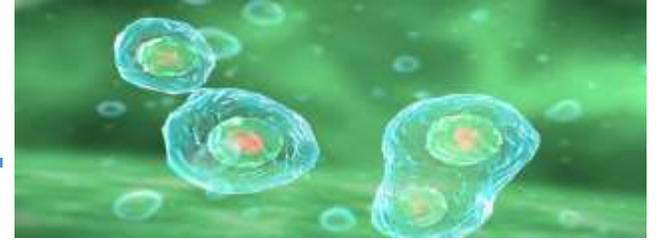


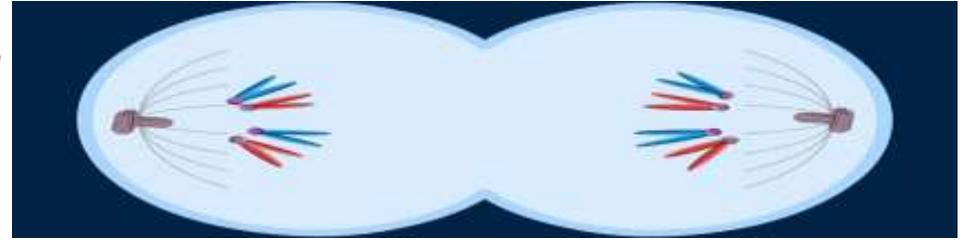
CELL DIVISION by MITOSIS



- For any plant or animal to grow, or for it to fix wounds or replace old cells, each cell in that body needs to be able to divide into two cells.
- To make an identical second cell, it needs to make an identical copy of its own plan, and then divide the cell into two – each half with its own identical plan.
- Each of these halves develops into its own cell.
- This whole process of cell division to produce two cells with exactly the same plan is called **Mitosis**.
- **Terms to Know**: Somatic Cells. Mother Cell. Daughter Cells. Chromatids. Chromosomes. DNA Replication.



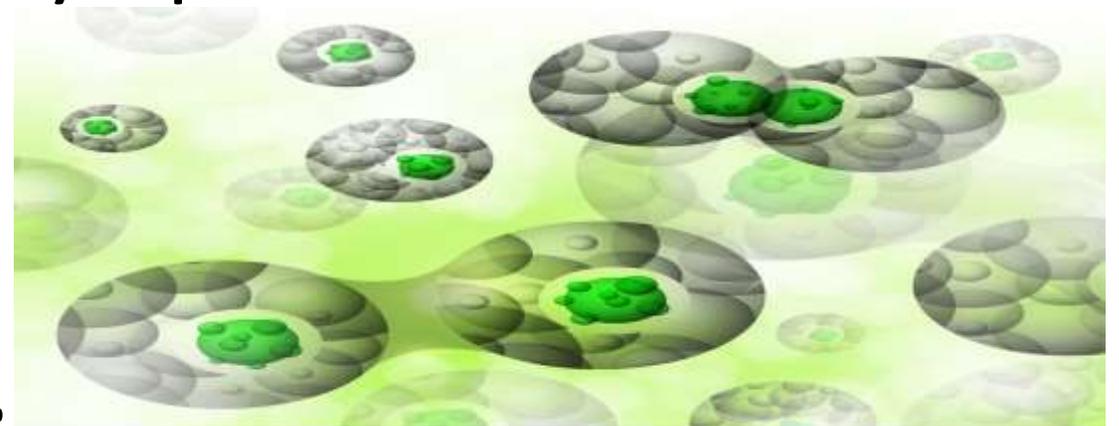
IPMAT



- InterPhase – This is when the cell is doing its normal job. Only when it starts getting ready to divide, it makes an exact copy of its nucleus (which contains its DNA with its full plan). This process at the end of InterPhase is called DNA Replication.
- ProPhase – The DNA unwinds into chromatids. The exact (replicated) copies of these join each other at a centromere to form double chromosomes. Spindle fibres start forming.

- MetaPhase – These double chromosomes all meet at the *equator* of the cell. Spindle fibres from the centrioles at the *poles* now attach to each of these chromatids.
- AnaPhase – The spindle fibres shrink. They thus pull to split the chromatids, which each get pulled to opposite *poles*.
- TeloPhase – Each *pole* now has exact copies of the full plan. They each put a nuclear membrane around it, and a membrane splits the cytoplasm between them (cytoplasmic cleavage).

So one cell has now divided into two fully functional cells.



5 Stages of Mitosis

A) Interphase



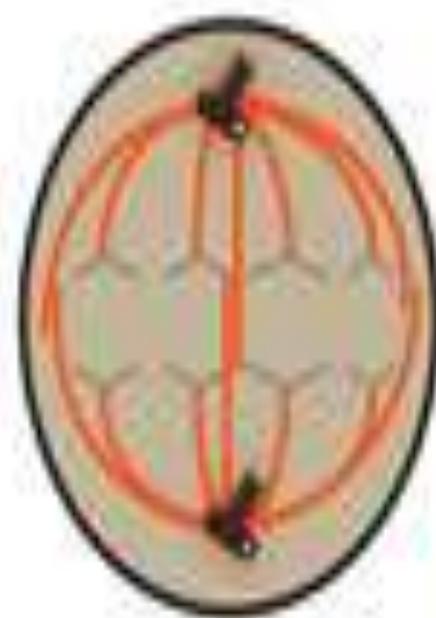
B) Prophase



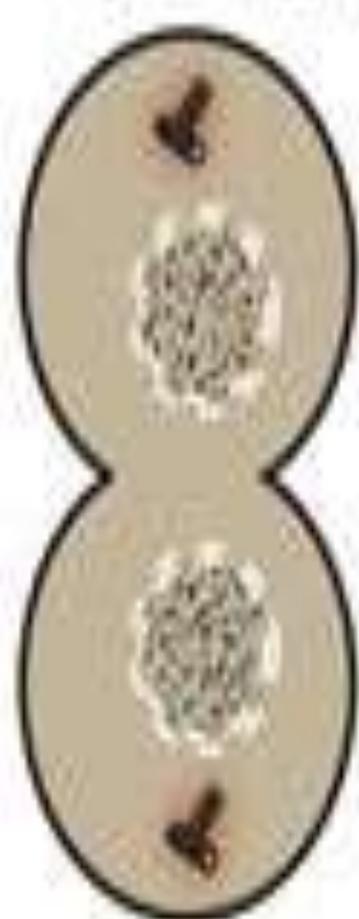
C) Metaphase



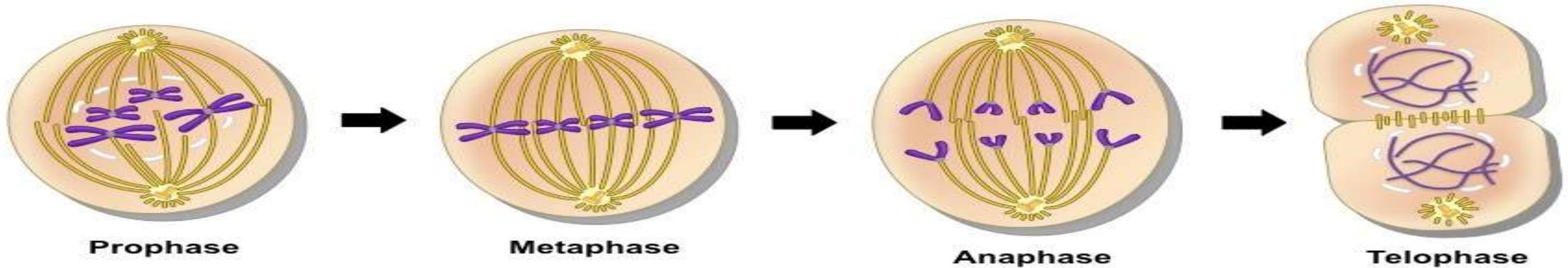
D) Anaphase



E) Telophase
(Cytokinesis)



MITOSIS: A Summary



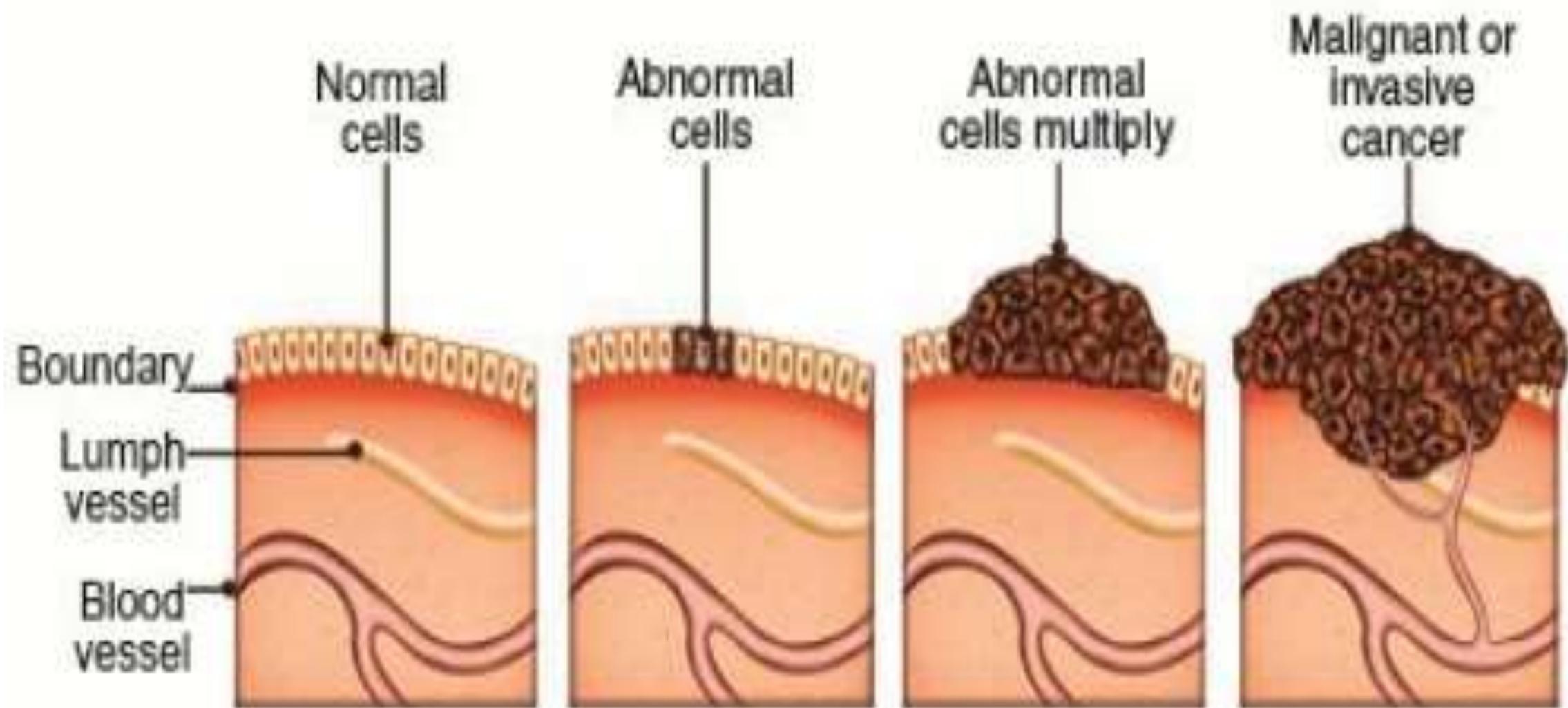
- One cell makes an **identical copy** of its plan.
- It is the **normal form** of cell division, and it happens in **all** the *somatic* (body) cells in your body.
- InterPhase: DNA **replication** – identical copy.
- ProPhase: **Prepares** the cell for division.
- MetaPhase: Chromosomes **meet** at equator.
- AnaPhase: **Separate**, and are pulled to poles.
- TeloPhase: **Two** identical plans are formed.

UNDERSTANDING CANCER



- **Cancer** (named after the biting Latin *Crabs*, because it is so sore) happens when cells in a body start dividing uncontrollably by Mitosis.
- This means that this is all they do: divide. They never stop long enough to do the job they should be doing for the body.
- This section of cells now becomes sore and useless. All it does is keep spreading as a cancerous growth, called a tumour.
- If it is *benign* (kind), it is **not** spreading dangerously.
- If it is *malignant* (bad), its growth **is** spreading to other parts of the body. It often can result in death.

Tumour formation



CAUSES and TREATMENTS

CARCINOGENS

- **Smoking** is central to many many different forms of cancer.
- Drinking **alcohol** excessively.
- Unprotected **radiation** (including suntans).
- **Unhealthy** living.



TREATMENTS

- **ChemoTherapy** – chemicals trying to kill cancer cells, with injected medicines.
- **RadioTherapy** – trying to kill the cancer cells with X-rays.
- **Surgery** – try to cut all the cancer cells out of the patient.

SIDE-EFFECTS of TREATMENTS

Hair loss. Nausea. Tiredness. Loss of appetite. Destruction of other (working) cells. Lower self-esteem and confidence.

D. MITOSIS

Question 1



1. Phase A – Metaphase

Reason -chromosomes arranged at centre of the cell.

Phase B – Telophase

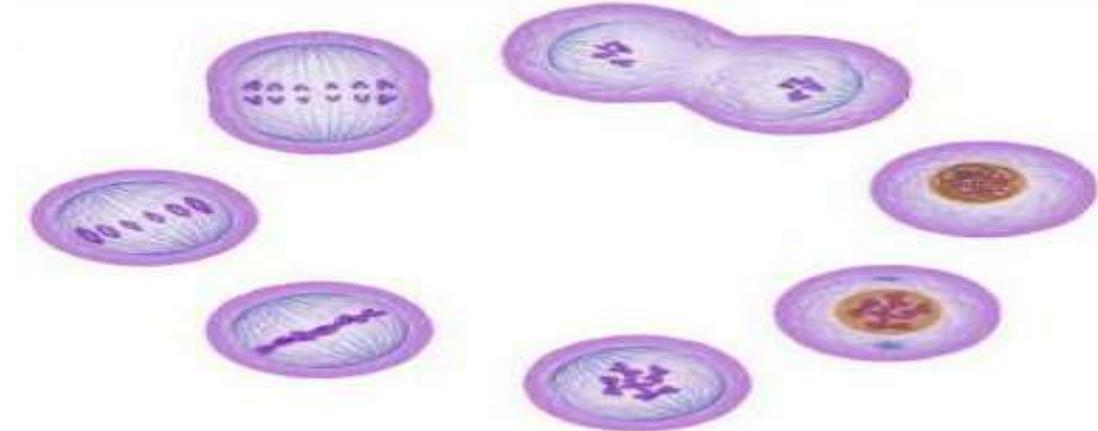
Reason – nuclear membrane and nucleolus has reached the poles. 2 cell are separated by a cell membrane.

Phase 3 – Prophase

Reason – centrioles have reached the poles. Nuclear membrane and nucleolus starts to disappear.

Phase 4 – Anaphase

Reasons – spindle fibres contract and daughter chromosomes are pulled towards the poles.
- centromeres holding the daughter chromosomes have split.



2. C, A, B, D

3. New cells are formed for growth.

Allows unicellular organisms to reproduce asexually.

Replaces and repairs damaged cells

Question 2

1. *Starting from the top:* Spindle fibre, cell plate, cell plate, cytoplasm, chromosomes
2. E, B, A, C, D
3. Plant cell – cell plates are only formed in plant cells.
4. A type of cell division that produces identical cells from the mother cell.
5. Chromosomes
6. a. *Starting from the top left and moving anti-clockwise:*
Daughter chromosome, centriole, centromere, spindle fibre
b. No. This is an animal cell – it has centrioles. Cell plates don't form in animal cells.
c. 2

Question 3

1. Centromere
2. Centrioles
3. Chromosomes
4. Karyokinesis
5. Spindle fibre

