3.1.1.1. Asexual

3.1.1.1.1. offspring have same chromosomes as parents, are genetically identical

3.1.1.2. Sexual

3.1.1.2.1. Differences between the chromosomes of the offspring and the parents(genetic diversity)

3.1.2. Fertilization doubles the number of chromosomes each time it occurs

3.1.2.1. cause doubling of chromosome number every generation

3.1.2.2. halving of chromosome number happens during mitosis

3.2. Bivalents formation and crossing over

3.2.1. At the start of meiosis, homologous chromosomes pair up with each other

3.2.1.1. pair of homologous chromosomes is bivalent and the pairing process is called ""synapsis""

3.2.2. After synapsis a process called ""crossing over"" takes place

3.2.2.1. A junction is created where one chromatid in each of the homologous chromosomes breajs and rejoins with other chromatid

3.2.2.2. mutal exchange between the chromatids

3.2.2.3. chromatids with new combinations of alleles are produced

3.3. Random orientation of bivalents

3.3.1. Each chromosome is attached to one pole

3.3.2. Pole to which each chromosome is attached depends on which way the pair of chromosomes is facing(called orientation)

3.3.3. Orientation of bivalents is random

3.4. Meiosis and genetic variation

3.4.1. Caused by

3.4.1.1. Random orientation of bivalents

3.4.1.2. Crossing over

Crossing over and random orientation promotes genetic variation(Random orientation of bivalents, Crossing over)

3.5. Fertilization and genetic variation

3.5.1. fusion of gametes from different parent promotes genetic variation

3.5.1.1. genetic variation is essential for evolution

4. Transcription and gene expression

4.1. The direction of Transcription

4.1.1. occurs in 5' to 3' direction

4.1.2. Promoter

4.1.2.1. Transcription begins near this site

4.2. Nucleosomes regulate transcription

4.2.1. Histones

4.2.1.1. Proteins associated with DNA

4.2.1.2. Chemical modification of the tails of histones is an important factor in determining whether a gene will be expressed or not

5.4.3. Cytokinesis occurs

5.5. Prophase II

5.5.1. Chromosomes condense and become visible

5.6. Metaphase II

5.7. Anaphase II

5.7.1. Centromeres separate and chromatids are moved to opposite poles

5.8. Telophase II

5.8.1. Chromatids reach opposite poles

5.8.2. nuclear envelope forms

5.8.3. Cytokinesis occurs

6. Inheritance

6.1. Gametes

6.1.1. Gametes are cells that fuse together to produce a single cell

6.1.2. Gametes are haploid

6.2. Zygotes

6.2.1. Fusion of gametes results in zygotes

6.2.2. Zygotes are diploid, two alleles of each gene that may be same allele or different alleles

6.3. Segregation of alleles

6.3.1. During meiosis a diploid nucleus divides twice, producing four haploid nuclei