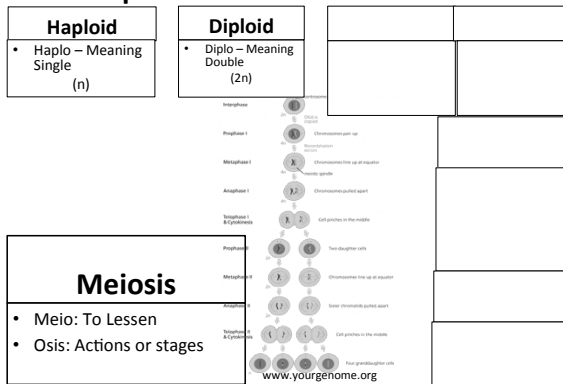
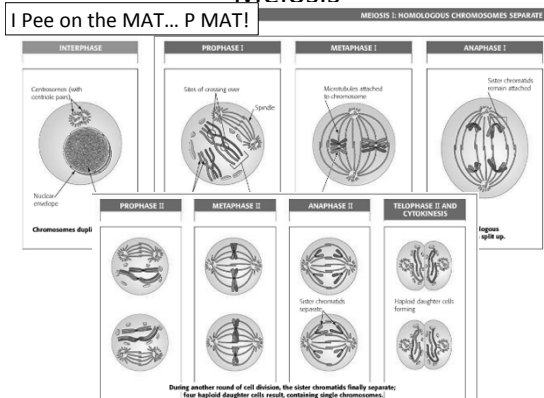


Important Word Roots

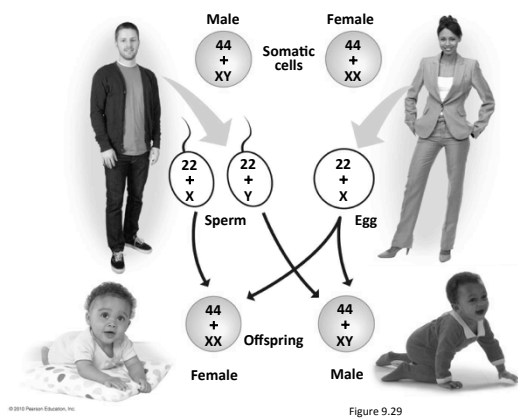
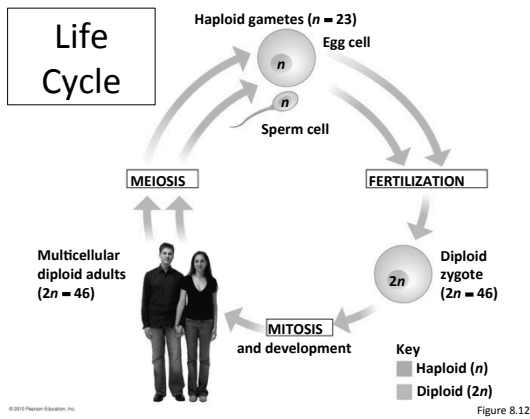
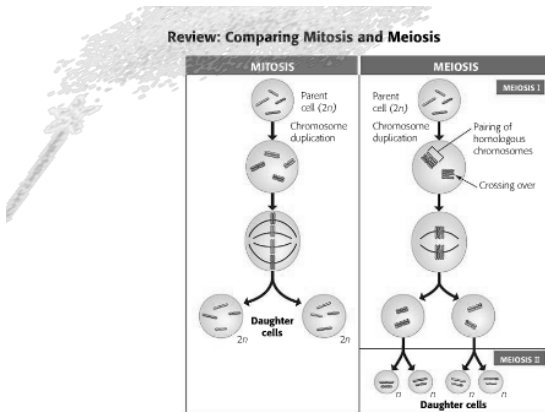


Meiosis

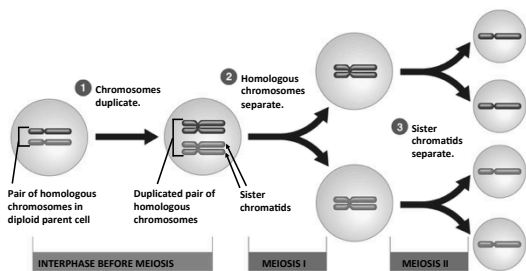


Important Latin Roots

Meioun	Mei	Tosis	Haplo	Di	Oid
• Lessen	• Small	• Process	• Single	• 2	<ul style="list-style-type: none"> “resembling,” “like” Greek: Eides – “Having the form of”



Without methods to increase Genetic Diversity many of the same sperm or egg would be produced



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Figure 8.13-3

The Origins of Genetic Variation

–You are not exactly like your parents or your siblings

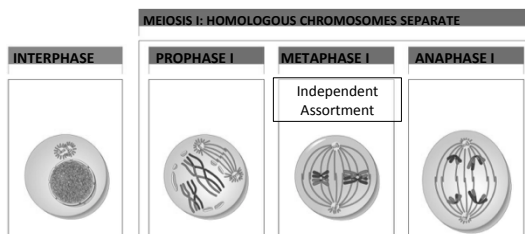
Why?

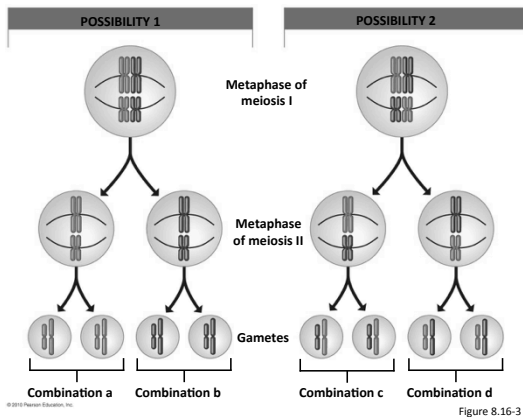
1. Independent Assortment of Chromosomes
2. Crossing Over
3. Random Fertilization

1. Independent Assortment of Chromosomes

– When aligned during metaphase I of meiosis, the orientation of each homologous pair of chromosomes is a matter of chance.

- Every chromosome pair orients independently of the others



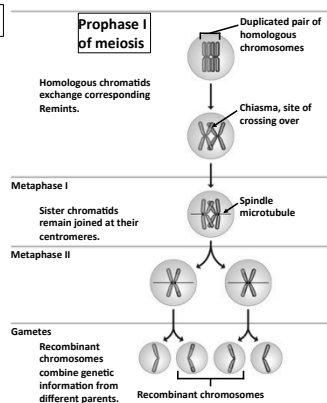


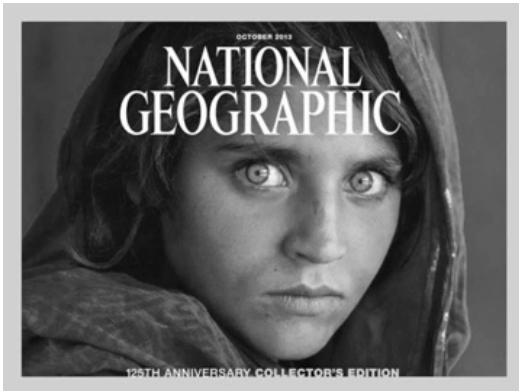
- For any species the total number of chromosome combinations that can appear in the gametes due to independent assortment is:
 - 2^n where n is the haploid number.
- For a human:
 - $n = 23$
 - $2^{23} = 8,388,608$ different chromosome combinations possible in a gamete

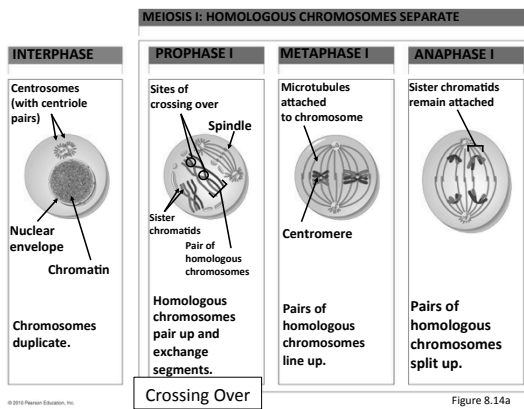
2. Crossing Over

In **crossing over**:

- Homologous chromosomes exchange genetic information
- **Genetic recombination**, the production of gene combinations are different from those carried by parental chromosomes







3. Random Fertilization

- A human egg cell is fertilized randomly by one sperm, leading to genetic variety in the zygote.
- If each gamete represents one of 8,388,608 different chromosome combination at fertilization, humans would have $8,388,608 \times 8,388,608$, or more than **7 trillion**, different possible chromosome combination

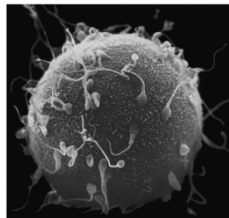
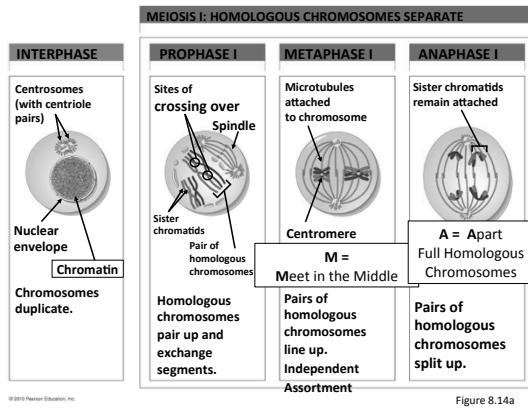
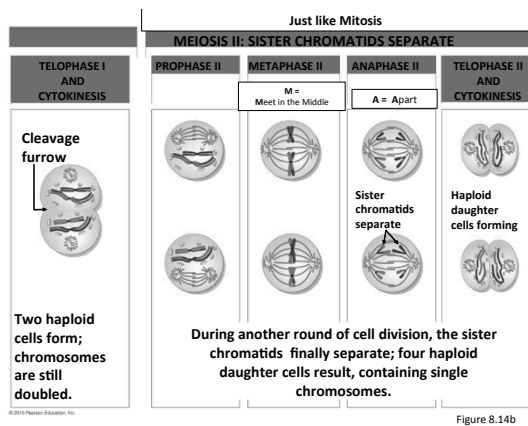


Figure 8.17



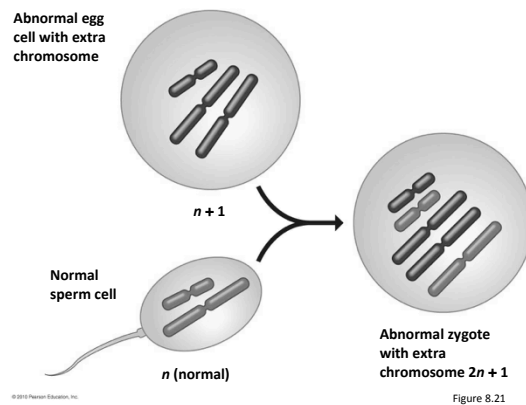
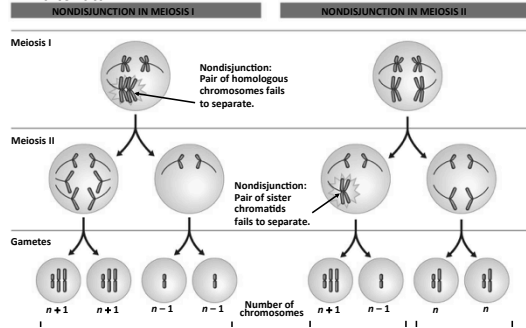


Errors in Meiosis

1. Non-Disjunction
2. Crossing Over

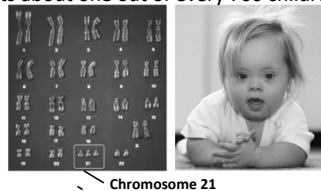
When Meiosis Goes Awry

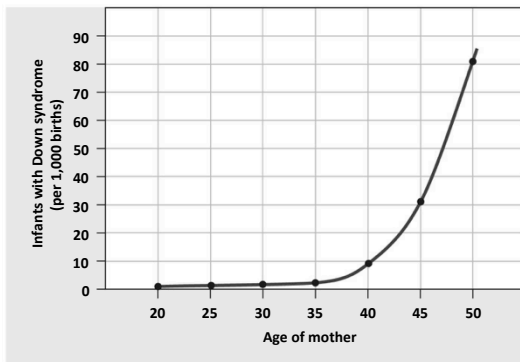
- What happens when errors occur in meiosis?
- Such mistakes can result in genetic abnormalities that range from mild to fatal.



Down Syndrome: An Extra Chromosome 21

- **Down Syndrome:**
 - Is also called **trisomy 21**
 - Is a condition in which an individual has an extra chromosome 21
 - Affects about one out of every 700 children





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Figure 8.23

Sex Chromosomes	Syndrome	Origins of Nondisjunction	Frequency in Population
XYY	Klinefelter syndrome (male)	Meiosis in egg or sperm formation	1/2,000
XYY	None (normal male)	Meiosis in sperm formation	1/2,000
XXX	None (normal female)	Meiosis in egg or sperm formation	1/3,000
XO	Turner syndrome (female)	Meiosis in egg or sperm formation	1/2,500

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Table 8.1

Evolution Connection: The Advantages of Sex

- Asexual reproduction conveys an evolutionary advantage when plants are:

Pros	Cons
1. _____	1. No _____
2. _____	



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Sexual Reproduction

– Sexual reproduction may convey an evolutionary advantage by:

Pros	Cons
1. _____ _____ _____	1. _____ _____
2. _____ _____ _____	2. _____ _____
