



The National
Orthodox School
Shmaisani

Science summary sheet #1

Grade 8 National

Unit 1: Heredity and Reproduction

Lesson 1

Genetic material

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Learning Objectives:

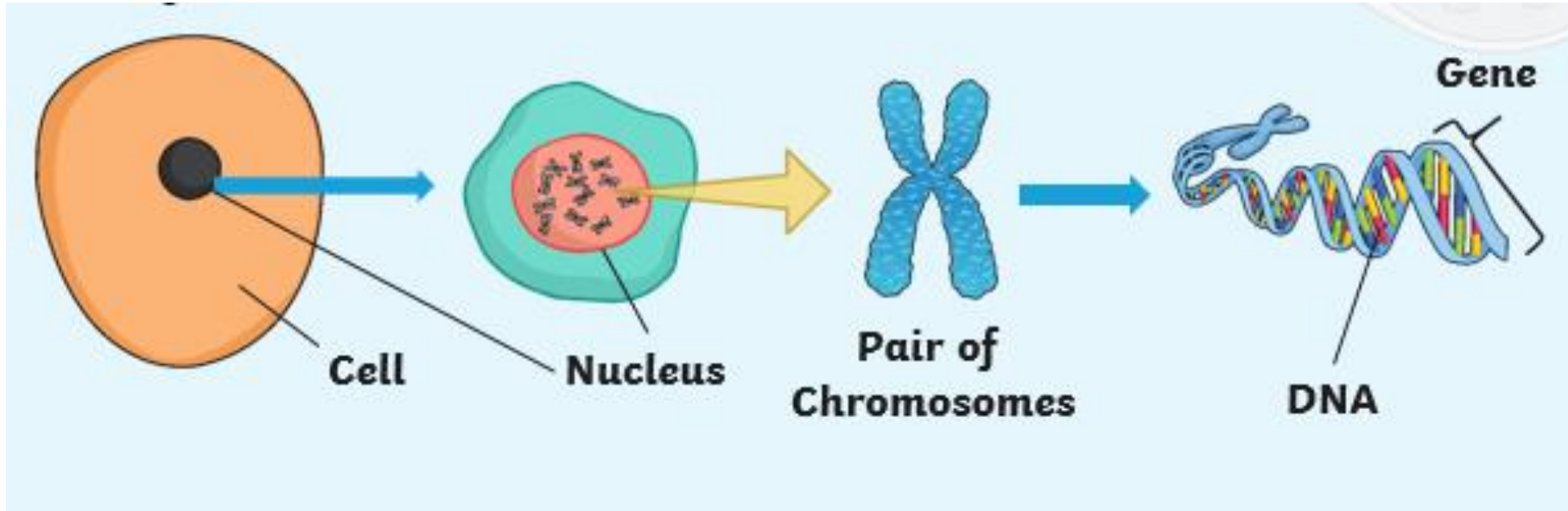
- Describe the structure of DNA
- Understand how DNA replicates
- Differentiate between Mitosis and Meiosis

Key words:

- ❖ Chromosome
- ❖ DeoxyriboNucleic Acid (DNA)
- ❖ Gene
- ❖ Nucleotide
- ❖ DNA Replication
- ❖ Cellular Division
- ❖ Mitosis
- ❖ Meiosis
- ❖ Gametes
- ❖ Binary Fission

Genetic Material Structure

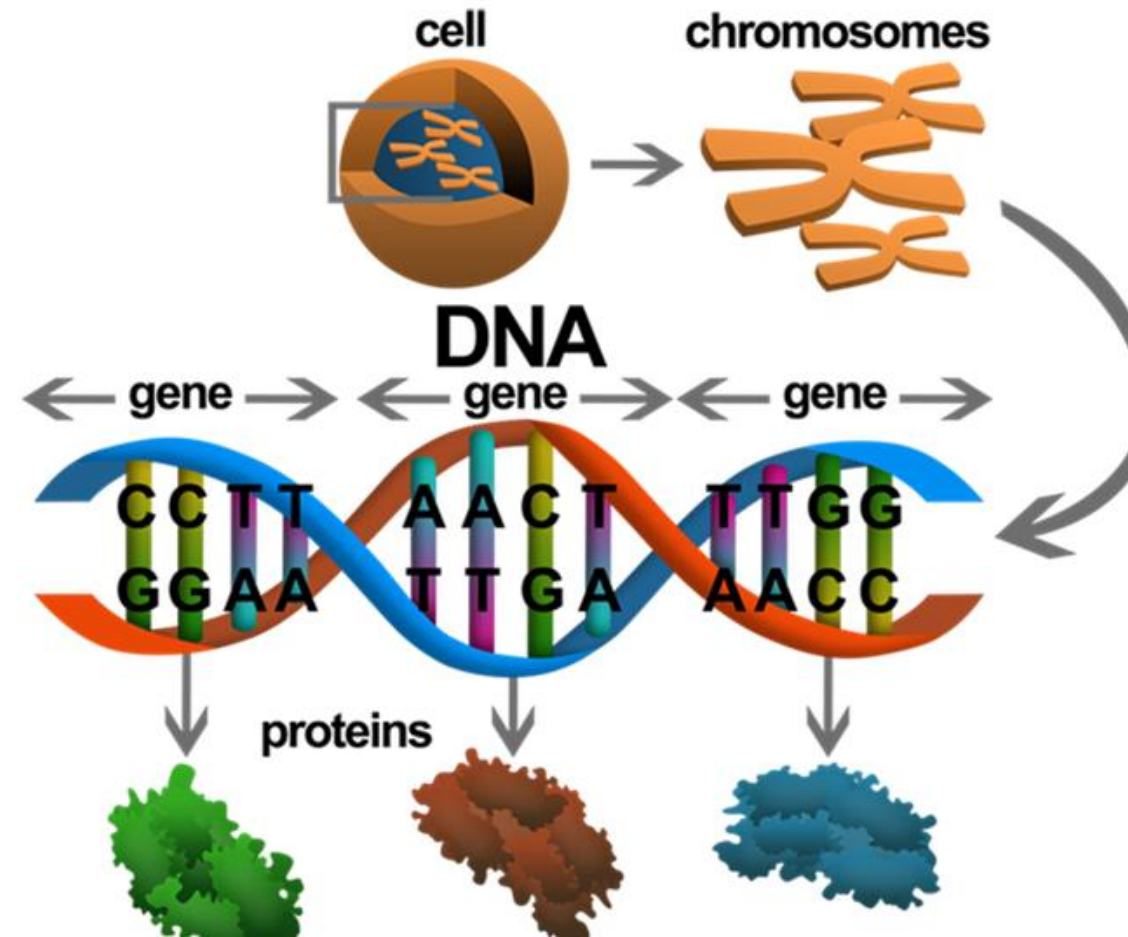
- Cells contain genetic material that is passed from one generation to another.
- **Chromosomes** are thread-like structures made up of **DNA**. Chromosomes are found in the nucleus of cells.



Different species of living things have different number of chromosomes. For example, humans have 23 pairs of chromosomes

Deoxyribonucleic Acid (DNA)

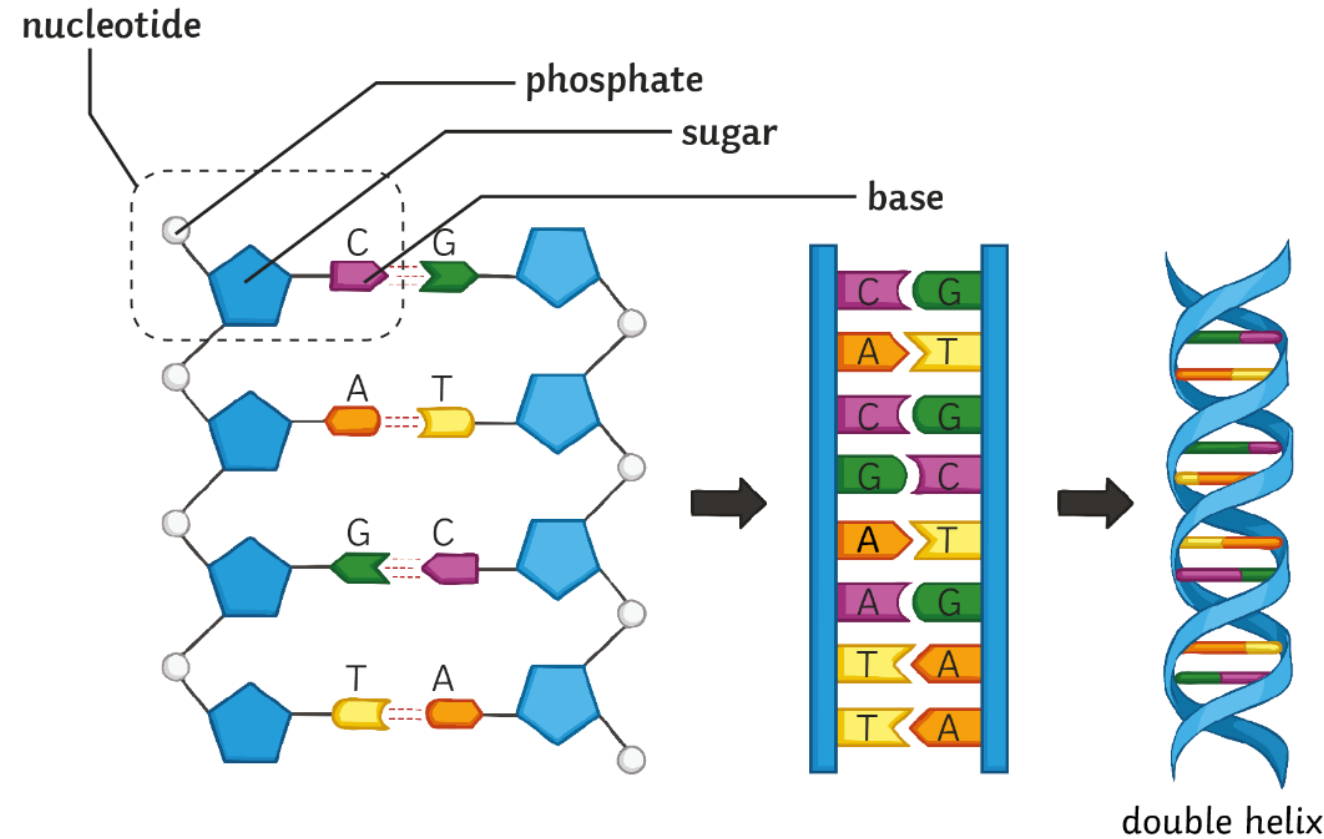
- DNA is the material we inherit from our parents.
- DNA is a double stranded helix structure containing segments called **genes** which give us many of our characteristics such as hair colour, eye colour, dimples and blood type.
- DNA helps keep the body functioning properly. It helps cells to make the proteins, which the cells need to live. DNA also allows living things to reproduce. The **genes** in DNA pass along physical traits from parents to children.



- **Nucleotides** are the building blocks of the **DNA**. Each nucleotide is made of a sugar and phosphate group with one of four different nitrogen bases attached.
- Nucleotides differ according to the nitrogen base they contain. There are 4 nitrogen bases :

Adenine (**A**)
 Cytosine (**C**)
 Guanine (**G**)
 Thymine (**T**)

The C base is always linked to a G base.
 An A base is always linked to a T base.



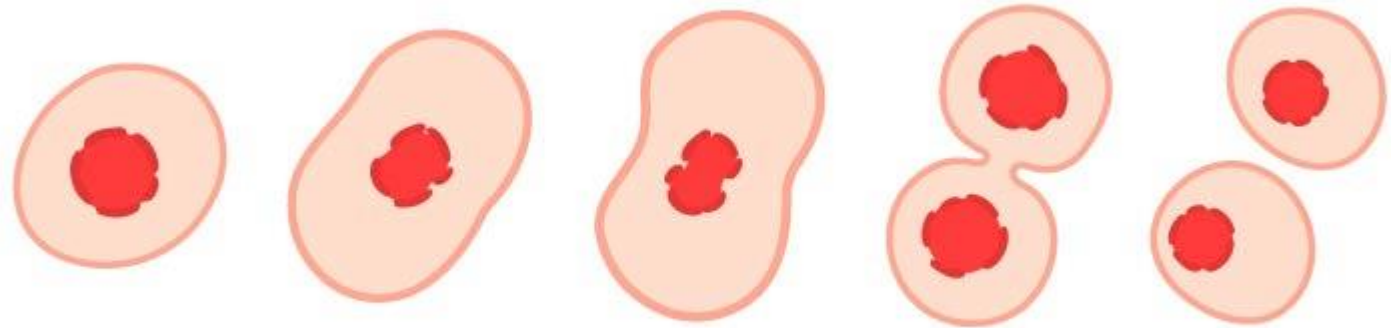
DNA Replication

- **DNA replication** is the process by which DNA makes a copy of itself during **cellular division**.
- The first step in DNA replication is to '**unzip**' the double helix structure of the DNA molecule.
- The two separated strands will act as templates for making the new strands of DNA.
- Every strand now adds a new complementary nucleotide base (A, C, G and T).
- The result of DNA replication is two DNA molecules consisting of one new and one old chain of nucleotides.



Cellular Division

- Cell division is the process in which a *parent* cell divides to make two or more *daughter* cells. It is an essential biological process in many organisms in order to grow, repair and reproduce.



- There are three types of cellular division:

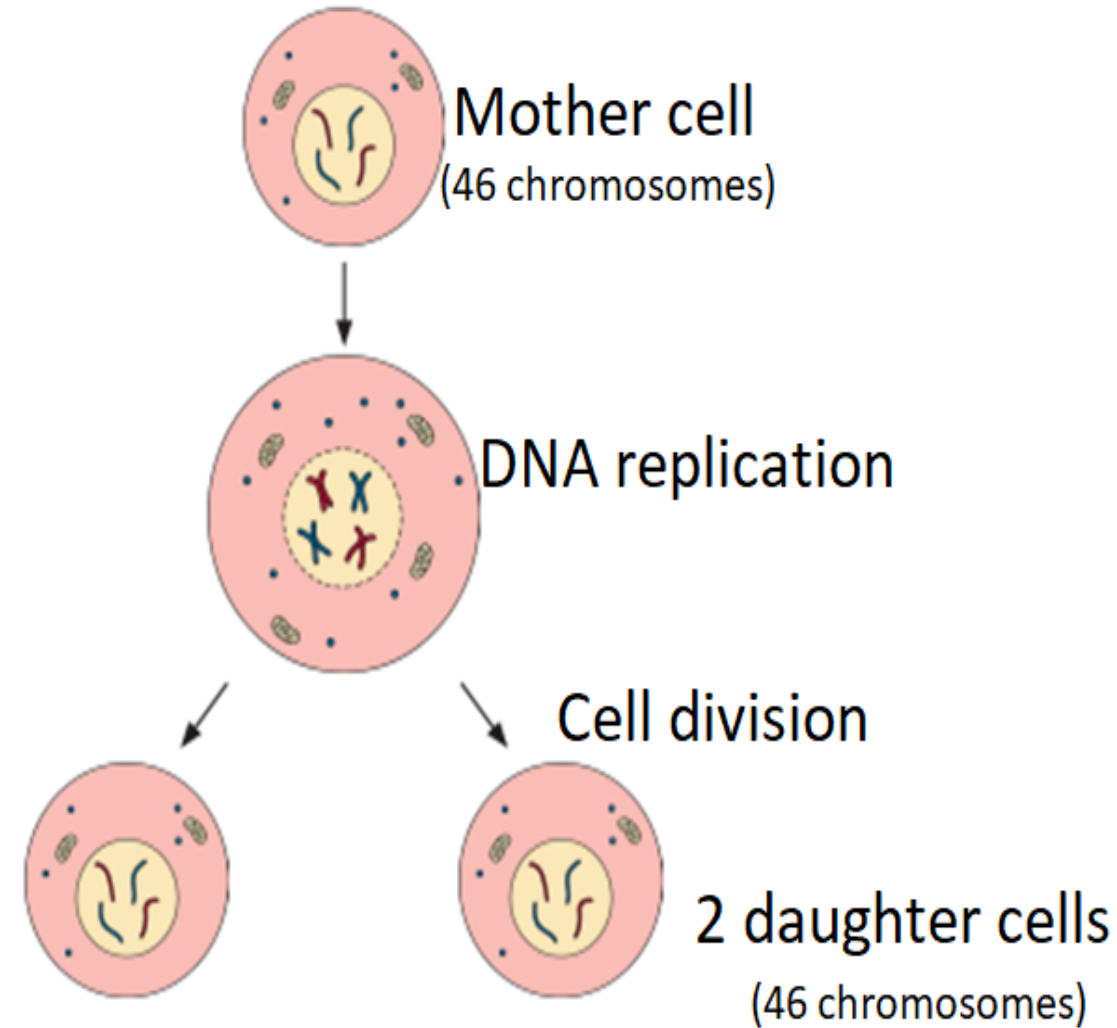
○ **Mitosis**

○ **Meiosis**

○ **Binary Fission**

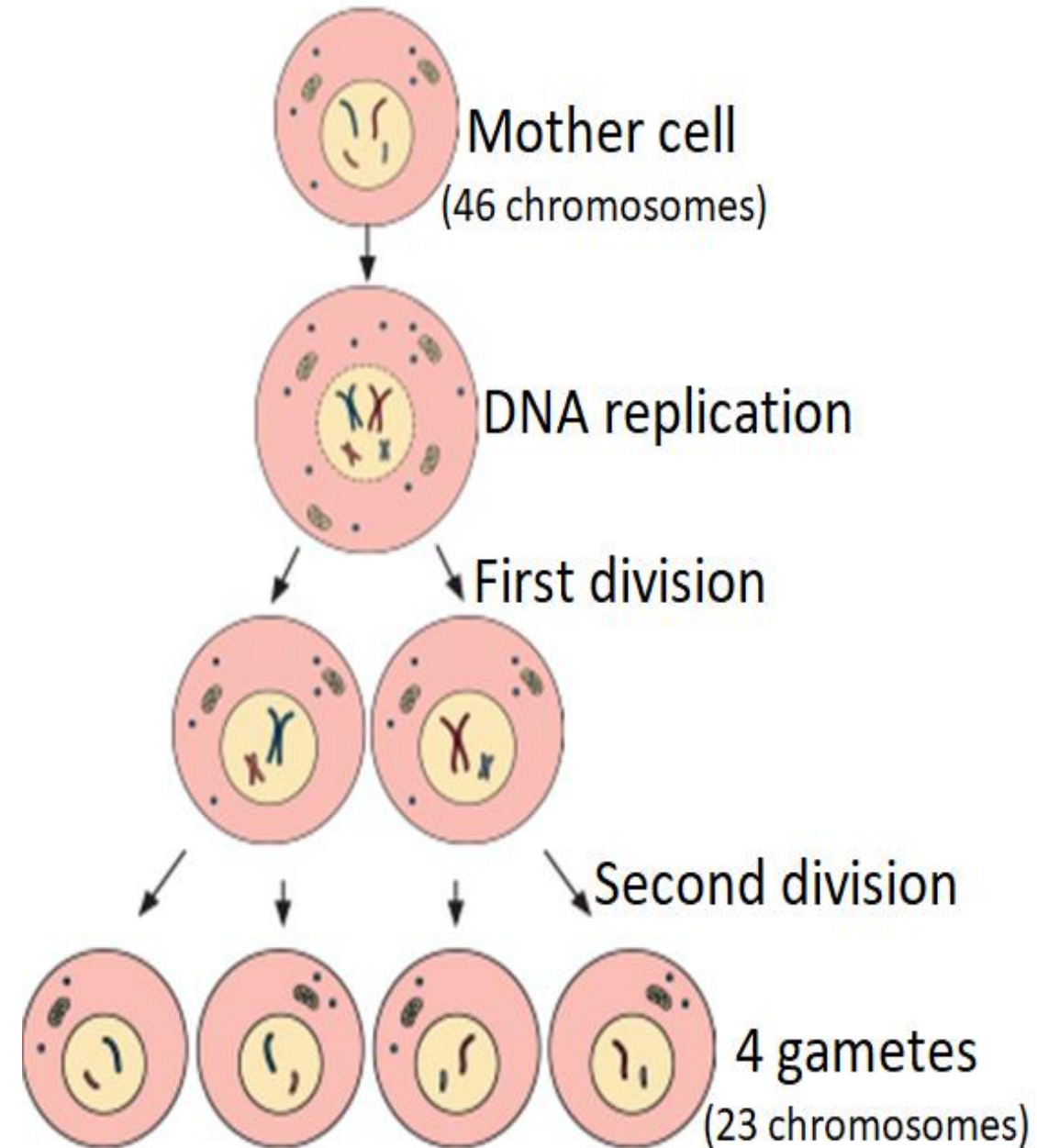
Mitosis

- Mitosis happens in all cells of the body. During mitosis, a cell duplicates all of its contents, including its chromosomes, and **splits to form two identical** daughter cells. This process helps in renewing damaged cells and provides more cells for growth and development.



Meiosis

- Meiosis is important for reproduction.
- Meiosis is the cell division that is required for the formation of a **gamete**. In this, a mother cell divides twice to produce **four daughter cells**. The daughter cells have half the number of chromosomes as the mother cell.



Binary Fission

- Binary fission is the process that **bacteria** use to carry out cell division. Binary fission is actually how bacteria reproduce, or add more bacteria to the population.

