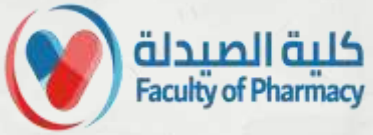

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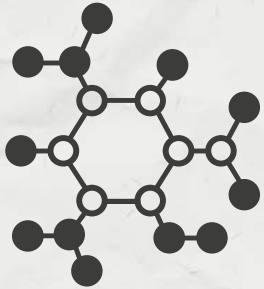
The Regulation of cell division

Meelad Alhammali : 3536
Awad Alhadad : 3649
Mohamed Ashraf : 3511
Aisha Jamal : 3705



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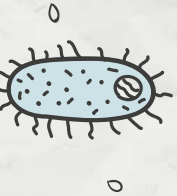
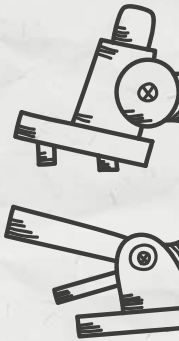




01

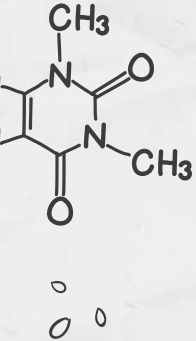
Define cell division

02

List types of cell division

03

Define cell cycle



04

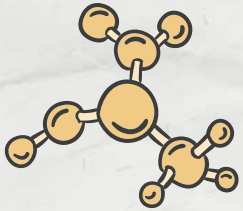
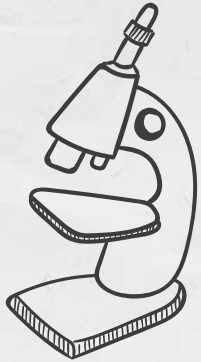
List stage of cell cycle

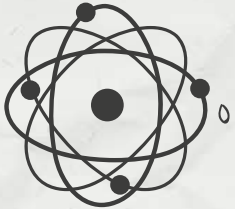
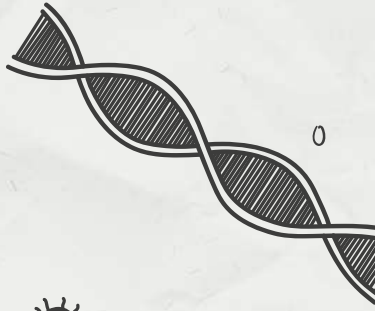
05

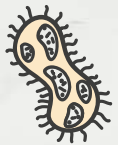
Explain the regulation of cell cycle

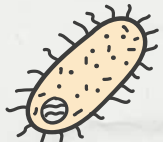
06

Describe defect could happen in cell cycle



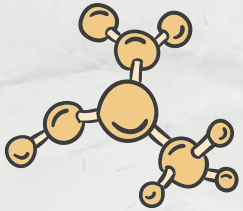
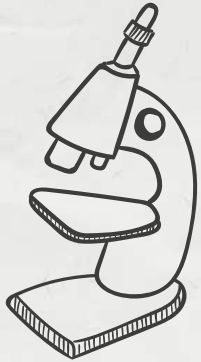



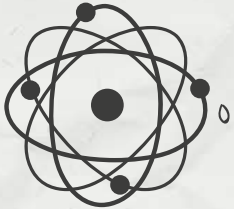
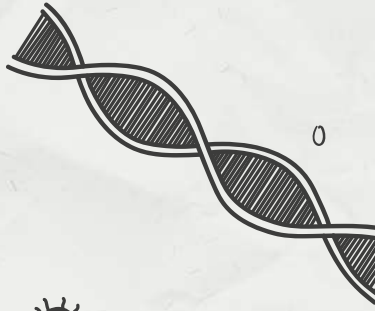
01

Define cell division

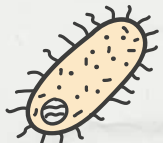
What is the meaning of cell division ?

- Cell division is the process in which a parent cell divides, giving rise to two or more daughter cells.
- It’s done by multicellular organisms in order to grow, (repair), and reproduce.
- In unicellular organisms, a cell division is equivalent to reproduction.

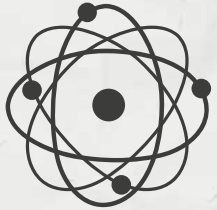


02

types of cell division

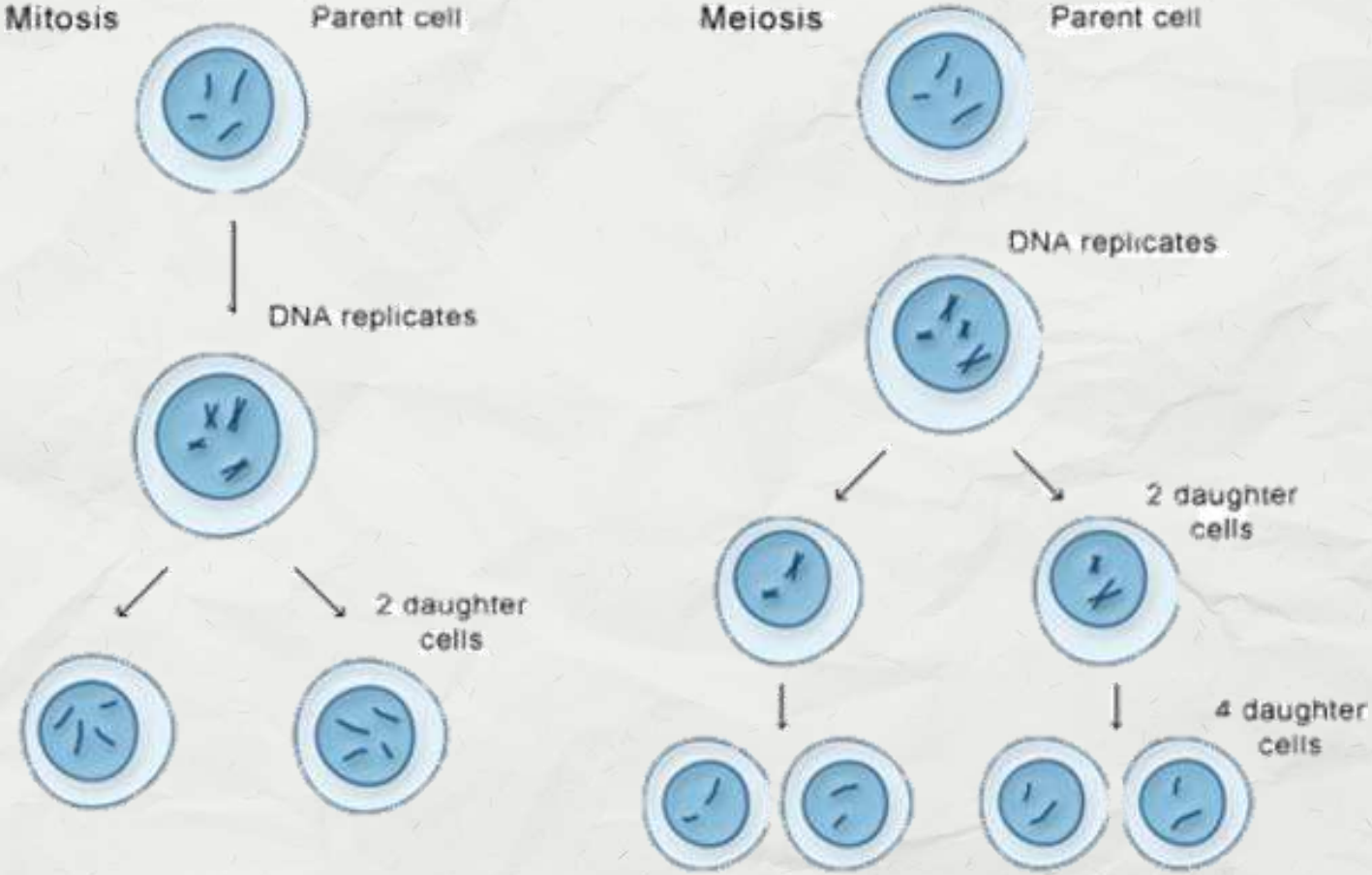
Types of cell division:

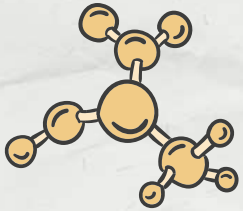
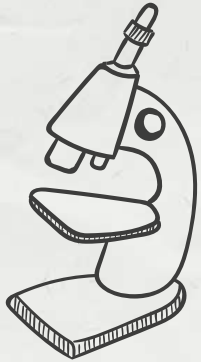


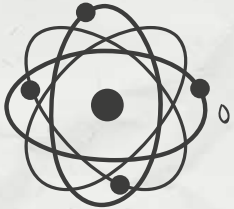
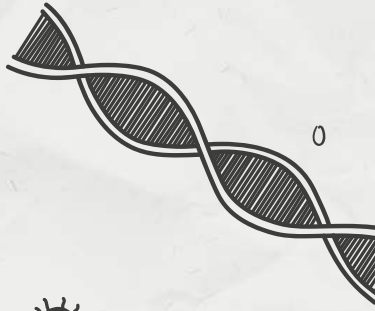
There are two types of cell division:

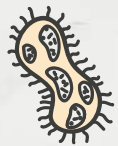
- **Mitosis**
  it's results in two daughter cells each having the same number and kind of chromosomes as the parent nucleus, typical of ordinary tissue growth.

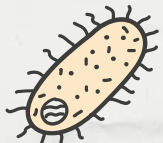
- **Meiosis:**
  it's results in four daughter cells each with half the number of chromosomes of the parent cell, as in the production of gametes and plant spores.


Mitosis
Parent cell
DNA replicates
2 daughter cells
Meiosis
Parent cell
DNA replicates
2 daughter cells
4 daughter cells



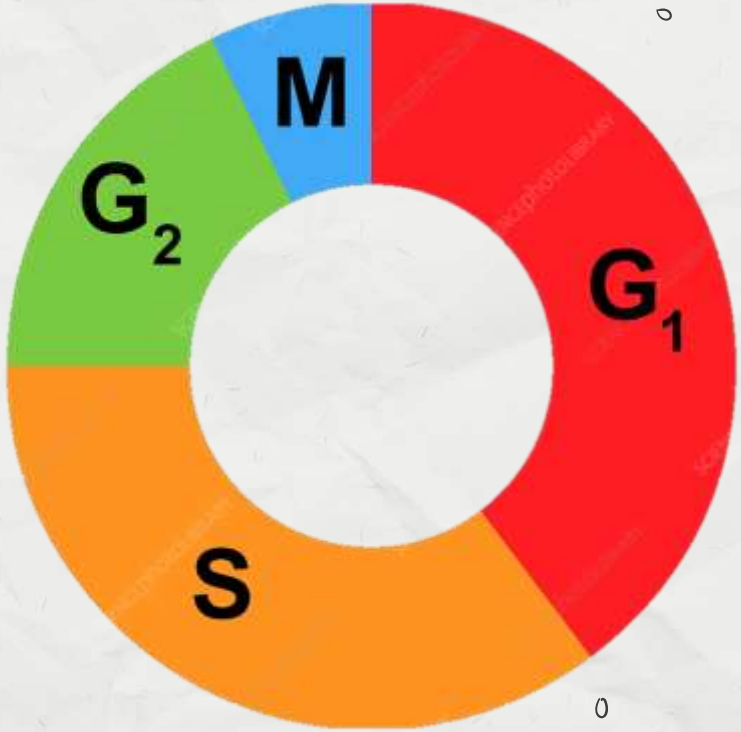



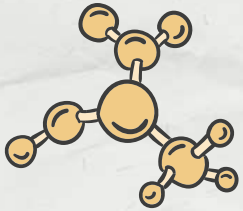
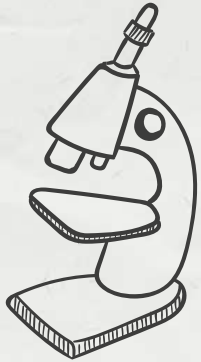
03

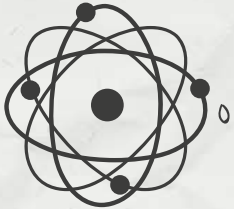
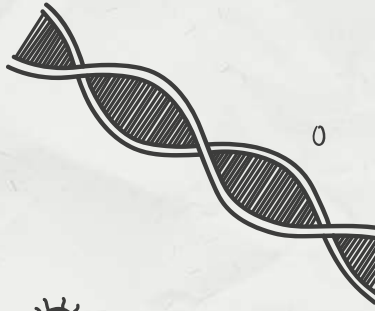
Define cell cycle

— What is the cell cycle ?

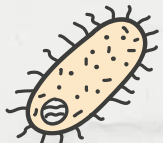
“The cell cycle is a four-stage process; or it is the ordered sequence of events that occur in a cell in preparation for cell division”.





04

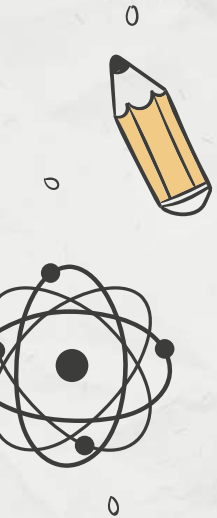
List stage of cell cycle

Stages of cell cycle

There are two main stages in the cell cycle :

- The first stage is **interphase** during which the cell grows and replicates its DNA**.**
- The second phase is the mitotic phase **(M-Phase)** during which the cell divides and transfers one copy of its DNA to two identical daughter cells

Interphase

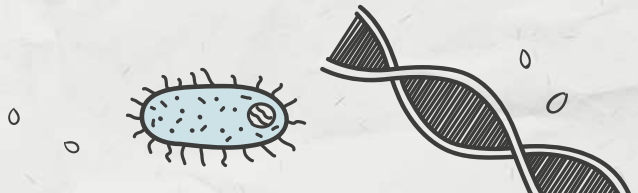


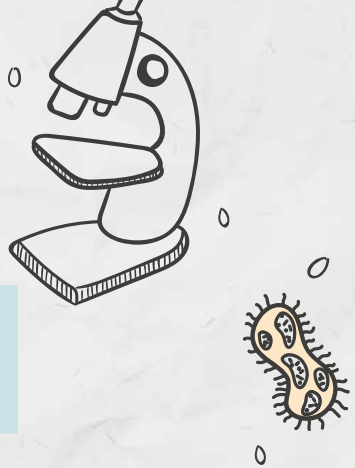
G1 phase

cells have split and the cells have only one copy of their DNA. Cells increase in size

S phase

s the stage during which DNA replication occurs. and consist of long strands of DNA that contain the genetic information of the cell.





G2 phase

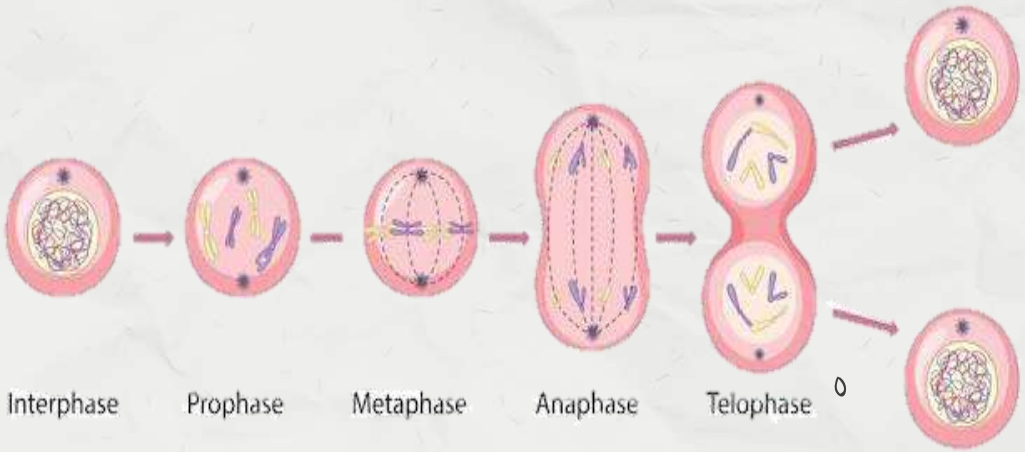
During this phase the cell may continue to grow and undergo normal cellular functions.

Mitosis Phase

The mitotic phase (M phase) is composed of two tightly coupled processes:
(mitosis and cytokinesis)

which includes the four broad phases of mitosis :

- prophase
- Metaphase
- anaphase
- Telophase



M- phase

- **Prophase**
  During prophase, the chromatin material will be short and thick into individual chromosomes which are visible under the light microscope

- **Metaphase**
  During metaphase, chromosomes line up on the equator of the cell. The chromosomes appear in a straight line across the middle of the cell

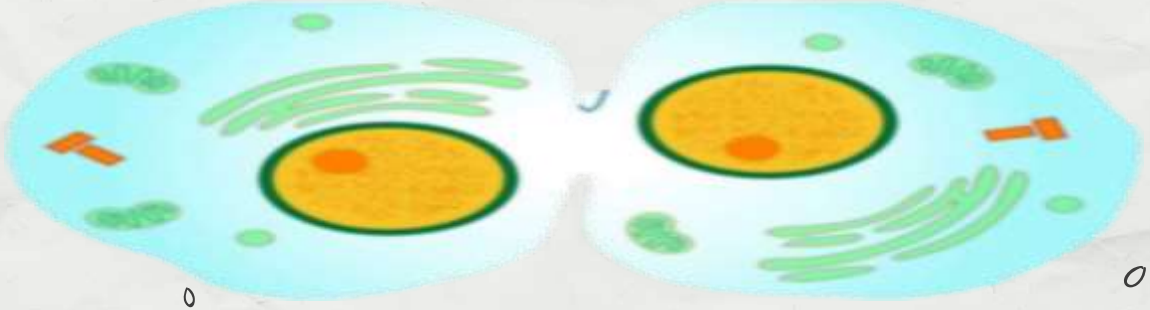
M- phase

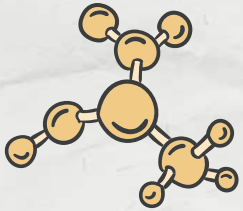
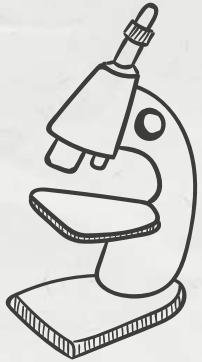
- **Anaphase**
  During anaphase the chromatids are pulled to opposite poles of the cell by the shortening of the spindle fibers. The chromatids now called daughter chromosomes.

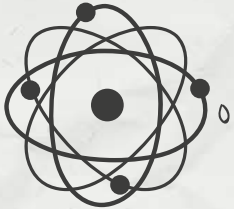
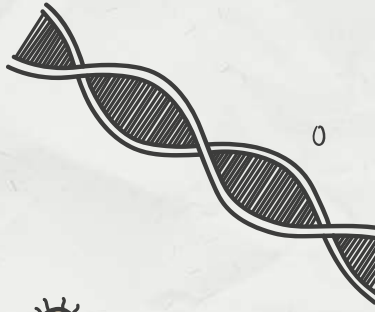
- **Telophase**
  During telophase, a nuclear membrane reforms around the daughter chromosomes that have gathered at each of the poles.

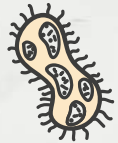
Cytokinesis

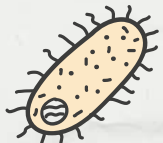
- Cytokinesis is the process following the division of the nucleus, the cytoplasm and plasma membrane are divided, resulting in two cells, each with its own nucleus and cytoplasm surrounded by a plasma membrane. It occurs in both plant cells and animal cells.
- Cytokinesis starts in anaphase and concludes in telophase, finishing as the next interphase begins.





05

Explain the regulation of cell cycle

the Regulation of cell cycle

the cell cycle is controlled by regulator molecules that either promote the process or stop it from progressing

Positive regulation of cell cycle:

Two groups of proteins; cyclins and cyclin-dependent kinases (Cdks), are responsible for promoting the cell cycle

Maturation promoting factor (MPF)

MPF is composed of two protein complex; cyclin and cyclin dependent kinase (cdc2p). These proteins are responsible for the progress of the cell through the various checkpoints

the Regulation of cell cycle

Cyclin:

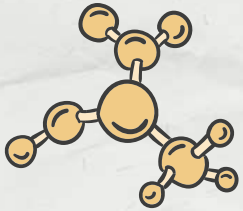
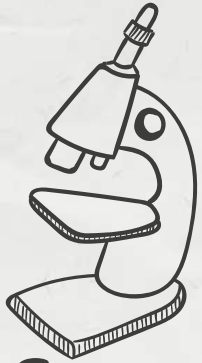
Cyclins are cell-signaling molecules that regulate the cell cycle , After the cell moves to the next stage of the cell cycle, the cyclins that were active in the previous stage are degraded

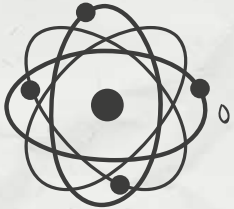
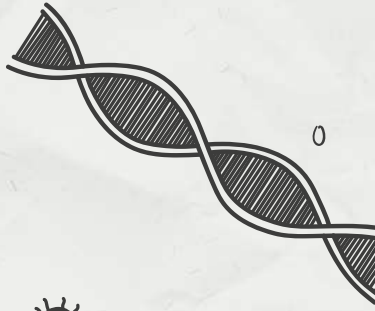
Cyclin dependent kinases(CDKs):

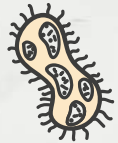
Cdks are kinase enzymes that phosphorylate other proteins or enzymes. Phosphorylation activates the protein by changing its shape

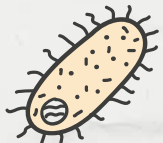
06

Describe defect could happen in cell cycle



What defects could happen in cell cycle?

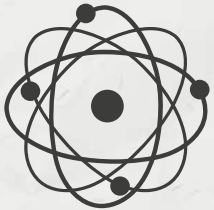
- There are a lot of examples of defect in cell cycle but the most common is cancer.

- Cancer is a group of diseases characterized by uncontrolled cell growth.

- Cancer begins when a single cell mutates, resulting in a breakdown of the normal regulatory controls that keep cell division in check.

- These mutations can be inherited, caused by errors in DNA replication, or result from exposure to harmful chemicals.

- A cancer tumor can spread to other parts of the body and, if left untreated, be fatal.

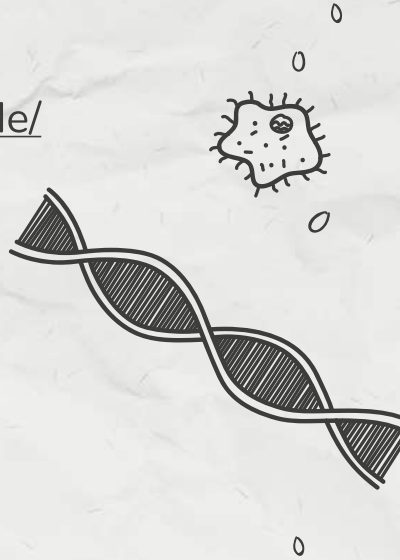


Summary

- The cell cycle is a repeating series of events that cells go through. Cell cycle consists of four stages: G1, S, G2, and M.
- cell division includes mitosis and cytokinesis. Mitosis has four sub-phases: Prophase , Metaphase ,Ǻóȧởĵ ȧọdž,Telophase.
- the cell cycle is controlled by regulator molecules that either promote the process or stop it from progressing
- Cancer is a disease that occurs when the cell cycle is no longer regulated. Cancer cells grow rapidly and may form a mass of abnormal cells called a tumor

References:

- https://medlineplus.gov/genetics/understanding/howgeneswork/cellsdivide/
- https://www.genome.gov/genetics-glossary/Cancer
- Vogel and motulsky's human genetics
- https://www.britannica.com/science/cell-cycle
- https://en.m.wikipedia.org/wiki/Cytokine
- Russell, P.J. (2010) iGenetics. 3rd edition.



Thank you