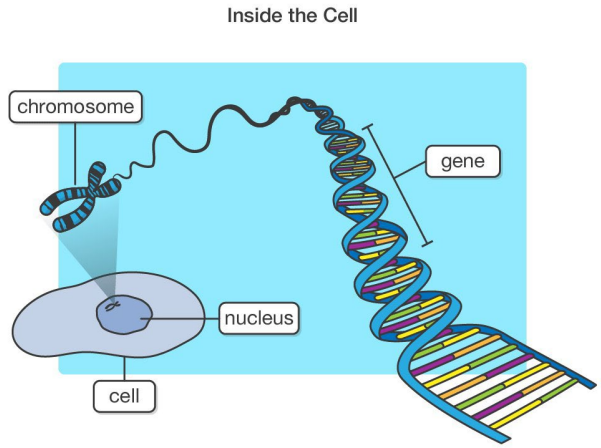
# Genetics & Inheritance

## How Genetic Information is Stored

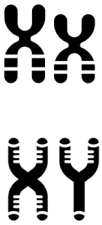
- Our cells contain a nucleus
- DNA is found in the nucleus
- **DNA** has a **double helix** structure which repeats (this is why it can be called a polymer)
- DNA is wrapped up into structures called **chromosomes**.
- In a normal human cell, each nucleus contains 23 pairs of chromosomes (46 in total).
- In a sex cell (e.g. sperm or egg), each nucleus only contains 23 chromosomes.

- A section of a chromosome is known as a **gene**
- Genes have information about your characteristics. E.g. you will have a gene that determines your eye colour




## Inheriting Chromosomes

- A **normal** cell contains **23 pairs**
- **Sex** cells contain **23**
- **Females** have an **XX** pair
- **Males** have an **XY** pair
- You chromosomes are **inherited** from your biological mother and father



## Variation

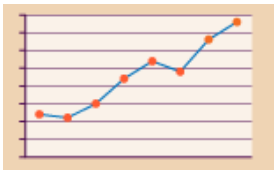
- All living things have differences between them, this is called variation.
- There are two types of variation: **inherited** and **environmental**
- However some characteristics can be a mixture of both.

| Examples of Variation | | |
|---|---|---|
| **Inherited** | **Environmental** | **Both** |
| Eye Colour | Scars | Weight |
| Skin Colour | Tattoos | Height |

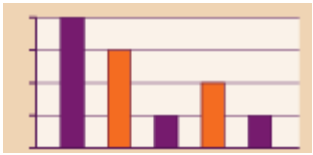
## Choosing the Right Graph for your Data

- Data collected from experiments can either be described as categoric or continuous.
- Data which could be any numbers are considered to be continuous. You have to **measure continuous data**. E.g. measuring the height or weight of the people in your class
- Data which needs to be put into categories is known as categoric (or discrete data). You have to **count categoric data**. E.g. counting the number of people in your class with blue or brown eyes.

**Continuous Data** should be on a line graph



**Categoric Data** should be on a bar chart



## Competition

All organisms need to compete for resources.

| Animals compete for: |
|---|
| Food, water, space, mates |

| Plants compete for: |
|---|
| Light, water, space, minerals |

***Adaptations** make organisms better suited for competition. This **increases** their chance of **surviving** and **reproducing***

## Evolution by Natural Selection

Charles Darwin's theory of natural selection explains how animals have evolved from simple life forms.

- **Mutated** DNA causes a change
- **Variation** between organisms
- **Advantage** against other organisms
- **Survives** when competing
- **Reproduction** becomes more likely
- **Genes** are passed on to offspring

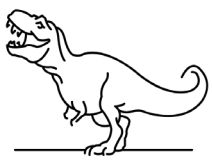
You can remember this using:
***M**y **V**ery **A**nnoying **S**ister **R**uins **G**ames*

## Extinction

This is when there are no remaining organisms of a species left.

Extinction is caused by:

- Destruction of habitat
- New diseases
- New predators
- Changes to the environment



# CORE Questions

***The following are core questions for this topic. Cover the answer section with a sheet of paper and try and quiz yourself. Only try learning 5 at a time, once you know them move on.***

| | | |
|---|---|---|
| 1 | True or False. Genetic information is passed on through a chemical called DNA. | True. |
| 2 | Where is DNA found? | Nucleus |
| 3 | Put the following in order from smallest to largest. Gene, Nucleus, DNA, Chromosome. | DNA > Gene > Chromosome > Nucleus |
| 4 | True or False. DNA can be describe as a polymer made up of two strands forming a double helix. | True. |
| 5 | Small sections of DNA on a chromosome which carry information are called what? | Genes |
| 6 | DNA wrapped up as a long strand is known as what? | Chromosome. |
| 7 | Where are chromosomes found? | In the nucleus. |
| 8 | How many chromosomes would you find in an ordinary human body cell? | 46 |
| 9 | How many chromosomes would you find in a sex cell? | 23 |
| 10 | One pair of chrmosomes in humans determines sex. What is the chromosomes for females? | XX |
| 11 | One pair of chrmosomes in humans determines sex. What is the chromosomes for males? | XY |
| 12 | How is genetic information inherited? | You get 23 chromosomes from your biological mother and father |
| 13 | State two different types of variation. | Inherited and environmental |
| 14 | Give 2 examples of inherited variation | Eye colour, skin colour, blood group, genetic disease |
| 15 | Give 2 examples of environmental variation | Scars, tatoos, piercings |
| 16 | Give 2 examples of variation which could be considered both environmental and inherited. | Weight and height |
| 17 | Give an example of continuous data | Height, weight |
| 18 | Give an example of discontinuous data | Blood type, hair colour, eye colour |
| 19 | Identify four things animals compete for. | Food, water, space, mates |
| 20 | Identify four things plants compete for. | Light, water, space, minerals |
| 21 | How do adaptations an animals chance of survival? | They are better suited to compete against other organisms |
| 22 | True or False. Adaptations make animals more successful at competing, therefore they find it easier to survive and reproduce. | True. |
| 23 | What happens to DNA when it is mutated? | DNA changes |
| 24 | True or False. Variation caused by a change in DNA which leads to adaptions makes organisms more likely to survive. | True. |
| 25 | Who discovered evolution by natural selection? | Charles Darwin |
| 26 | If a mutation in DNA causes an animal to have an advantage, what is it more likely to do? | Survive and reproduce |
| 27 | How does evolution occur? | The process of natural selection. |
| 28 | Identify two factors which can lead organisms to become extinct. | Any from: changes to the environment, destruction of habitat, new disease, new predators |
| 29 | How can we prevent organisms becoming extinct? | Create genebanks or put animals on endangered species list |
| 30 | Suggest why certain species of monkeys become extinct when forests are cut down. | There habitat is destroyed (and they can no longer compete for food and water). |