Science KS3 **Inheritance and genetics**

Glossary:

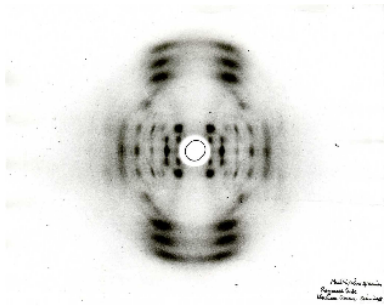
- **Cell division**
  Cell dividing to produce more cells.
- **Chromosome**
  Molecule of DNA.
- **DNA**
  Carries genetic information.
- **Egg**
  Female sex cell.
- **Fertile**
  Able to produce offspring.
- **Fertilisation**
  Fusing of male and female sex cells.
- **Gene**
  Length of DNA which codes for a protein.
- **Inherited**
  Passed from one generation to the next.
- **Mutation**
  Error when copying a gene during cell division.
- **Nucleus**
  Controls the cell, contains DNA.
- **Offspring**
  Children.
- **Organism**
  Individual in a species
- **Sexual reproduction**
  Producing offspring by fusing sex cells.
- **Specialised cells**
  Cells adapted for a function.
- **Species**
  A group of similar organisms which can breed and produce fertile offspring.
- **Sperm**
  Male sex cell.
- **Variation**
  Differences between organisms of the same species.

Activities

- Smoking can cause mutations in DNA. Carry out some research to find out what types of chemical are found in cigarette smoke and how they can lead to cancer.

- Explain the difference between continuous and discontinuous variation. Give two examples of each type of variation.

- Watson and Crick used 'Photo 51' to help work out the structure of DNA. This image was created by Rosalind Franklin. Produce a biography of Rosalind Franklin. Your biography should include her work on DNA and how it was used to find its structure.



- DNA is the genetic material of human cells. Describe the structure of DNA and where it is found in a human cell.

QUICK QUESTIONS:

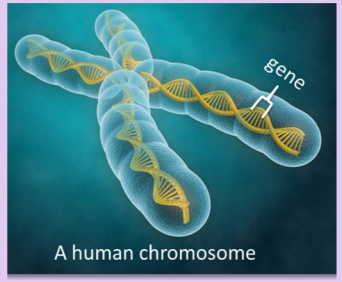
1. What are chromosomes and where are they found?
2. What is a gene?
3. Give two reasons cells divide.
4. What is a mutation?
5. Name two causes of variation.
6. State the two types of variation.
7. How many chromosomes in:
   a) A normal human body cell.
   b) A sperm.
   c) An egg?

1. Chromosomes

- **Chromosomes** are found in the **nucleus** of plant and animal cells.
- Chromosomes contain complex molecules of **DNA**.
- The DNA contains the information needed to make more cells.
- Most cells in humans contain **23 pairs** of chromosomes (**46 chromosomes** in total).

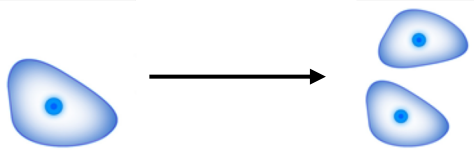
2. Genes

- A **gene** is a length of **DNA**.
- Hundreds and thousands of genes are found on a single **chromosome**.
- Humans have around 20,000 genes.



3. Cell division

- Cells divide for **growth** and **repair**.
- When a cell divides, **genetic information** stored in the genes is copied so that each new cell is a **copy** of the original cell.



4. Mutations

- Sometimes an error occurs when genetic information is copied, this causes a **mutation**.
- Not all mutations are harmful.
- Changes in genes can be caused by the **environment.**
- These changes affect the individual, but only affect their **offspring** if they occur in sperm or egg cells.

PiXL Science

KS3 Spine

Inheritance and genetics

5. Sexual reproduction

- A **sperm cell** from a male **fuses** with an **egg cell** from a female. This is called **fertilisation**.
- Sperm and egg cells are **specialised**. They only contain **23 chromosomes**, one copy of each pair.
- Half the genetic material in a **fertilised egg** is from the sperm and half from the egg, making 46 chromosomes in total.

6. Variation

- **Sexual reproduction** causes a lot of **variation**; differences between **organisms** in the same **species**.
- This is because the **genetic information** in an offspring is a combination of genetic information from the parents.
- The environment can also cause variation in a species e.g. diet and lifestyle.
- Variation can be **continuous,** e.g. height, or **discontinuous,** e.g. blood type.

7. Inheritance

- Inherited variation is due to differences in the **genes**.
- These differences can be **inherited,** passed from one generation to the next.

8. Watson, Crick, Wilkins and Franklin

- DNA is made from **two strands bonded together** in a **double helix**. **James Watson** and **Francis Crick** worked out the structure of DNA in the 1950's using an x-ray image, photo 51, produced by **Rosalind Franklin**. **Maurice Wilkins** produced work which supported the model.
- Watson, Crick and Wilkins were awarded the **Nobel Prize.** Unfortunately, Franklin died before the prize was awarded.