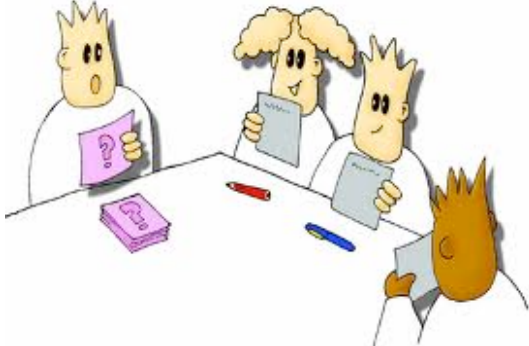


# Meiosis

Cells Division in Reproductive  
Cells



Which traits do you have that are unique to you compared to your siblings?

Which traits do you have that are not in your parents?

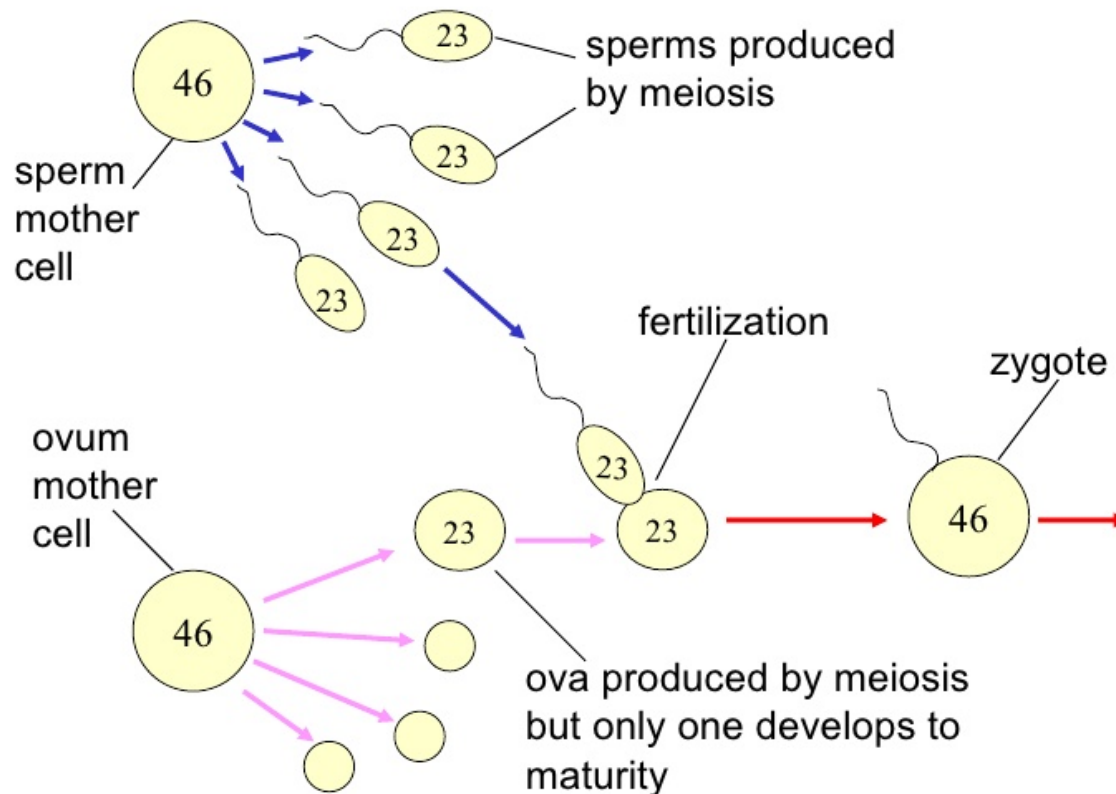
# How Reproductive Cells are Produced ?

**Meiosis** - process of making gametes (sex cells)

- results in **half** the number of chromosomes in cells

**haploid = 1n**

15



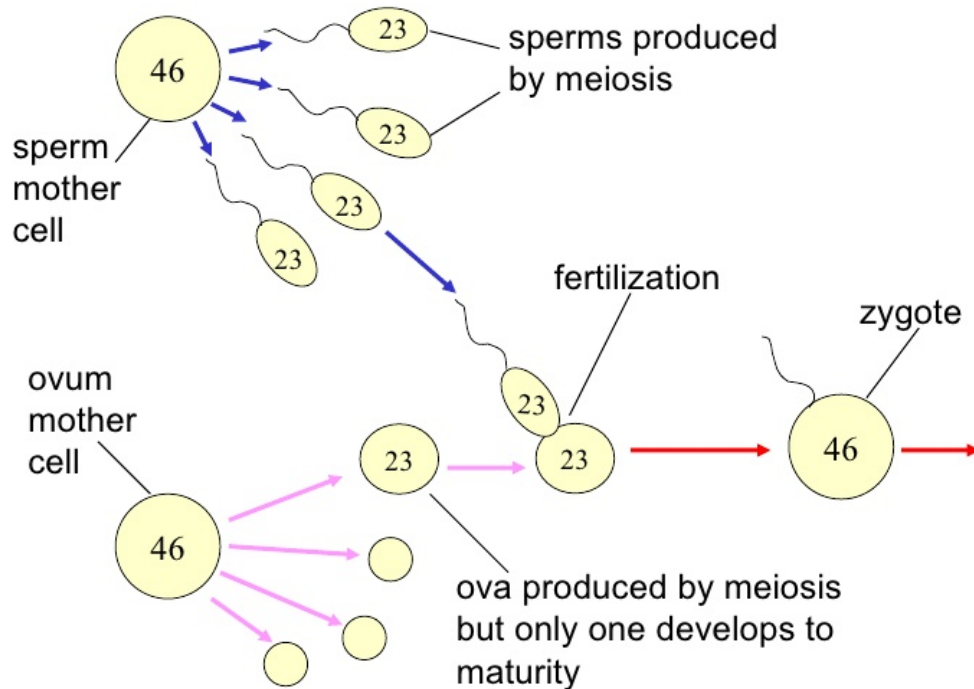
# How Reproductive Cells are Produced ?

Oogenesis - making of egg cells in female ovaries

Spermatogenesis- making sperm in male testis

15

## Spermatogenesis

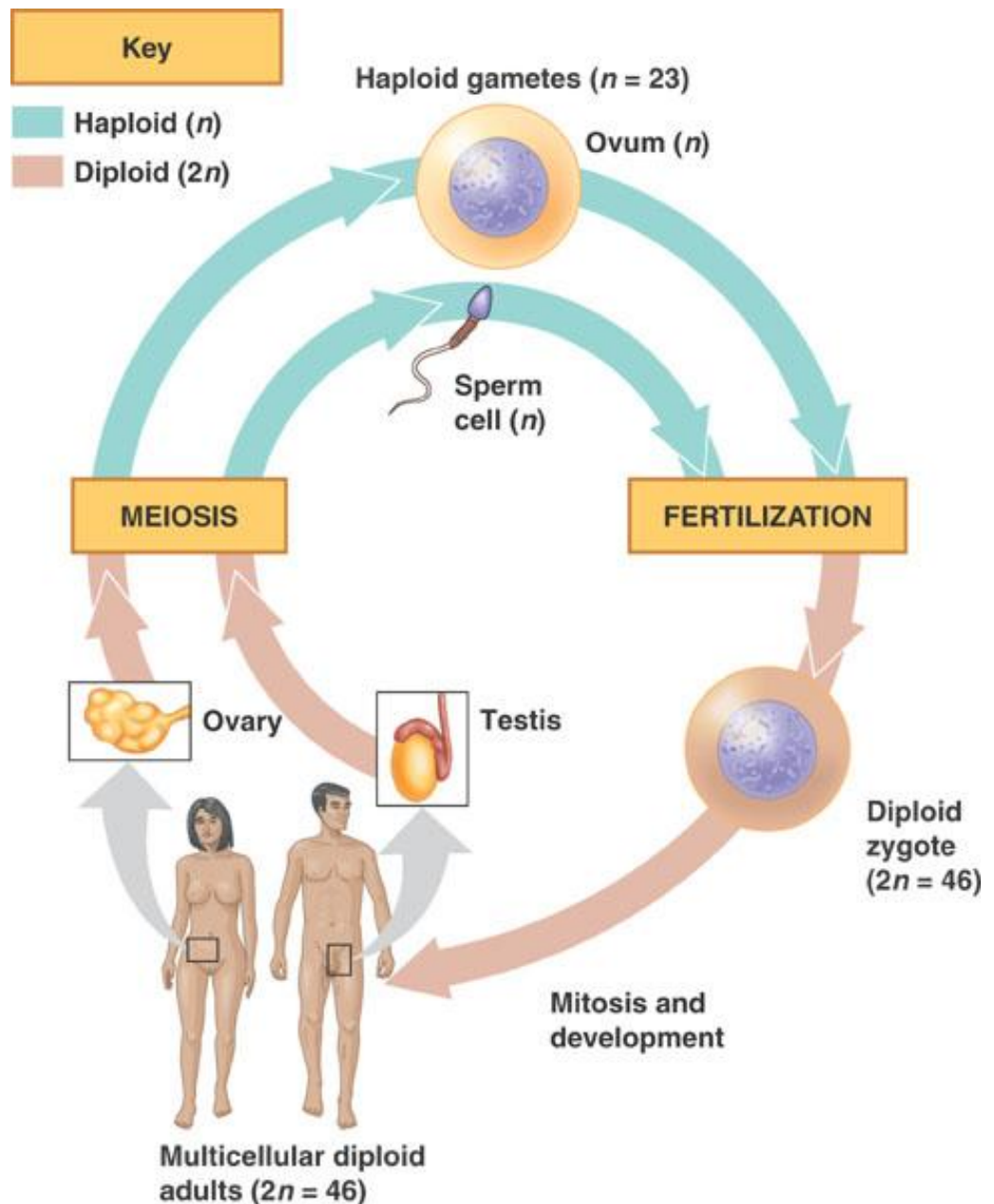


## Oogenesis

Union of gametes  
returned cells to  
**Diploid = 2n**

**\*\*fertilization\*\***

1/2 chromosomes  
from father +  
1/2 chromosomes  
from mother =  
**diploid**





Are the following cells haploid (1N) or diploid (2N)?

A liver cell?

An unfertilized egg (ovum)?

A **zygote** (fertilized egg)?

A child?

A brain cell?

A sperm cell?

A pollen grain?

An apple seed?

How many chromosomes are found in each?

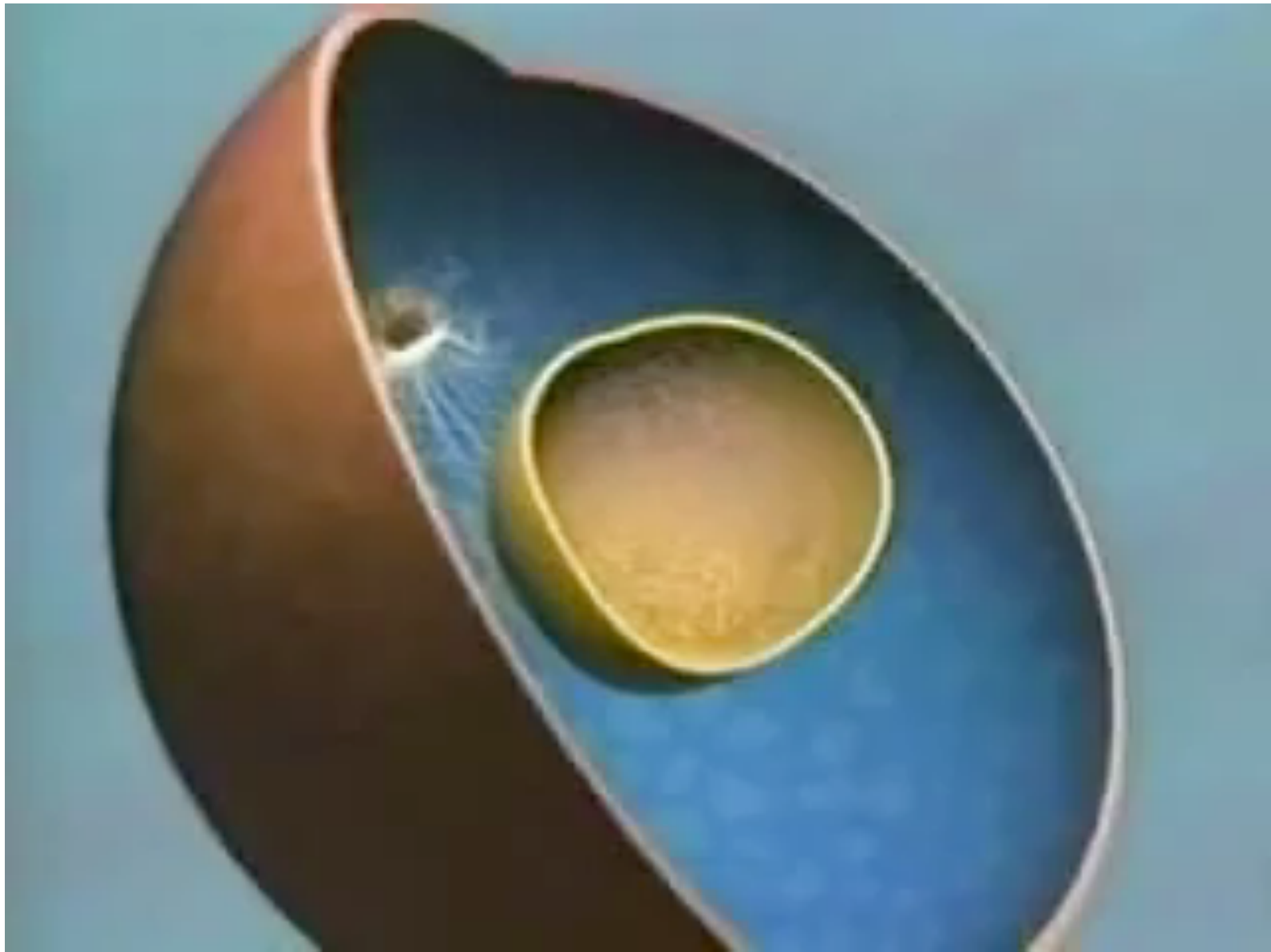
A liver cell?

An unfertilized egg (ovum)?

A **zygote** (fertilized egg)?

A child?



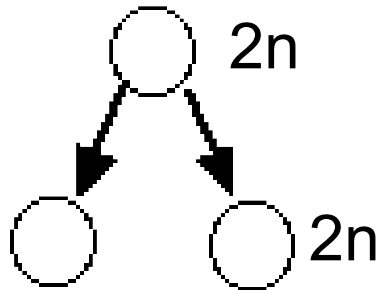


# Stages of Meiosis

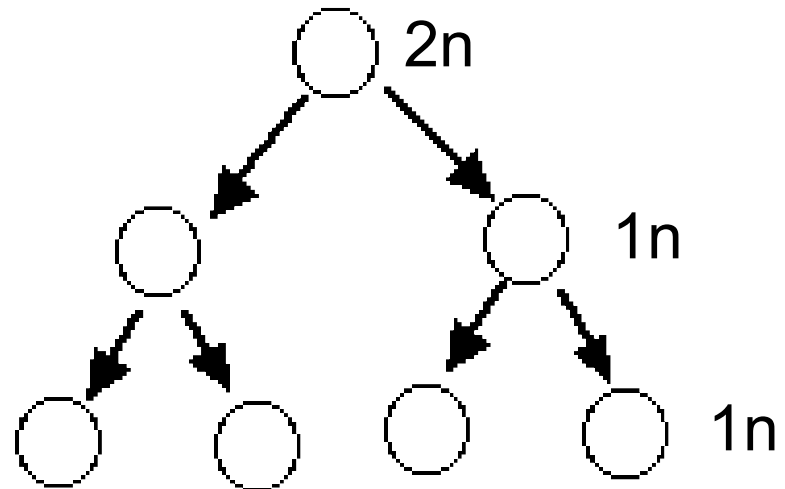
Occurs in two divisions (meiosis I & meiosis II)

End result---> 4 haploid cells

**mitosis**



**meiosis**



Get a Comparison sheet....

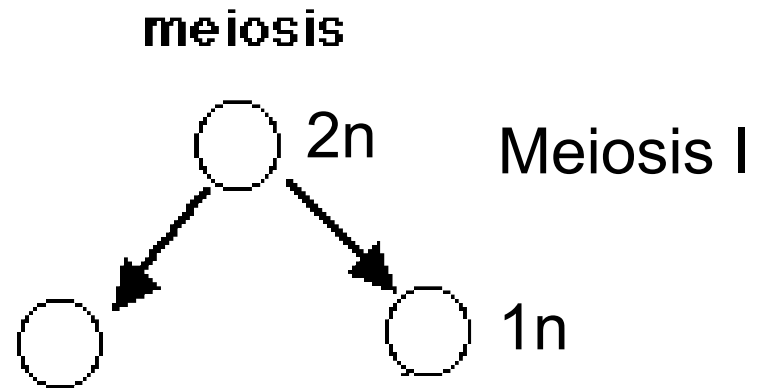
# Meiosis I



# Stages of Meiosis

## meiosis I

= reduction stage since chromosomes are reduced to  $1n$  from  $2n$



# Stages of Meiosis

## meiosis I

= reduction stage since chromosomes are reduced to  $1n$  from  $2n$

## meiosis II

- sister chromatids separate



# Complete the chart!

	<b><i>Chromosomes Number</i></b>	<b><i>Chromatid Number</i></b>
<b><i>Prophase I</i></b>		
<b><i>Metaphase I</i></b>		
<b><i>Anaphase I</i></b>		
<b><i>Telophase I</i></b>		
<b><i>Prophase II</i></b>		
<b><i>Metaphase II</i></b>		
<b><i>Anaphase II</i></b>		
<b><i>Telophase II</i></b>		

# MEIOSIS

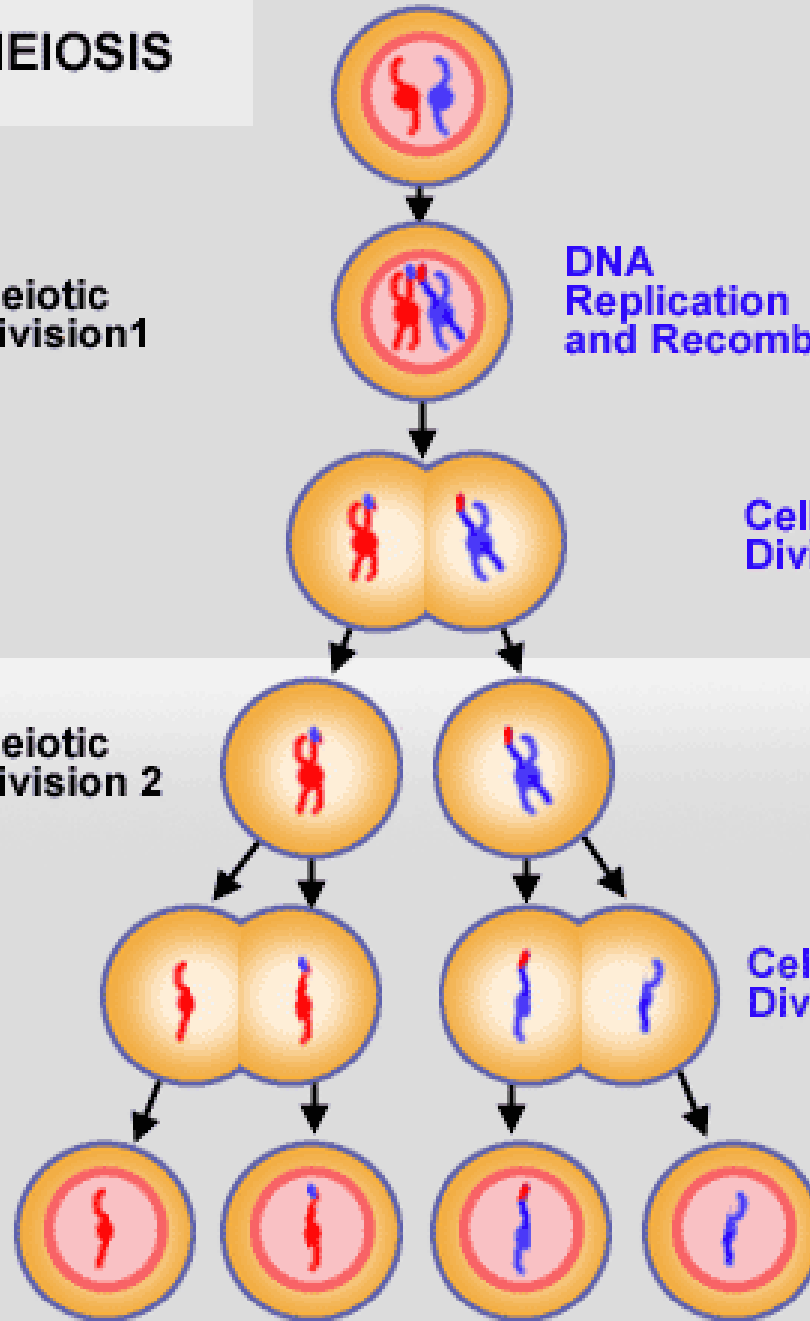
Meiotic  
Division 1

DNA  
Replication  
and  
Recombination

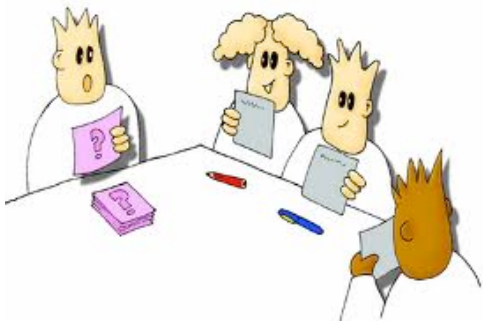
Cell  
Division 1

Meiotic  
Division 2

Cell  
Division 2







A fruit fly has 8 chromosomes  
in G1 of Interphase

What is the chromosome # of original cells of mitosis?

What is the chromosome # of original cells of meiosis?

What is the chromosome # of daughter cells of mitosis?

What is the chromosome # of daughter cells of meiosis?

What # of cells are produced in mitosis?

What # of cells are produced in meiosis?

What type(s) of cells involved in mitosis

What type(s) of cells involved in meiosis?

What is the ploidy of original cells in mitosis?

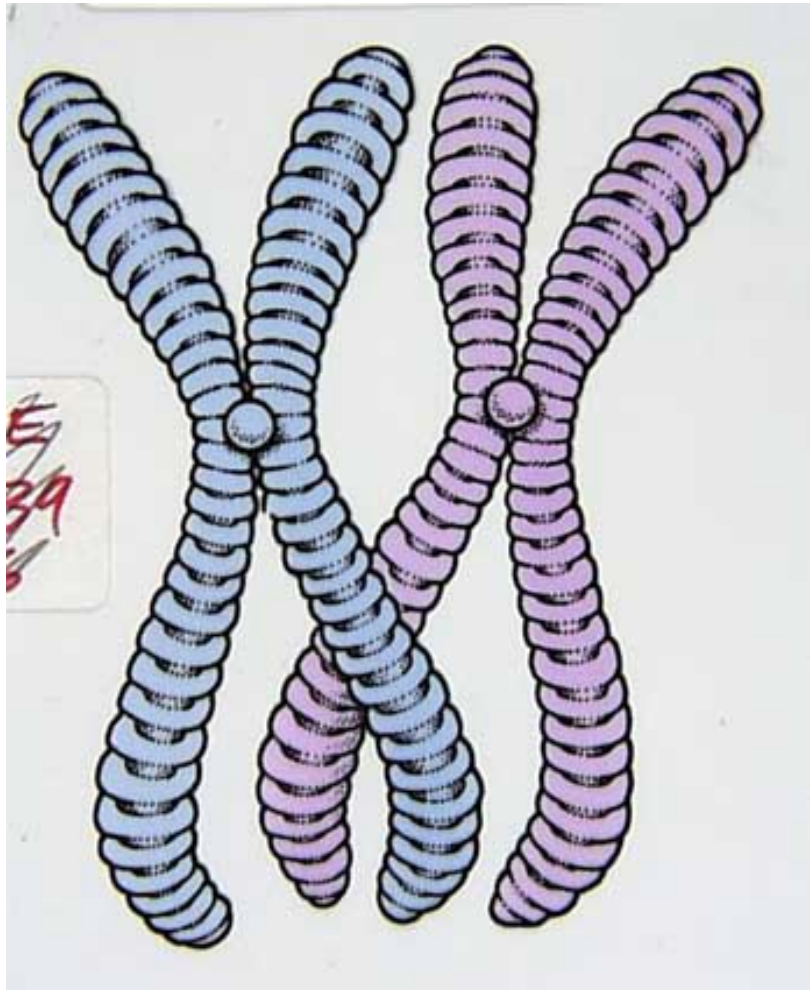
What is the ploidy of original cells in meiosis?

What is the ploidy of resulting cells in mitosis?

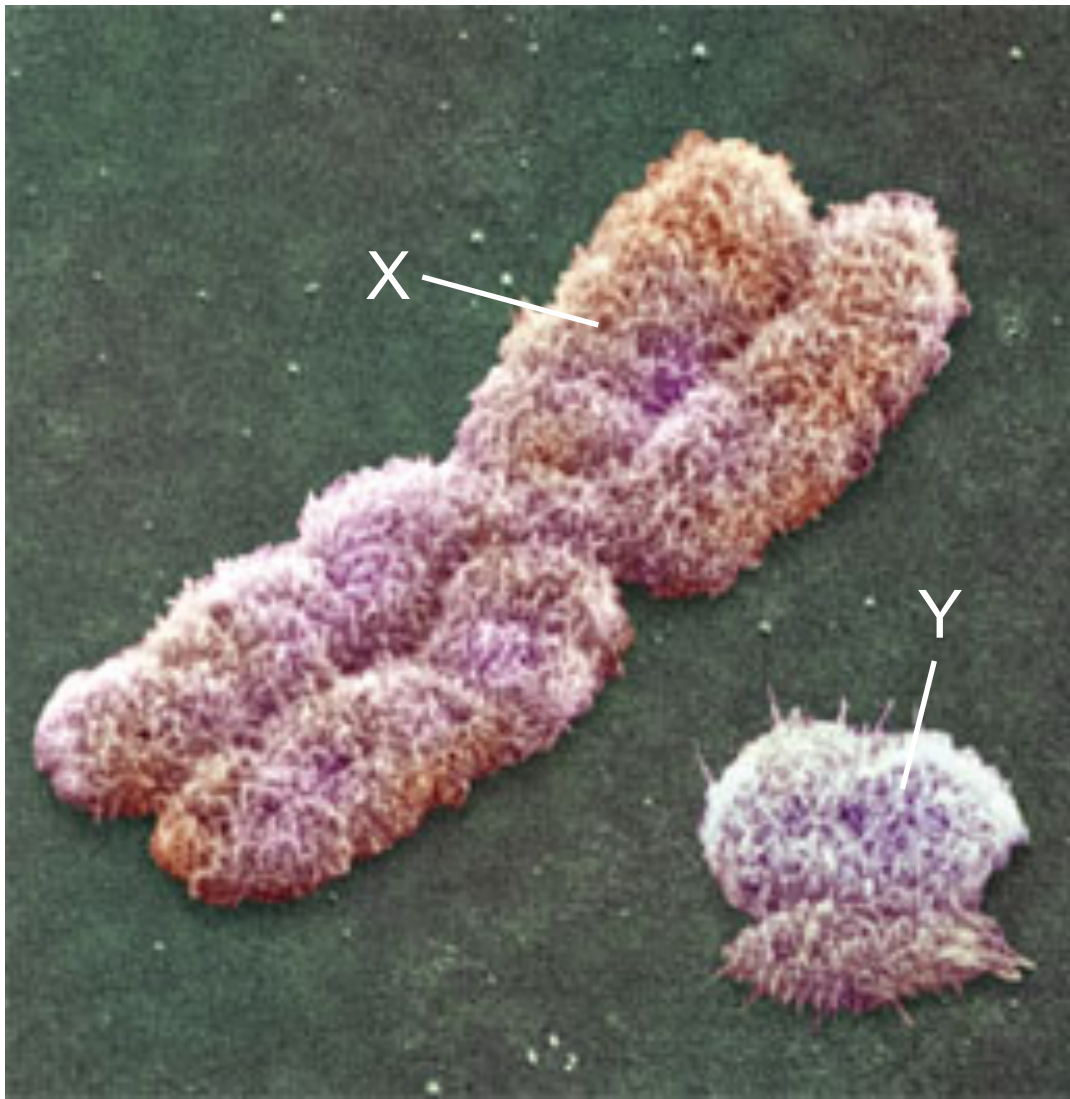
What is the ploidy of resulting cells in meiosis?

# Homologous Chromosomes

## Bivalents



- not genetically identical
- One originated from the father, one from the mother.
- they code for the same genes (hence the banding pattern is the same)
- during prophase I they come together and for **BIVALENTS**



# Why is Variation Important?

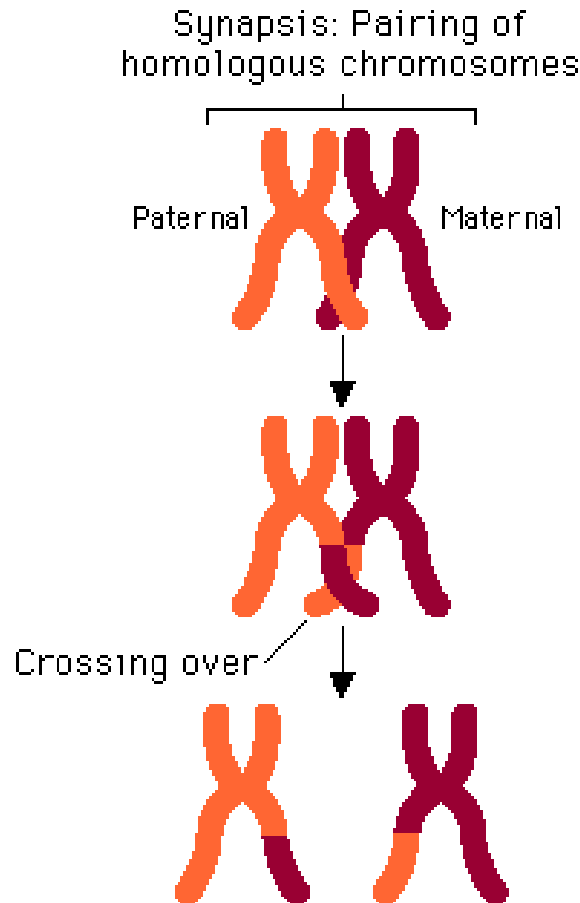
- variation in genes allow organisms to survive different circumstances



# Variation in Sexual Reproduction

How is variation in chromosomes created during meiosis?

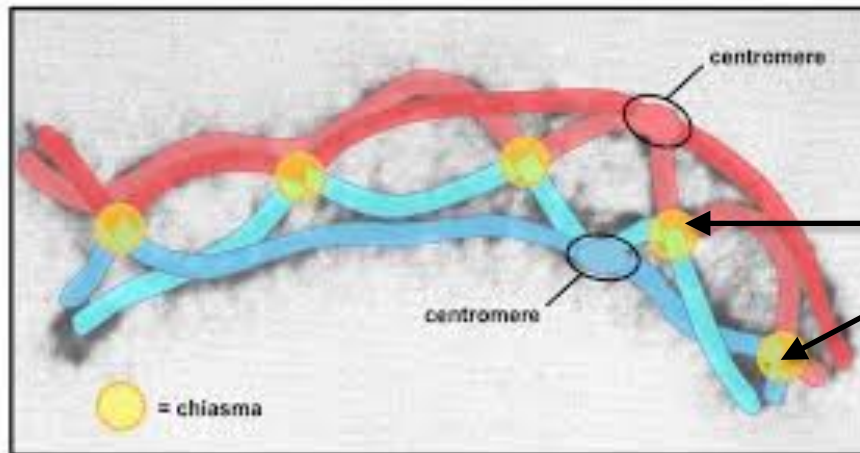
## 1. Crossing over





Centromere of one homologue chromosome

## SYNAPSES of homologous chromosomes



Chiasma

Answer: There are **5** chiasmata present between these homologous chromosomes

*in this case, crossing over can happen more than once*

# Variation in Sexual Reproduction

How is variation in chromosomes created during meiosis?

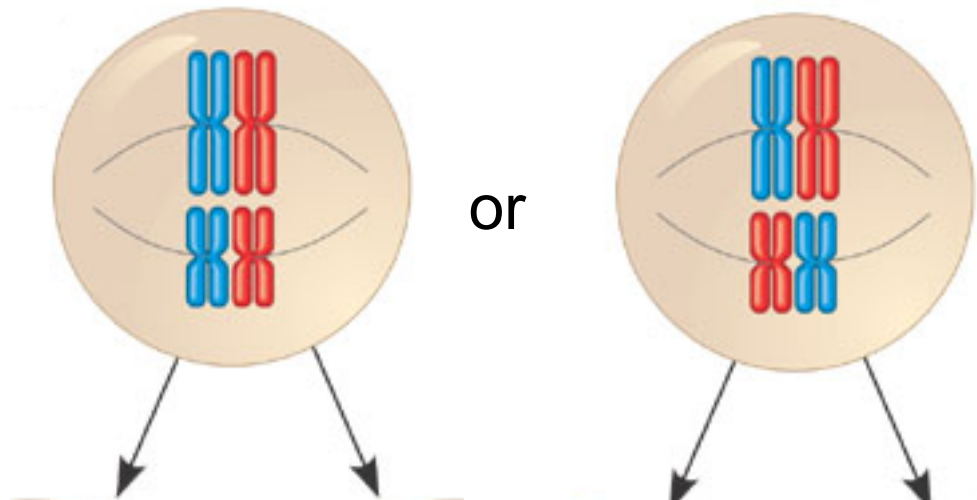
## 1. Crossing over

- during Prophase I tetrads of homologous chromosomes are formed (an event called **Synapses**)
- non sister chromatids wind around each other forming **Chiasma** or points where exchange of segments of chromosomes occurs
- resulting in new genetic combinations formed

# Variation in Sexual Reproduction

How is variation in chromosomes created during meiosis?

## 2. Independent assortment



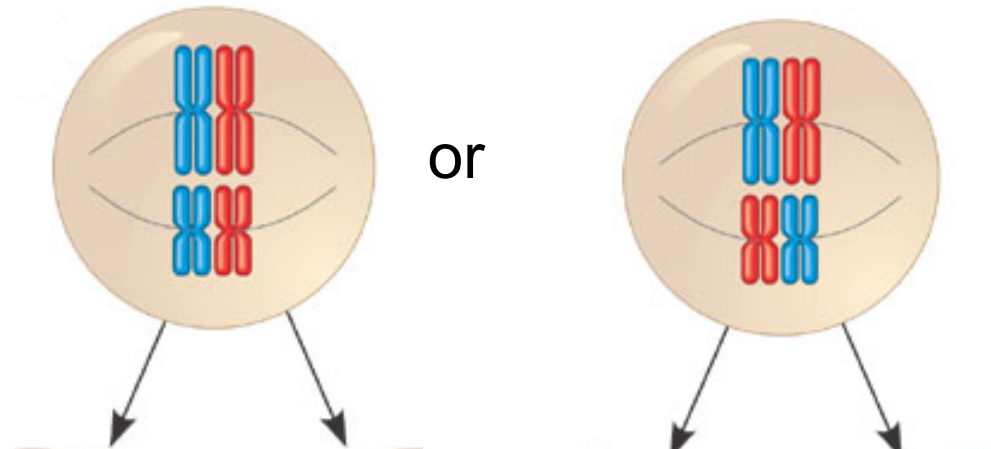


# Variation in Sexual Reproduction

How is variation in chromosomes created during meiosis?

## 2. Independent assortment

- during metaphase I when homologous chromosomes line up at poles



# Variation in Sexual Reproduction

How is variation in chromosomes created during meiosis?

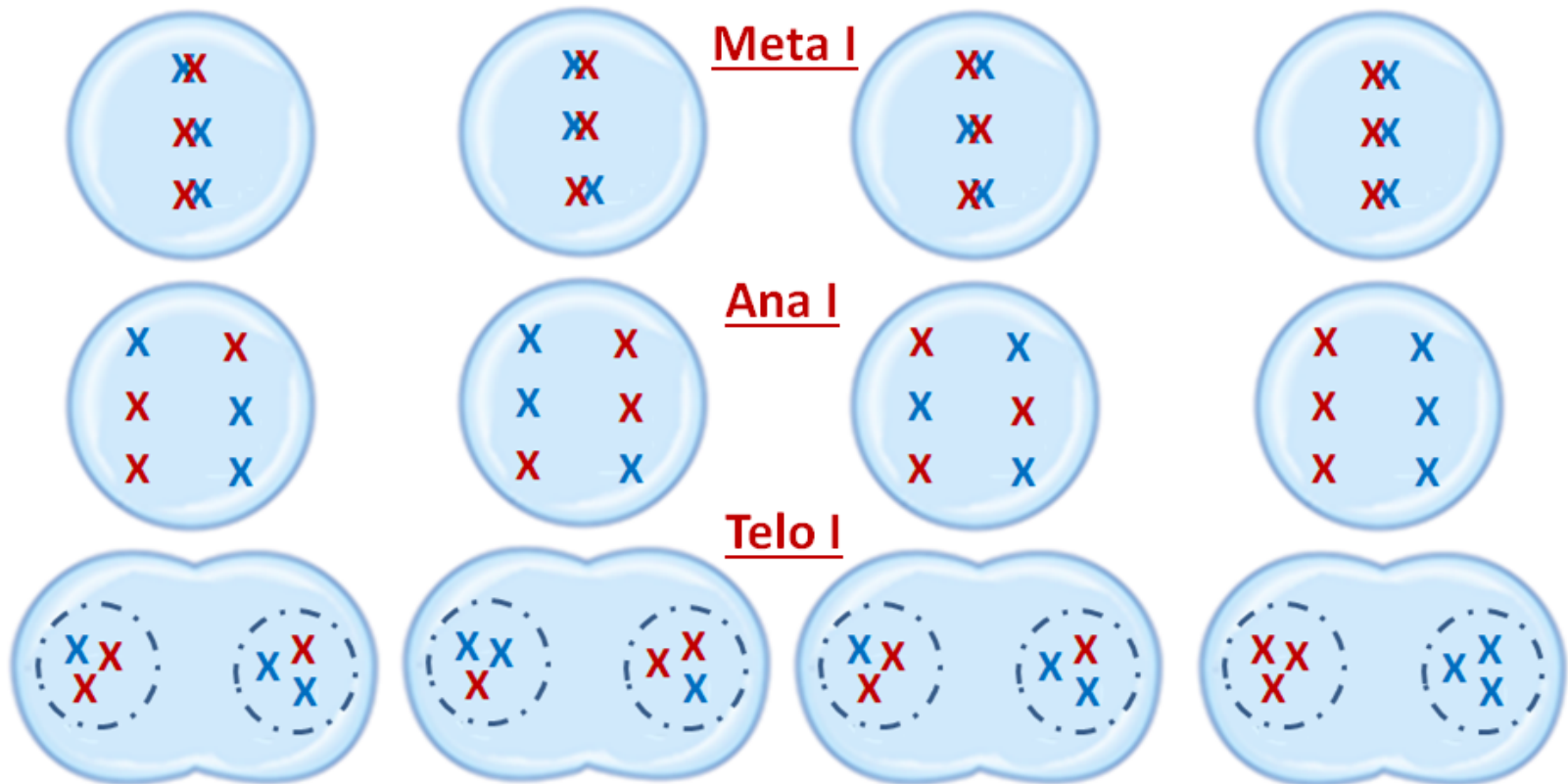
## 2. Independent assortment

- during metaphase I when homologous chromosomes line up at poles
- homologous chromosomes line up independently
  - > that is, 'maternal' chromosomes & 'paternal' chromosomes line up randomly

# Variation in Sexual Reproduction

## Independent assortment in Anaphase I

leads to different combinations of chromosomes in gametes



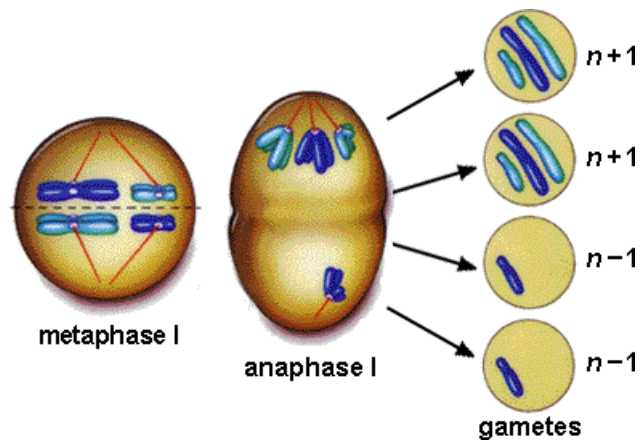
Each gamete can be a different combination of **maternal** and **paternal** chromosomes depending on the orientation of homologous pairs in metaphase I

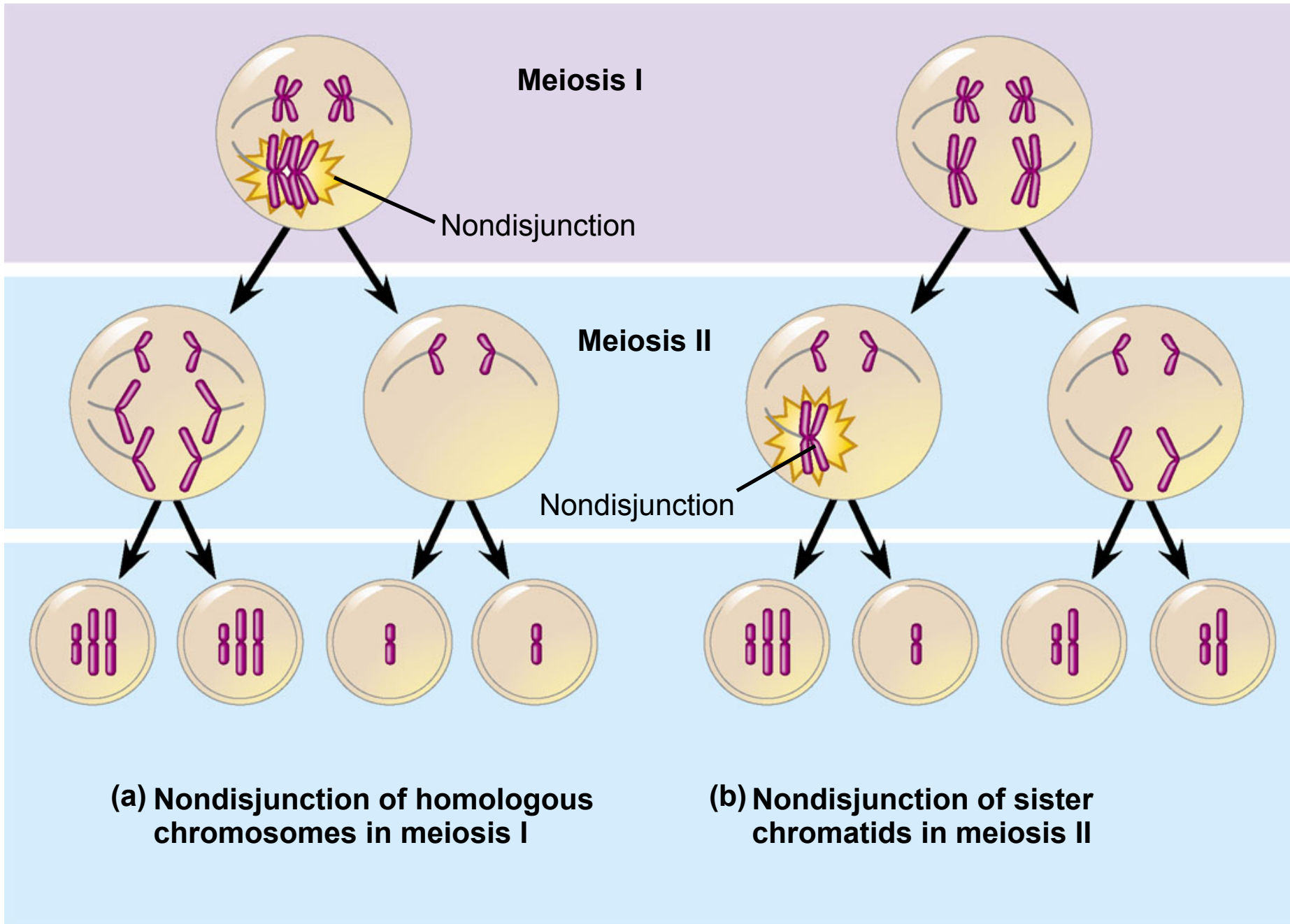
# Errors can occur in Meiosis

- mutations can occur and are often detrimental

## Nondisjunction

- failure of chromosomes to separate properly
- results in a missing or an extra chromosome in a gamete cell





**Meiosis I**

Nondisjunction

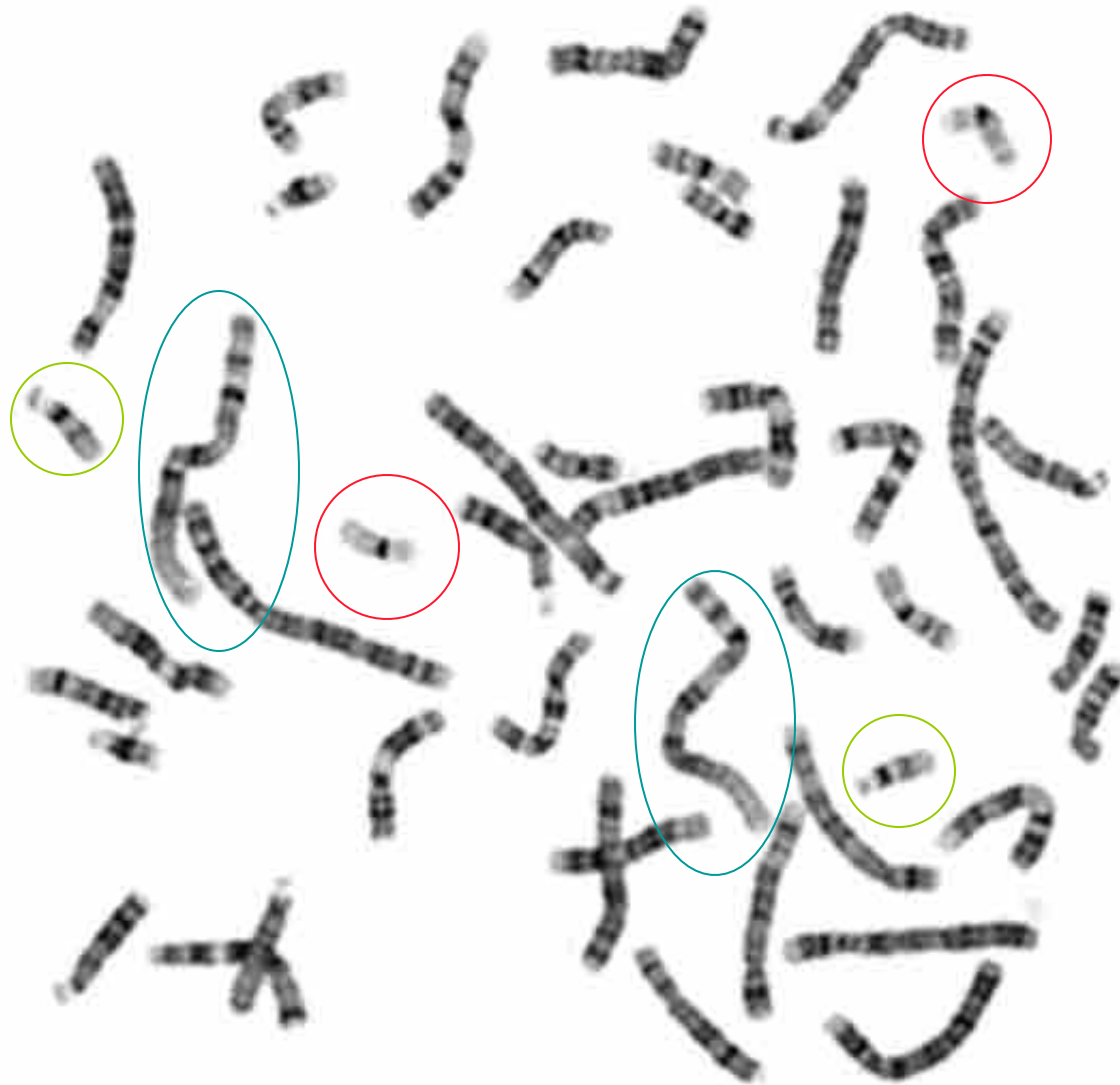
**Meiosis II**

Nondisjunction

**(a) Nondisjunction of homologous chromosomes in meiosis I**

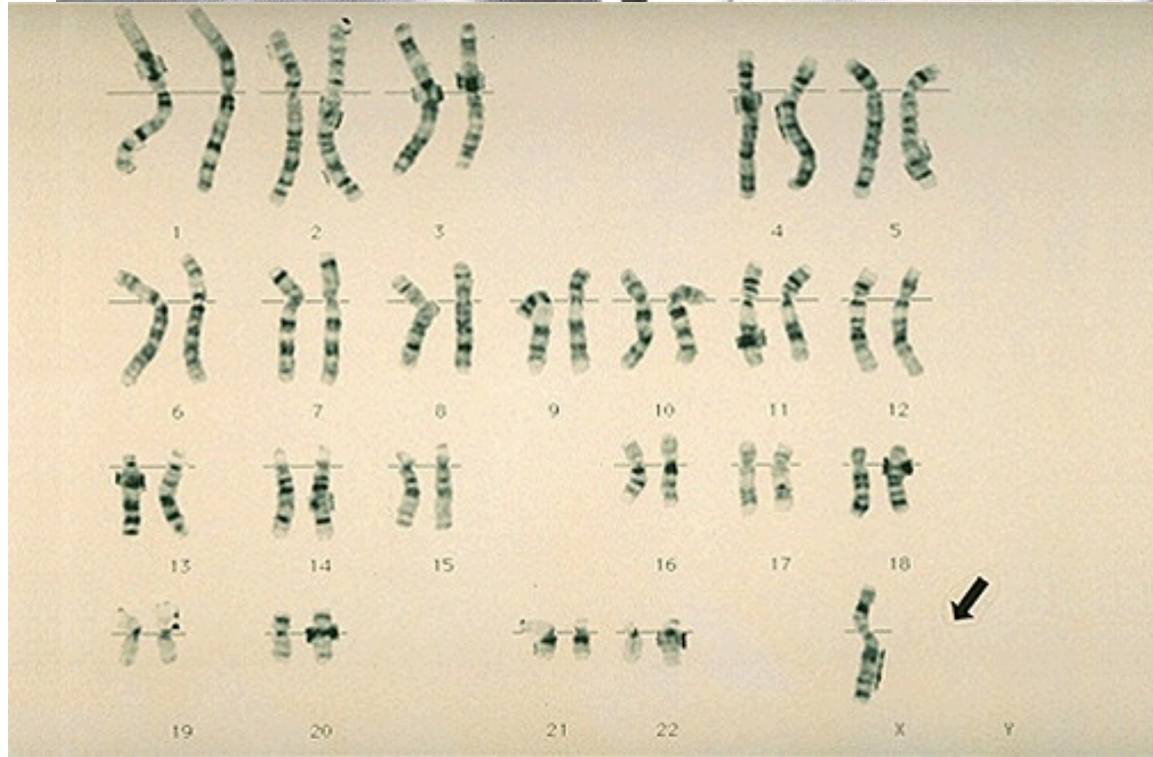
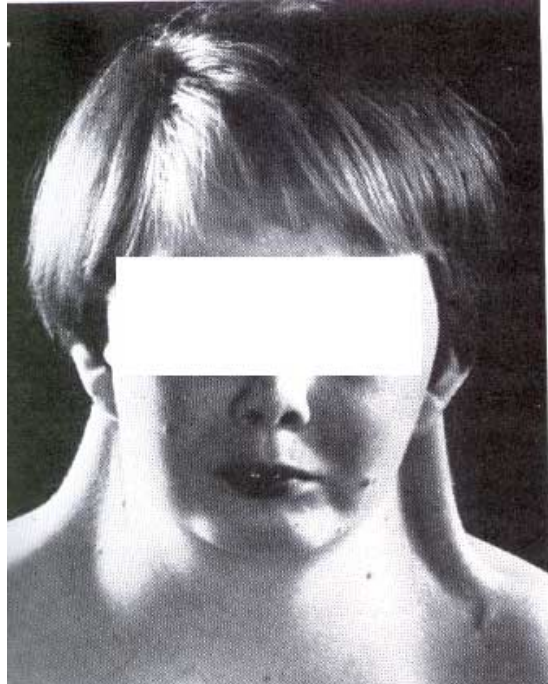
**(b) Nondisjunction of sister chromatids in meiosis II**

# Karyotype Charts



# Karyotype Charts

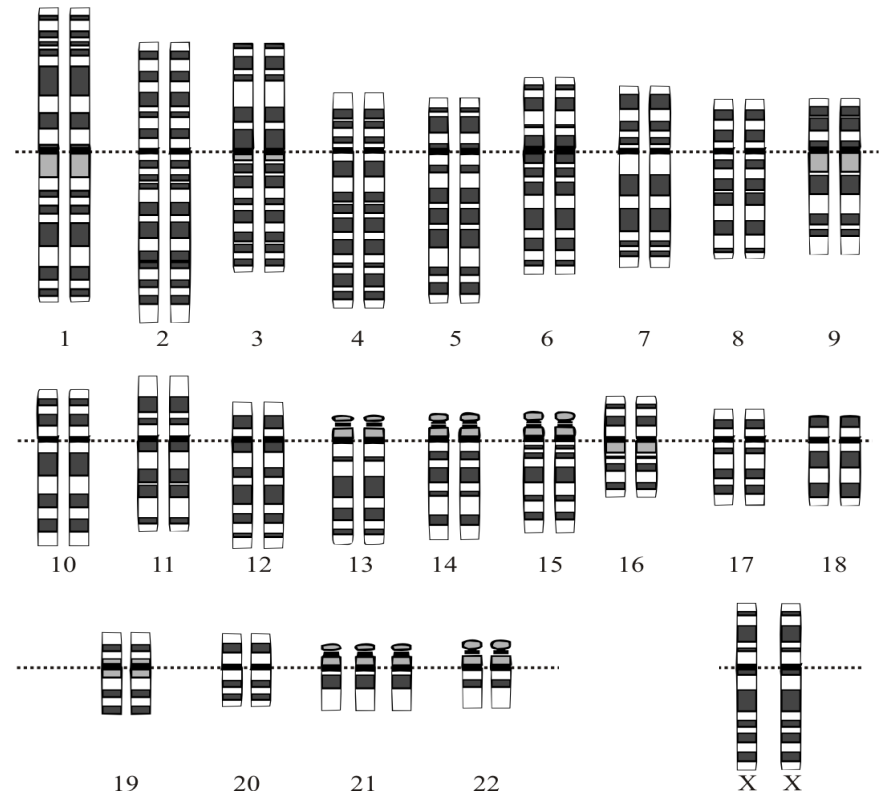






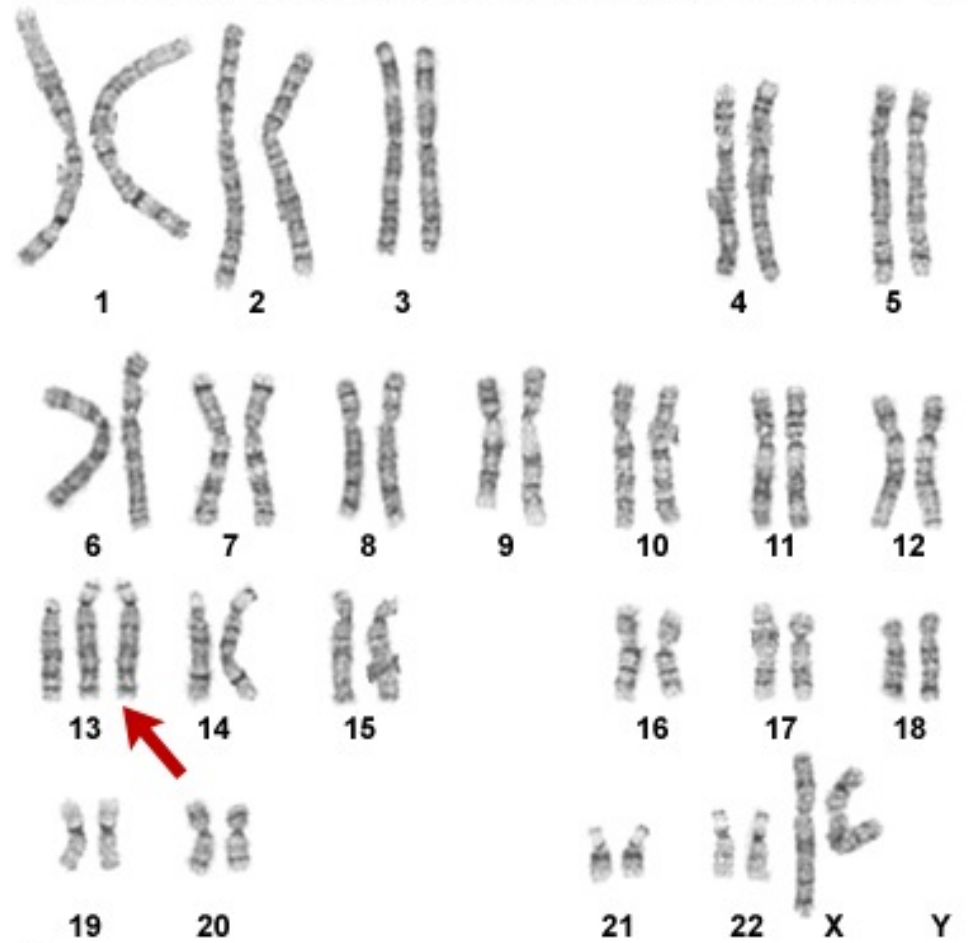
# Errors can occur in Meiosis

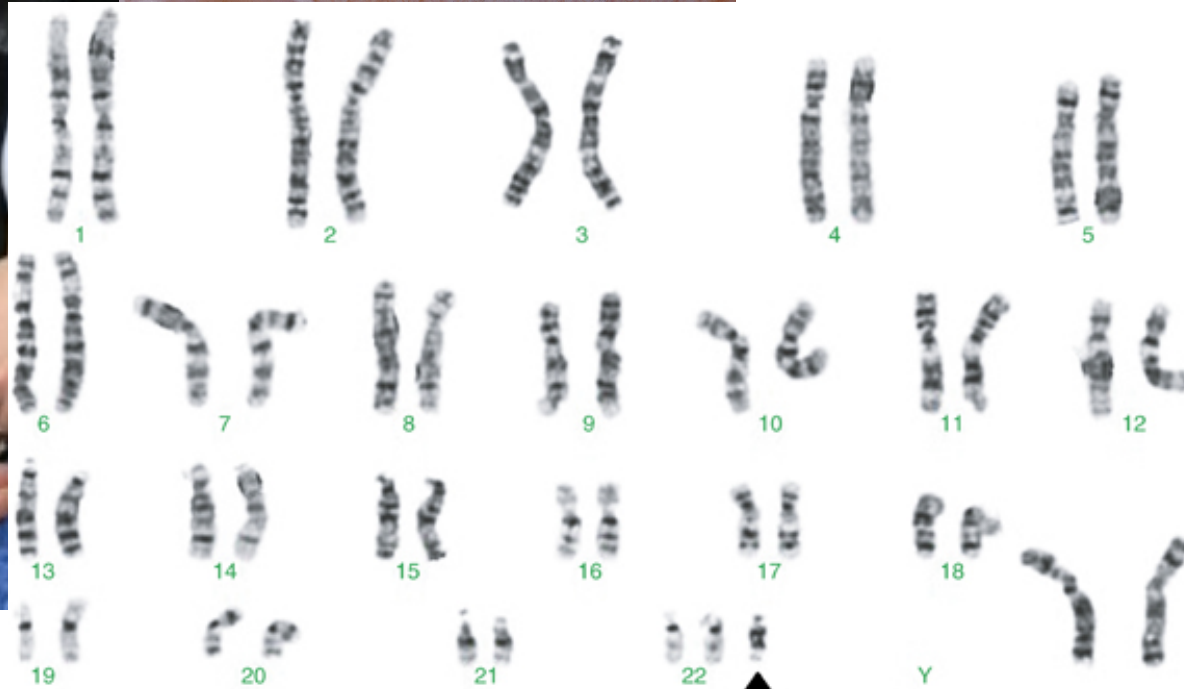
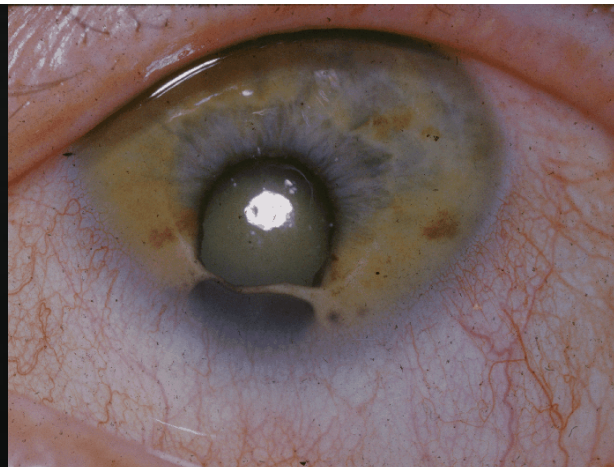
»





Karyotype From a Female With Patau syndrome (47,XX,+13)





- Cat eye syndrome

47,XX,+mar.ish psudic(22:22)(q11.2q11.2  
D14Z1/D22Z1++,D22Z4++,D22S75-)

# Homework

Read section 3.3

Data Based question 167/8

Data Based Question on Page 159