



# ARJUNA NEET BATCH

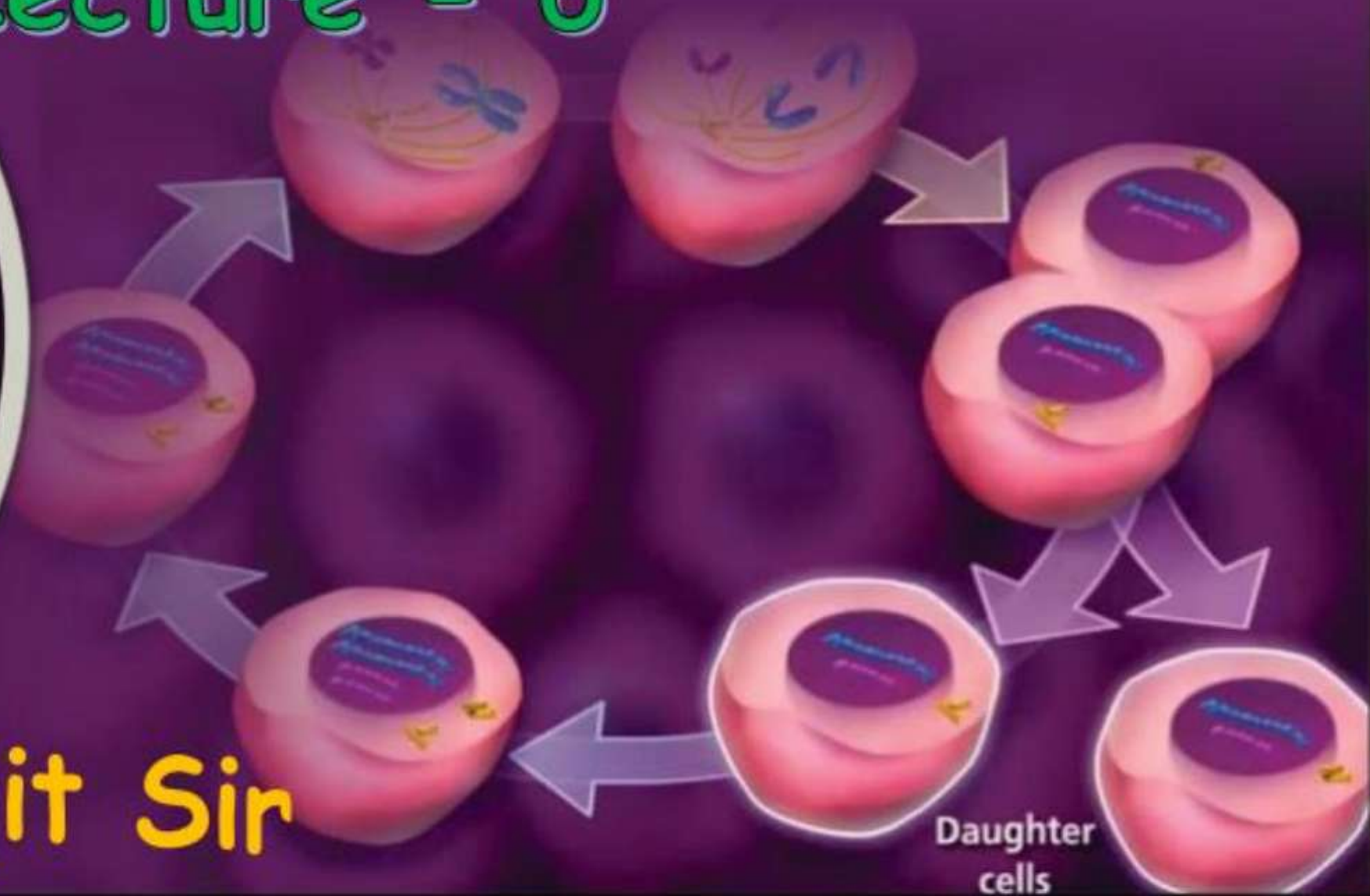


## CELL CYCLE AND CELL DIVISION

### Lecture - 6



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Objective of today's class



# MEIOSIS II AND AMITOSIS





Q. How many mitotic generations<sup>n?</sup> are required to produce 128 cells from 2 cells?

Sol<sup>n</sup>:

$$2^n \times 2 = 128$$

$$2^n = 64$$

$$n = 6$$

$$X = 2^n \leftarrow \text{from one cell}$$

Q. If a gamete<sup>n</sup> contains 10 chromosomes, then how many bivalents and tetrads would be formed in corresponding meiocyte<sub>2n</sub>?

Sol<sup>n</sup>: no. of bivalent = no. of tetrads =  $n = 10$

$$n = 10$$





## Diplotene :-

Desynapsis takes place.



A  
S

(a) Due to partial breakdown of synaptonemal complex.

→ nonsister chromatids

(b) 2 homologous chromosomes remain attached at certain points called chiasmata.

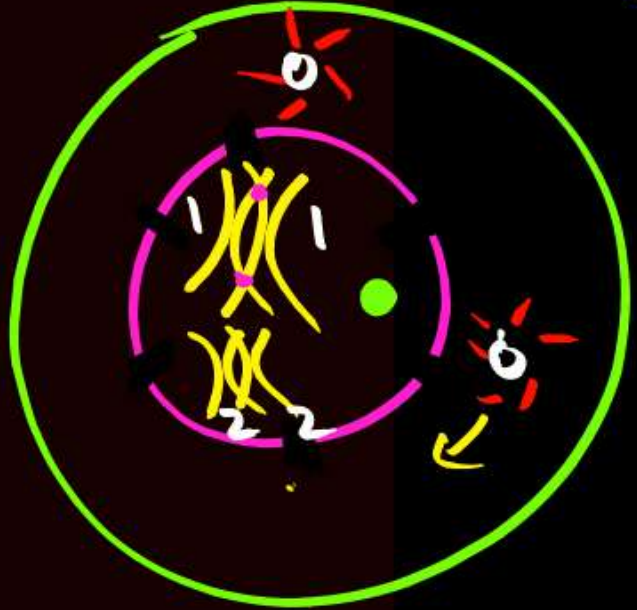
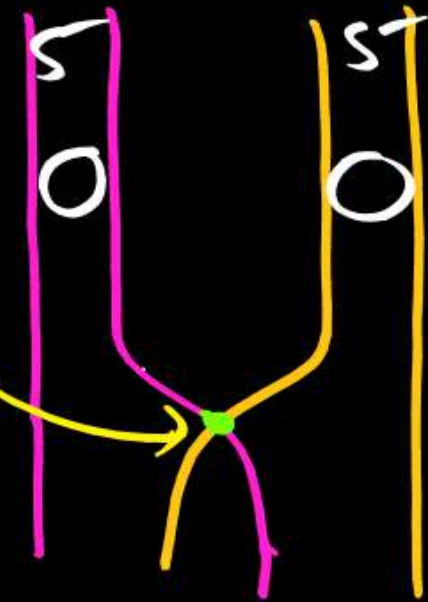
(c) Chiasmata

- Represents the site of C.O.
- Gives X shape to chromosomes.

(d) NM and nucleus start disappearing.

primary

- lasts for months or years in oocytes of some vertebrate
- Such long diplotene phase is called dictyotene phase.



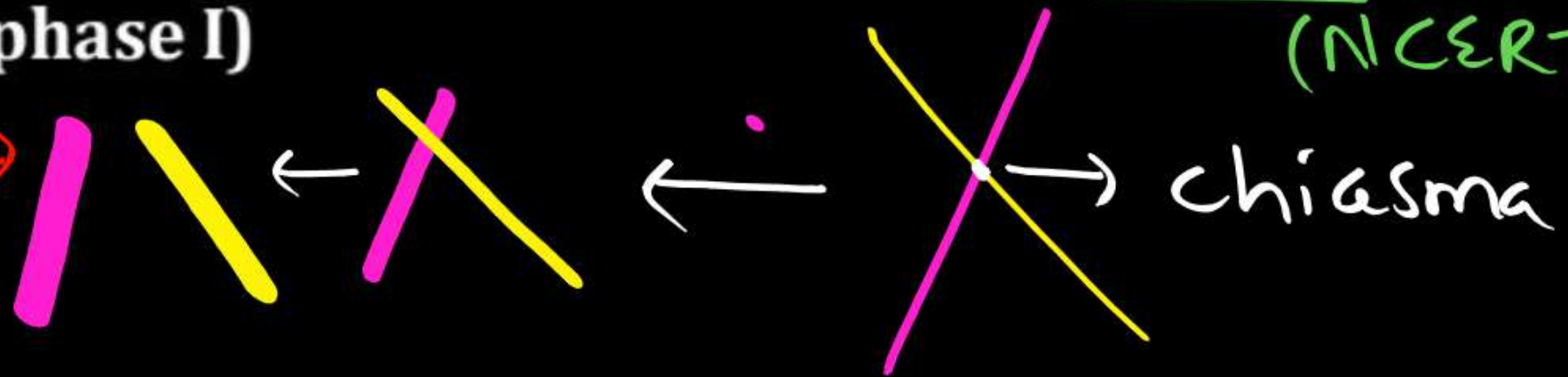
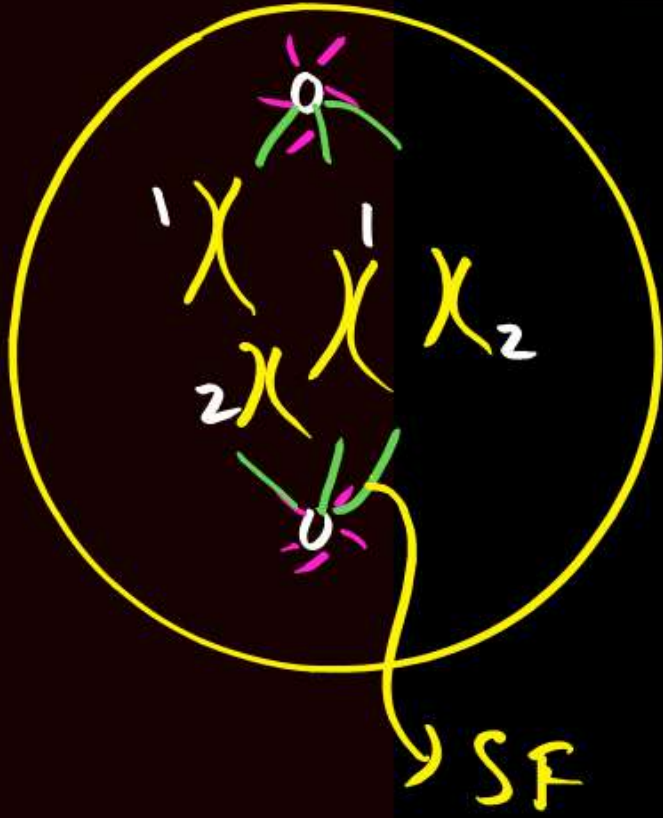


$L \rightarrow 2 \rightarrow P \rightarrow D \rightarrow D \Rightarrow \underline{\underline{meta I}}$   
 $\leftarrow \text{pro I}$



## Diakinesis :-

- (a) Beginning of diakinesis is marked by
  - (i)\* Terminalization of chiasmata
  - (ii) Inhibition of RNA synthesis.
- (b) NM and nucleolus completely disappear.
- (c) 2 daughter centrosomes lie at opposite poles.
- (d) Spindle fibre formation starts.
- (e) End of diakinesis marks transition to metaphase (metaphase I)



non-sister chromatids



① Leptotene  $\Rightarrow$  bouquet stage



② Zygotene  $\Rightarrow$  synapsis, bivalent formation  
synaptonemal complex formation



③ Pachytene  $\Rightarrow$  crossing over, recombination nodule  
tetrad becomes visible



④ Diplotene  $\Rightarrow$  desynapsis, partial break down  
of synaptonemal complex, chiasmata



⑤ Diakinesis  $\Rightarrow$  Terminalisation of chiasmata.  
SF formation



Q.

desynapsis, c.o., Terminalisation  
(Diplotene) (pachytene) diakinesis  
of chiasmata, beginning of chromatid  
condensation leptotene

D → B → A → C



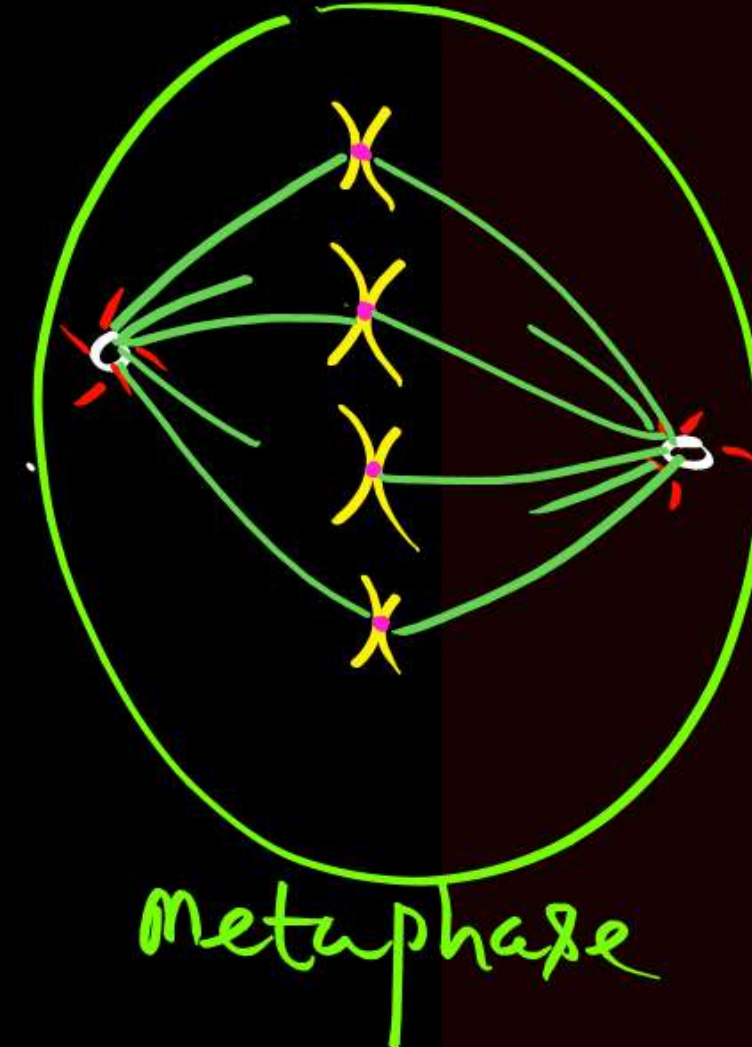
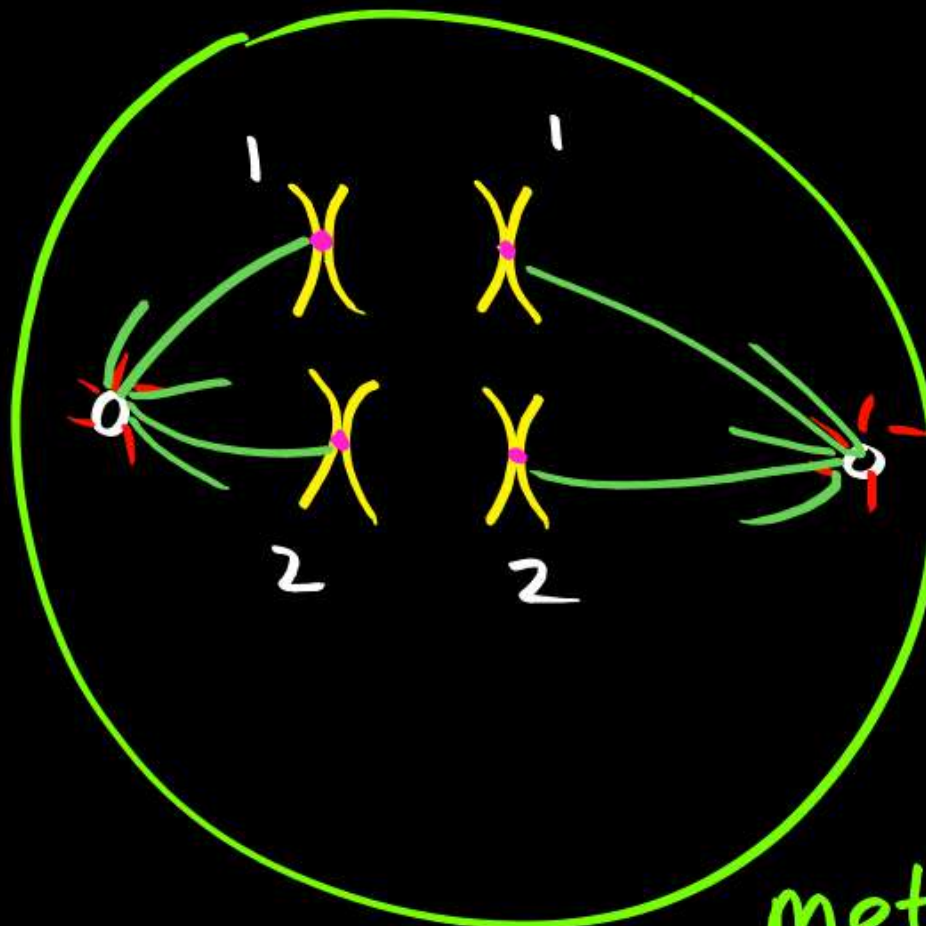
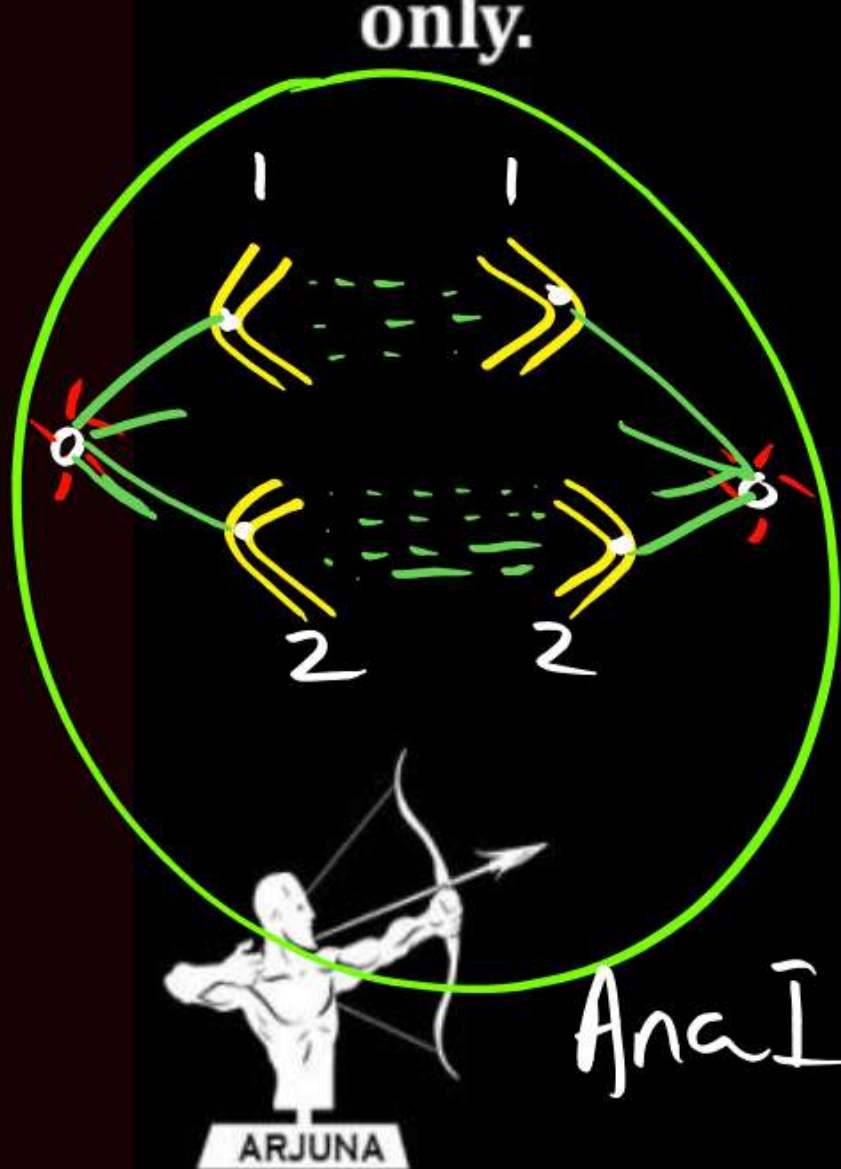
## Metaphase - I :-

Congression takes place.

\* Two metaphasic plates are formed.

Note :-

Each chromosomes is bound to spindle fibre from one pole only.



### **Anaphase - I :-**

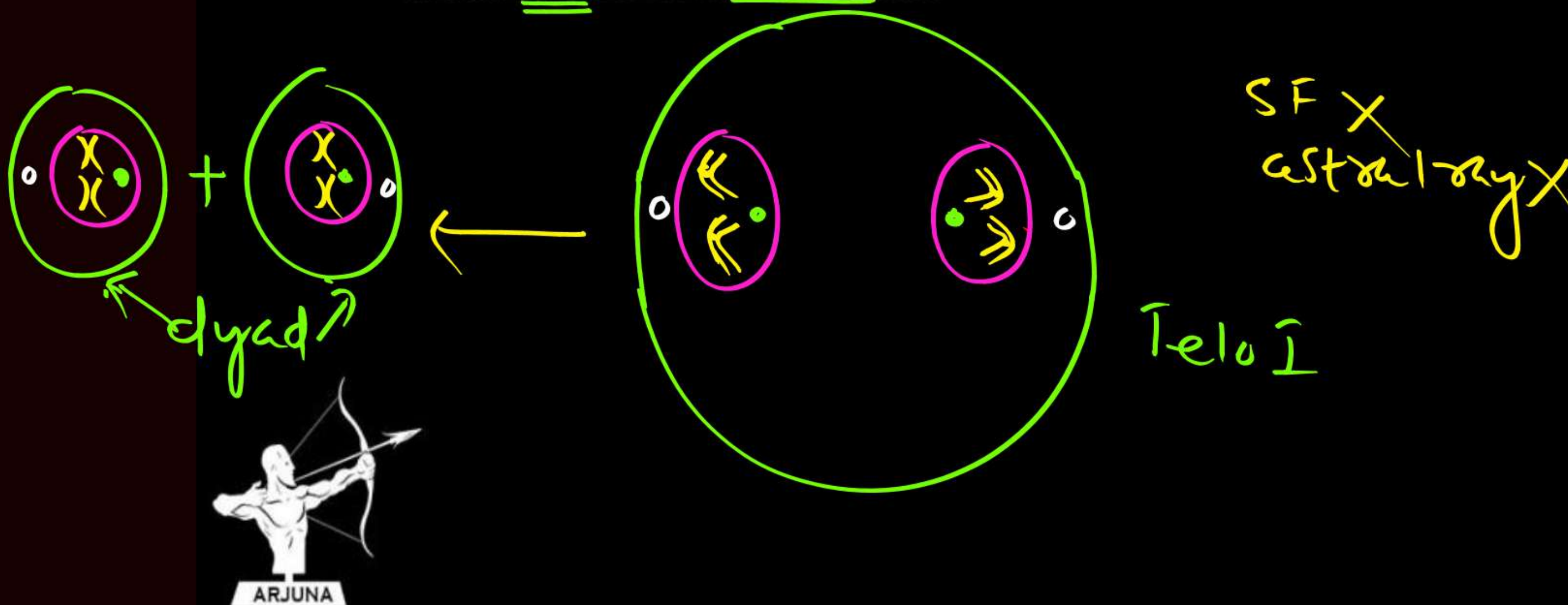
- **Separation of homologous chromosomes.**
- **Centromere of each chromosome remain intact**





## Telophase - I :-

- (a) NM, nucleolus reappear
- (b) Spindle fibre disappear.
- (c) Astral rays disappear.
- (d) Chromosomes undergo slight Decondensation, which does not form chromatins





### **Cytokinesis - I :-**

**Produces two daughter cells which are non-identical to each other.**

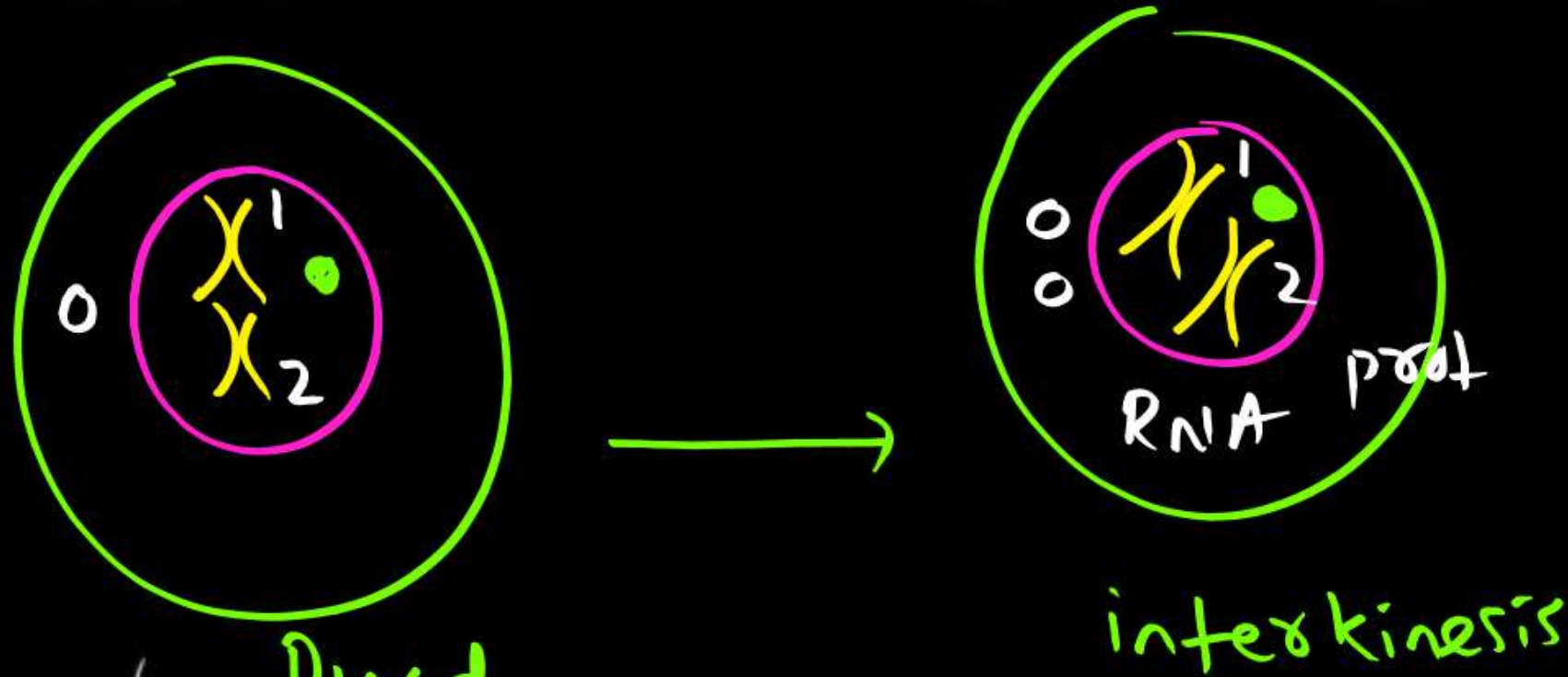




## Interkinesis :-



- (a) No DNA replication.
- (b) Further slight decondensation of chromosomes but chromatins are not formed (i.e. DNA exist in the form of chromosome).
- (c) Centrosome duplicates.
- (d) Synthesis of RNA and proteins required in meiosis II.



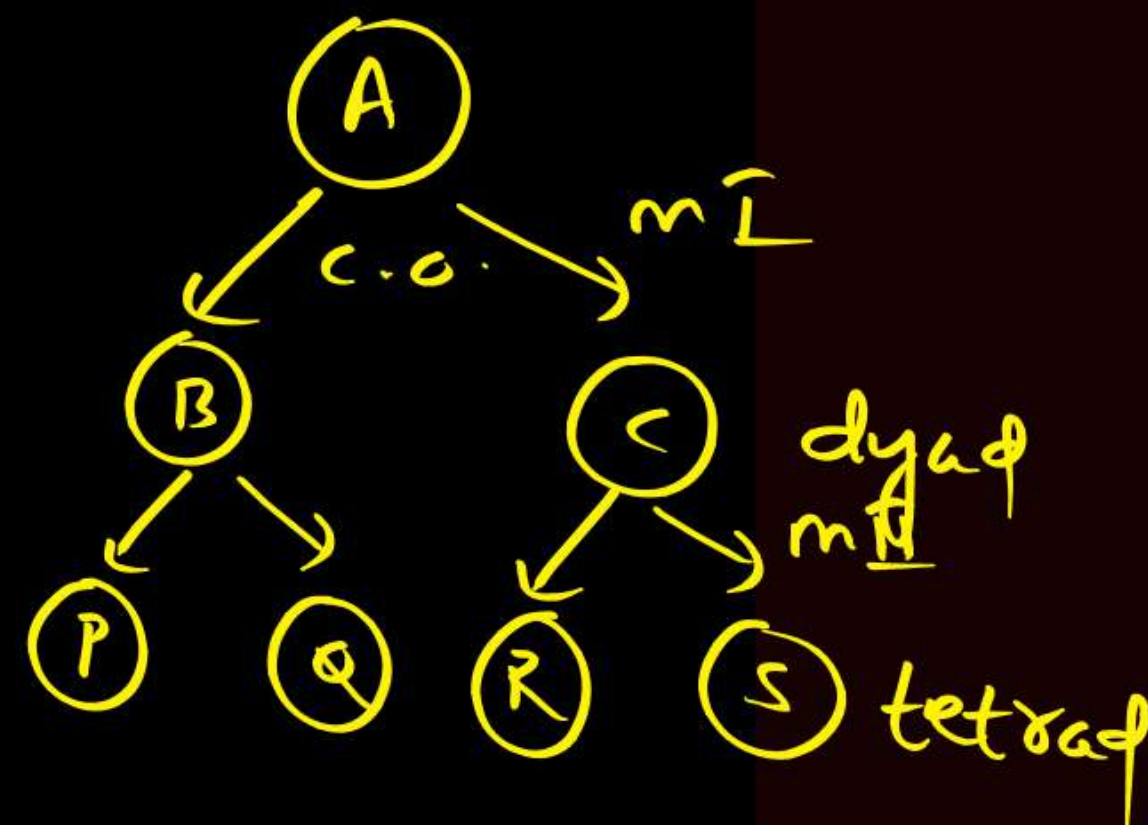


## Meiosis - II :-

- (a) Both daughter cells of meiosis -I undergo simultaneous meiosis-II.
- (b) Similar to mitosis

$A \neq B \neq C$

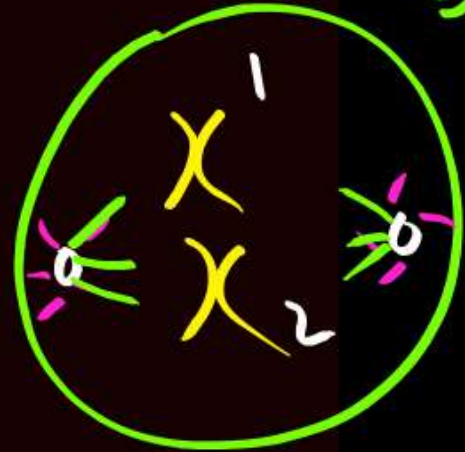
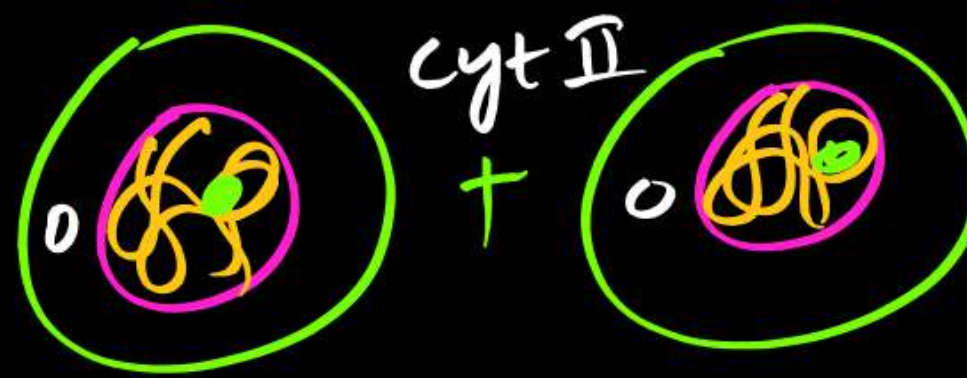
$P \neq Q$   
 $R \neq S$







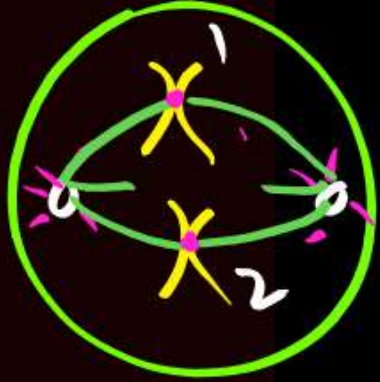
## karyokinesis-II :-



### (1) Prophase-II :-

(a) Condensation of slightly decondensed chromosome.

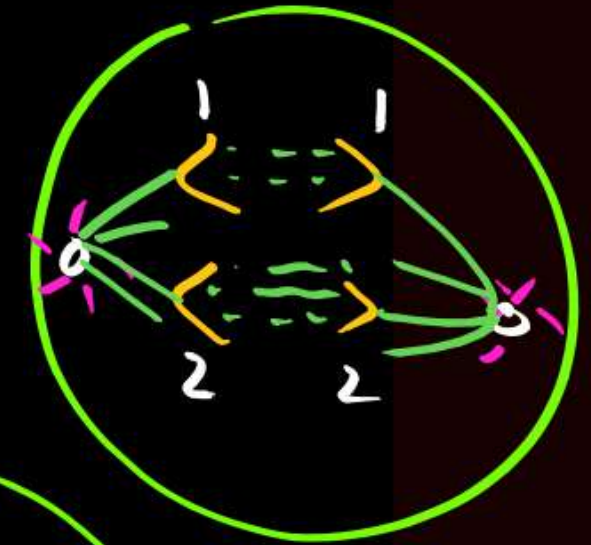
(b) Movement of both centrosome away from each other.



### (2) Metaphase-II :-

Single metaphasic plate is formed.

(3) Anaphase-II :- → centromere splits in 2.  
Separation of sister chromatids takes place.

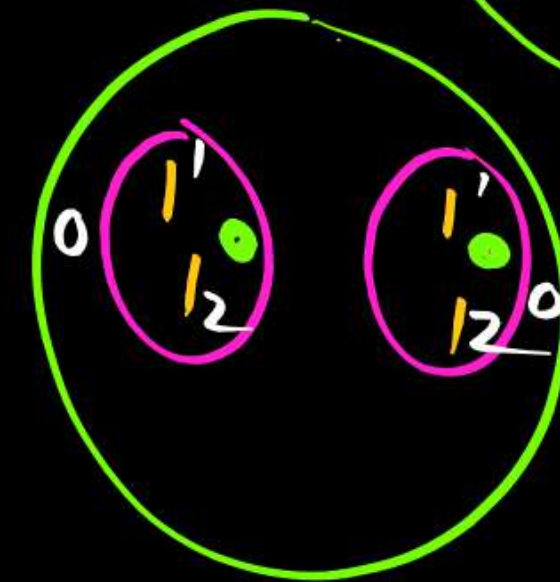


### (4) Telophase-II :-

Produces two haploid nuclei.

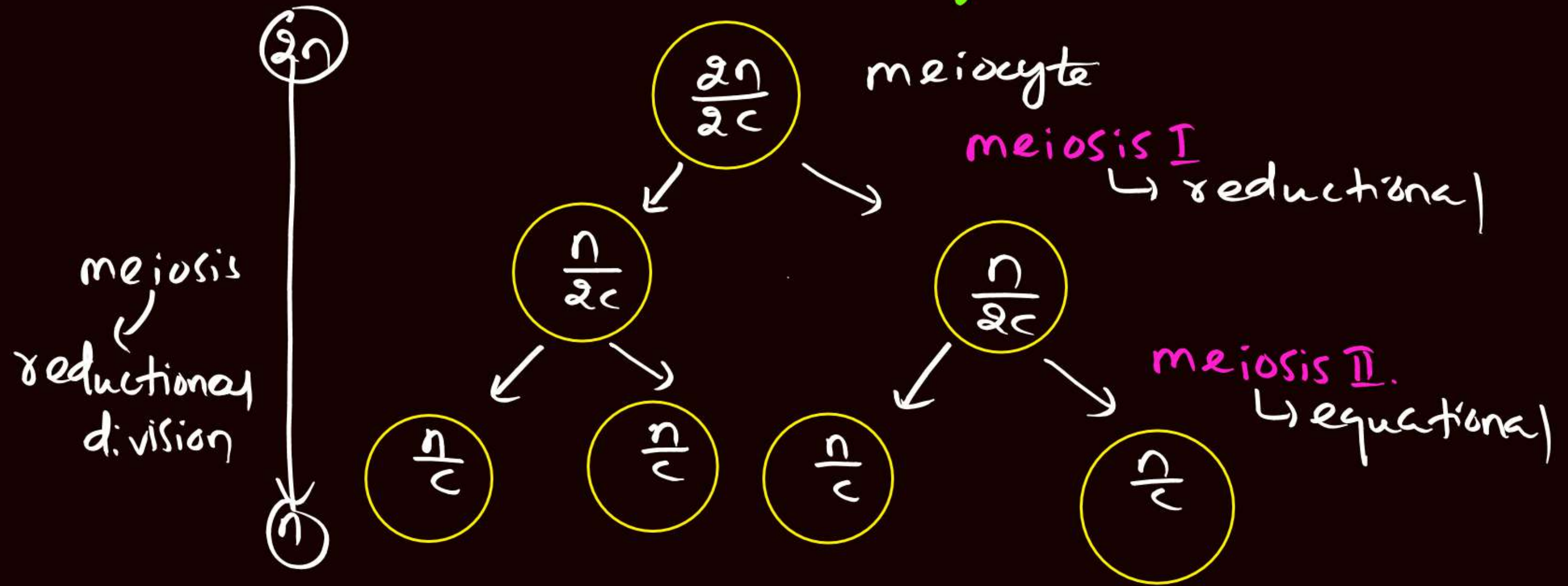
### (5) Cytokinesis-II :-

Produces haploid daughter cells





Meiosis is reductional division. But only meiosis I is reductional while meiosis II is equational.





## Significances of meiosis

### (i) Gametogenesis:-

Formation of gametes.

Example:- Gymnosperm, Angiosperm, Animals

### (2) Variation:-

(a) Meiosis → C.O → Recombination → Variation

(b) Contribution towards evolution.

\* (Bryophyte, most of algae →

↓  
evolution

gametes  
are  
formed  
by  
mitosis

### \* (3) Maintenance of chromosome no. from generation to generation:-

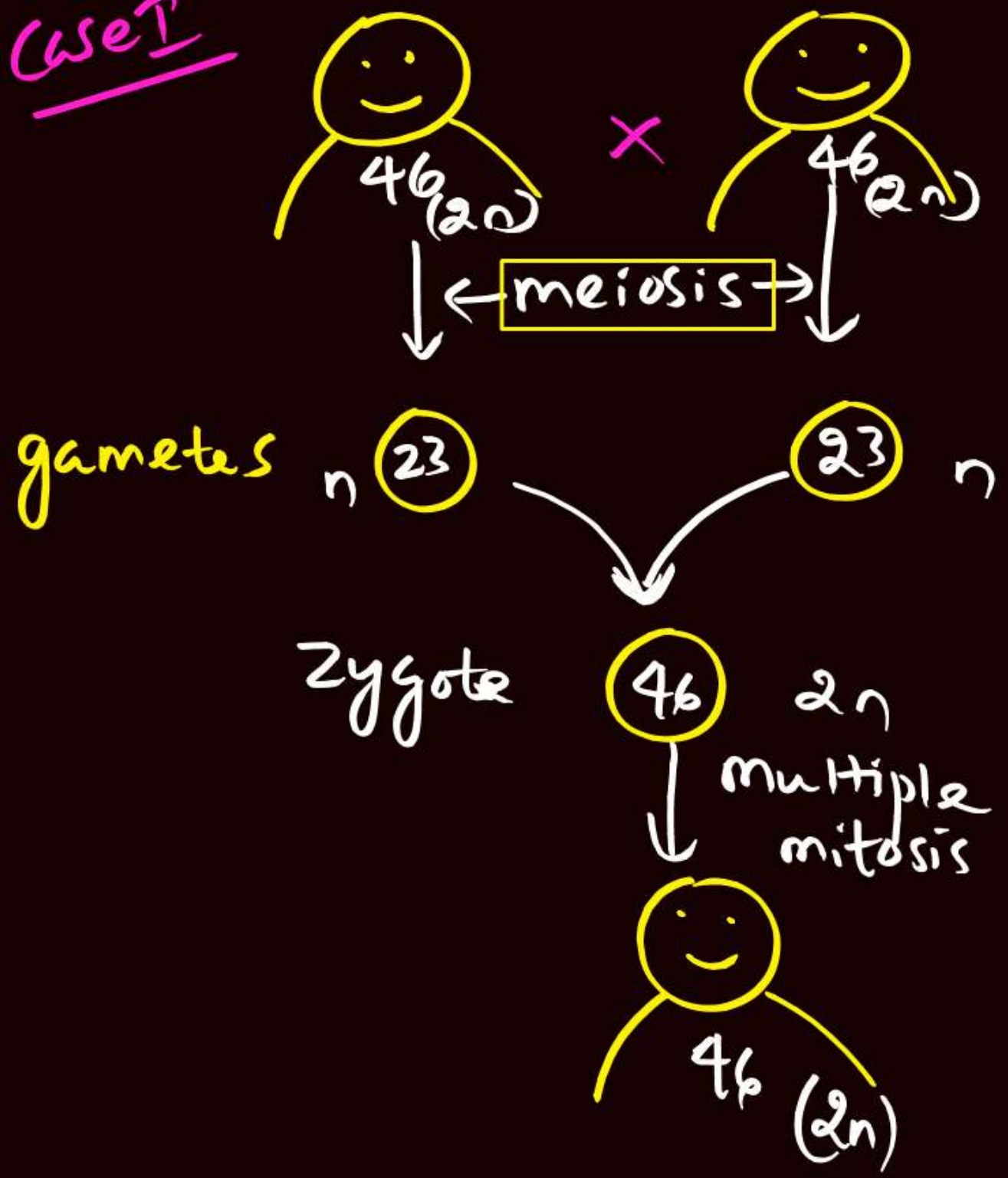
(a) Is paradox of meiosis.

(b) Meiosis per se (by itself) reduces chromosomes no. to half of the meiocyte.

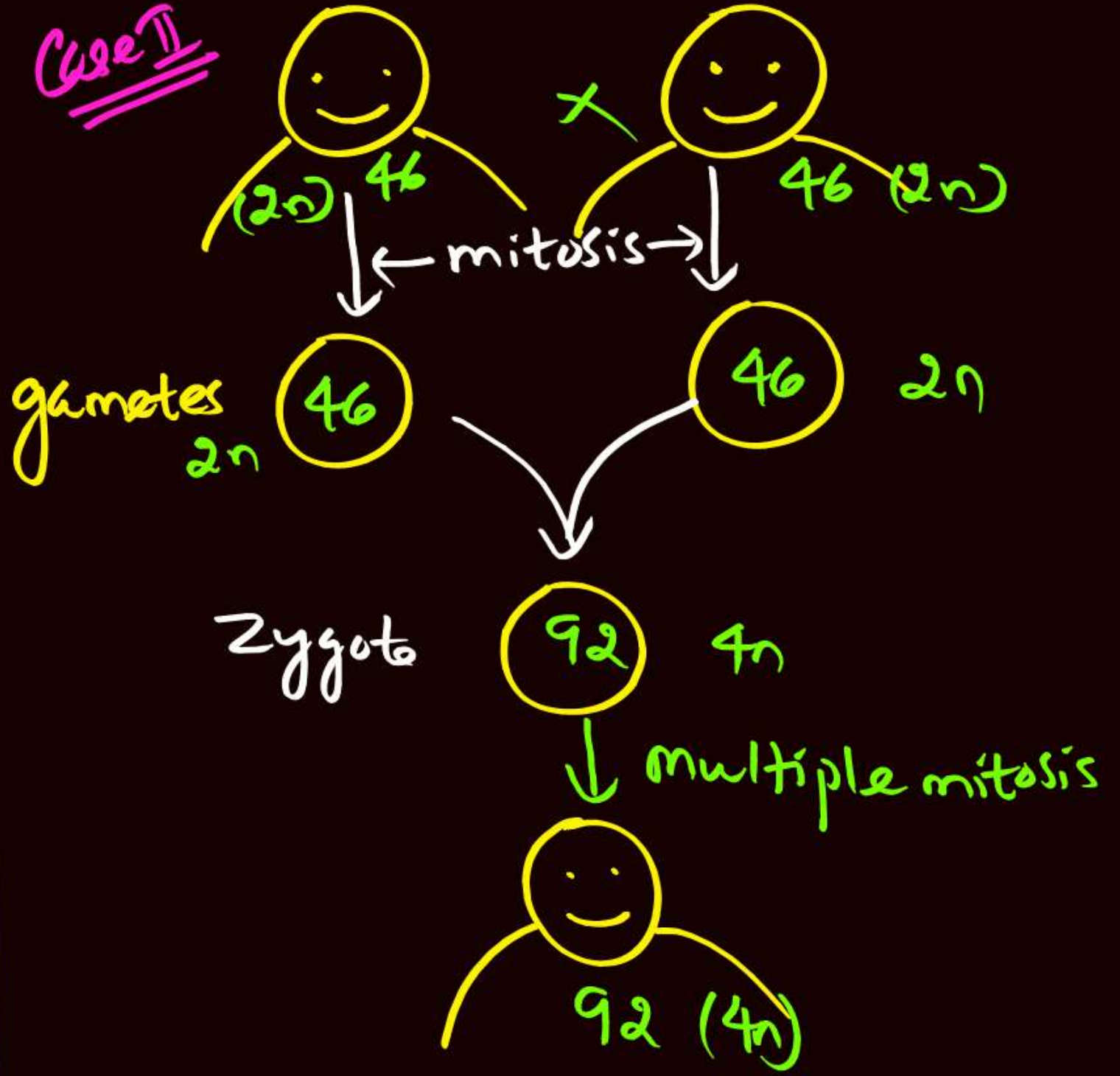




Case I



Case II





*thanks  
for watching*

