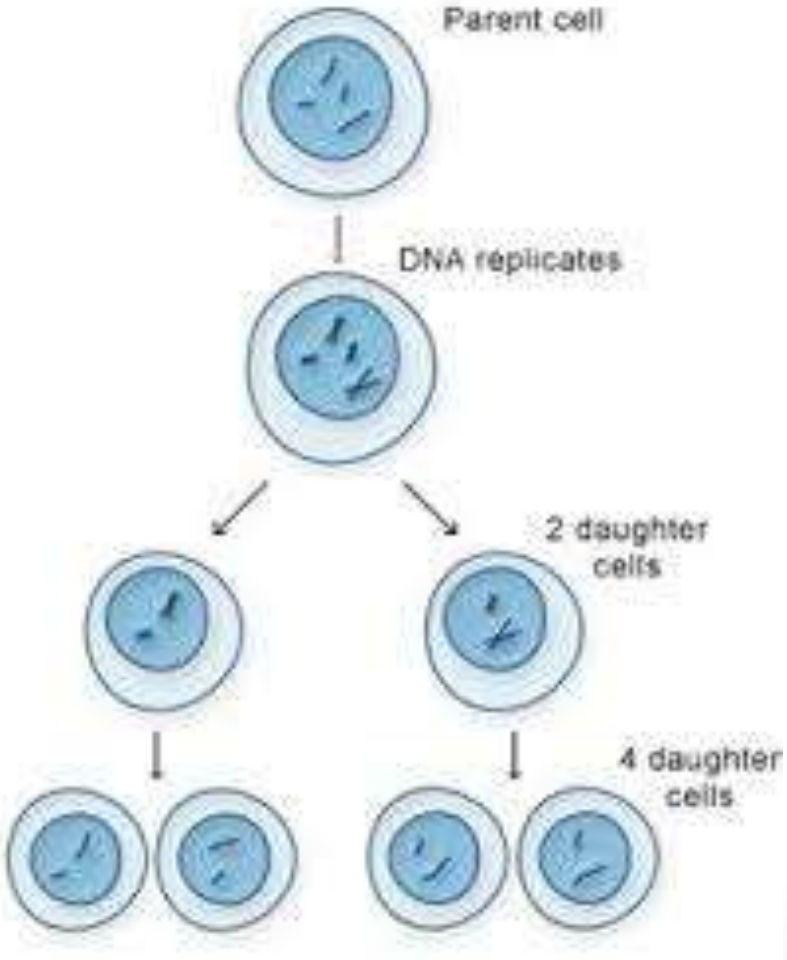
The magic meiosis

A cell in the reproductive organ looks just like a normal body cell before it starts to divide and form gametes.

As in normal cell division, the first step is that the chromosomes are copied.

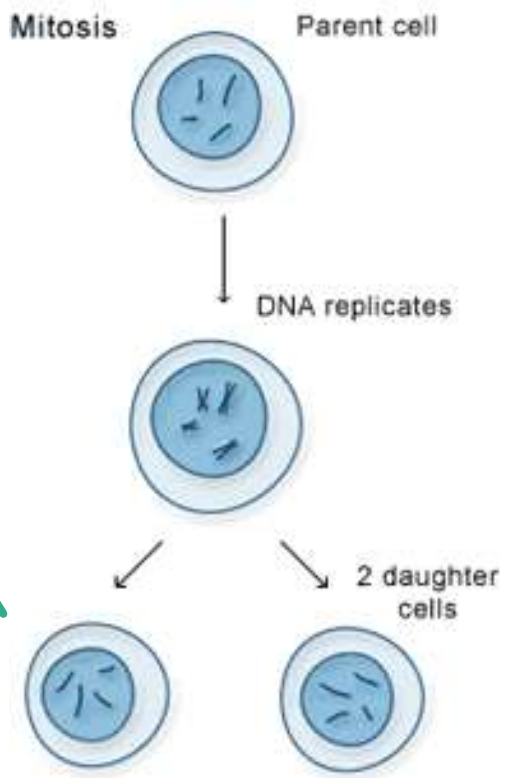
The cell divides in two, and these new cells immediately divide again.

This gives four sex cells, each with a single set of chromosomes



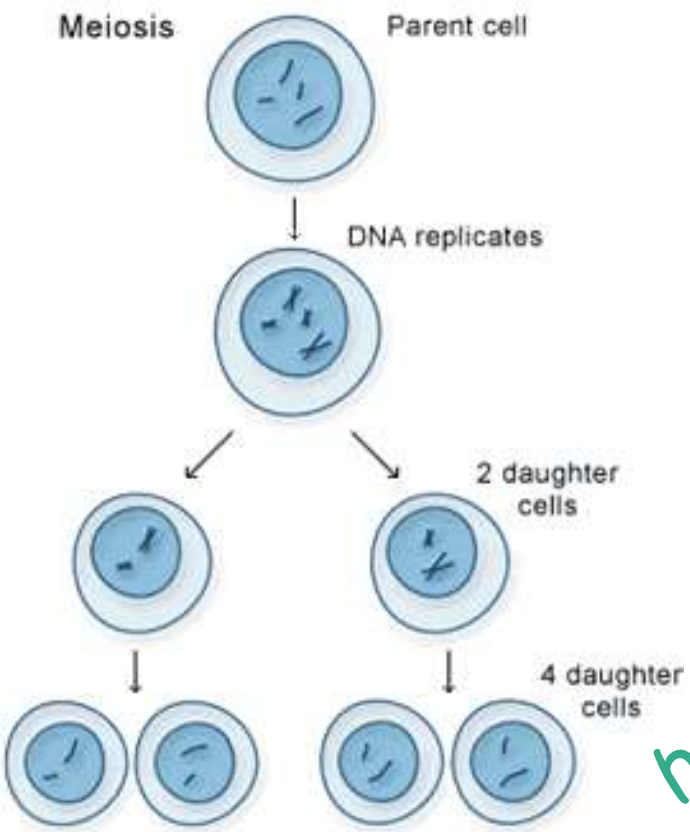
gametes

Variation



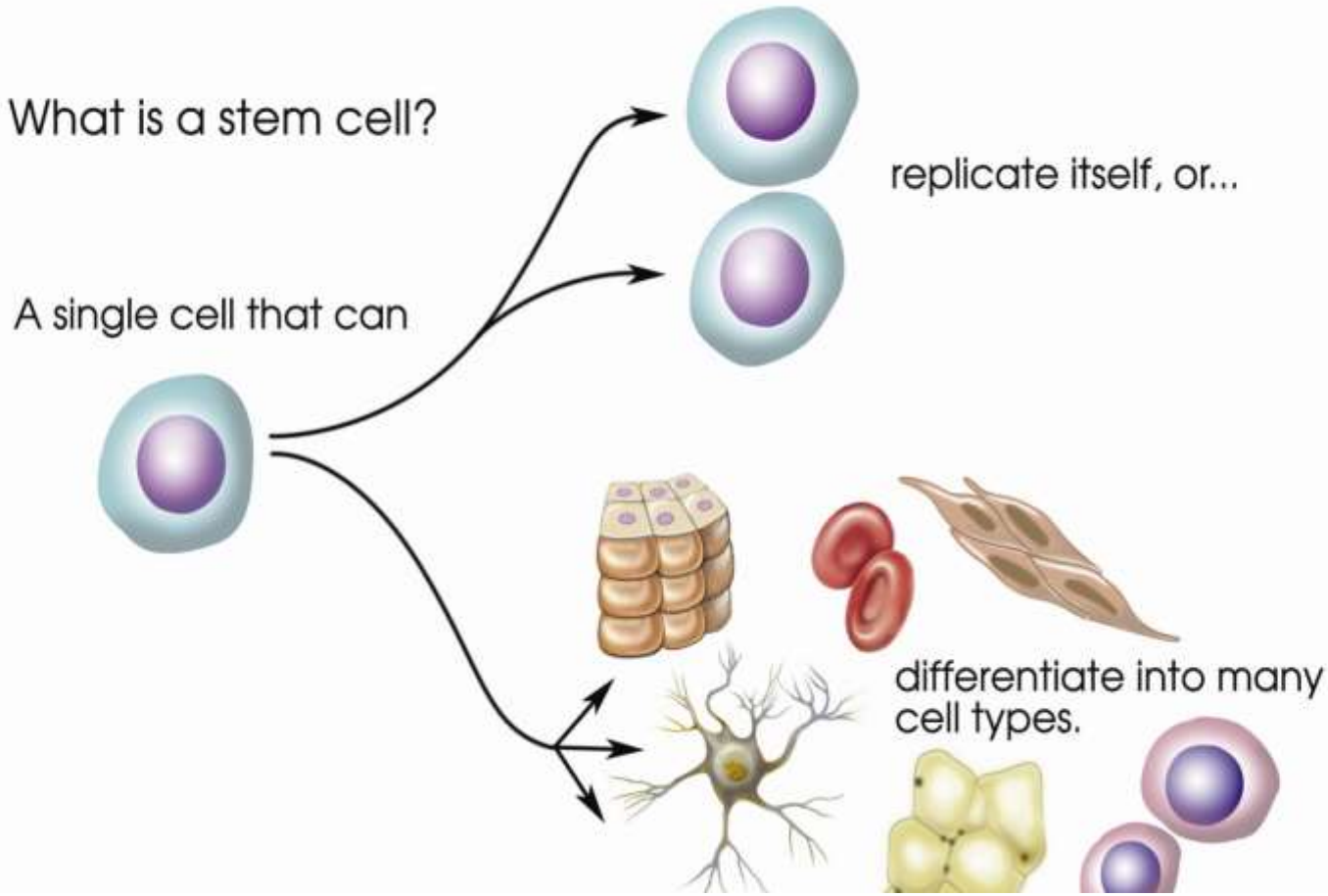
diploid

46 chromosomes – all genetic information passed to daughter cells



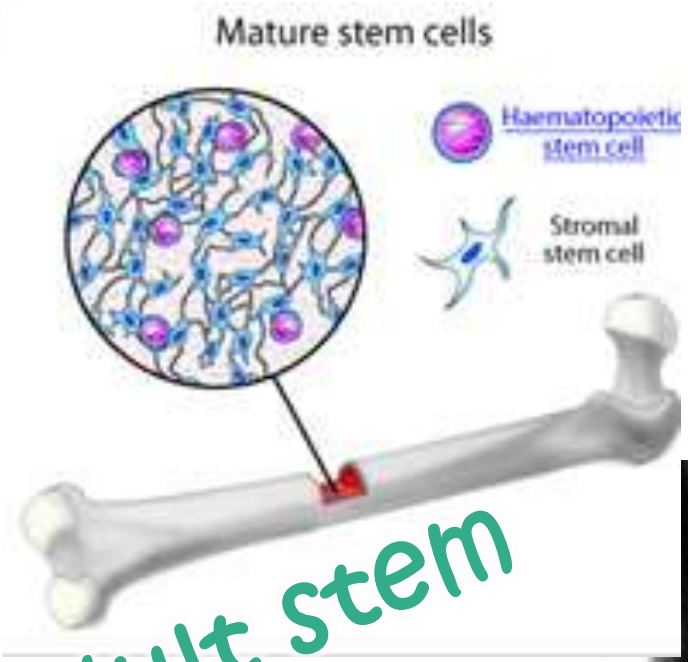
haploid

23 chromosomes – only half genetic information passed to daughter cells
50/50 chance of passing down gene



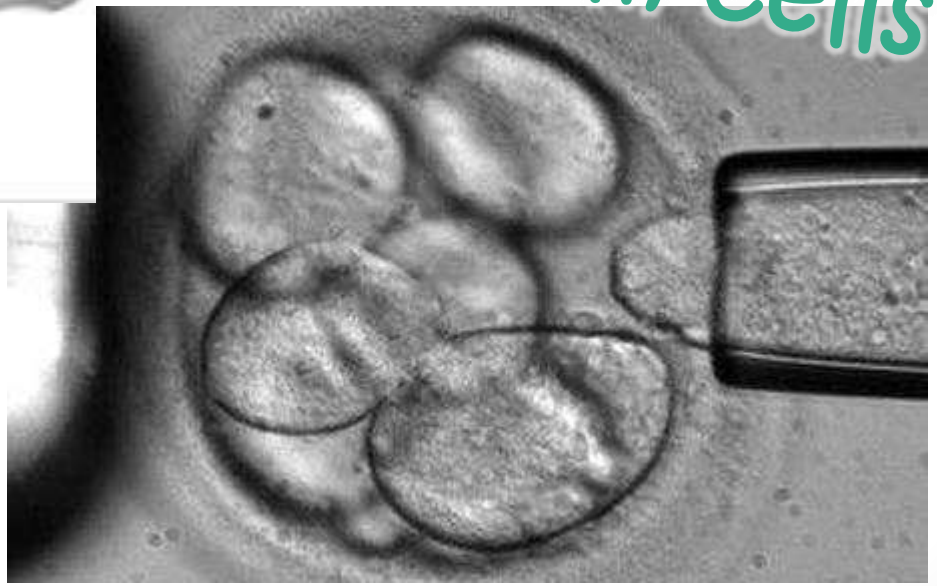
The cells in the embryo that can change and specialise are called **stem cells**

Where do stem cells come from?



Adult stem cells

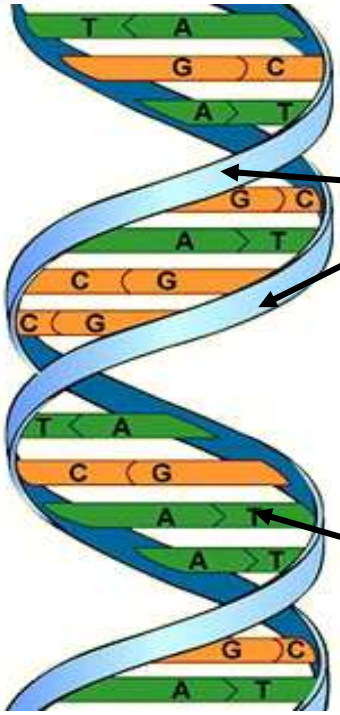
Embryonic stem cells



	Embryonic stem cell	Adult stem cell
Where are they found?	In embryos	Tissues and organs e.g. bone marrow, blood vessels, muscle, skin, liver and brain
What kind of cells can these differentiate into?	Different proteins are added to switch genes on or off, so they can differentiate into anything.	They are likely to turn into the cells they were taken from.
How do you retrieve these types of cells?	They are removed from the inner mass of a blastocyst.	They are taken from tissues within a juvenile or adult body using a needle.
What is an advantage of using these types of cells?	They can become any type of cell.	Embryos don't need to be destroyed.
What is the disadvantage of using these types of cells?	Embryos are destroyed, people dislike the idea of this as they believe the embryo is alive as soon as it's fertilised.	They don't differentiate into any type of cell.

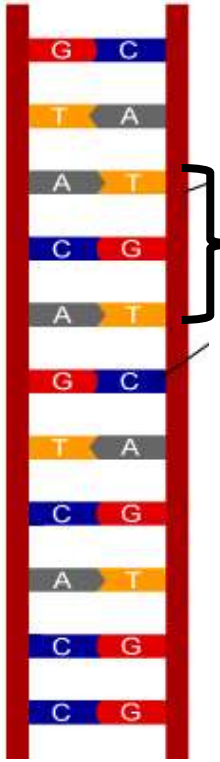
Gregor Mendel

- Mendel was born in 1822 in Austria
- He was a monk and worked in the monastery gardens
- Mendel carried out breeding experiments using peas, he cross-bred them and counted the different offspring carefully
- He found that characteristics were inherited in clear and predictable patterns
- Mendel believed that 'inherited factors' were passed down to offspring, characteristics that couldn't be mixed
- Mendel kept records of everything he did and analysed his results, unheard of at the time
- People ignored his theory as they didn't understand or know anything about genes or chromosomes and because he was a monk



phosphate backbone

amino acids - A, G, T and C



triplet code = 1 amino acid

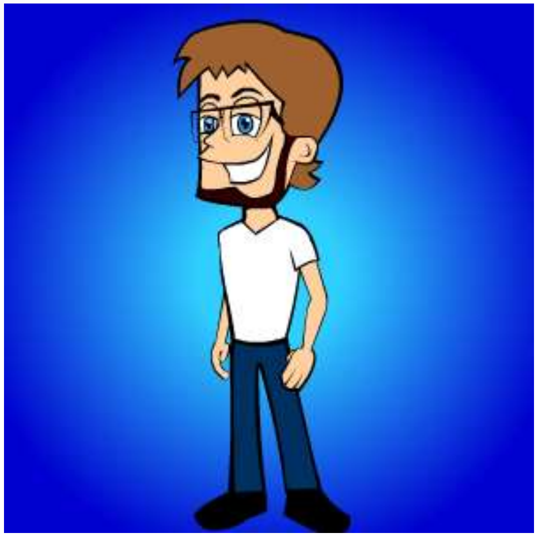
Alleles

We get one set of chromosomes from our mother and one from our father.

Therefore we have 2 copies of everything chromosome and gene.

An allele is a different type of the same gene.

PUNNET SQUARES



Meet Bob:

Bob is confused

He needs your help

Bob has blue eyes

Both of his parents have brown eyes

Father's sperm

Mother's egg

	P	p
P		
p		

How can Bob have blue eyes?

P = brown allele

p = blue allele

Homozygous VS Heterozygous

SAME

DIFFERENT

PP

pp

Pp

Pp

Cystic Fibrosis

- Cystic fibrosis is an inherited disorder caused by a **recessive** allele.

- **2 recessive alleles need to be inherited** for the symptoms of the disease to be displayed.

Extension ☺ - If the mother is healthy but the father has cystic fibrosis, can the child inherit the condition?

What are the chances of a child inheriting cystic fibrosis if their mother is a carrier of the condition and their father has cystic fibrosis?
