

Mitosis occurs during growth, repair, replacement of cells.
Asexual reproduction occurs by mitosis in both plants & simple animals producing genetically identical clones.

MITOSIS produces two genetically identical DIPLOID CELLS

The result of changes in DNA that lead to uncontrolled growth and division

Cancer

MITOSIS is part of THE CELL CYCLE

Growth in organisms	Growth in plants	Cell division and differentiation, elongation (cells increase in length)
	Growth in animals	Cell division and differentiation.

Cell division and growth

Edexcel GCSE Biology Cells and Control Part 1

Percentile charts can be used to monitor growth

The 50th percentile (bold line) is the median (average) growth of the population at that age. Half will be below and half above.

Stage 1	Interphase (not part of mitosis)	Before mitosis: Increase the number of sub-cellular structures e.g. ribosomes, mitochondria. DNA replication makes copies of chromosomes.
Stage 2	Prophase	Nucleus breaks down and spindle fibres appear.
Stage 3	Metaphase	Chromosomes are lined up on spindle fibres on the equator (middle) of the cell.
Stage 4	Anaphase	Chromosome copies are separated and pulled to opposite ends of the cell.
Stage 5	Telophase	A new nuclear membrane forms around each set of chromosomes.
Stage 6	Cytokinesis	Cell surface membrane forms to separate the cells (+new cell wall in plants).

Cells divide in a series of stages to produce two daughter cells, each with identical set of chromosomes to the parent cell (in the nucleus).

how a cell changes and becomes specialised so that different cells can carry out different functions.

Cell differentiation

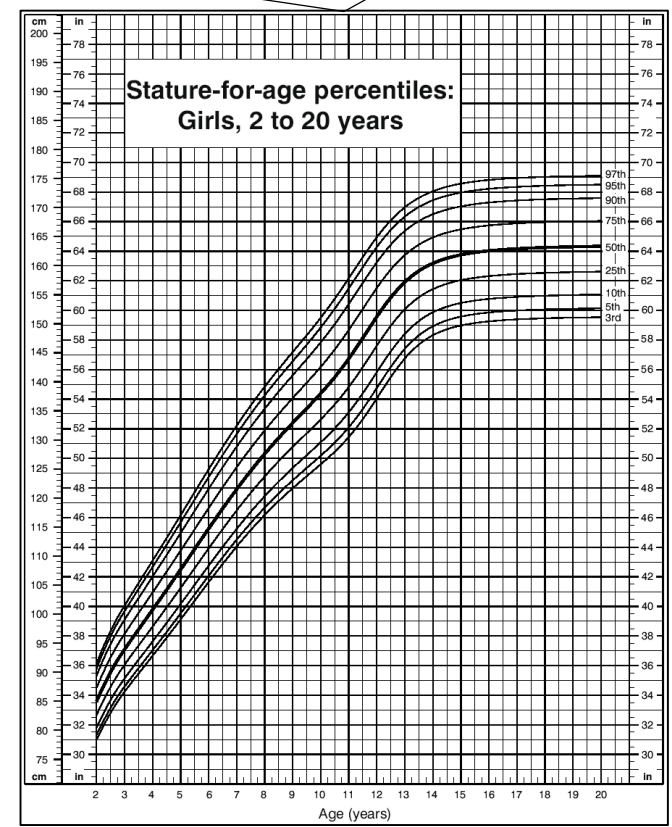
Divides to form more cells of the same type, and can differentiate to form many other cell types.

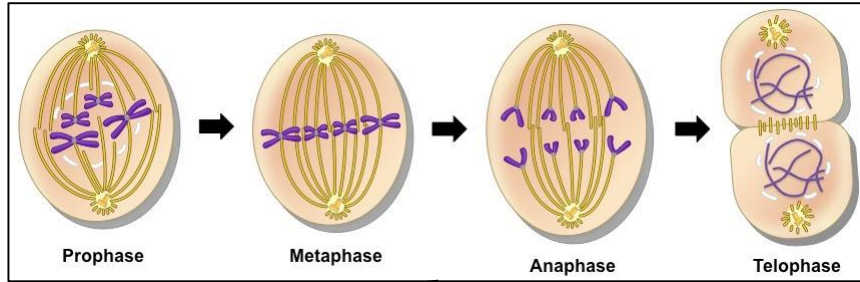
Undifferentiated cell of an organism

STEM CELLS

Human Embryonic stem cells	Can be cloned and made to differentiate into any cell type	Therapeutic cloning of stem cells to produce new tissue uses same genes so the body does not reject the tissue. Can be a risk of infection
Adult stem cells	Can form into surrounding human cells e.g. blood cells	Tissue made from adult stem cells is matched to avoid rejection, risk of infection. Only a few types of cells can be formed.
Meristems (plants)	Can differentiate into any plant cell type throughout the life of the plant.	Used to produce clones quickly and economically, e.g. rare species, crop plants with pest /disease resistance

Treatment with stem cells may be able to help conditions such as diabetes and paralysis. Some people object to the use of stem cells on ethical or religious grounds





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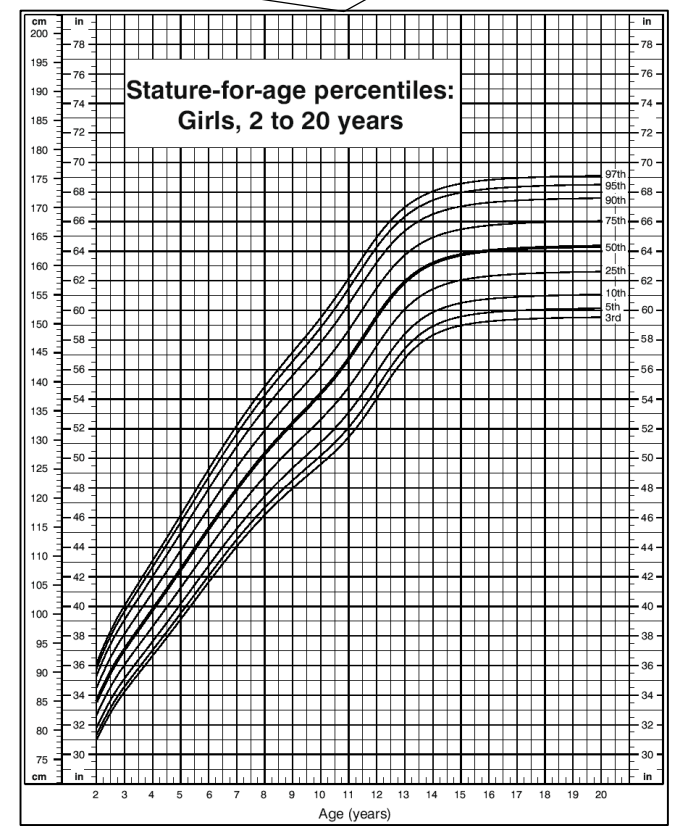
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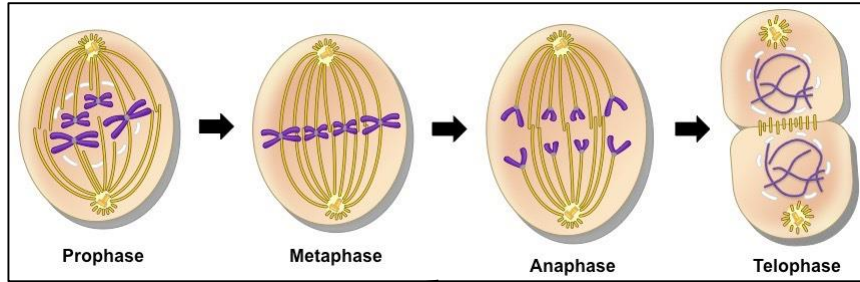
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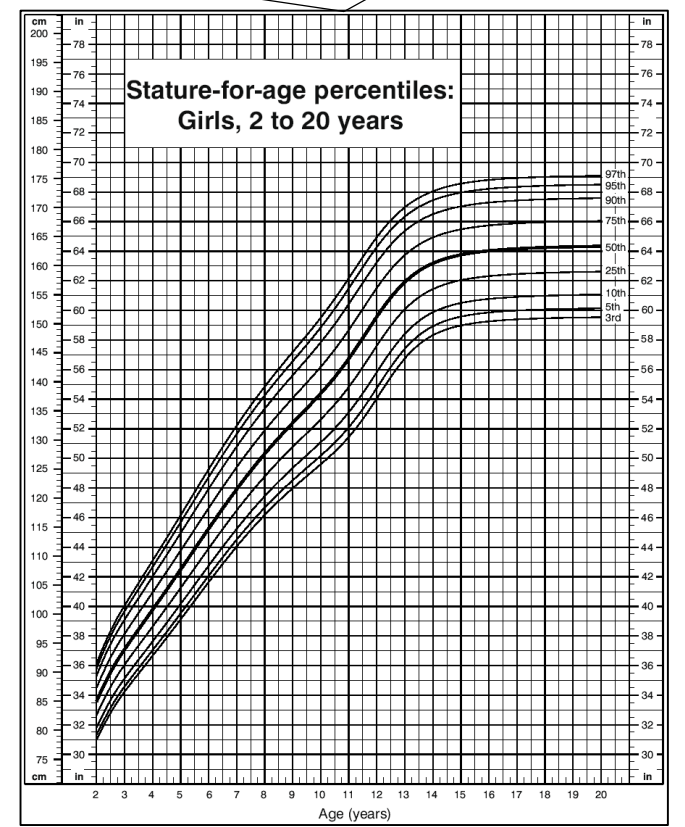
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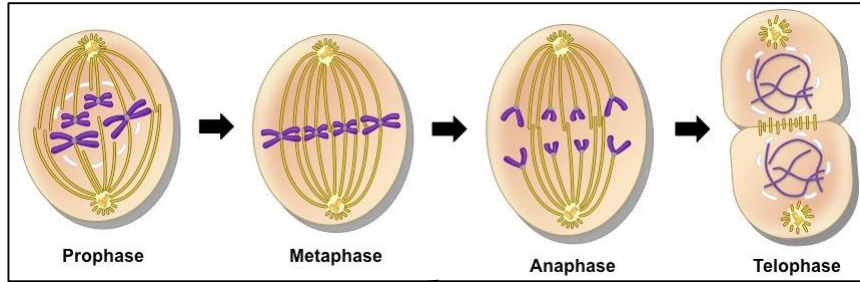
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