

National 4 Biology

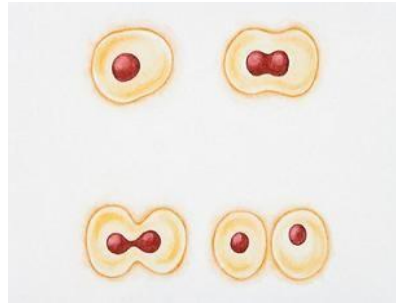
Unit 1 Cell Biology

Summary Notes

1. Cell division and it's role in growth and repair.

Cell division

The process of cell division is called *mitosis*.



Each cell must divide to ensure the *exact same* genetic information is passed from cell to cell. This means each new cell will continue to function correctly.

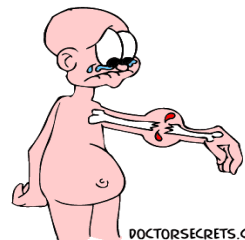
A normal human cell contains 46 chromosomes. Each new cell should therefore also contain _____ chromosomes.

Regeneration

Cells divide to make new cells. This happens constantly throughout life so we can grow.

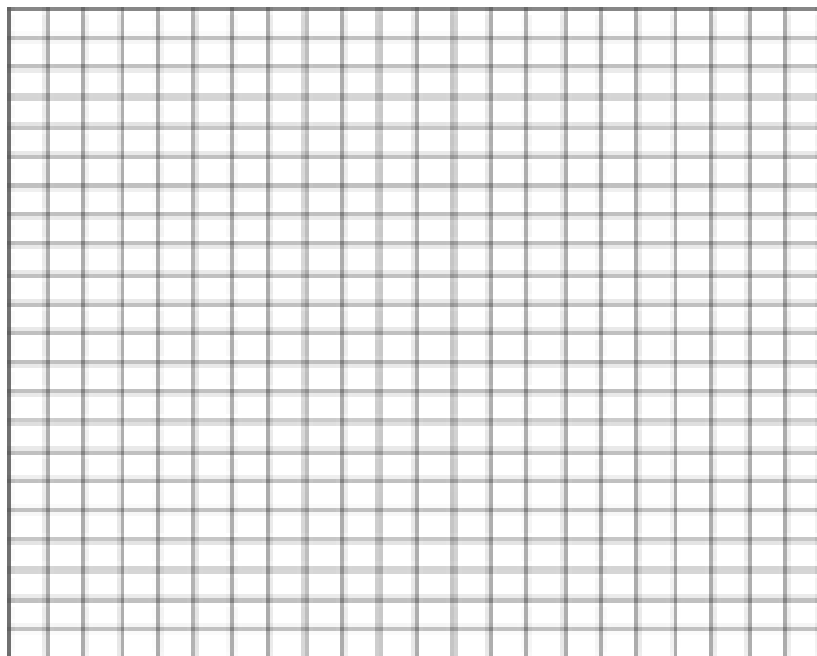


Sometimes we damage ourselves and our body must make new cells to repair the lost or damaged ones.



Cell division Worksheet 1

Cell division Number	Number of cells
1	
2	
3	
4	
5	
6	
7	
8	



Cancer

Cancer is caused by *uncontrolled cell division*.

2. DNA, genes and chromosomes.

Chromosomes

Chromosomes are found in the nucleus of all cells. They are made of DNA.

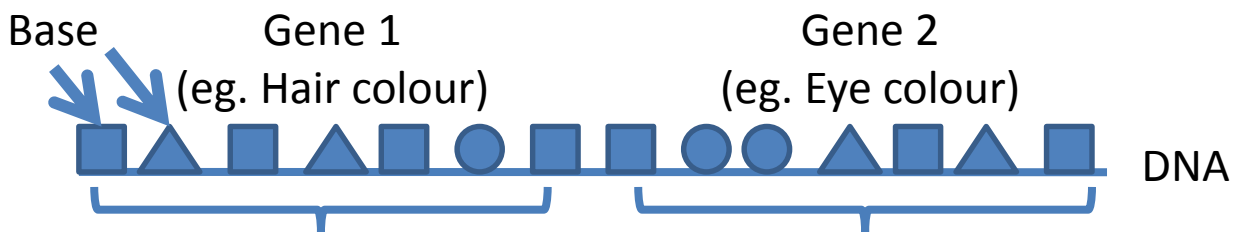
DNA

DNA is made up of lots of bases. Each base is a piece of code.

Genes

A gene is a section of lots of bases that gives us a characteristic. For example; eye colour or hair colour.

The section of bases that code for hair colour will be different for the section of bases that code for eye colour. That is why the genes are both different.

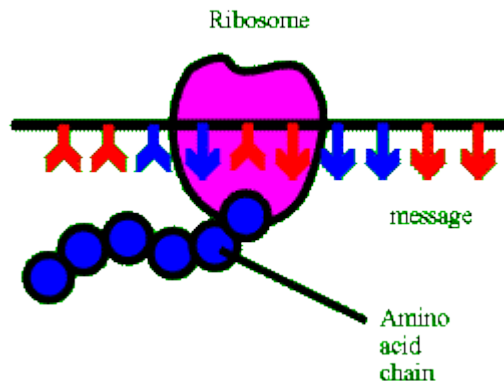


Proteins

A protein is made of lots of little units called *amino acids*.

Each amino acid gets into the right order to make the right protein depending on the sequence of bases on the DNA.

One gene makes one protein.

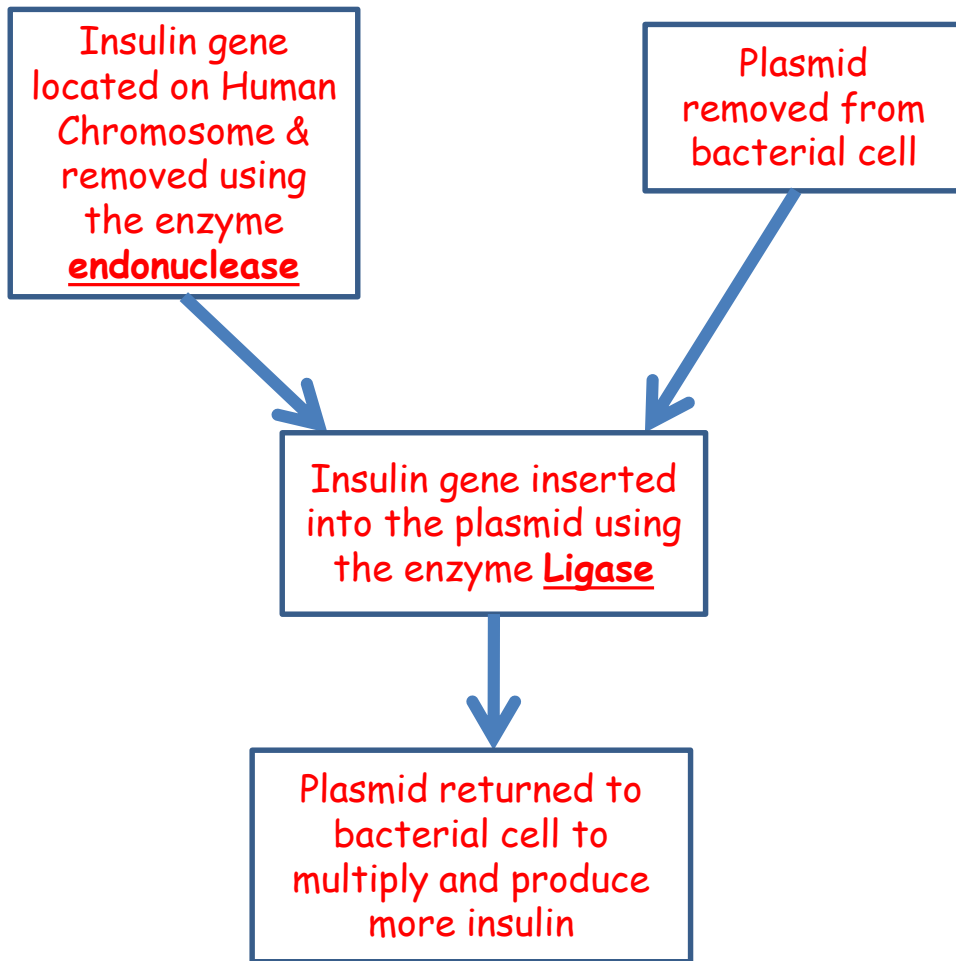


3. Therapeutic of Cells.

Genetic Engineering is the transfer of genes from one organism to another to alter the characteristic of the receiving organism.

This is most commonly done with bacteria to manufacture products that are useful to humans i.e. insulin to treat people with diabetes.

The altered bacteria are said to be *reprogrammed*.



Advantages of genetic engineering

- Fast
- Production of unlimited quantity
- Production of human product (not animal)

Disadvantages of genetic engineering

- Ethical and moral implications
- Expensive

Stem Cells

A *stem cell* is any cell that is:

- unspecialised
- can divide repeatedly to form new cells (mitosis)

Advantage - Can discover new treatments for illnesses

Disadvantage - Uses embryonic stem cells

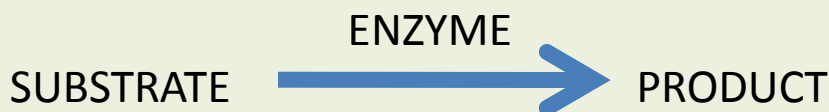
4. Properties of Enzymes and use in industry.

Enzymes are biological catalysts, essential for life. They are *found in living cells* and *speed up reactions*. Enzymes can be *used over and over again* and are *unchanged by these reactions*.

Enzymes are all made of protein.

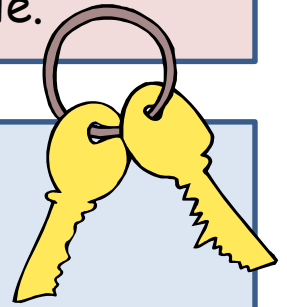
The molecule that an enzyme works on is called the SUBSTRATE.

The molecule that is formed is called the PRODUCT.



Enzymes are **SPECIFIC** - this means that an enzyme can only react with one type of substrate molecule.

Some enzymes break down molecules (degradation).



This happens when an enzyme **breaks a large molecule down into smaller molecules.**

Some degrading enzymes are :
Amylase, Pepsin, Lipase and Catalase

Some enzymes build-up molecules (synthesis).

This happens when an enzyme **links small molecules together to make a large molecule.**

A synthesising enzyme is :
Phosphorylase

Enzymes have conditions they work best at. These conditions are known as their optimum.

An enzyme heated to much above its optimum can become denatured. Its shape changes and it is no longer specific.

Enzymes in Industry (biotechnology)

Biological washing powders contain enzymes.



Advantages:

- Can be used at lower temperatures
- Kinder to fabrics

Disadvantages:

- Can cause allergic reactions

Cheese contains an enzyme called RENNET.

There are two types of rennet used in cheese making:

Natural Rennet

Advantage - Not genetically engineered

Disadvantage - Lots of calves are killed to get the rennet from their stomachs.

Genetically Engineered Rennet

Advantage - Calves are not killed in the production

Disadvantage - Long term effects of genetic engineering are unknown.

