It takes place because of the random movement of particles in a solution.

Substances that diffuse into and out of the cell:

- Oxygen
- Carbon Dioxide
- Glucose
- Water

Factors that affect the rate of diffusion:

- Concentration
- Gas or liquid
- Temperature
- Concentration Gradient
- Viscosity
- Thickness

Diet and Exercise

Malnutrition occurs when you don't have enough nutrition in your diet or you have too much. Deficiency diseases such as anaemia, rickets and scurvy can occur.

A healthy diet contains the right balance of different foods, including carbohydrates, provins, fats which are used by the body as energy and to build cells

Mineral ions and vitamins are needed in small doses to leve the functioning of cells in the body normal $\frac{BMI = mass}{(height)^2}$

Cholestero

- -> Decreases all membrane permeability and floridity
- -> Important component in the myelin sheath of neurones

Processor to:

- Steroid Hormones
- Vitamin D
- Bile acid
- -> Cholesterol is produced by the liver and can be found in everyday diets
- -> Liver produces Ig/day of cholesterol
- -> Dietary cholesterol is absorbed normally into the large intestine

Statins:

- -> Statins are a chemical originally found in fungi
- -> They are used to reduce someones cholesterol diet
- -> They block an irreversible step in the manufacturing of cholesterol in the body

Animals often compete with each other for territory, food, water and mates

Extremophiles

Extremophiles are organisms that can live in extremely harsh conditions like super hot volcano vents, very salty lakes or at an extremely high pressure on the sea bed

Adaptions in Plants

Dessert Plants have Adapted to little Water

Small Surface Area to Volume Ratio - Plants lose water vapour from the surface of their leaves,

- Cacti have spines instead of leaves: to reduce surface area and therefore water loss
- Small surface area compared to their size which reduces water loss

Water Storage Tissue - For example, cactus store water in their stems

Maximising Water Absorption - Some cacti have shallow but extensive roots to absorb water quickly over a large area

- Others have deep roots to absorb underground water

Plants compete for each other for light, space, water and nutrients from the soil

- Some plants have armour, like roses have thorns and cacti have spree CO. UK
 Some plants produce poisons to prevent predators from the plants have Some plants produce poisons to prevent predators from the days them
 Some plants have warning colours to warn of the laws
- ew from 10 of 28

Competition

Change in Change the distribution of species (living organisms)

The environment is changing all the time, these changes are caused by living and non - living factors, these include:

Living - A change in the occurrence of infectious diseases

- A change in the number of predators
- A change in the number of prey or the availability of food sources
- A change in the number of types of competitors

Non - Living - A change in average temperature

- A change in average rainfall
- A change in the level of air or water pollution

Some environmental changes can be measured by using living indicators:-

- ***** Some organisms are sensitive to changes in the environment these are called indicator species
- ★ Lichen are sensitive to the concentration of sulfur dioxide in the atmosphere, the number and type of lichen can indicate how clean the air is (lots of lichen means clean air)
- \star If raw sewage leaks into the river then there will be a lot of bacterial population in the water this uses up the oxygen in the water

Advantages	Disadvantages
Gets you lots of ideal offspring	Reduced gene pool, fewer different alleles in population. This means that if a population was all closely related and there was a new disease then it could be wiped out - there would be no allele in the population to give resistance to the disease
Greater understanding to the development of embryos and age - related disorders	Cloned animals might not be as healthy
Preserve endangered species	Un - ethical, ruins Gods plan for people to be naturally conceived
Could prevent children being born with illnesses	Expensive to complete and often it fails
	People may not want the possibility of humans being cloned in the future

A useful gene from one organism's chromosome can be copied into the cell of another:-

- 1. A useful gene is 'cut' from one organism's chromosome using enzymes
- 2. Enzymes are then used to cut another organism's chromosome and then to insert the useful gene
- 3. Scientist use this method to do all sorts of things for example, the human issuing ene can be Notesale.C inserted into bacteria to produce human insulin

Genes can be transferred into Animal and

This method can be used to transfer useful genes into an initiand plants at the very early stages of their development (i.e. stor Mafter fertilisation)

This means they the develop useful charge ensuics:

- Genetically modified crops have had their genes modified e.g. to make them resistant to viruses, insects or herbicides (chemicals used to kill weeds)
- Sheep have been genetically engineered to produce substances, like drugs, in their milk that can be used to treat human disease
- Genetic disorders like cystic fibrosis are caused by faulty genes. Scientists are trying to treat these disorders by inserting working genes into sufferers - this is called gene therapy.

Genetically Modified Crops

Genetically Modified Crops - Plants can be modified by inserting the required gene into the cells of an early embryo - these plants are called GM Crops.

> Crops can be modified so that they include a poison that kills insects that try to eat the plant.

> Crops can also be modified so that they are 'resistant' to herbicide, this means that the farmer can spray the plant with a herbicide that would normally kill it, in order to kill the weed without damaging the crop.

1. Organisms produce many more offspring than their environment can support.

2. Despite the overproduction the number of individuals of a species remain fairly constant. There are factors controlling population number such as competition for resources (food, mates etc.) or the effects of disease and predators.

3. There is a variation within a population due to the different genes they inherit. Nw variation is produced by random mutation (a change in the DNA), some of which can be beneficial, some harmful but mostly neutral in the effect.

4. There is a struggle for existence due to competition for resources, disease and predators so those individuals which are best adapted to their environment have a 'selective advantage' and will breed and produce more offspring than less well - adapted organisms.

5. The successful organisms will pass on their genes to their offspring who will increase in number in comparison to less successful individuals. This is survival of the fittest.

Why are Beneficial Mutations Important?

Beneficial mutations are important because they may allow an organism to come better adapted to their environment.

Why does the rate of change in organisms change when the environment changes? nithe rational arises of the rational arises When the environment changes, the speed of change can be rapid as more of the rand mutations may be beneficial under the new conditions. What is a Mutation?

Mutations are a change in your DNA

Volution? What is the Evidence to Fossils - The variety of life on ear the drame arise all at once. - As each new 'type' of organism evolved, the older less well adapted ones became extinct.

Those birds with the mutation were able to gain more food:

- They had a selective advantage
- They bred and produced more offspring carrying the beneficial mutation.



Insect eating finch - Thinner beak for catching insects from under bark and stones.