

## Biology Quiz - Cell cycle, Mitosis, Cyclins and Cancer

### Mitosis:

↳ is the division of the nucleus into two genetically identical daughter nuclei. It does this by duplicating every piece of DNA and then splitting. It does to grow and repair old cells.

### Interphase:

- Most active and longest phase

There are many processes occurring in the nucleus and cytoplasm such as: metabolism, endocytosis, exocytosis, using and obtaining nutrients.

### 3 stages: G<sub>1</sub>, S, and G<sub>2</sub>

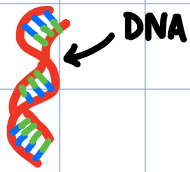
### Cyclins:

- are a family of proteins that control cell cycle timing
- Cells cannot progress unless a specific cyclin reaches a certain concentration
- Cyclins bind to enzymes and activate them CDKs (cyclin-dependent kinases)

### Chromosomes in Mitosis:

- chromosomes condense by supercoiling during mitosis

## Interphase:

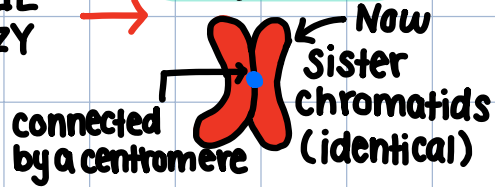


DNA

SUPERCIL  
LIKE CRAZY



## Prophase:



## Mitosis:

1) Interphase (the set up before cell division)

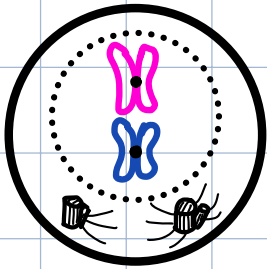
**G<sub>1</sub>:** in cytoplasm cell grows, carries out normal processes, protein synthesis for cell growth and DNA synthesis

**S (Synthesis):** in nucleus DNA duplicates, No chromosomes have formed yet

**G<sub>2</sub>:** in cytoplasm protein synthesize for cell division, mitochondria and chloroplasts are replicated

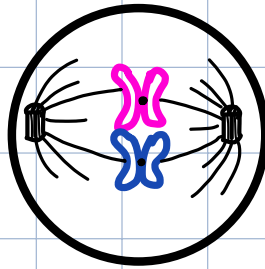
2.) 4 Stages of Mitosis:

### Prophase:



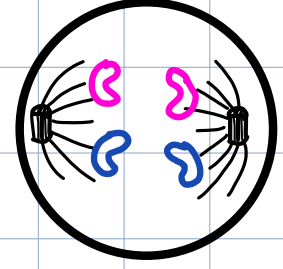
- DNA gets super coiled
- Nucleus + nuclear membrane disappears
- Spindle fibres form
- Centrioles (animal cell) move to opposite poles

### Metaphase:



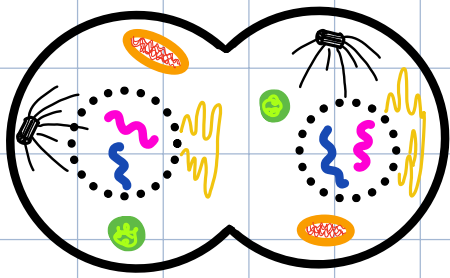
- Spindle fibres bind to centromere
- Sister chromatids align at the equatorial plate

### Anaphase:



- Centromere divides
- Sister chromatids are pulled apart by spindle fibres
- Now called chromosomes

## Telophase:



- Nuclear membrane and nucleolus reform
- Spindle fibres disintegrate

## Miotic index:

$$\text{M.I.} = \frac{\text{\# of cells in mitosis}}{\text{total \# of cells}}$$

## Tumors and cancer:

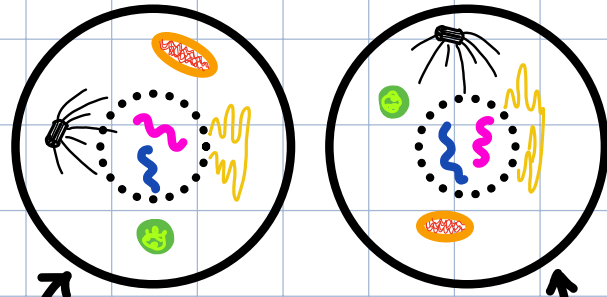
Mutagens: are agents that cause mutations, and therefore may cause cancer. (ex. x-rays, UV radiation and asbestos)

Oncogenes: a mutated gene

Metastasis: movement of cells from a primary tumour to set up a secondary tumour in other parts of the body (spreading tumour)

Difference between primary and secondary tumour: primary is where it starts. Secondary is when the tumour branches off to another part of the body.

## 3) Cytokinesis



Division of the cytoplasm into 2 daughter

Animal cells: microfilaments at equator pulls membrane in.

Cleavage furrow forms (pinching cells apart)

Plant Cells: Golgi apparatus forms vesicles merge to form a cell plate. Cell plate forms a new cell wall.

## Correlation between smoking and incidents of cancers

- Cigarette smoke contains many different chemical substances. Many of these have been shown to cause tumours in experiments. There is a positive correlation between smokers and them getting cancer from the graph (handout). This leaves no doubt that smoking causes cancer.