Edexcel GCSE Biology

Your notes

Growth in Organisms

Contents

Growth

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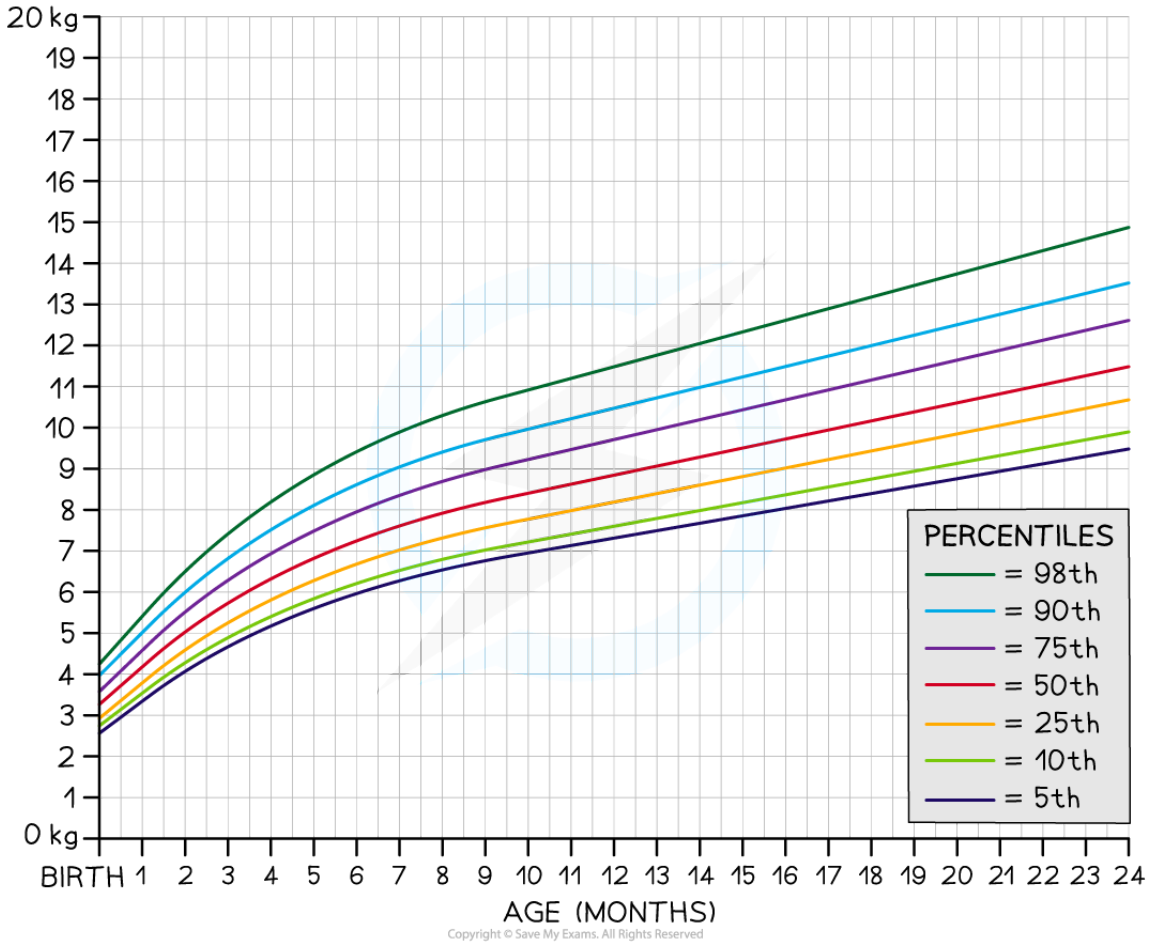
Growth in Animals & Plants

- Growth is described as a **permanent increase in size or mass**
- The growth process is slightly different in plants compared to animals
- **Both plants and animals** grow via two key processes:
  - **Cell division** - mitosis
  - **Cell differentiation** - development of specialised features creating specialised cells
- **Plants** also grow through a **unique process** called **cell elongation**
  - This is where **hormones**, such as **auxin**, cause cells to grow longer in response to certain **stimuli** e.g. sunlight

Monitoring Growth

- **Growth charts** can be used to monitor the growth of an organism by comparing its growth to the usual trends for that particular organism
- In humans, the growth of a baby is monitored using indicator measurements such as **mass, length and head circumference**
- These measurements are then **compared with historical data** collected from other children of the same age
- Any potential **issues can then be highlighted** and assessed if necessary. These issues might include:
  - Malnutrition
  - Obesity
  - Inconsistencies across different measurements e.g. a large baby with a small head
  - Sudden changes in trend (which may indicate expression of a new health problem)



The growth of an infant can be monitored using a growth chart that compares their mass, length or head circumference to historical data

Reading a Growth Chart

- To compare the growth of a child using a growth chart:
  - Find the child's age on the X-axis
  - Find the child's weight on the Y-axis
  - Read across and up to the growth chart lines and find where they **intersect** (the correct percentile is the line closest to the intersection)
- For example:

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- If a baby is on the **25th percentile** for mass, it means that they are **lighter than 75%** of children their age and **heavier than 25%** of children their age
- Children can fluctuate around a growth trend, this is more obvious in younger children
- Girls follow a different growth chart to boys
- Specialised growth charts have been produced for children who suffer from specific health issues, such as Down syndrome


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The Importance of Cell Differentiation

- As a multicellular organism develops, its cells **differentiate to form specialised cells**
  - Specialised cells have structural adaptations which enable them to perform **specific functions** within the organism
- Almost all of the cells in a multicellular organism will contain the **same genetic information** (the same genes or alleles), but each cell will have a different set of **active genes** which determine how the cell functions
  - When the cell differentiates, these active genes cause the **development and composition of subcellular structures** which enables it to carry out a certain function
  - e.g. To form a nerve cell the cytoplasm and cell membrane of an undifferentiated cell must elongate to form connections over large distances

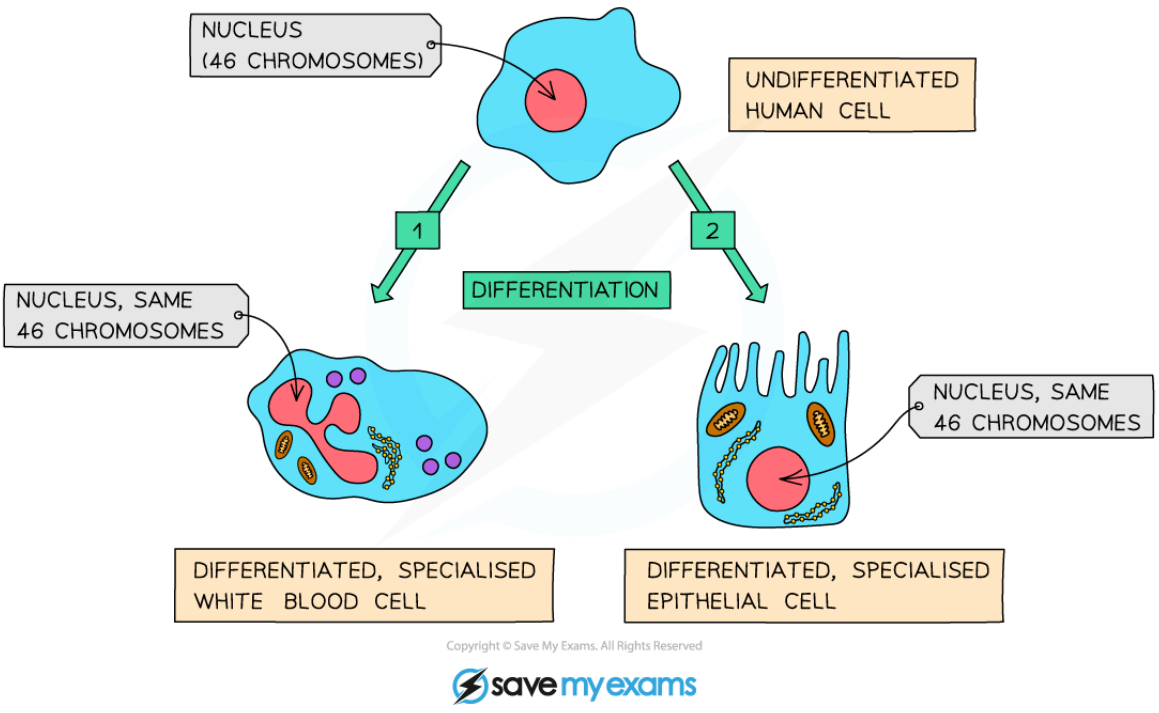

Diagram showing the differentiation of a human cell

Cell Differentiation in Plants and Animals

- In an **animal**, most cells differentiate at an early stage of its development. Cell division is mainly restricted to repair and replacement in mature animals
  - Animal cells therefore **lose their ability to differentiate** after they have become specialised early in the life of the animal
  - Some cells in various locations throughout the body of an animal retain the ability to differentiate throughout the life of the animal. These cells are called adult stem cells and are mainly involved in replacing and repairing cells (such as blood or skin cells)
- **Plants** differ from animals in that many types of plant cell retain the ability to fully differentiate **throughout the life of a plant**, not just in the early stages of development


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