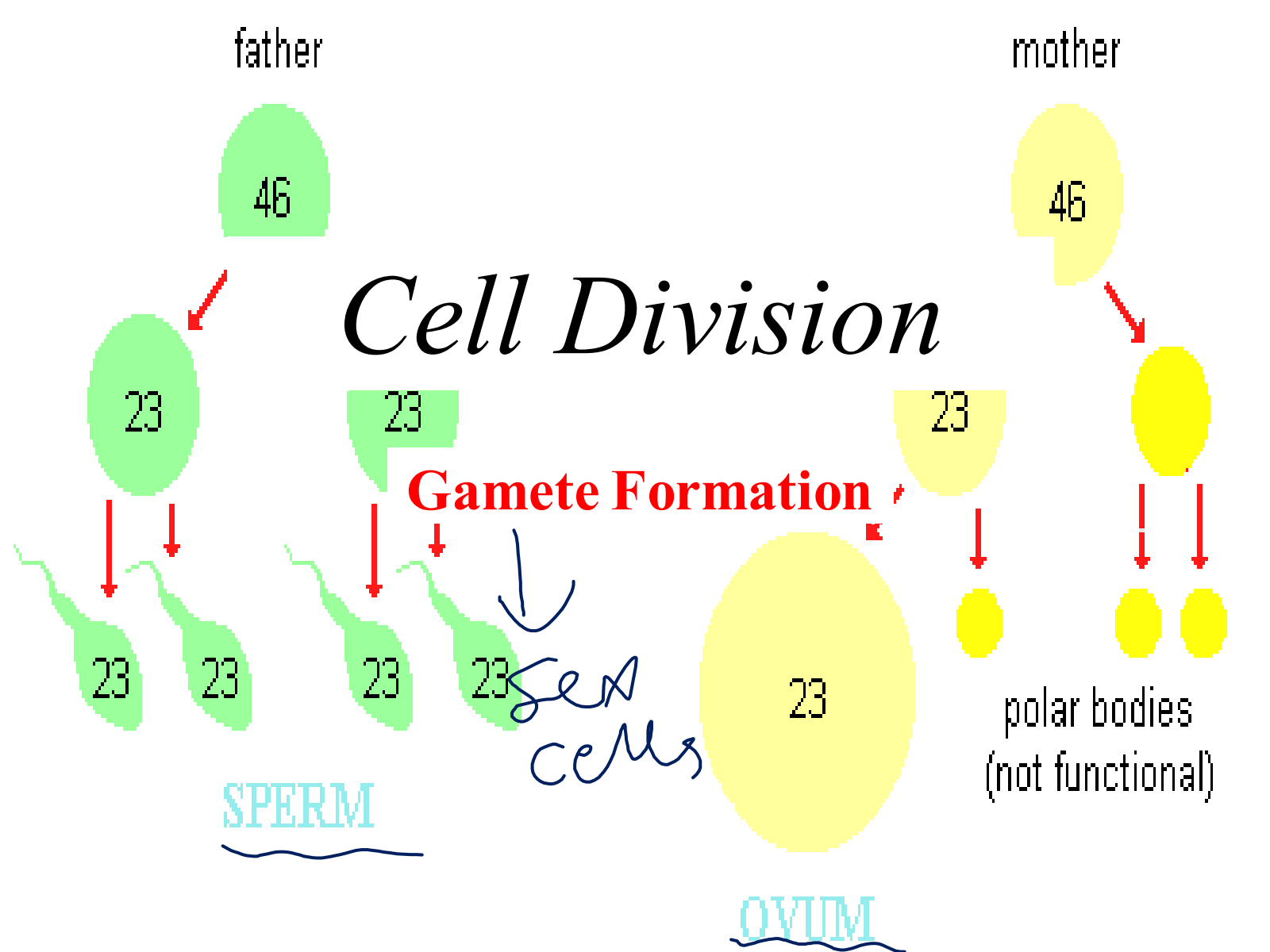

father
mother
46
46
Cell Division
23
23
23
Gamete Formation
23
23
23
23
23
sex cells
polar bodies
(not functional)
SPERM
OVUM

OUTCOME QUESTION(S):

S1-1-05:

What role do gametes play in reproduction?

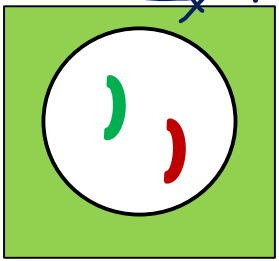
Vocabulary & *Concepts*

Genetic Diversity

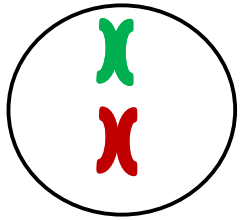
Gamete	Diploid	Haploid
Meiosis	Homologous pair	

MITOSIS – *in general*

Reminder



Parent cell:
Full set of Chromosomes



P

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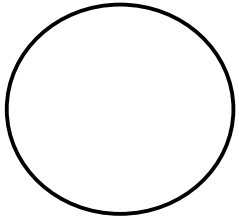
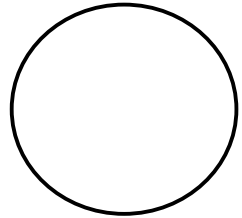
Mitosis is used for making **identical cells:**

Growth, Repair *and* Asexual Reproduction





Identical daughter cells:
Full set of Chromosomes

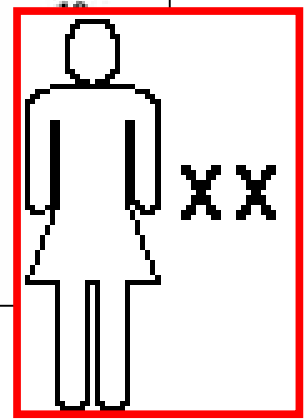
PROS – Asexual Reproduction – CONS

Good

Bad

Large number of offspring *made very quickly*	**No diversity in organisms** *clones are vulnerable to disease/environment*
Each offspring will be successful *clones are well adapted*	**Little possibility for evolution** *clones are identical*
Stay close together *colonies build if nutrients are present*	**Can lead to overcrowding** *starvation if not enough nutrients*
No need to waste energy finding a sexual partner	?

What would happen if we used mitosis to make sperm and egg cells for sexual reproduction?



Sexual reproduction

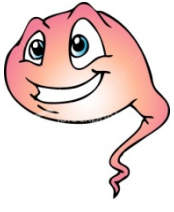
- **Two parents make ONE offspring**
- Offspring ***NEVER identical*** – **genetic diversity**

- **Requires** the formation of ***specialized sex cells:***

Gametes – cells used only for sexual reproduction

Since **2 gametes** will be coming together **each** can only have to have ½ **the chromosomes**

23 + 23 = 46



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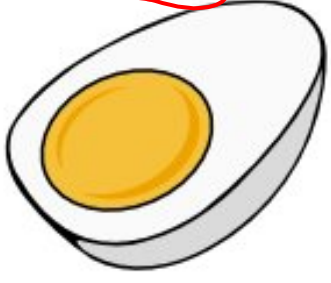

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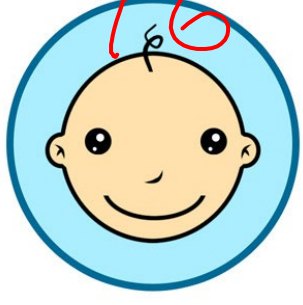
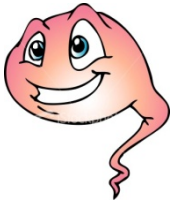
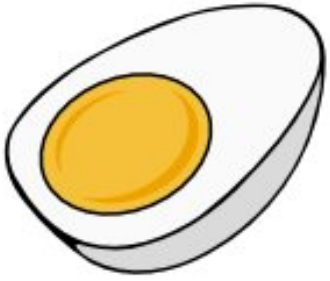
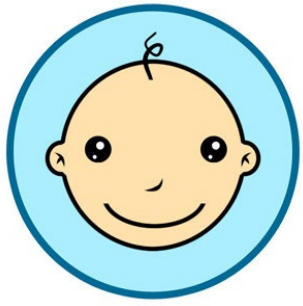


Haploid **sperm** + *Haploid* **egg** = ***Diploid*** **zygote**

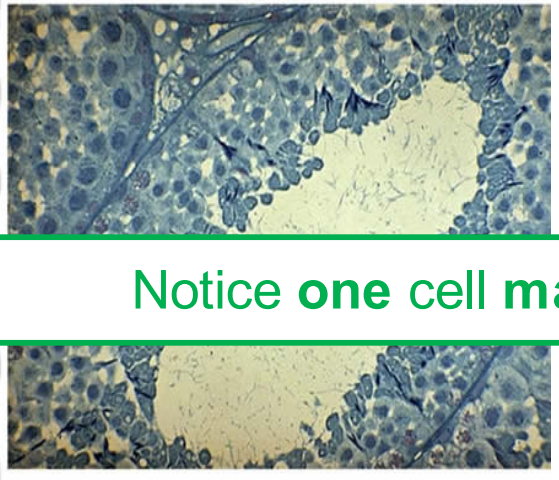
(23 chromosomes) (23 chromosomes) (46 chromosomes)

MEIOSIS:

Process of producing *specialized* ***haploid*** sex cells.

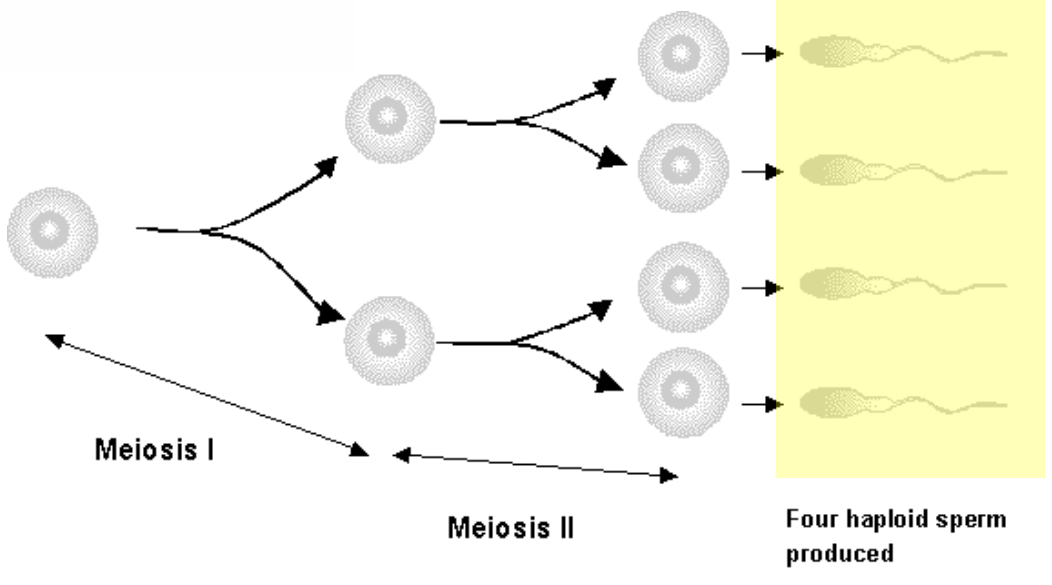
Having a FULL SET of chromosomes - ***diploid*** **(2n) cell**
Having a ½ SET of chromosomes – ***haploid*** **(n) cell**

Testes



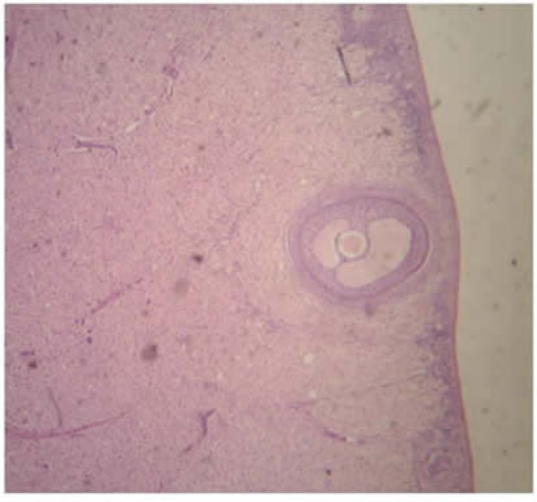
Gametes are made in organs called *gonads*.

Notice **one** cell **makes 4** male gametes - sperm



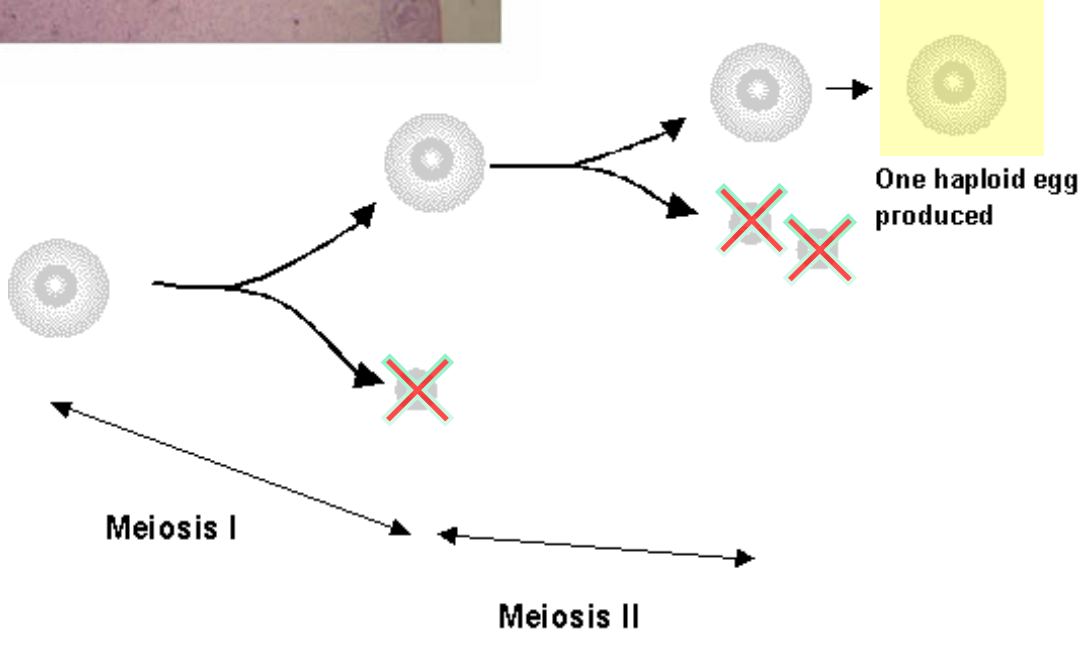
SPERMATOGENESIS – cell division process for making sperm

Ovary

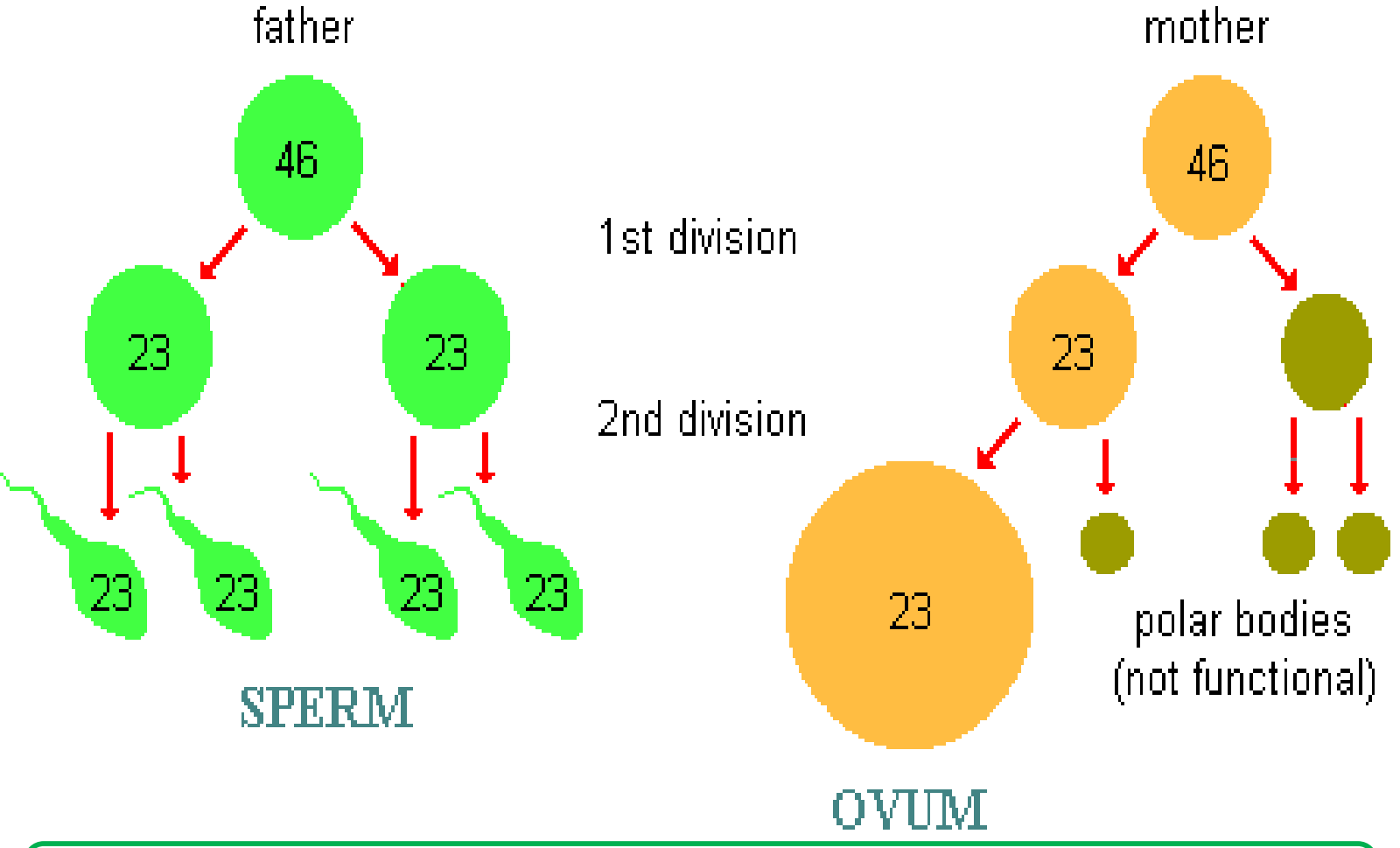


Female gonads = ovaries

Notice **ONLY 1 ova (egg)** receives enough cytoplasm to **survive**

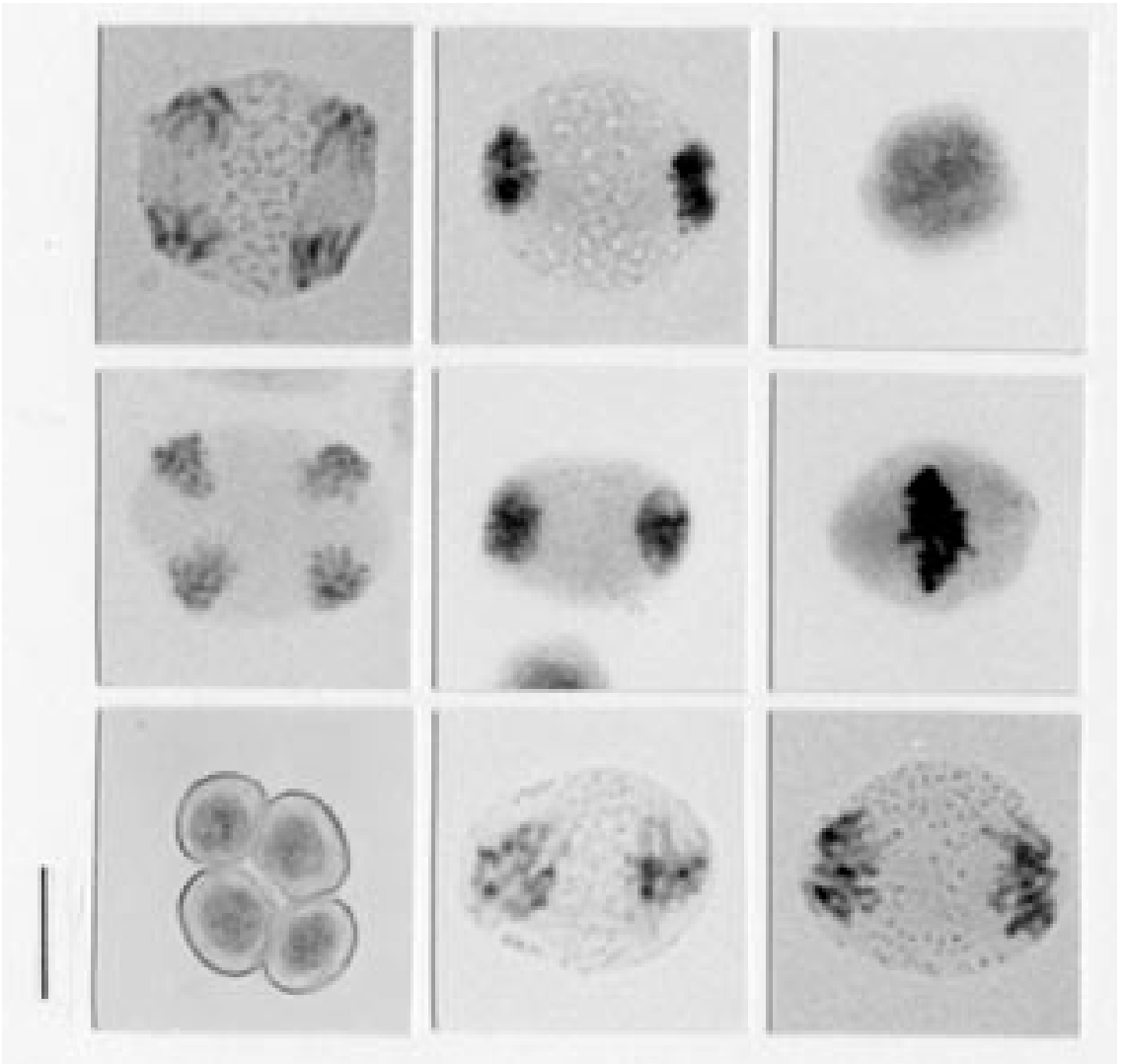


OOGENESIS – cell division process for making eggs



One giant, healthy egg is produced to ensure **success**

Meiosis



Meiosis has two stages:

1. **Reduction stage**

- *Cut number of chromosomes in half – **haploid***
- *Separate homologous pairs*

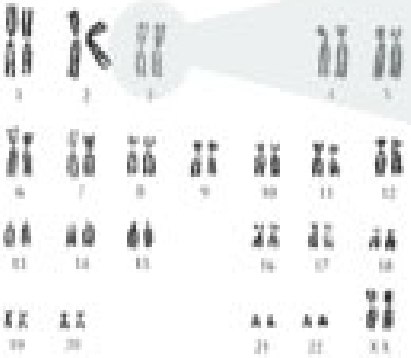
Remember when we said our 46 chromosomes could be put into 23 pairs…

Homologous pair: chromosomes that pair up based on **size** and the **genes** that they contain.

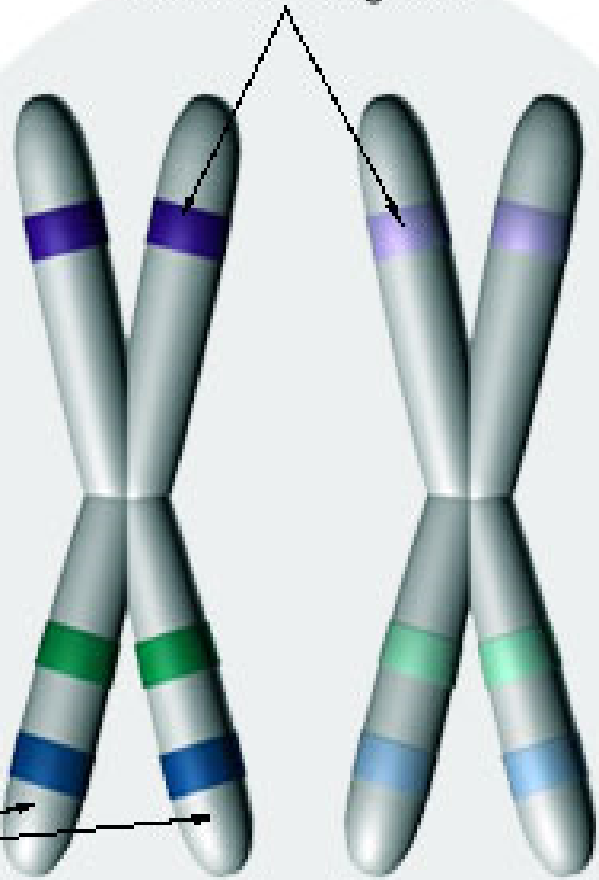
In a pair – one is from the mother and one from the father

COMMON MISTAKE: *Don't confuse sister chromatids with homologous pairs.*

Homologous chromosomes contain DNA that codes for the same genes. In this example, both chromosomes have all the same genes in the same locations (represented with colored strips), but different 'versions' of those genes (represented by the different shades of each color).

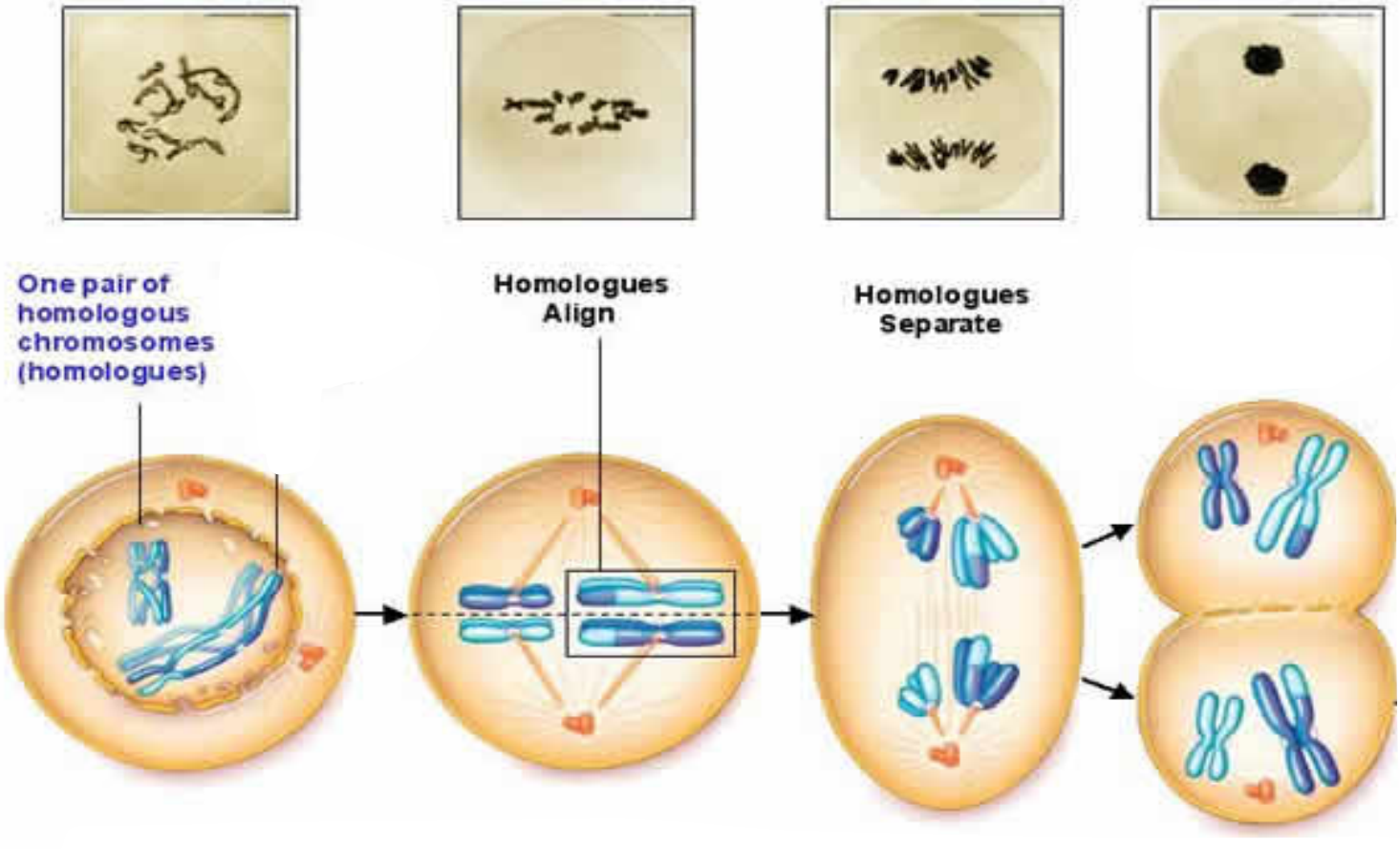


Homologous regions code for the same gene.



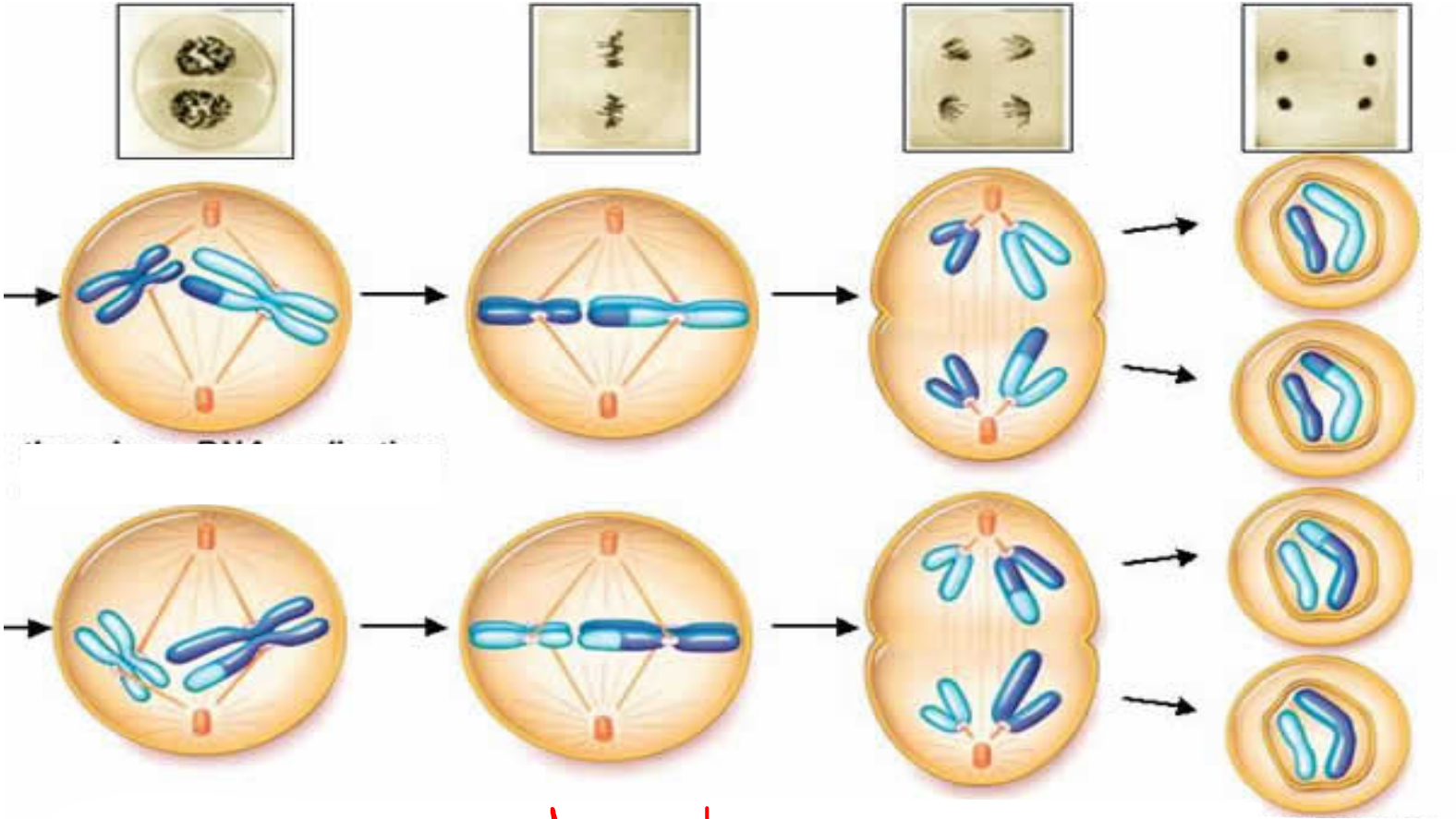
Sister chromatids are exact replicas...
but homologous chromosomes are not.

Meiosis 1 – *Reduction stage*



MEIOSIS I: Separate the Homologues

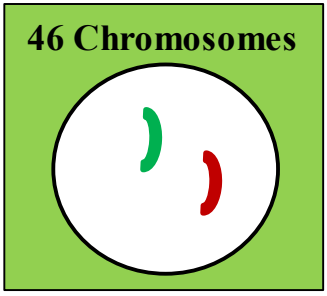
Meiosis 2 – *Division stage*

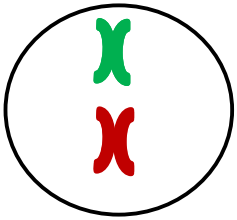


d.s. chromosomes

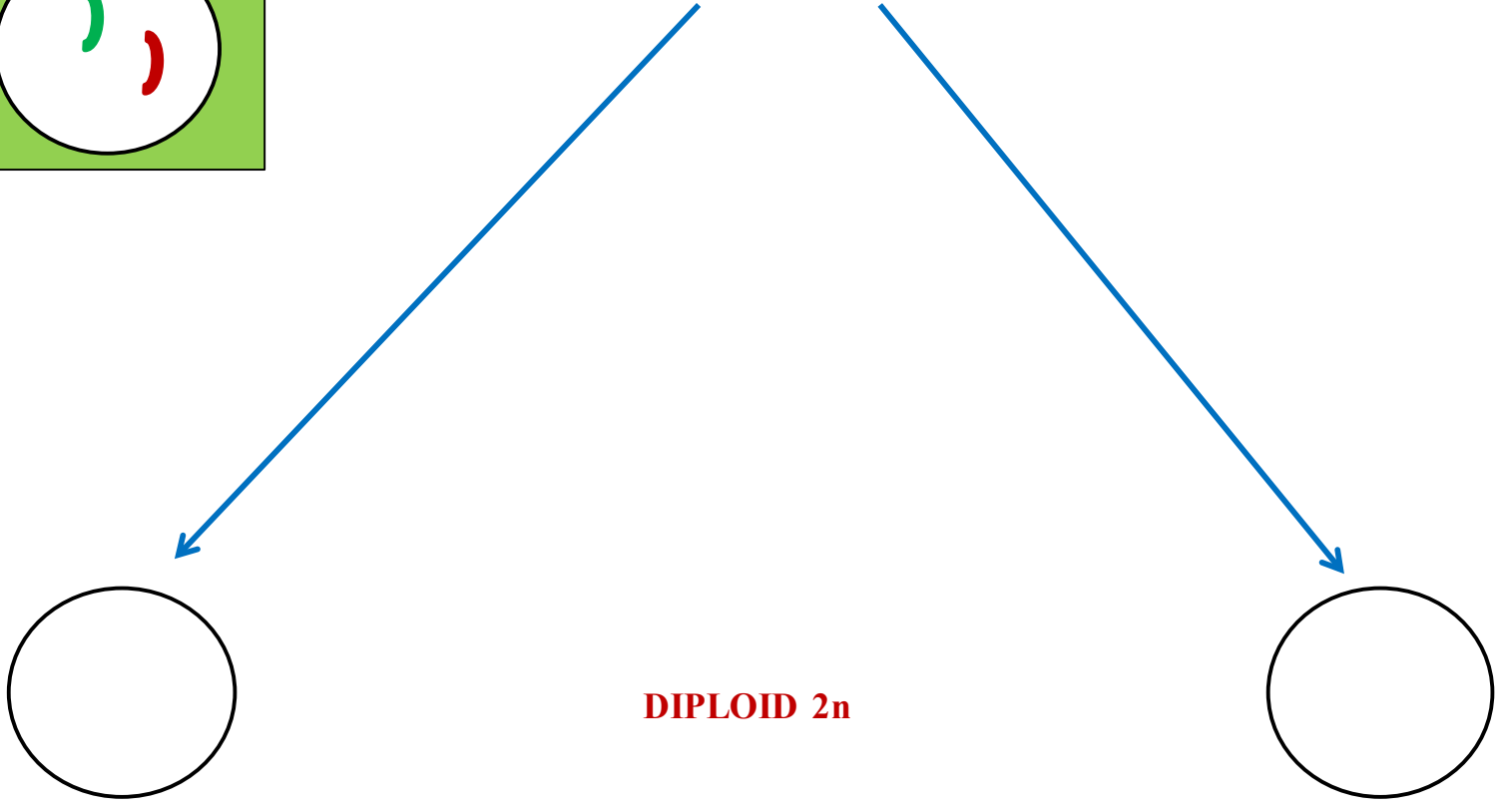
MEIOSIS II: Separate the Sister Chromatids (by mitosis)

MITOSIS– *in general*





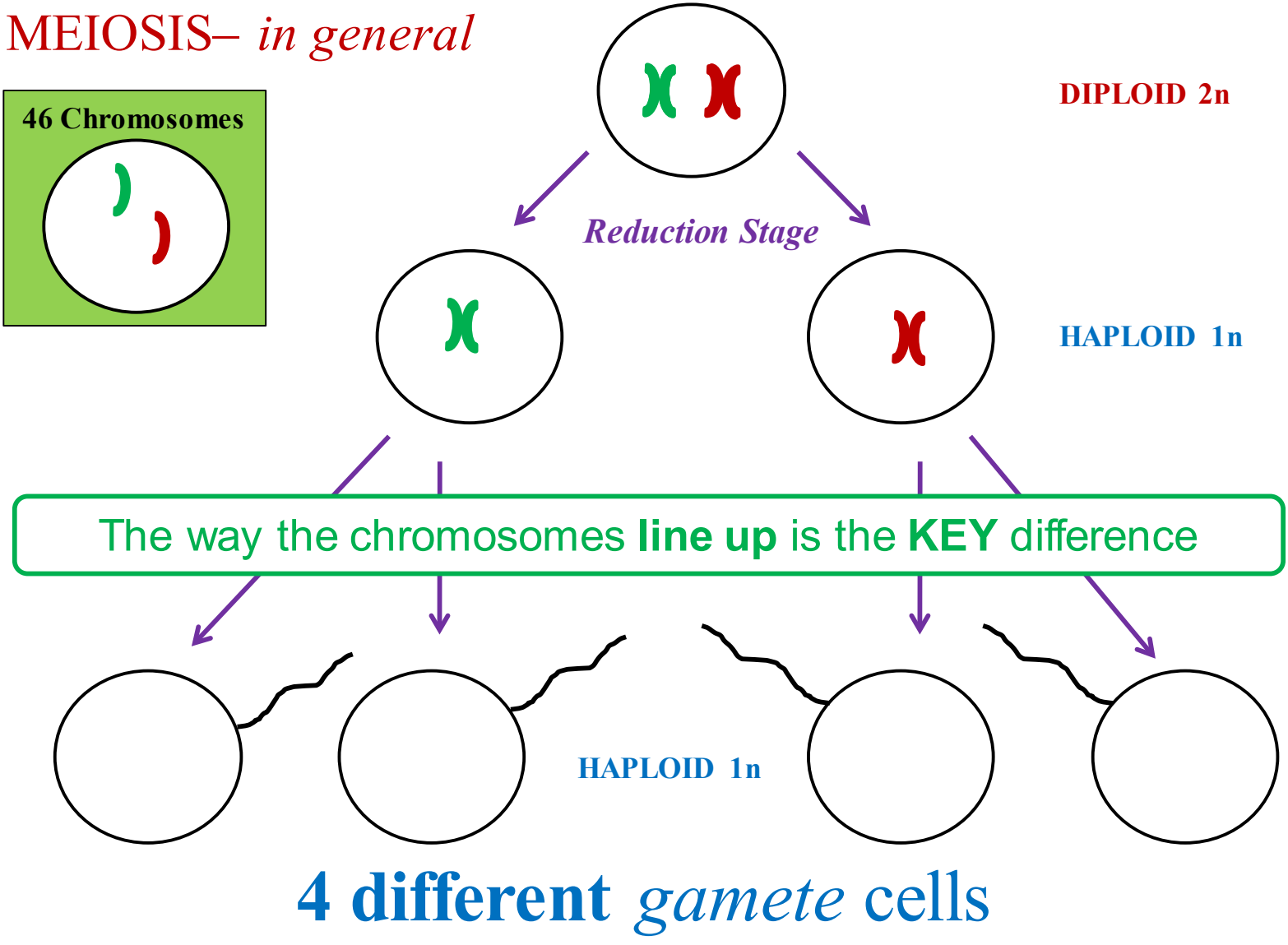
DIPLOID 2n



DIPLOID 2n

2 identical **diploid** *daughter* **cells**

MEIOSIS– *in general*

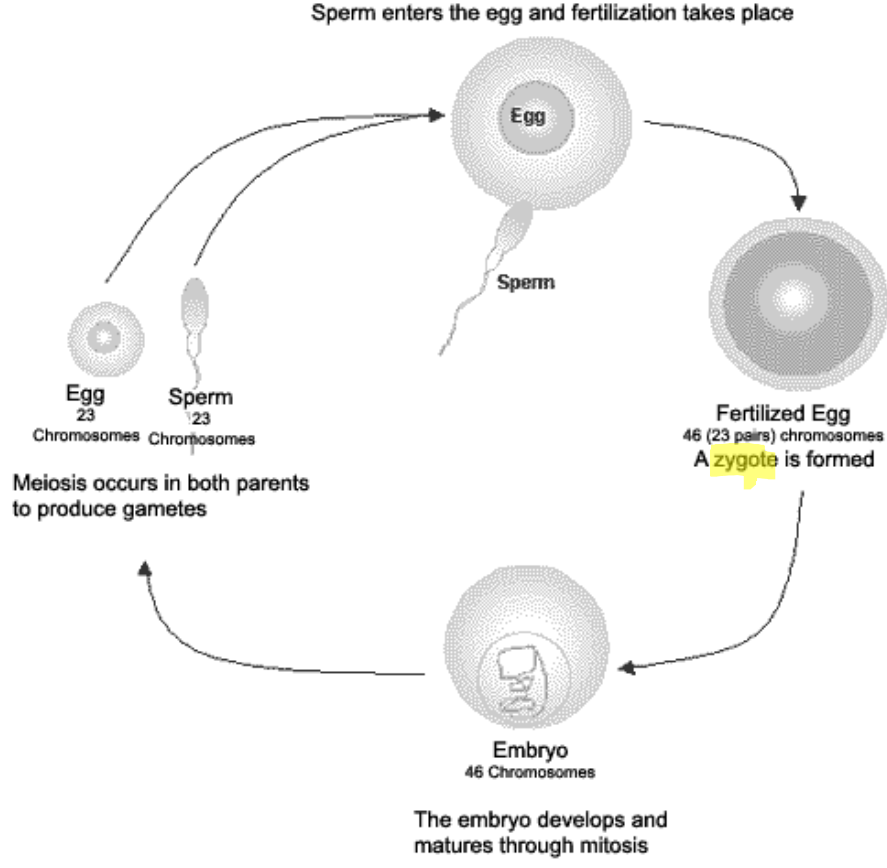


4 different *gamete* cells

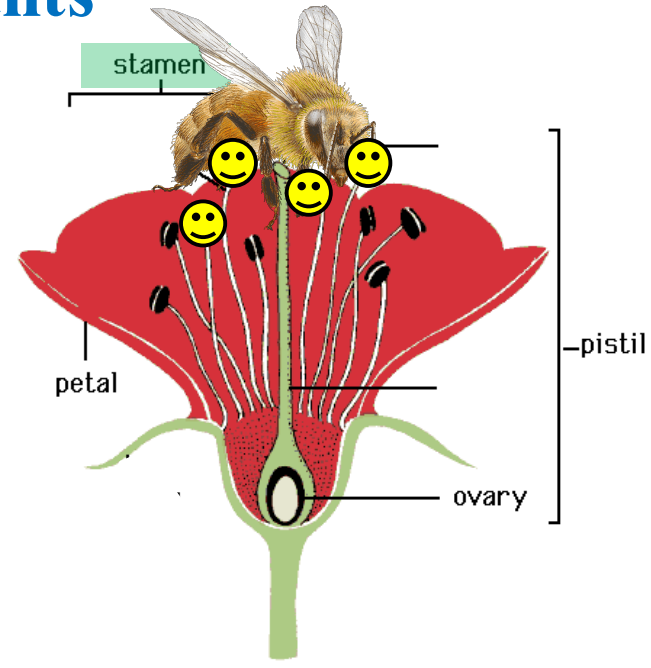
Sexual reproduction:

- *Sperm* **combines** with the *egg* - ***fertilization***
- Gametes combine to form a **zygote**

After fertilization:
Mitosis *is used to grow from a single cell into a baby.*



Plants

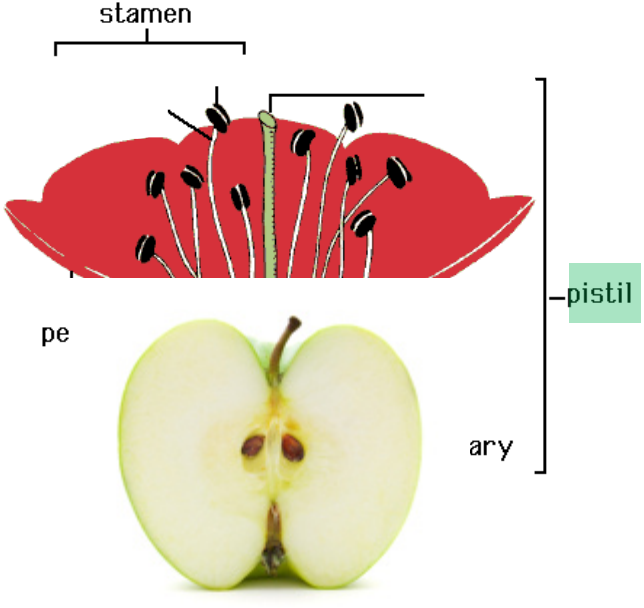


Male gamete – **pollen**

(*ON stamen*)

Female gamete – **eggs**

(*IN pistil*)



- Seeds are the zygotes
- **Ovary** develops into ***fruit***

PROS – Asexual Reproduction – CONS

Large number of offspring *made very quickly*	**No diversity in organisms** *clones are vulnerable to disease/environment*
Each offspring will be successful *clones are well adapted*	**Little possibility for evolution** *clones are identical*
Stay close together *colonies build if nutrients are present*	**Can lead to overcrowding** *starvation if not enough nutrients*
No need to waste energy finding a sexual partner	?

PROS – Sexual Reproduction – CONS

Good Bad

PROS	CONS
High variation in offspring *less vulnerable to outside threats*	**More complex = More mistakes** *increased mutations and errors*
More variety = More evolution *superior offspring likely to carry on*	**No guarantees of success** *unpredictable offspring*
Two "parents" *better offspring care and protection*	**Takes time** *Finding mate / fertilization*
?	**Takes energy** *Making gametes / attracting mate*

CAN YOU ANSWER THESE QUESTIONS?

S1-1-05:

What role do gametes play in reproduction?

Vocabulary & *Concepts*

Genetic Diversity

Gamete	Diploid	Haploid
Meiosis	Homologous pair	