উদ্ভাস

একাডেমিক এন্ড এডমিশন কেয়ার

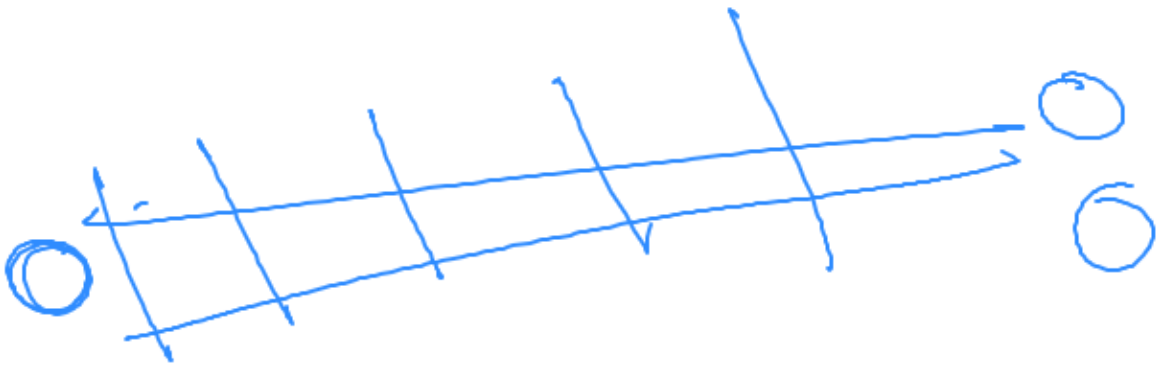
بِسْمِ اللهِ الرَّحْمٰنِ الرَّحِيْمِ

বিস্‌মিল্লাহির রাহ্‌মানির রাহীম

Cell Devision (Lecture B-06)

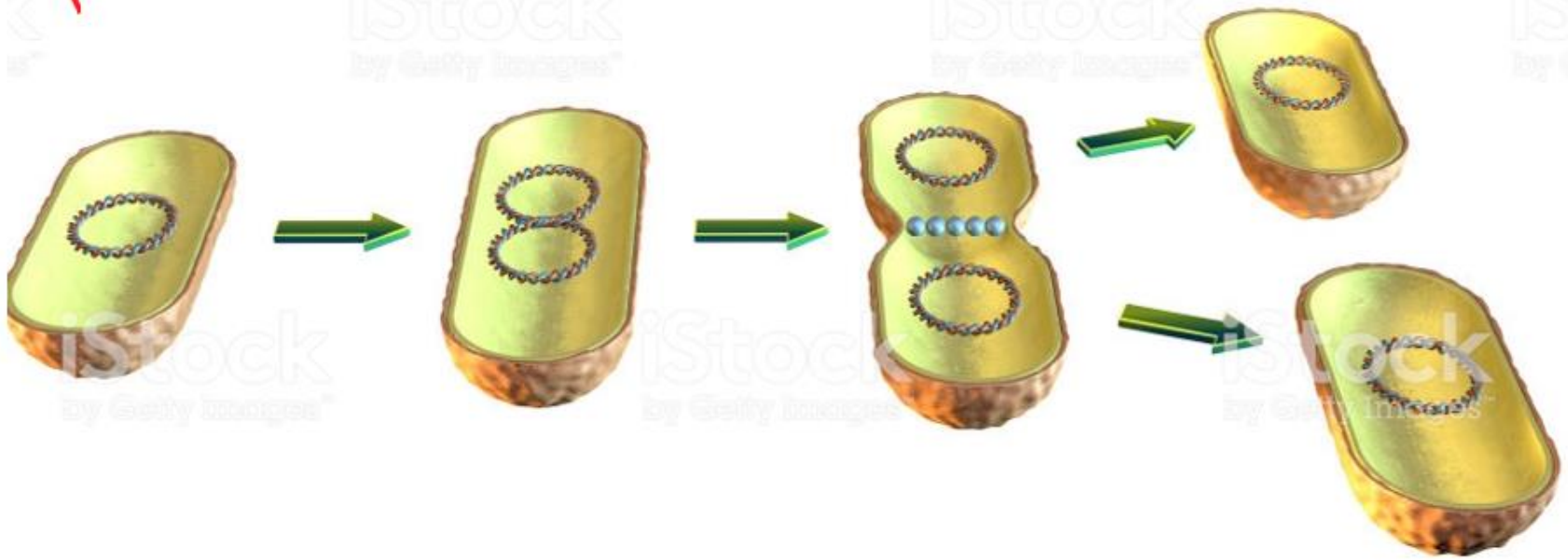
There are 5 continuous steps of Mitosis;

- Prophase
- Pro-Metaphase
- Metaphase
- Anaphase
- Telophase



Cell Division in single celled organism

Amito sis

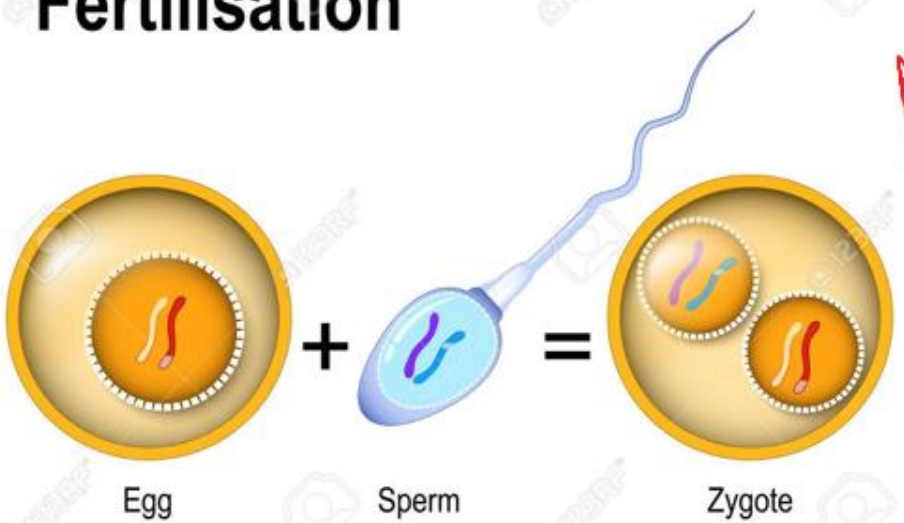


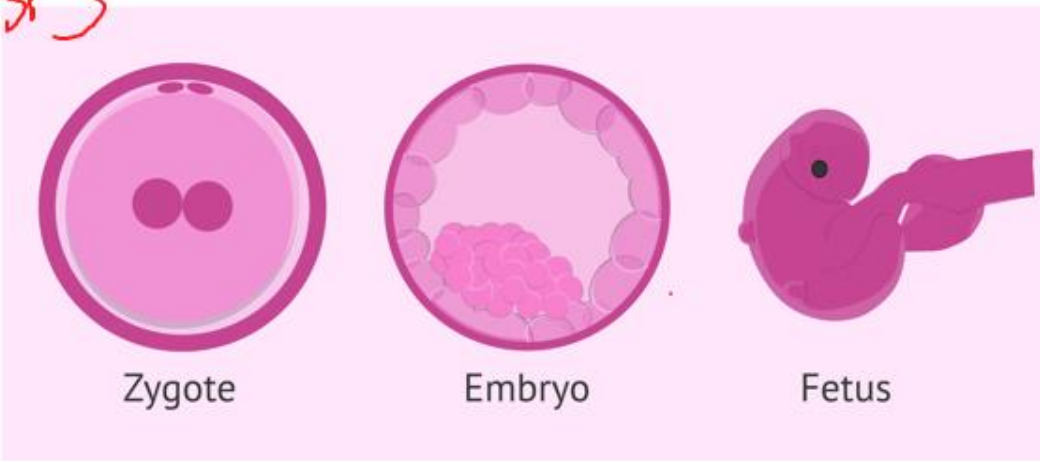
Cell division in Multicellular organism

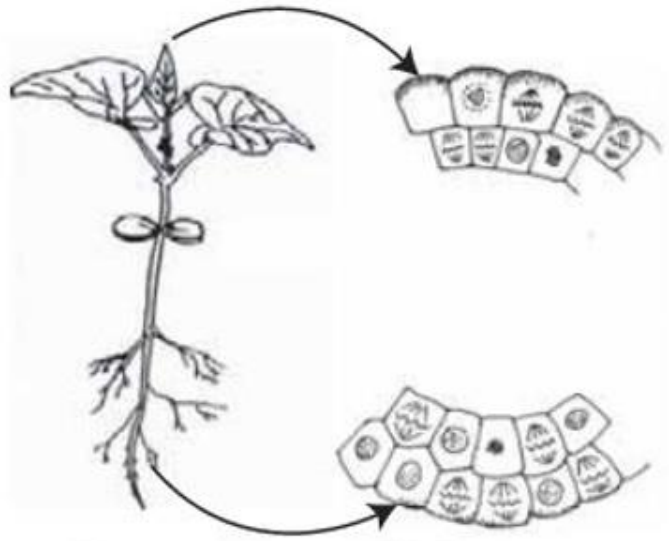
Meiosis

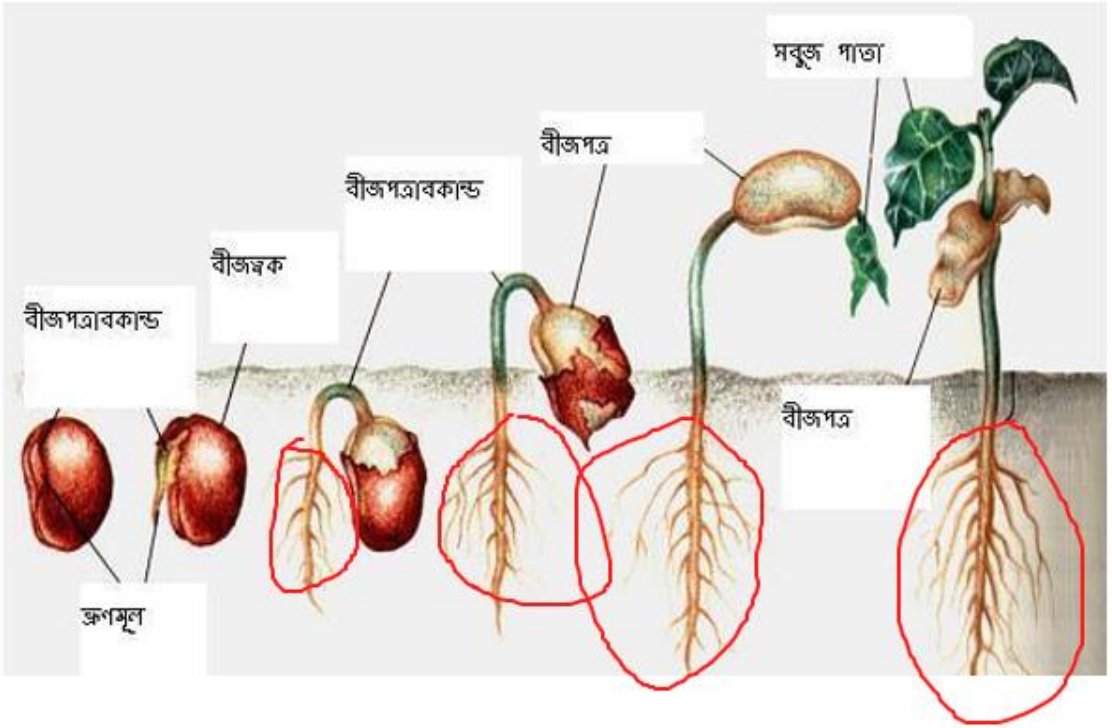
Mitosis

Fertilisation









Meristem of the plant parts growing, such as the tip of the stem and roots, plumule and radicle, Developing leaves, buds etc.

1. Nucleus, Chromosome , Cytoplasm are divided only ones.
2. 2 daughter cells are produced with the same types chromosomes in number. Physical and structural features as their mother cell.
3. It is known as equational division.
4. It usually takes place in the Somatic cell of animals and plants meristem.
5. It helps in growth of plants and animals.

2n → 2n 2n

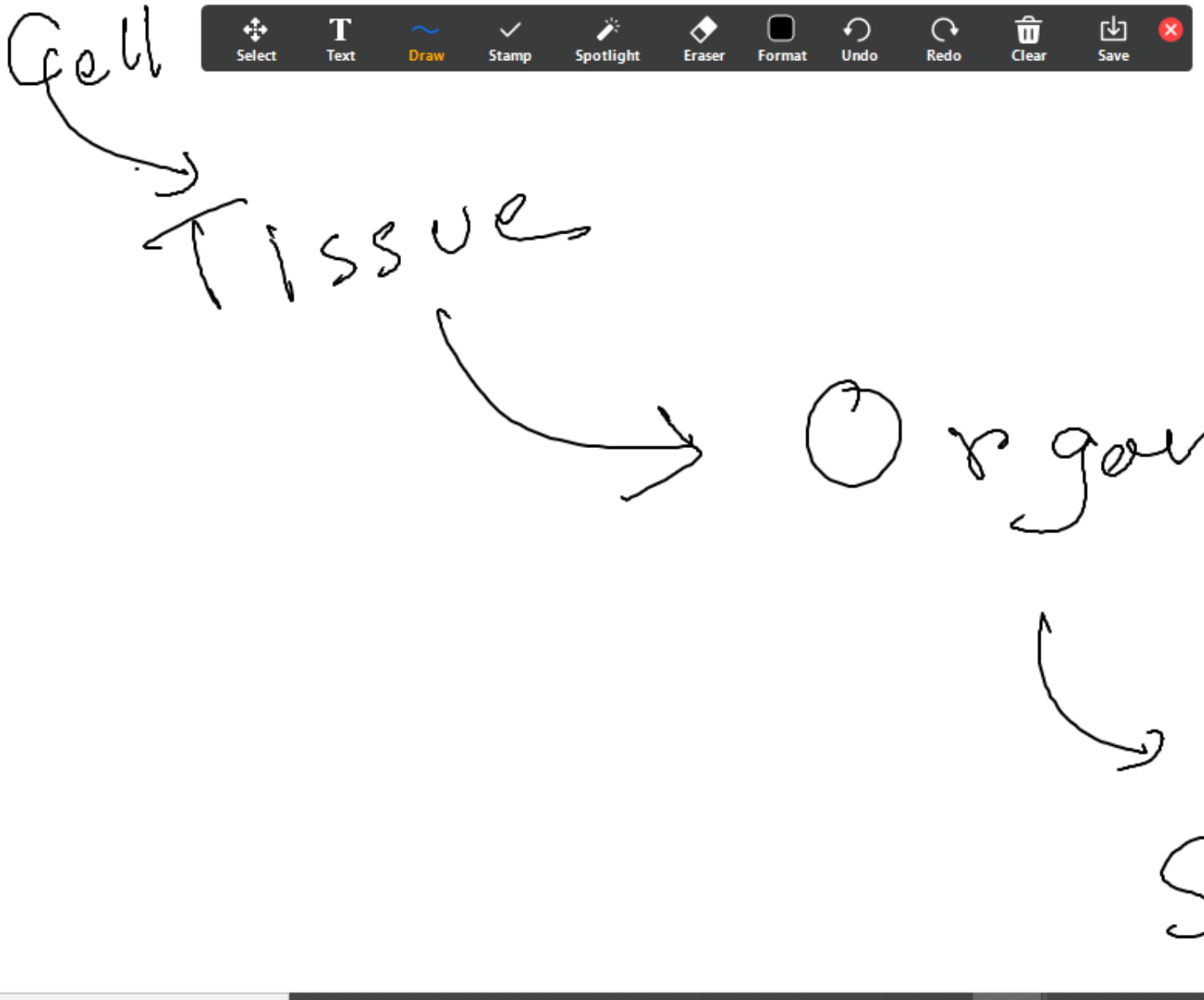
1 = Equal = 1

You are screen sharing Stop Share

5 participants raised hand

Whiteboard - Zoom

Select Text Draw Stamp Spotlight Eraser Format Undo Redo Clear Save



5 participants raised hand

Th

1.

2.

Be

lf,

Activate Windows
Go to Settings to activate Windows.

Type here to search

ENG 5:29 PM 6/24/2020

There are 5 continuous steps of Mitosis;

- Prophase
- Pro-Metaphase
- Metaphase
- Anaphase
- Telophase

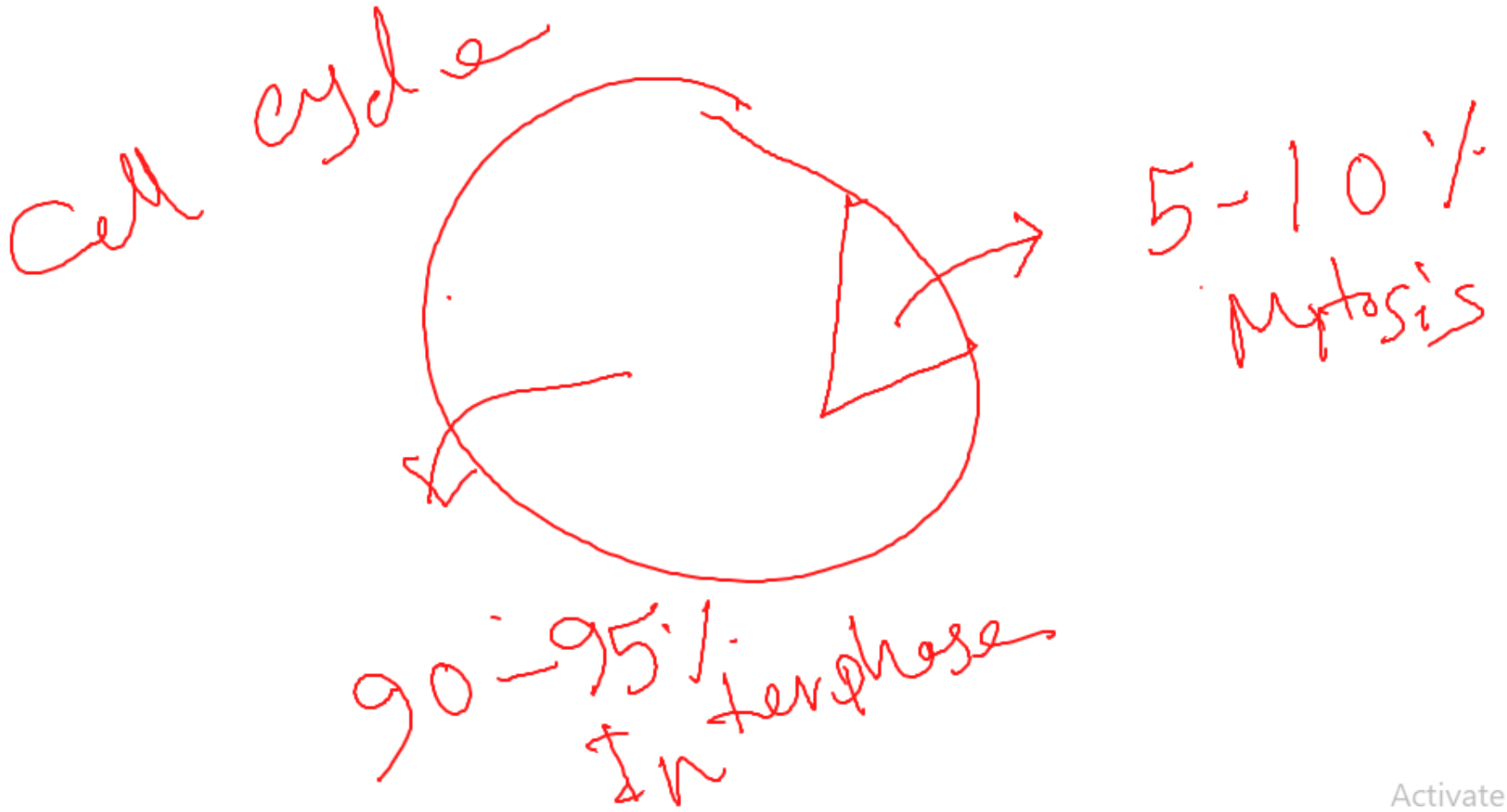
You are screen sharing Stop Share

Whiteboard - Zoom

Select Text Draw Stamp Spotlight Eraser Format Undo Redo Clear Save

Th

- F
- F
- M



Activate Windows
Go to Settings to activate Windows.

Type here to search

ENG 5:32 PM 6/24/2020

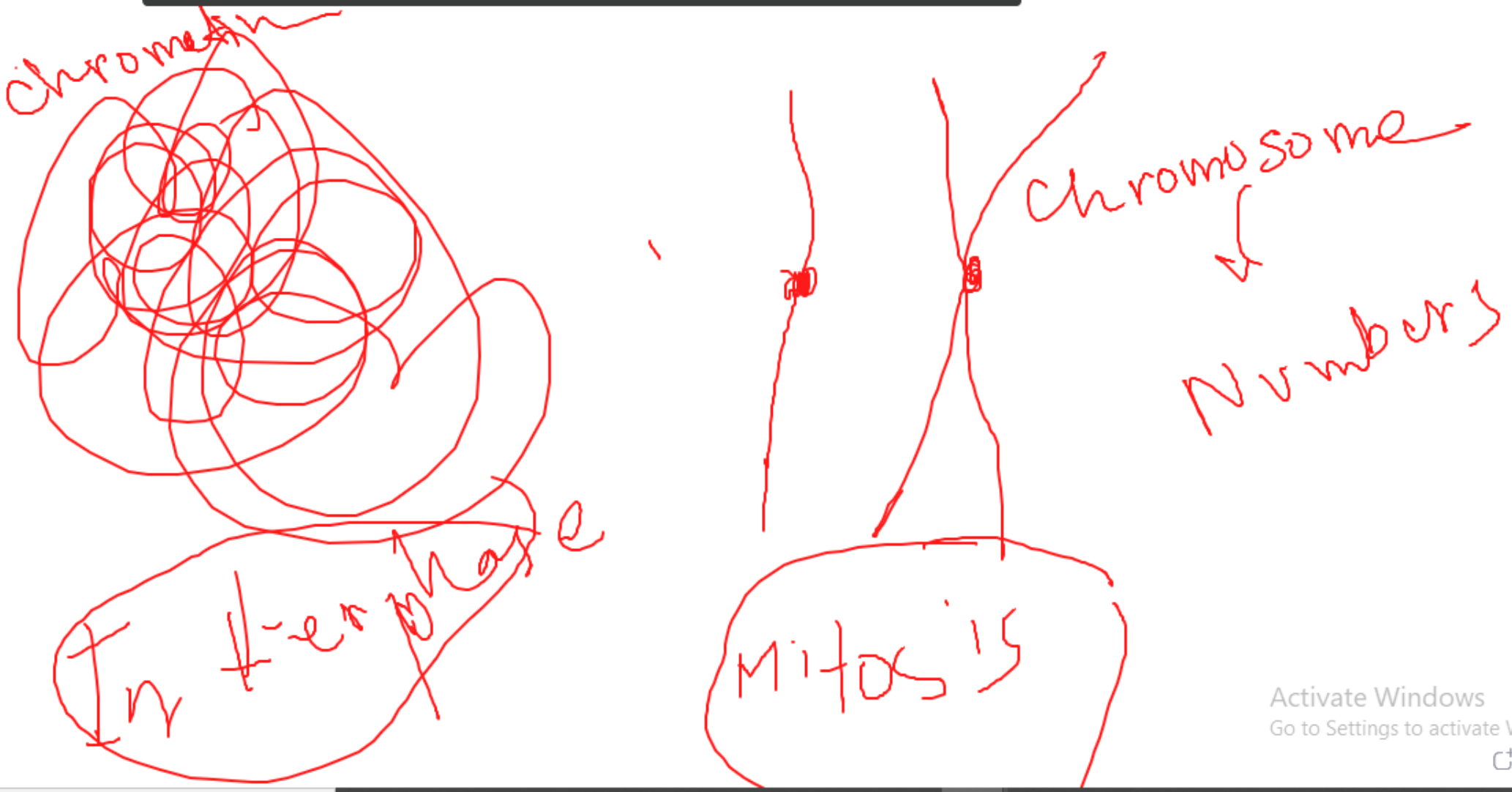
(a) Prophase

1. The nucleus becomes little larger and Chromatin fibers start condensing into short, Thick and tightly coiled structures called chromosomes.
2. Every chromosome then divide into two sister chromatids, at the centromere they remain attached.
3. As the chromosomes are still tangled , it is difficult to easily count the number of chromosomes in a cell.

You are screen sharing Stop Share

Whiteboard - Zoom

Select Text Draw Stamp Spotlight Eraser Format Undo Redo Clear Save



Th
• F
• F
• M

Activate Windows
Go to Settings to activate Windows.

Type here to search

ENG 5:35 PM 6/24/2020

(a) Prophase

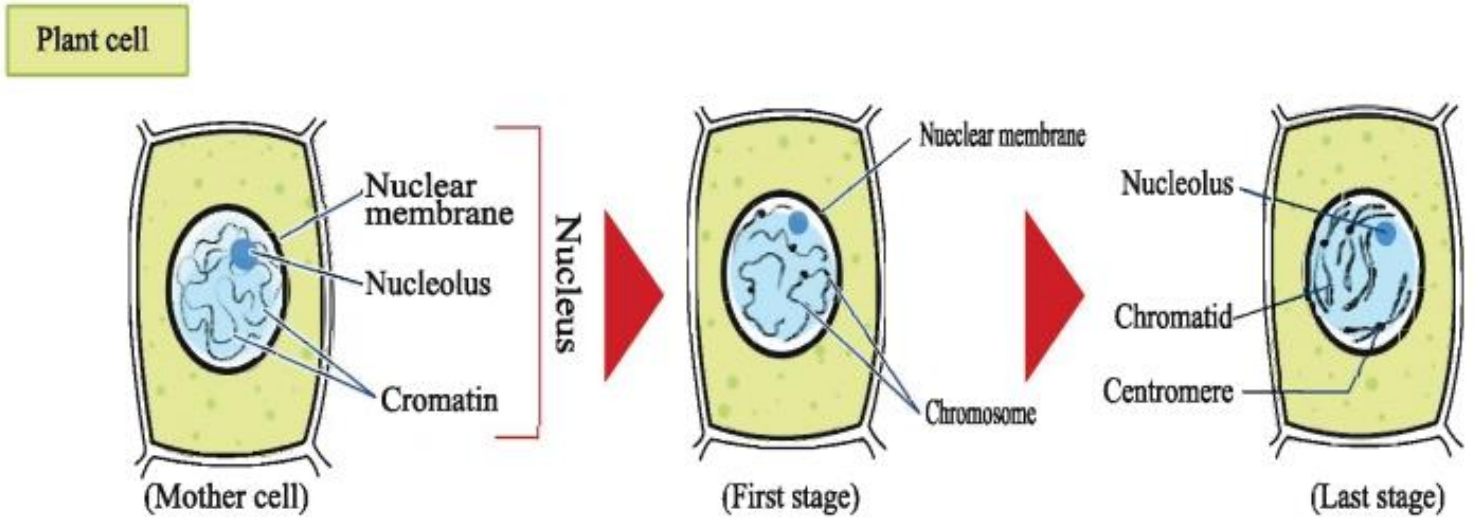
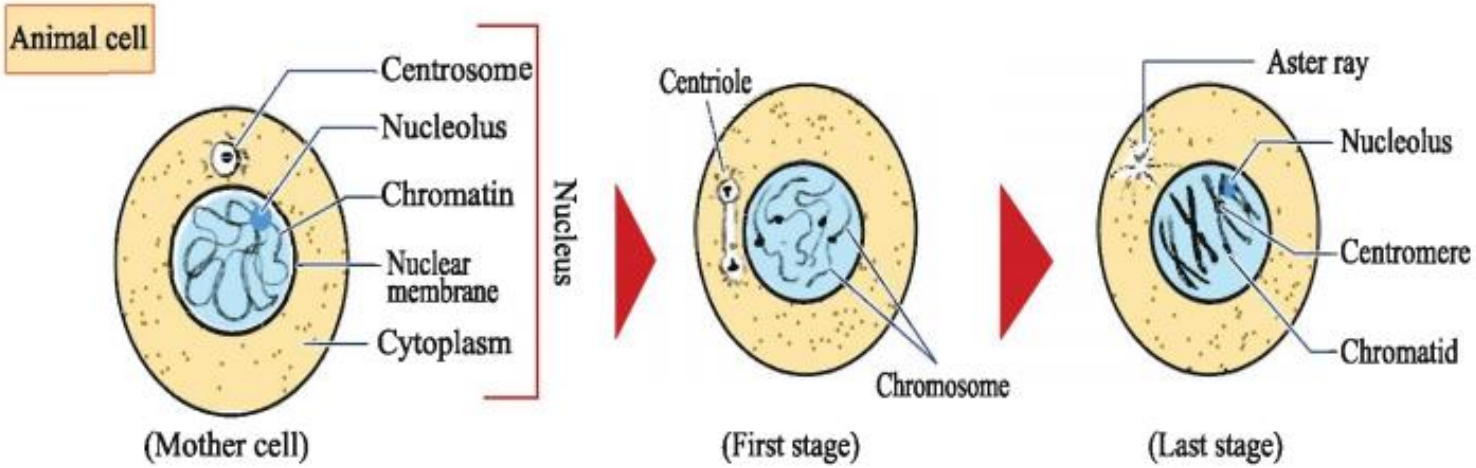


Figure: 3.01 Prophase (Plant cell)



Mute | Start Video | Participants 185 | Q&A 24 | Polls | New Share | Pause Share | Whiteboard | Remote Control | More 18

Whiteboard - Zoom

You are screen sharing | Stop Share

5 participants raised hand

Select | Text | Draw | Stamp | Spotlight | Eraser | Format | Undo | Redo | Clear | Save

A = Chromosome = 1

Chromatid = 1

B = Chromosome = 1

Chromatid = 2

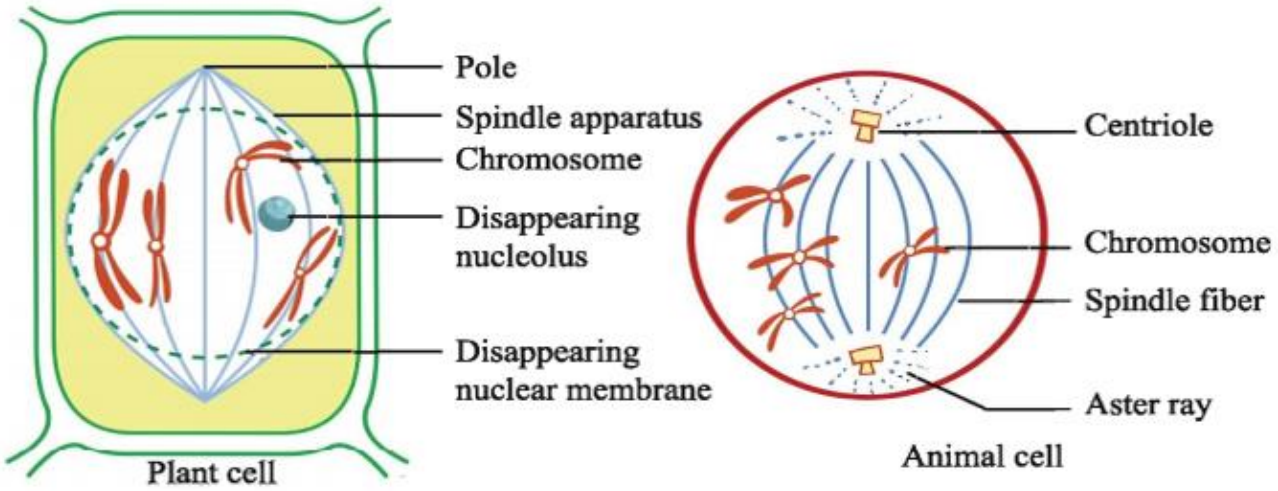
Activate Windows
Go to Settings to activate Windows.

Type here to search

ENG 5:38 PM 6/24/2020

(b) Pro-metaphase

1. At the early stage ,spindle apparatus with two poles is developed in plants.
2. The middle plane of the apparatus is known as equator.
3. Some fibers of the spindle apparatus made of microtubules are stretched from one pole to the other. These are called spindle fibers. They are also called chromosomal fibers or tractional fibers.
4. In animal cells, the spindle apparatus is developed from centroles.



Mute | Start Video | Participants 184 | Q&A 20 | Polls | New Share | Pause Share | Whiteboard | Remote Cont... | ... 18

Whiteboard - Zoom

You are screen sharing | Stop Share

5 participants raised hand

Select | Text | Draw | Stamp | Spotlight | Eraser | Format | Undo | Redo | Clear | Save

5 participants raised hand

Th

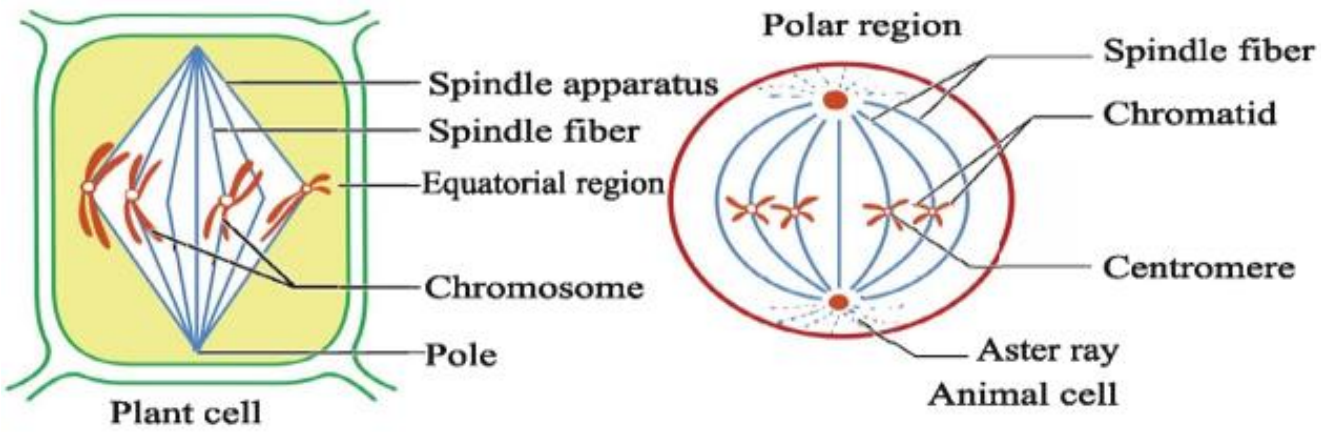
- F
- F
- N

Type here to search

ENG 5:40 PM 6/24/2020

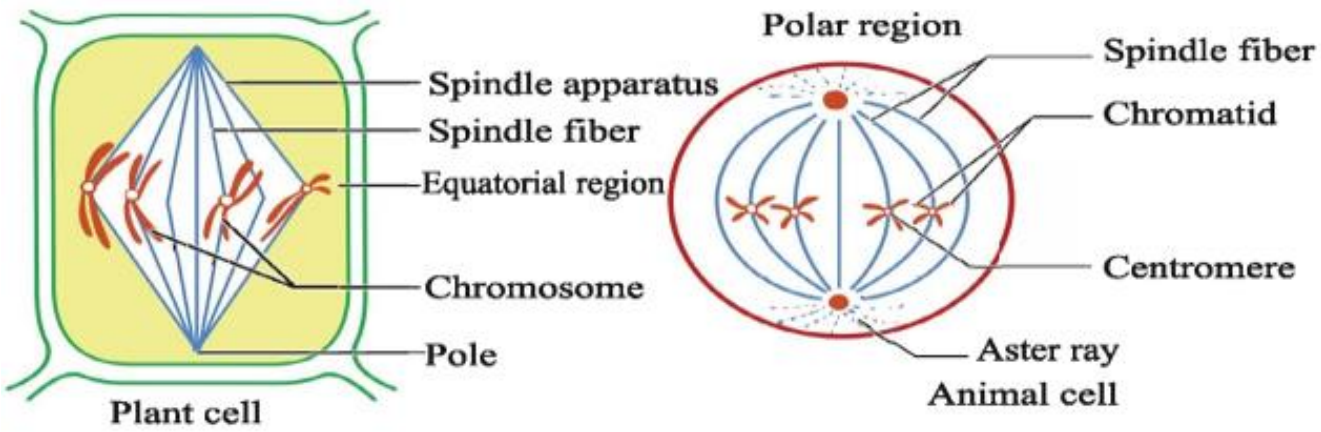
(b) Metaphase

1. The pairs of chromosomes align themselves in such a way that the center of the cell.
2. In this stage the chromosomes look short and thick.
3. The centromere divides and the separated chromatids become independent daughter chromosomes.
4. The nuclear membrane and nucleolus disappear completely.



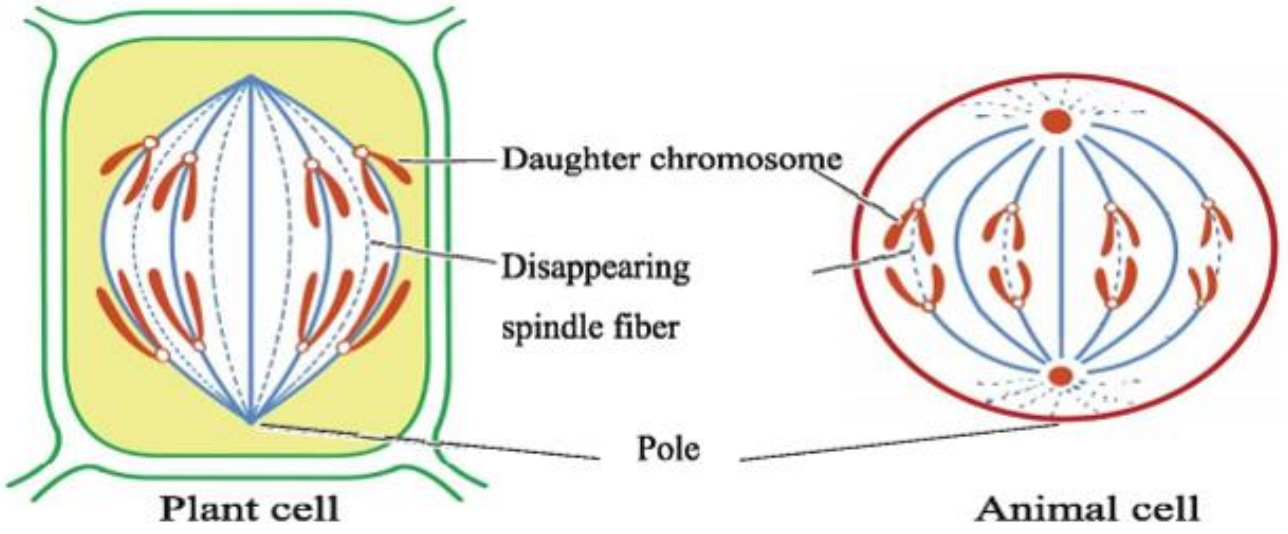
(b) Metaphase

1. The pairs of chromosomes align themselves in such a way that the center of the cell.
2. In this stage the chromosomes look short and thick.
3. The centromere divides and the separated chromatids become independent daughter chromosomes.
4. The nuclear membrane and nucleolus disappear completely.



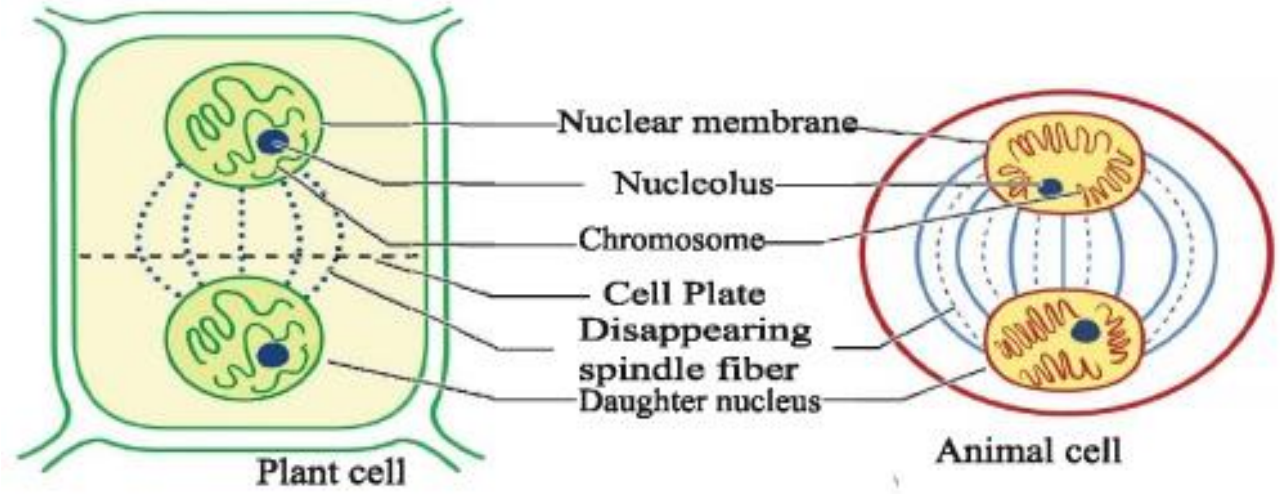
(d) Anaphase

1. Spindle Fibers begin to shorten.
2. This exerts a force on the sister chromatids that pulls them apart.
3. Spindle fibers continue to shorten, pulling chromatids to opposite poles.
4. This ensures that each daughter cell gets identical sets of chromosomes
5. The chromosomes look V,L,J,I shaped and these chromosomes are called metacentric, Submetacentric, acrocentric and telocentric.



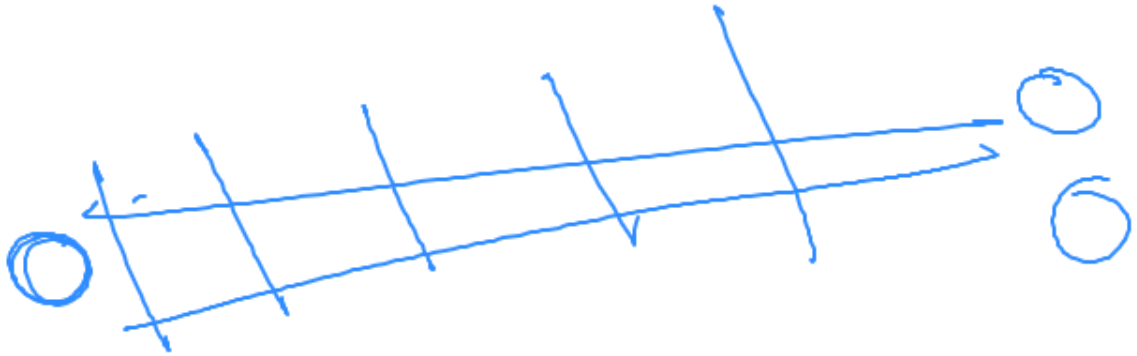
(e) Telophase

1. This is opposite to the prophase.
2. Chromosomes become decondensed and surrounded by new nuclei. The nuclear membrane re appear. So ultimately new neuclei are formed in the two poles.
3. The spindle fibers and apparatus gradually disappear,
4. The cell plate forms at the equator plane.
5. Equal distribution of cytoplasmic organelles is accomplished. As a result two identical daughter cells are developed.



There are 5 continuous steps of Mitosis;

- Prophase
- Pro-Metaphase
- Metaphase
- Anaphase
- Telophase



(a) Prophase

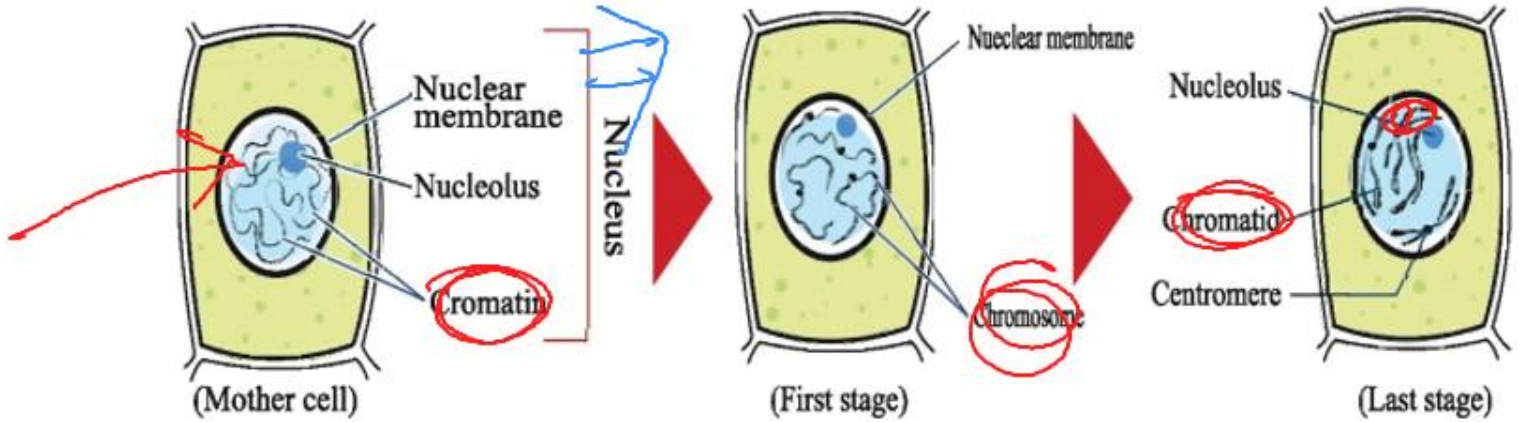
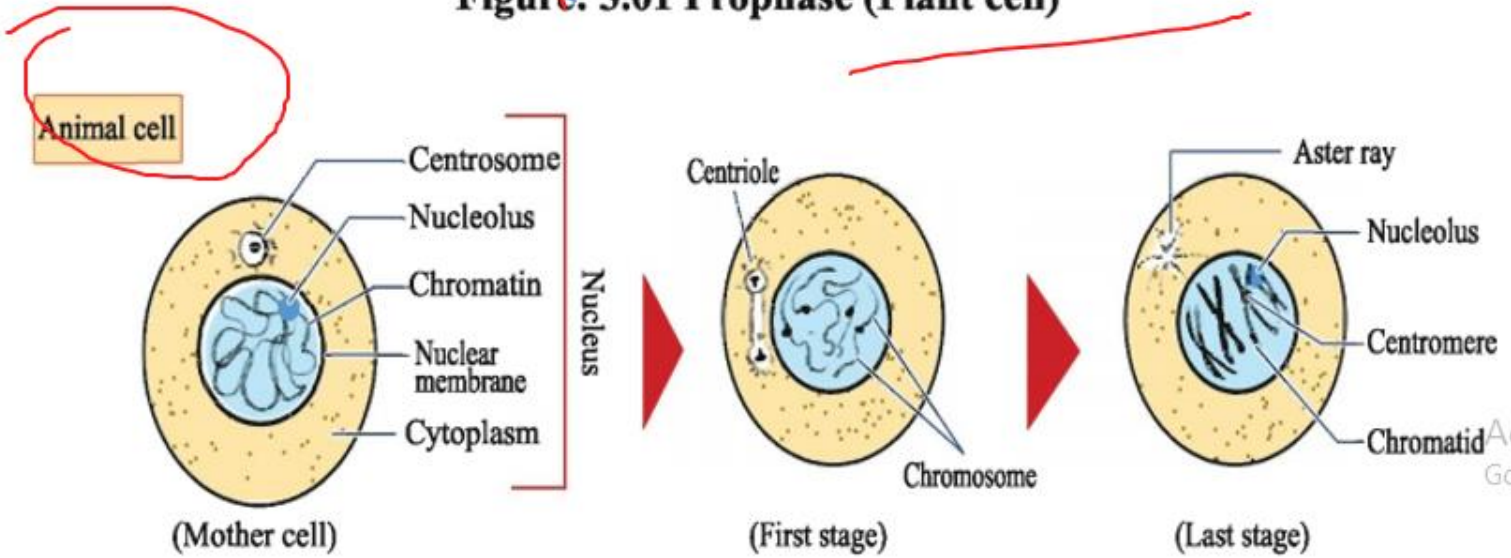


Figure: 3.01 Prophase (Plant cell)

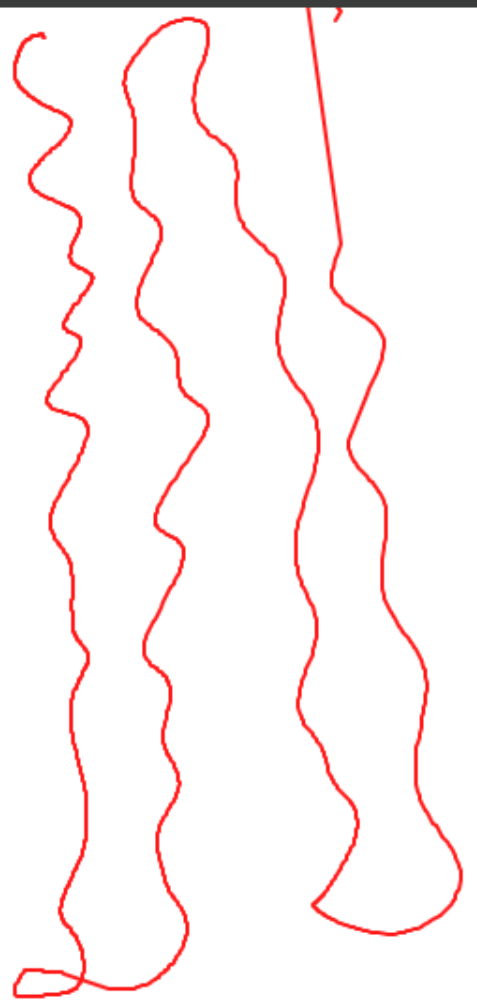


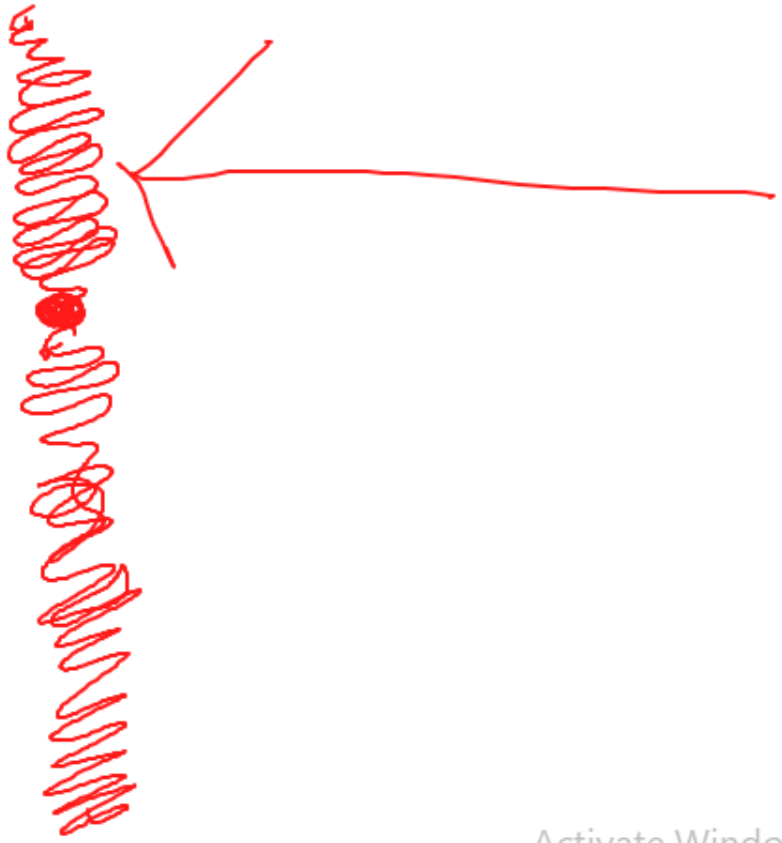
You are screen sharing Stop Share

3 participants raised hand

Whiteboard - Zoom

Select Text Draw Stamp Spotlight Eraser Format Undo Redo Clear Save





1.

2.

3.

t

at

y

Activate Windows
Go to Settings to activate Windows.

Type here to search

ENG 5:49 PM 6/24/2020

(a) Prophase

Whiteboard - Zoom

Select Text Draw Stamp Spotlight Eraser Format Undo Redo Clear Save

1.

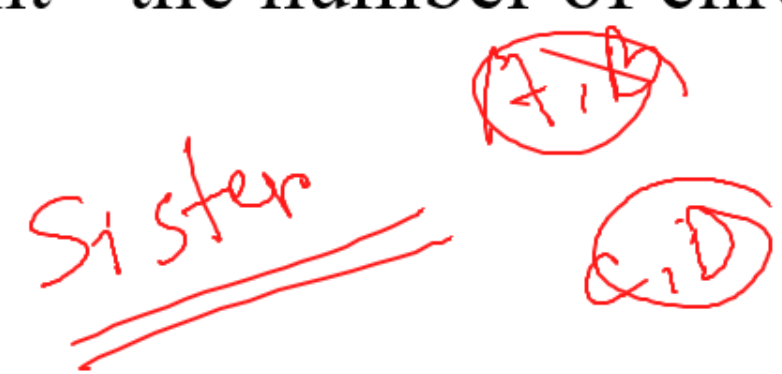
2.

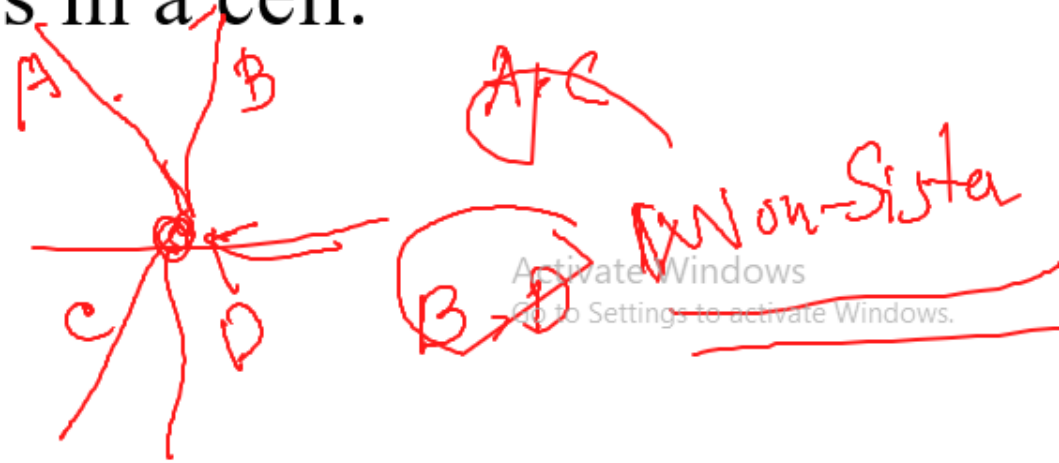
3.

Chromatin ← Coiling → Chromosome

1. Shorter
2. Thicker

1. The nucleus becomes little larger and Chromatin fibers start condensing into short, Thick and tightly coiled structures called chromosomes.
2. Every chromosome then divide into two sister chromatids, at the centromere they remain attached.
3. As the chromosomes are still tangled , it is difficult to easily count the number of chromosomes in a cell.





Mute | Start Video | Participants 179 | Q&A 35 | Polls | New Share | Pause Share | Whiteboard | Remote Control | More 4

Whiteboard - Zoom

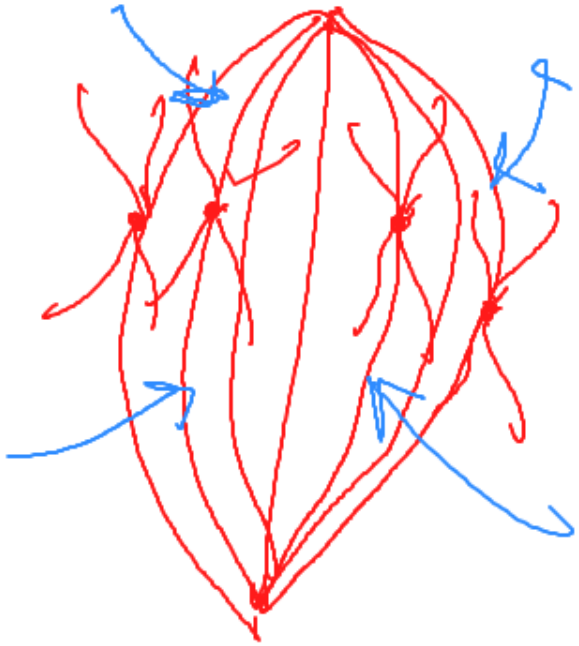
You are screen sharing | Stop Share

Select | Text | Draw | Stamp | Spotlight | Eraser | Format | Undo | Redo | Clear | Save

1.

2.

3.



• → Chromosd

fiber

4.

riole

omosome

dle fiber

r ray

Type here to search

ENG 6:01 PM 6/24/2020

Mute | Start Video | Participants 175 | Q&A 32 | Polls | New Share | Pause Share | Whiteboard | Remote Control | ... 4

Whiteboard - Zoom

You are screen sharing | Stop Share

5 participants raised hand

5 participants raised hand

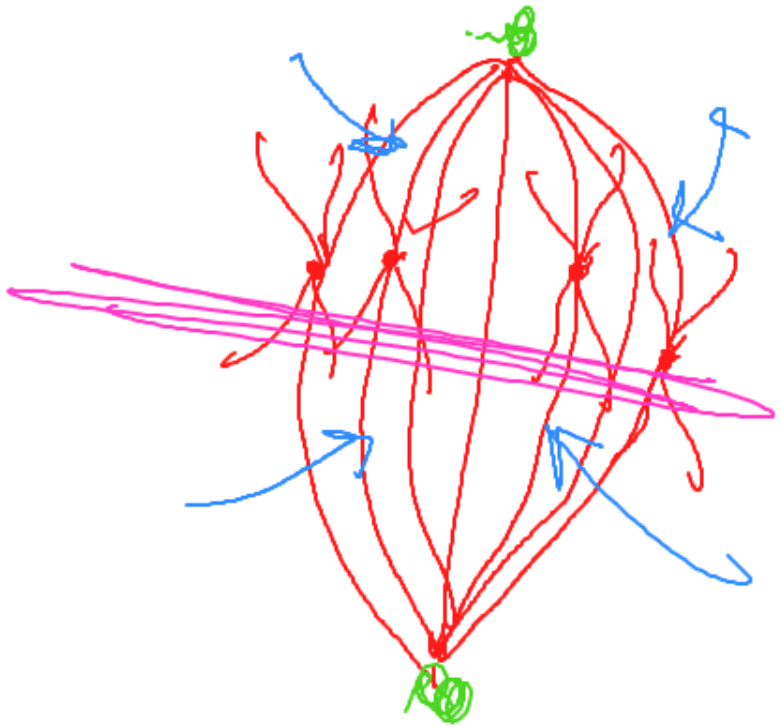
Select | Text | Draw | Stamp | Spotlight | Eraser | Format | Undo | Redo | Clear | Save

1.

2.

3.

4.



→ Pole

→ Chromosome

Fiber

→ Equator

riole

mosome

dle fiber

r ray

Activate Windows
Go to Settings to activate Windows.

Talk to Cortana

Type here to search

ENG 6:02 PM 6/24/2020

Mute | Start Video | Participants 175 | Q&A 32 | Polls | New Share | Pause Share | Whiteboard | Remote Control | More 4

Whiteboard - Zoom

You are screen sharing | Stop Share

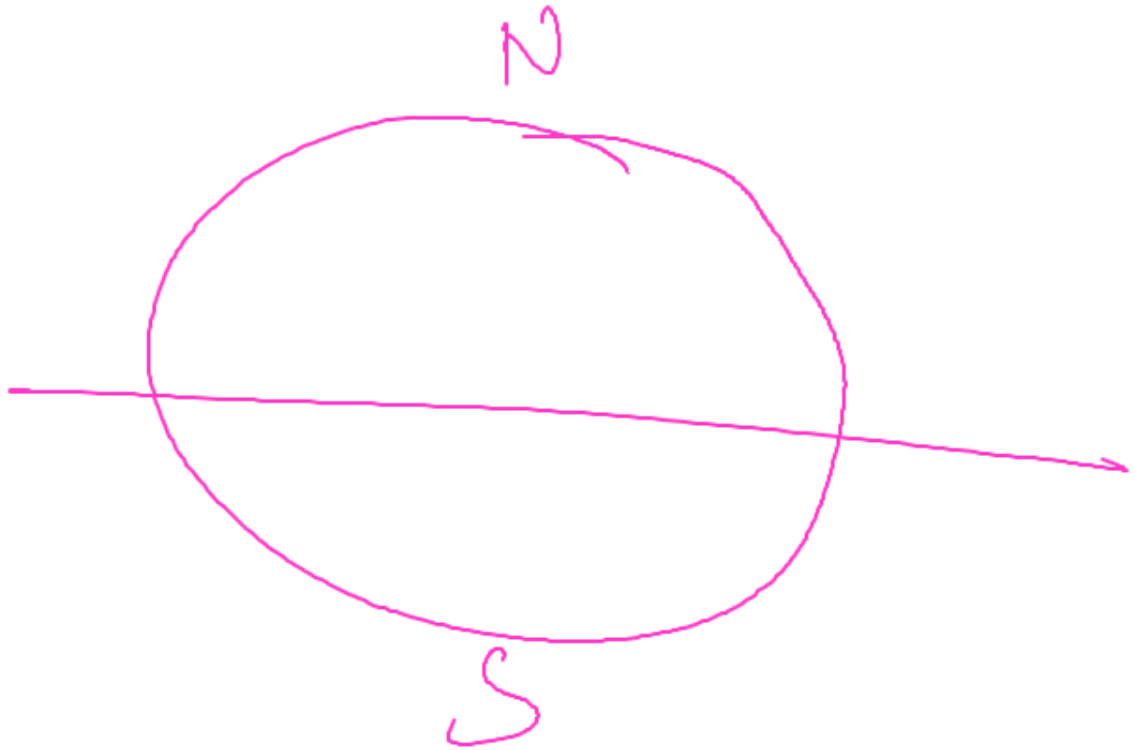
4 participants raised hand

Select | Text | Draw | Stamp | Spotlight | Eraser | Format | Undo | Redo | Clear | Save

1.

2.

3.



4.

riole

omosome

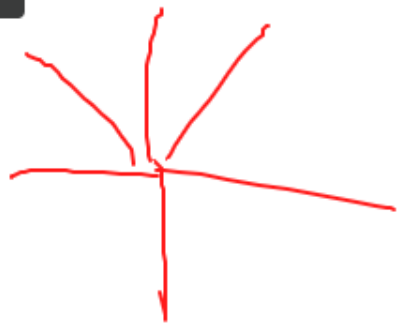
dle fiber

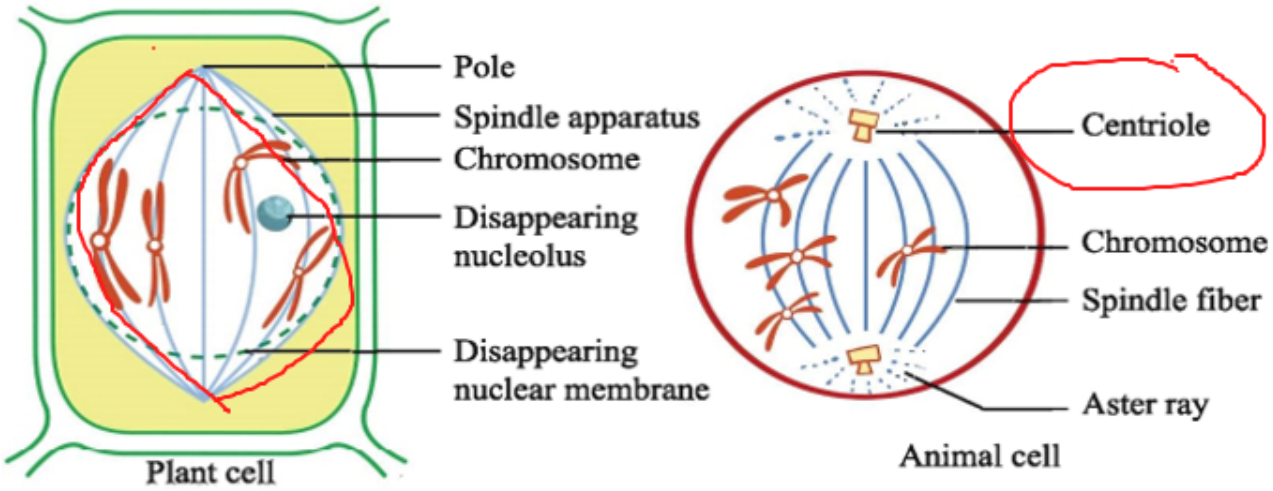
r ray

Type here to search

ENG 6:02 PM 6/24/2020

1. At the early stage ,spindle apparatus with two poles is developed in plants.
2. The middle plane of the apparatus is known as equator.
3. Some fibers of the spindle apparatus made of microtubules are stretched from one pole to the other. These are called spindle fibers. They are also called chromosomal fibers or tractional fibers.
4. In animal cells, the spindle apparatus is developed from centroles.





Mute | Start Video | Participants 172 | Q&A 34 | Polls | New Share | Pause Share | Whiteboard | Remote Control | More 6

Whiteboard - Zoom

You are screen sharing | Stop Share

7 participants raised hand

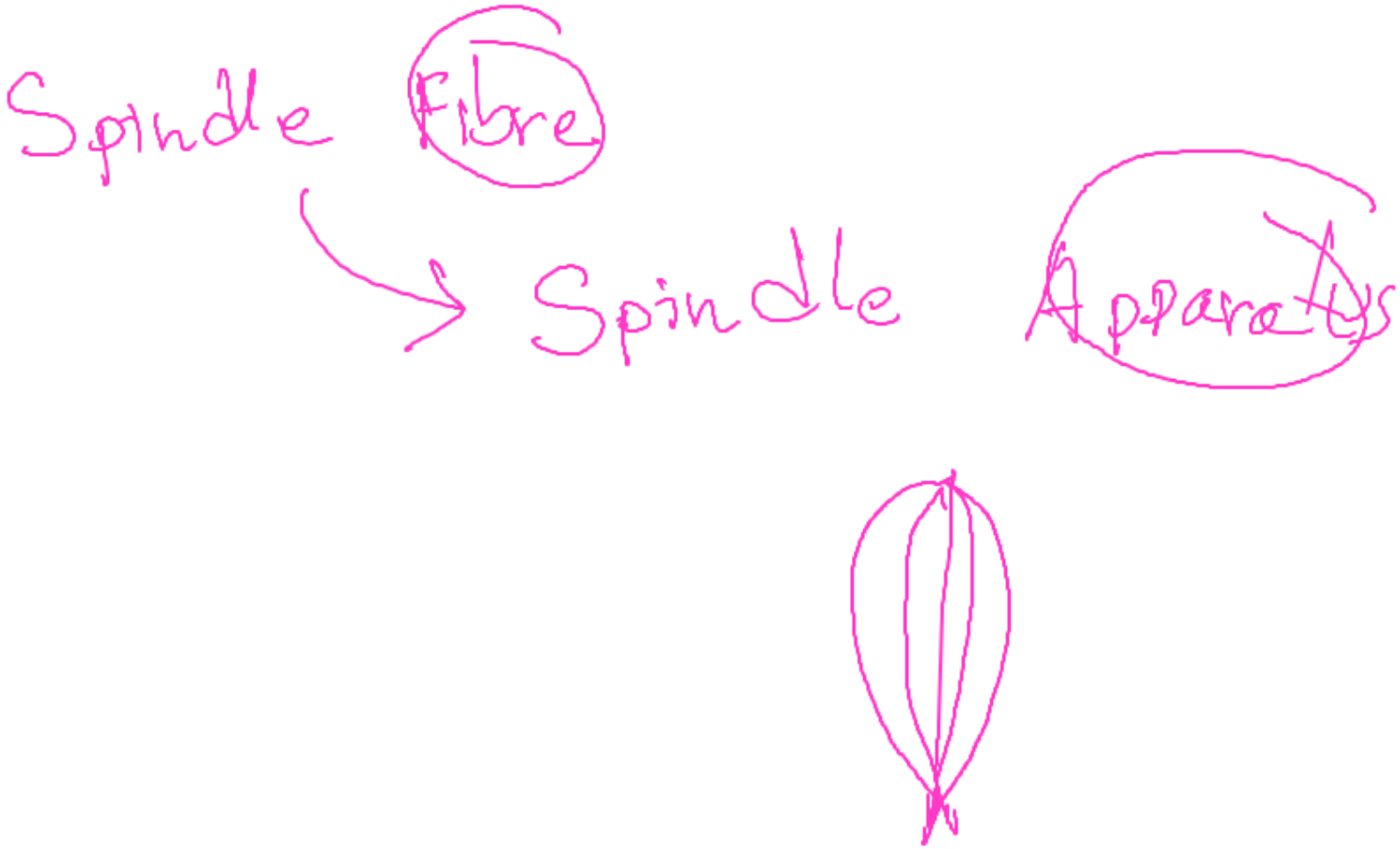
Select | Text | Draw | Stamp | Spotlight | Eraser | Format | Undo | Redo | Clear | Save

1.

2.

3.

4.



riole

omosome

dle fiber

r ray

Activate Windows
Go to Settings to activate Windows.

Type here to search

ENG 6:08 PM 6/24/2020

(b) Pro-metaphase

Whiteboard - Zoom

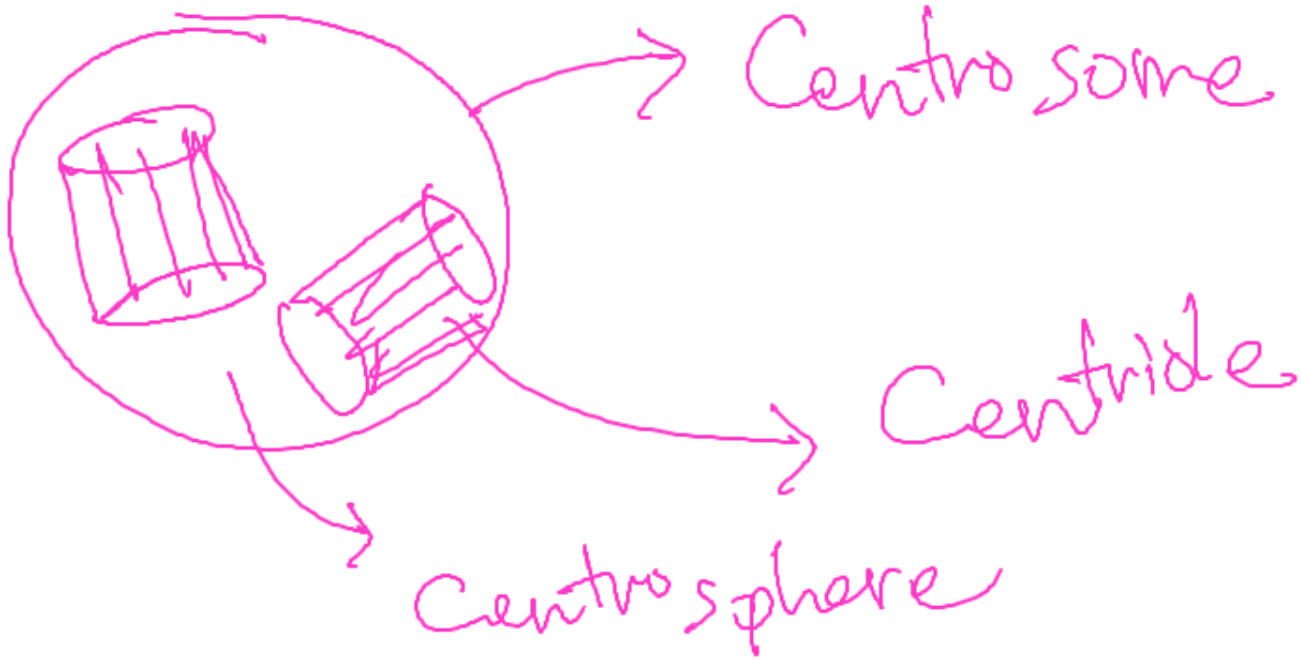
Select Text Draw Stamp Spotlight Eraser Format Undo Redo Clear Save

1.

2.

3.

4.



Centriole + Centrosphere = Centrosome

riole

omosome

dle fiber

r ray

(b) Pro-metaphase

Whiteboard - Zoom

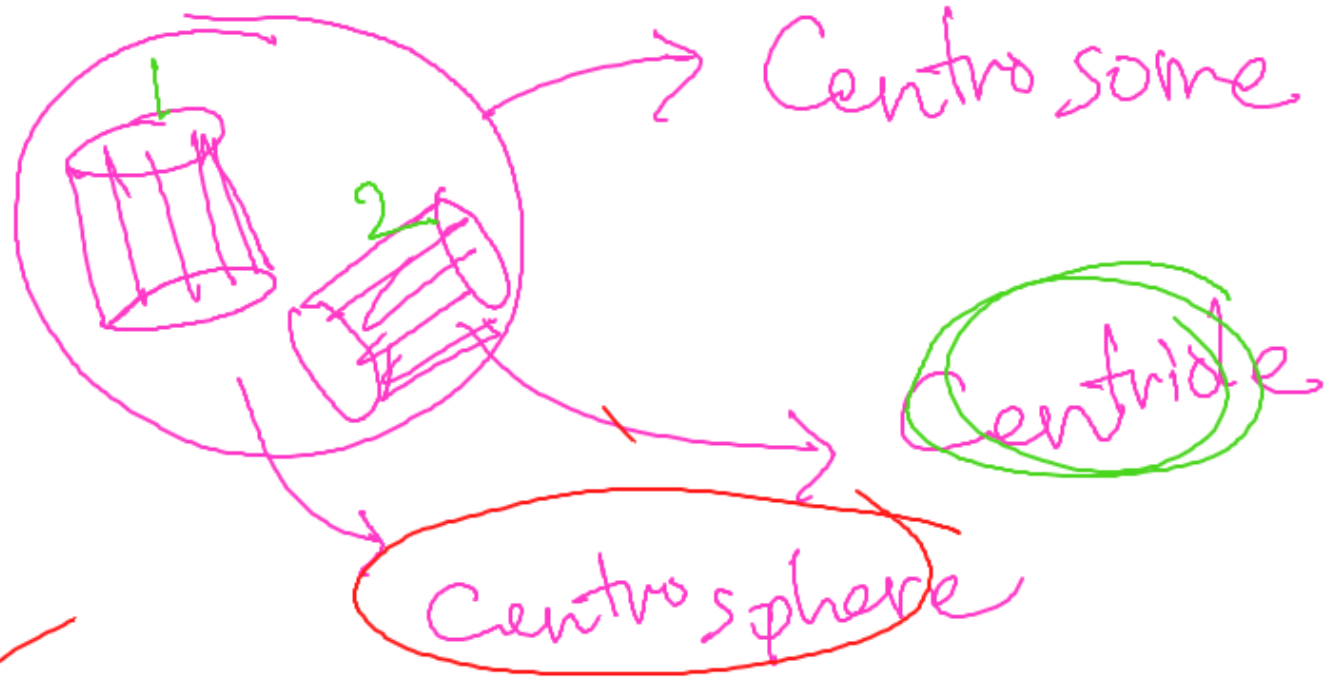
Select | Text | Draw | Stamp | Spotlight | Eraser | Format | Undo | Redo | Clear | Save

1.

2.

3.

4.



Centriole + Centrosphere = Centrosome

riole

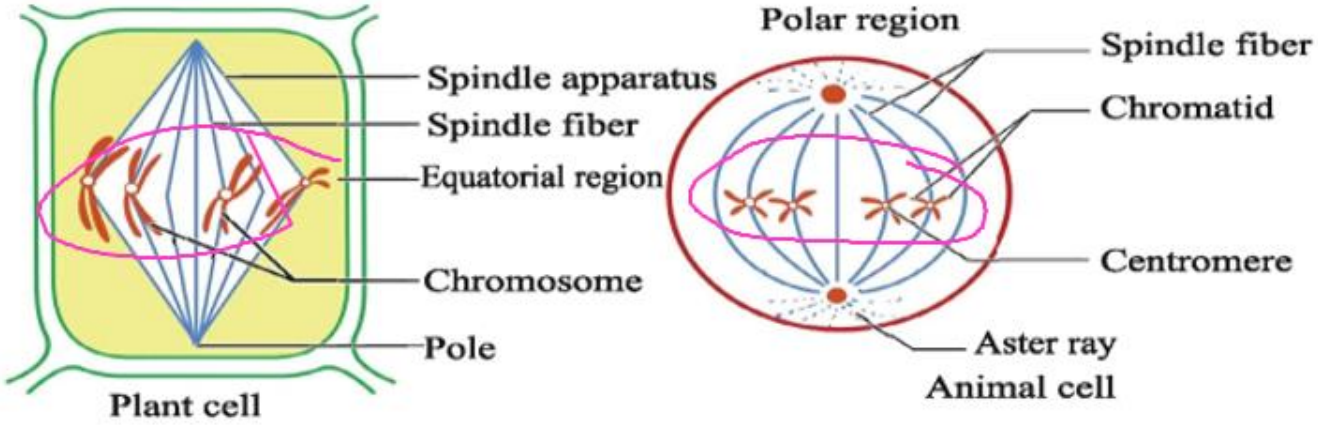
mosome

dle fiber

r ray

1. The pairs of chromosomes align themselves in such a way that the center of the cell.
2. In this stage the chromosomes look short and thick.
3. The centromere divides and the separated chromatids become independent daughter chromosomes.
4. The nuclear membrane and nucleolus disappear completely.

Meta = Middle



Mute | Start Video | Participants 158 | Q&A | Polls | New Share | Pause Share | Whiteboard | Remote Control | More 14

Whiteboard - Zoom

You are screen sharing | Stop Share

Select | Text | Draw | Stamp | Spotlight | Eraser | Format | Undo | Redo | Clear | Save

1.

2. Begin to become shorter & thicker

⇒ Prophase

3.

4. Becomes shortest & thickest

⇒ Metaphase

dle fiber

omatid

romere

Type here to search

ENG 6:20 PM 6/24/2020

Poll Question 01

Which one is the preparation stage before cell division?

(a) Prophase (b) Interphase (c) Metaphase (d) Telophase

(b) Metaphase

Whiteboard - Zoom

Select Text Draw Stamp Spotlight Eraser Format Undo Redo Clear Save

1.

2. Begin to become shorter & thicker

⇒ Prophase

3.

Becomes shortest & thickest

4.

⇒ Metaphase

dle fiber
omatid
romere

Mute | Start Video | Participants 156 | Q&A 29 | Polls | New Share | Pause Share | Whiteboard | Remote Control | More 16

Whiteboard - Zoom

You are screen sharing | Stop Share

4 participants raised hand

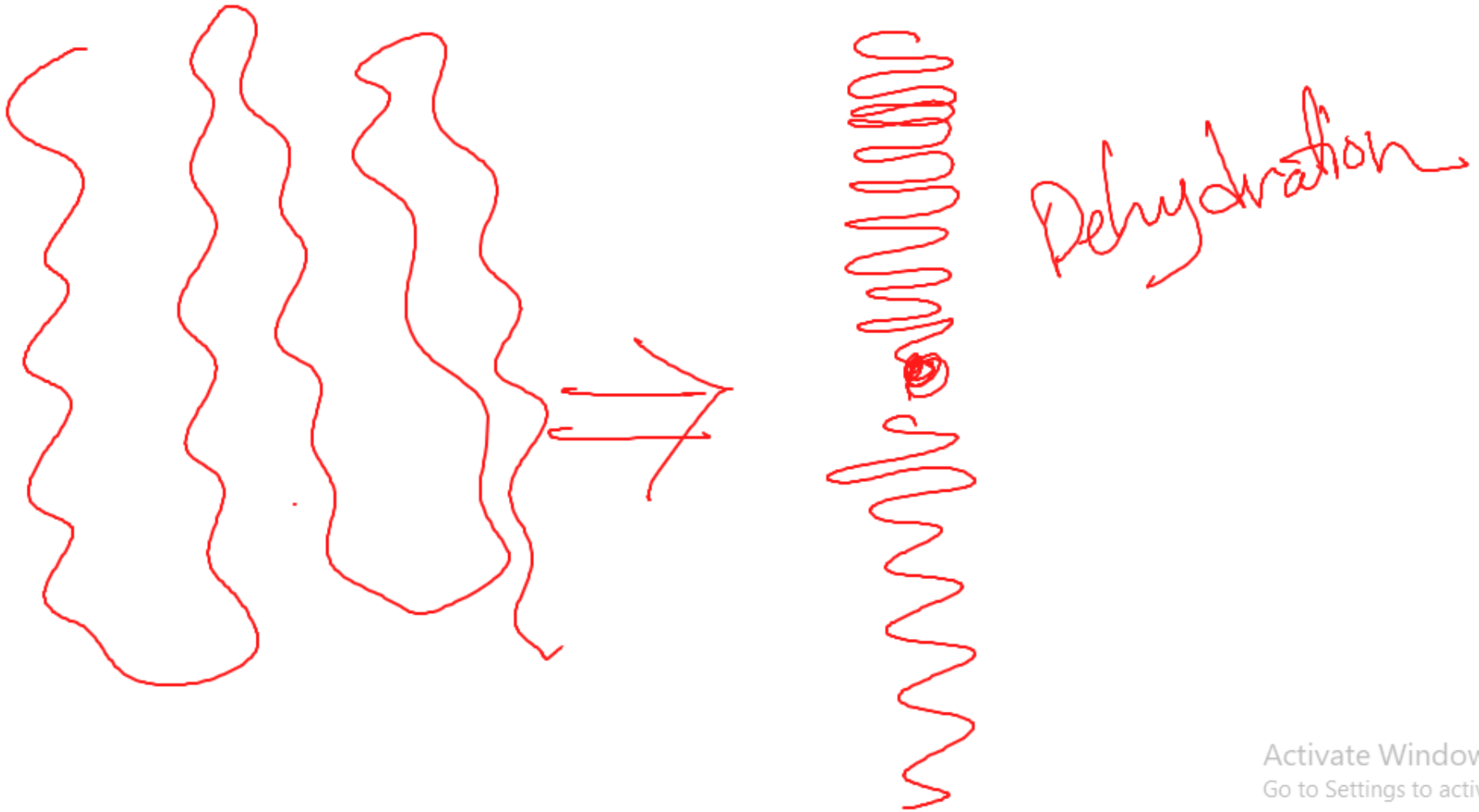
Select | Text | Draw | Stamp | Spotlight | Eraser | Format | Undo | Redo | Clear | Save

1.

2.

3.

4.



dle fiber

omatid

romere

Activate Windows
Go to Settings to activate Windows.

Type here to search

ENG 6:21 PM 6/24/2020

Mute | Start Video | Participants 157 | Q&A 27 | Polls | New Share | Pause Share | Whiteboard | Remote Control | More 17

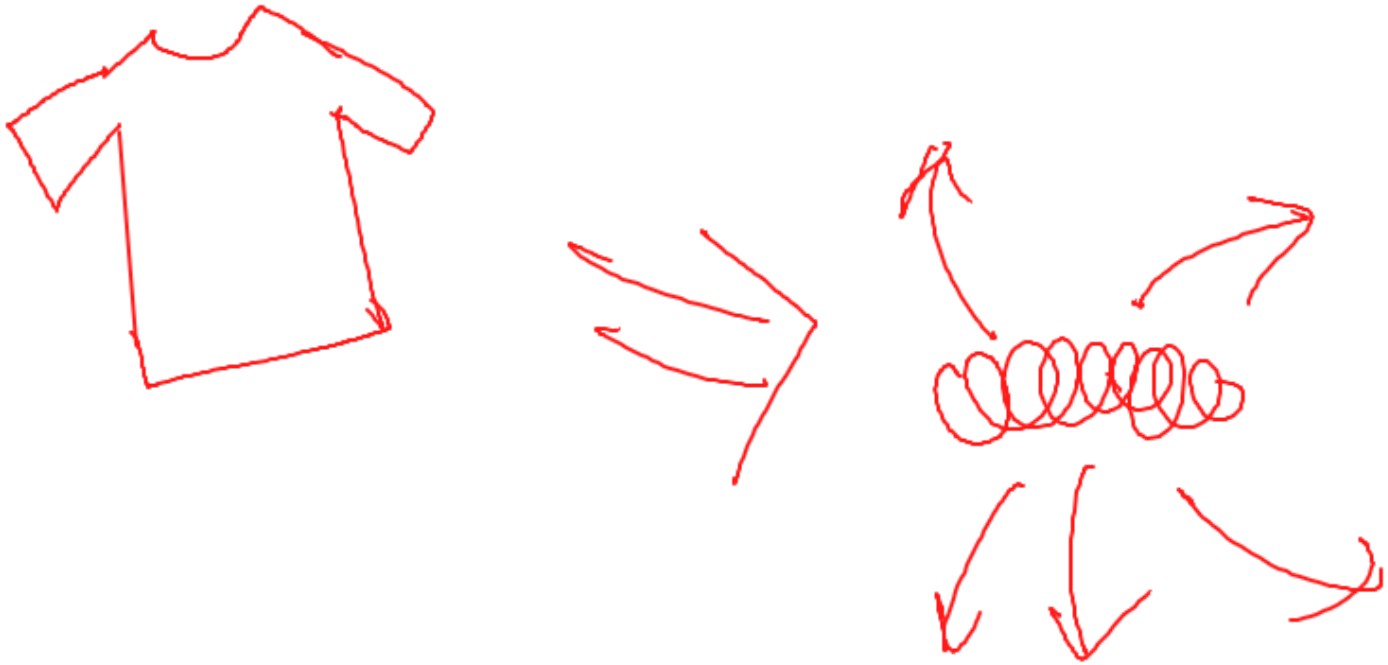
Whiteboard - Zoom

You are screen sharing | Stop Share

Select | Text | Draw | Stamp | Spotlight | Eraser | Format | Undo | Redo | Clear | Save

1.

2.



3.

4.

dle fiber

matid

romere

Type here to search

ENG 6:22 PM 6/24/2020

(b) Metaphase

Whiteboard - Zoom

Select | Text | Draw | Stamp | Spotlight | Eraser | Format | Undo | Redo | Clear | Save

1.

2. Dehydration

3. Water

4. Excretion

dle fiber

matid

romere

Mute | Start Video | Participants 151 | Q&A 12 | Polls | New Share | Pause Share | Whiteboard | Remote Control | More 4

Whiteboard - Zoom

You are screen sharing | Stop Share

4 participants raised hand

Select | Text | Draw | Stamp | Spotlight | Eraser | Format | Undo | Redo | Clear | Save

1.
2.
3.
4.
5.

VVI- for neet

V

L

J

I

Metacentric

Sub-metacentric

Acrocentric

Telocentric

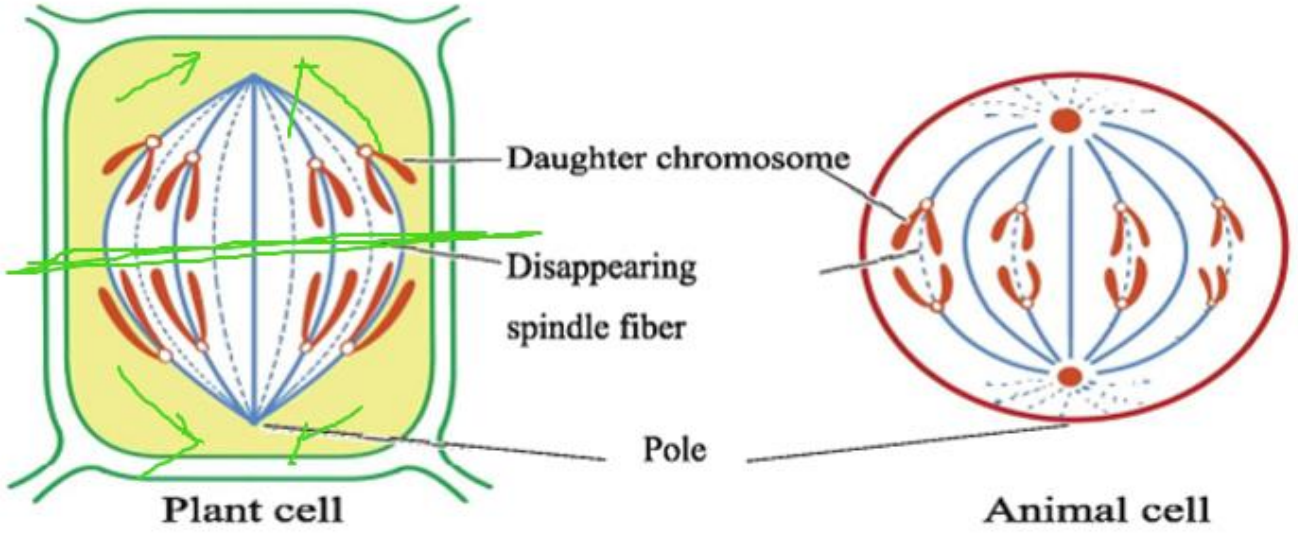
Activate Windows
Go to Settings to activate Windows.

Type here to search

ENG 6:29 PM 6/24/2020

(d) Anaphase

1. Spindle Fibers begin to shorten.
2. This exerts a force on the sister chromatids that pulls them apart.
3. Spindle fibers continue to shorten, pulling chromatids to opposite poles.
4. This ensures that each daughter cell gets identical sets of chromosomes
5. The chromosomes look V,L,J,I shaped and these chromosomes are called metacentric, Submetacentric, acrocentric and telocentric.



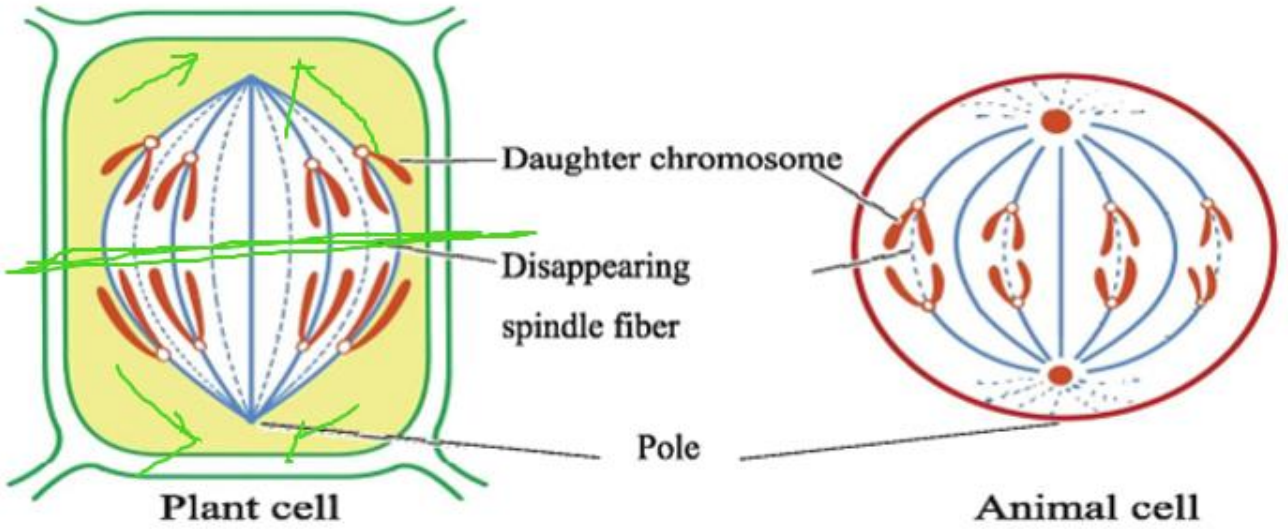
Poll Question 01

Which one is the preparation stage before cell division?

(a) Prophase (b) Interphase (c) Metaphase (d) Telophase

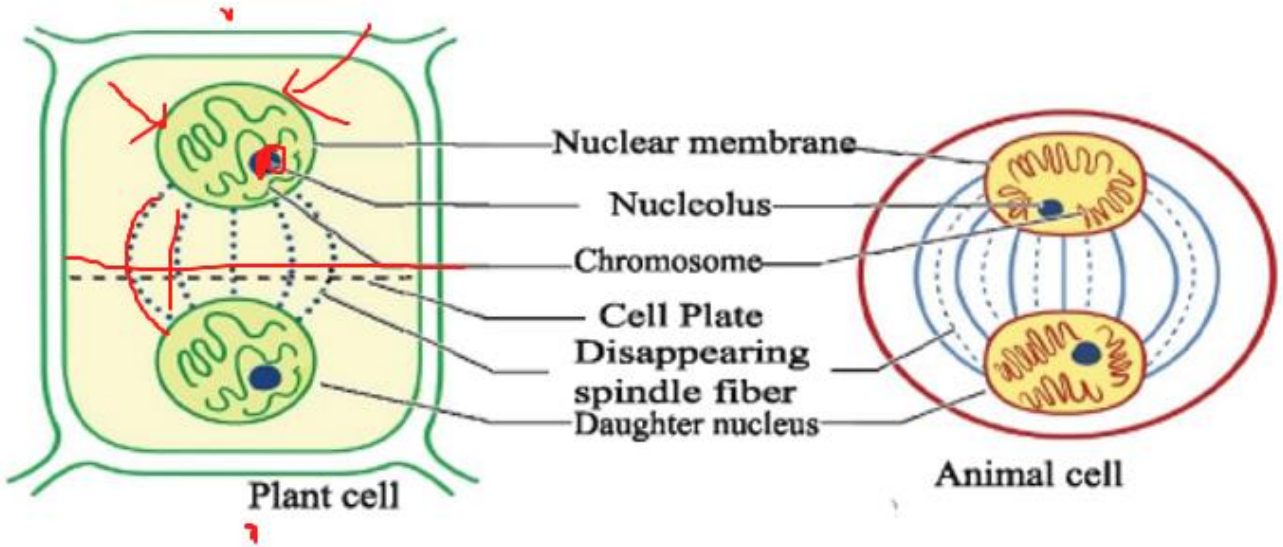
(d) Anaphase

1. Spindle Fibers begin to shorten.
2. This exerts a force on the sister chromatids that pulls them apart.
3. Spindle fibers continue to shorten, pulling chromatids to opposite poles.
4. This ensures that each daughter cell gets identical sets of chromosomes
5. The chromosomes look V,L,J,I shaped and these chromosomes are called metacentric, Submetacentric, acrocentric and telocentric.

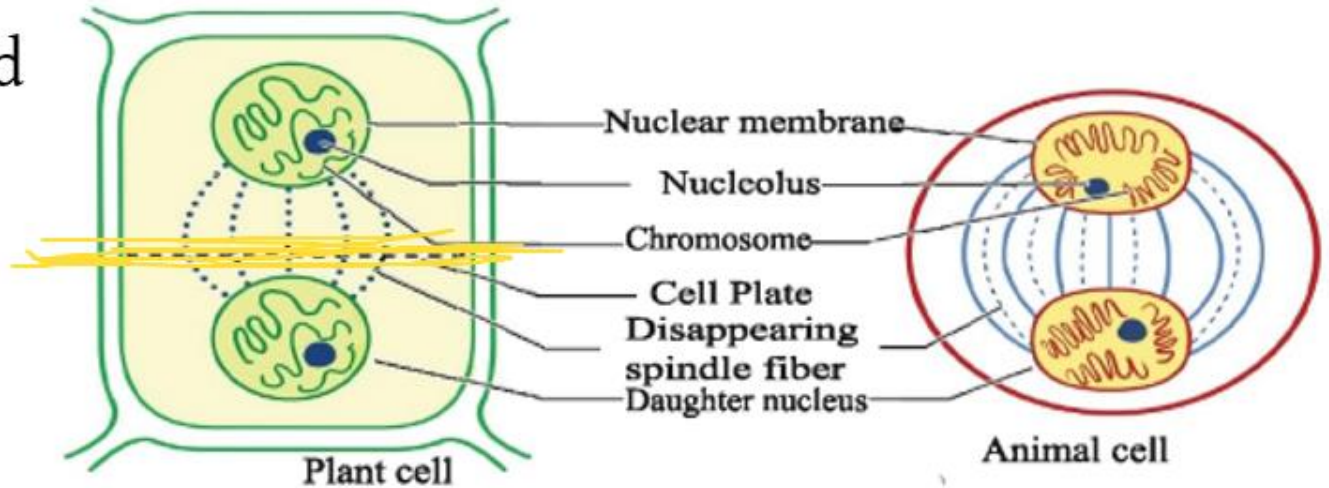


(e) Telophase

1. This is opposite to the prophase.
2. Chromosomes become decondensed and surrounded by new nuclei. The nuclear membrane re appear. So ultimately new neuclei are formed in the two poles.
3. The spindle fibers and apparatus gradually disappear,
4. The cell plate forms at the equator plane.
5. Equal distribution of cytoplasmic organelles is accomplished. As a result two identical daughter cells are developed.



1. This is opposite to the prophase.
2. Chromosomes become decondensed and surrounded by new nuclei. The nuclear membrane re appear. So ultimately new neuclei are formed in the two poles.
3. The spindle fibers and apparatus gradually disappear,
4. The cell plate forms at the equator plane.
5. Equal distribution of cytoplasmic organelles is accomplished. As a result two identical daughter cells are developed.



Mute | Start Video | Participants 134 | Q&A | Polls | New Share | Pause Share | Whiteboard | Remote Co... | ... 7

Whiteboard - Zoom

You are screen sharing | Stop Share

3 participants raised hand

Select | Text | Draw | Stamp | Spotlight | Eraser | Format | Undo | Redo | Clear | Save

1.

2.

3.

4.

5.

Nucleolus & N. membrane ⇒

Disappear ⇒ Metaphase

Reappear ⇒ Telophase

Tasks

Quit Zoom

Start Zoom

Pin to taskbar

Close all windows

Activate Windows
Go to Settings to activate Windows.

Type here to search

ENG 6:38 PM 6/24/2020

You are screen sharing Stop Share

(c) Telophase

1.

2.

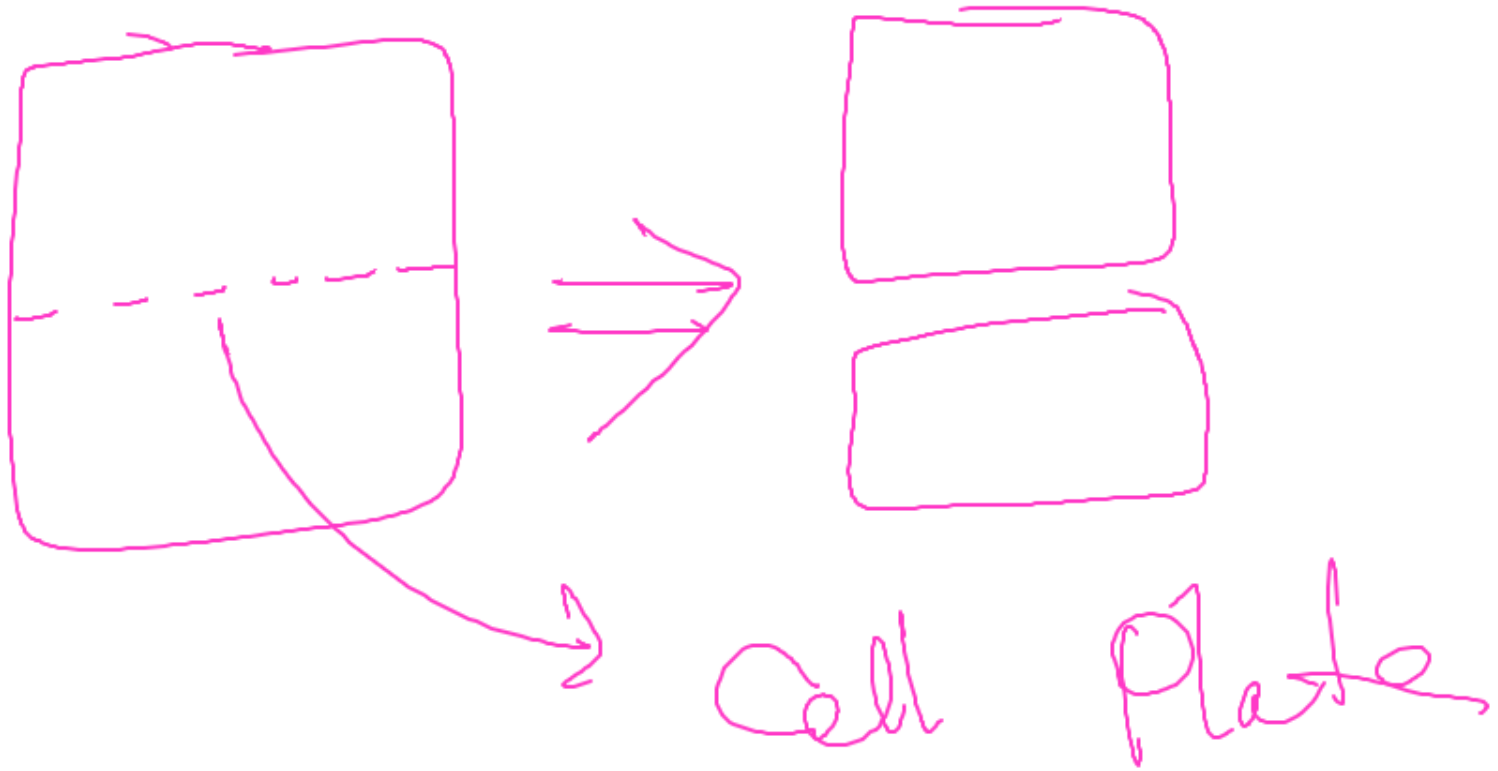
3.

4.

5.

Whiteboard - Zoom

Select Text Draw Stamp Spotlight Eraser Format Undo Redo Clear Save



Activate Windows
Go to Settings to activate Windows.

Type here to search

ENG 6:41 PM 6/24/2020

Poll Question 01

Which one is the preparation stage before cell division?

(a) Prophase (b) Interphase (c) Metaphase (d) Telophase

Poll Question 02

How many times the Chromosomes are divided during Mitosis.

(a) 1 time (b) 2 times (c) 3 Times (d) Never

Poll Question 03

In which stage the cells or chromosomes are dehydrated?

(a) Prophase
(b) Pro metaphase
(c) Metaphase
(d) telophase

Poll Question 04

In which stage the Chromosomes become most thick and small?

(a) Prophase
(b) Pro metaphase
(c) Metaphase
(d) Telophase

Poll Question 05

What is the name of J shaped Chromosome?

(a) metacentric
(b) Submetacentric
(c) acrocentric
(d) telocentric.