

Keystone Biology Remediation

B1: Cell Growth and Reproduction

Assessment Anchors:

- to describe the events that occur during the cell cycle: interphase, nuclear division (e.g. mitosis or meiosis), cytokinesis (B.1.1.1)
- to compare the processes and outcomes of mitotic and meiotic nuclear divisions (B.1.1.2)
- to describe how the process of DNA replication results in the transmission and/or conservation of genetic material (B.1.2.1)
- to explain the functional relationships between DNA, genes, alleles, and chromosomes and their roles in inheritance (B.1.2.2)

Unit Vocabulary:

allele

DNA

interphase

cell cycle

DNA replication

meiosis

chromosomes

gamete

nucleic acid

crossing over

gene

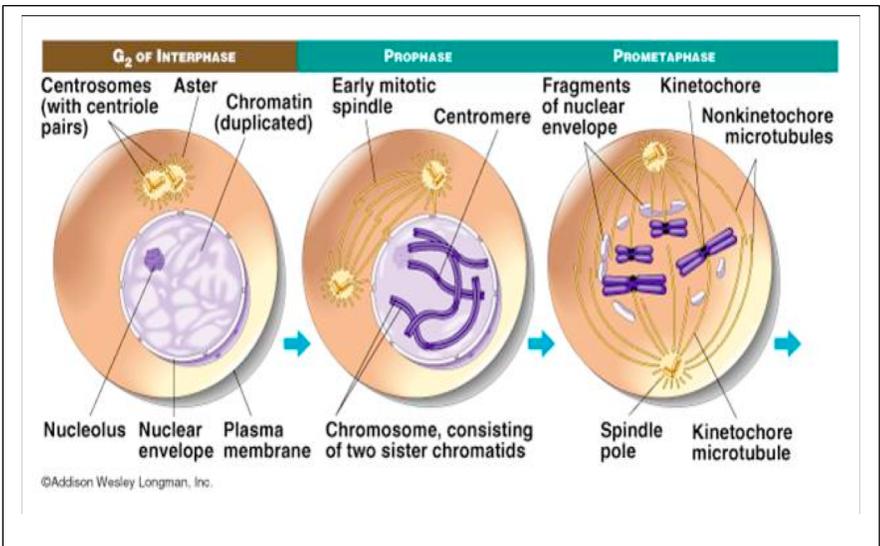
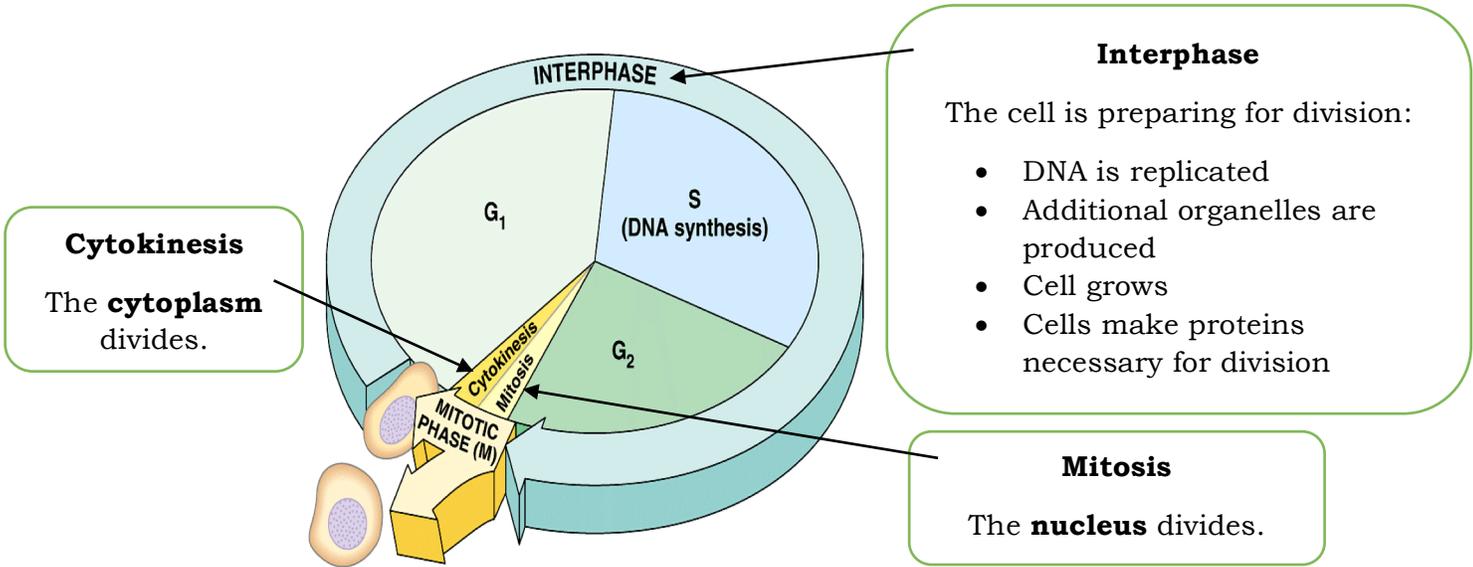
semiconservative replication

cytokinesis

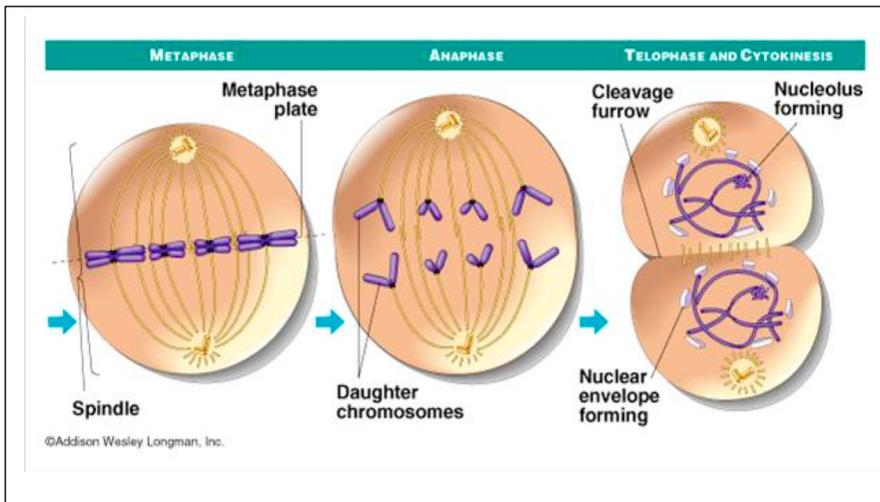
inheritance

template

Assessment Anchor: Describe the events that occur during the cell cycle: interphase, nuclear division (e.g. mitosis or meiosis), cytokinesis. (B.1.1.1)



**** Consider prometaphase to be late prophase.



Stages of Mitosis:

A. Prophase

- chromatin coils becoming shorter and thicker; once they are visible as individual strands, they are called chromosomes
- two copies of each chromosome are held together by a centromere
- centrioles separate and move to opposite poles.
- spindle fibers form attaching centromeres to centrioles
- nucleolus disappears
- nuclear membrane breaks down

B. Metaphase

- chromosomes line up along the equator

C. Anaphase

- sister chromatids split at the centromere
- now that the chromatids are separated, they are called chromosomes
- chromosomes move to opposite poles

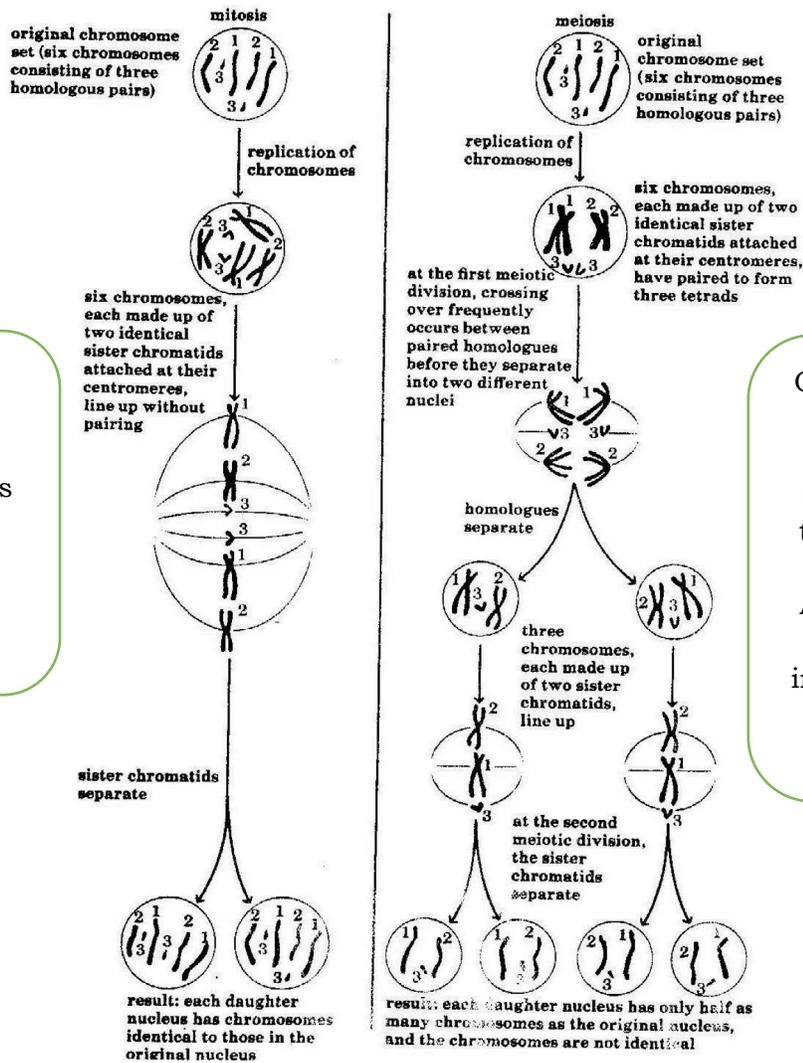
D. Telophase

- chromosomes begin to uncoil into chromatin
- nuclear membrane reforms
- spindle fibers break down
- nucleolus becomes visible

Assessment Anchor: Compare the processes and outcomes of mitotic and meiotic nuclear divisions. (B.1.1.2)

transparency 31
Figure 12-11, page 257
Comparison of mitosis and meiosis

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Original cell is **diploid** – notice the pairs of chromosomes.

Original cell is **diploid** – notice the pairs of chromosomes.

One DNA replication and one nuclear division produces daughter cells with the diploid number of chromosomes.

One DNA replication and **two** nuclear divisions produce daughter cells with the haploid number of chromosomes. Also, **crossing over** during prophase I increases the genetic variation in the resulting gametes.

Mitosis: result is 2 diploid daughter cells that are identical to each other and identical to the parent cell.

Meiosis: result is 4 haploid gametes that are genetically different from each other and from the parent cell.

Purpose of mitosis: growth, repair, and replacement (in multicellular organisms); reproduction (binary fission) in unicellular organisms

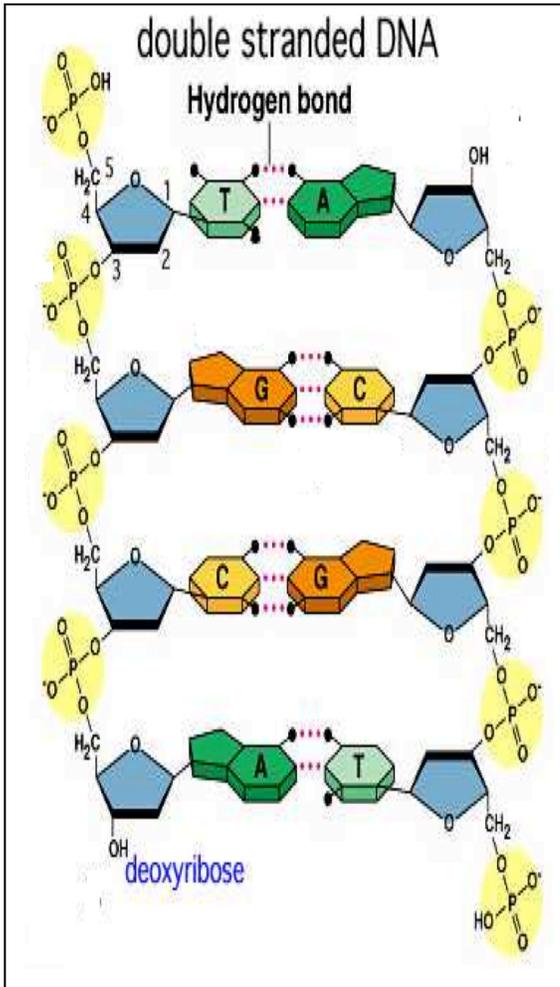
Purpose: production of gametes

Location: all body cells

Location: reproductive organs

Assessment Anchor: Describe how the process of DNA replication results in the transmission and/or conservation of genetic material. (B.1.2.1)

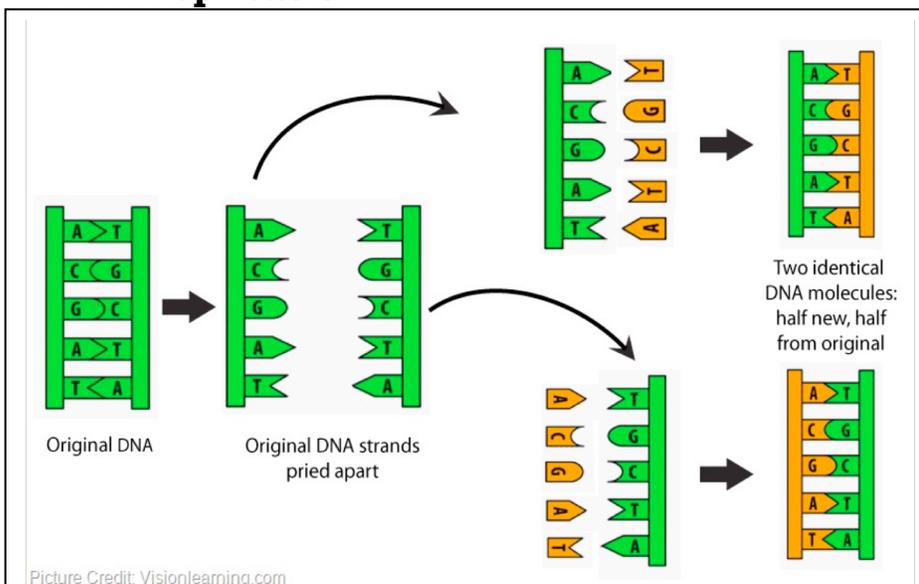
DNA



Facts that you need to know about DNA including important vocabulary:

- DNA is one type of **nucleic acid** (that's what the "NA" stands for!)
- DNA is a polymer made of monomers called **nucleotides**.
- Each nucleotide consists of three parts: a sugar (deoxyribose), a phosphate, and a base.
- Nucleotides are different depending on which base they contain.
- There are four possible bases (and therefore, four possible nucleotides). They are **cytosine, guanine, adenine and thymine**. (A, T, G, C)
- **All living things** have a genetic code based on these four nucleotides. What makes each of us different is the order that the bases are in.
- **Complementary** can refer to the two strands of a DNA molecule or bases that pair with each other. (Adenine is complementary to thymine and cytosine is complementary to guanine.)

DNA Replication



Important info and terms:

The process depicted in the graphic is called **DNA replication**. This process happens right before a cell divides.

The strand that is used for the pattern to build the new strand is called the **template strand**.

The **base pair rule** is:

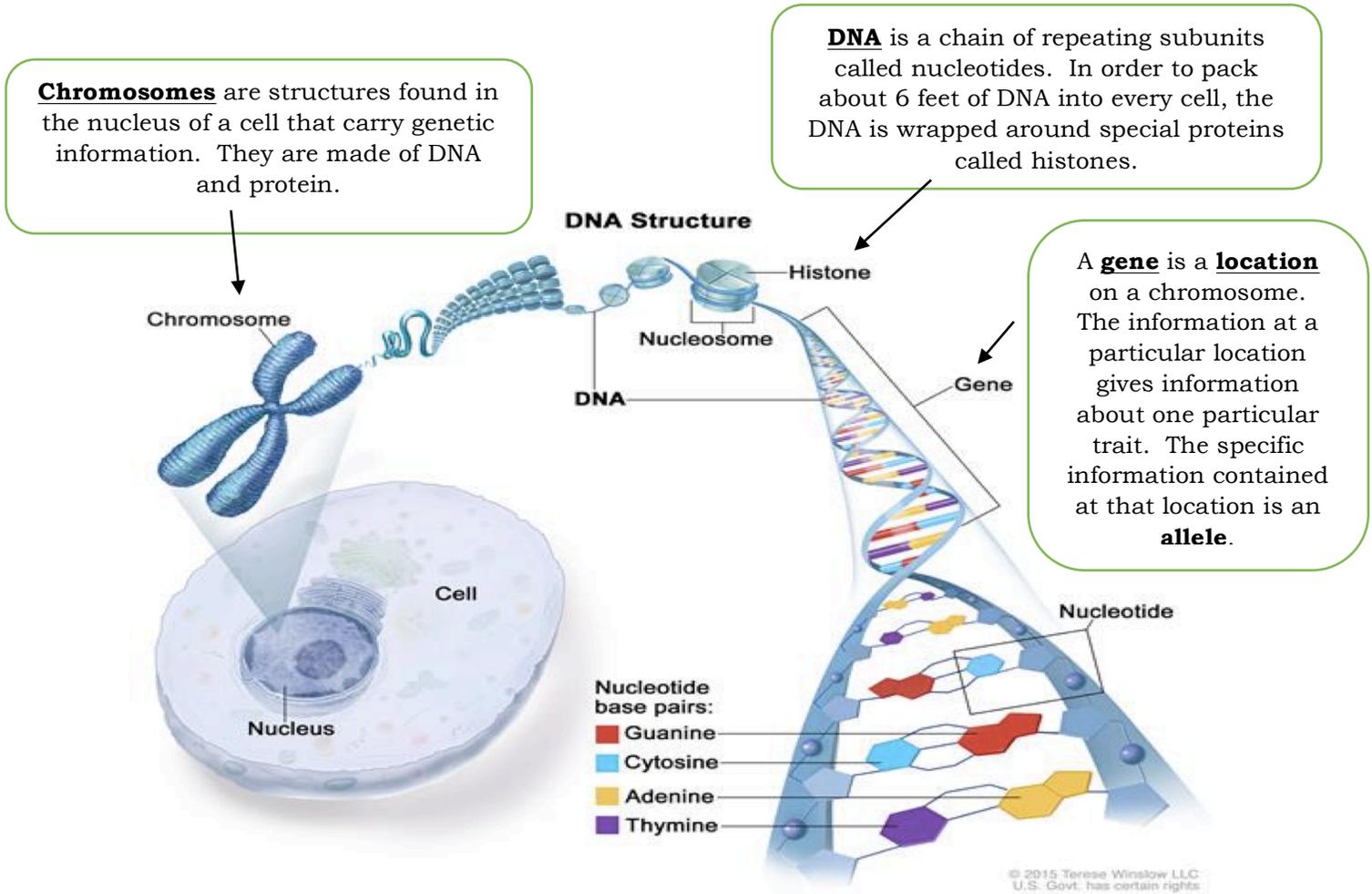
- A always binds with T
- C always binds with G

Semiconservative refers to the fact that the resulting DNA strands are half original DNA and half new nucleotides.

Result: two strands that are identical to each other and identical to the original strand.

Assessment Anchor: Explain the functional relationships between DNA, genes, alleles, and chromosomes and their roles in inheritance. (B.1.2.2)

The Relationship between DNA, Chromosomes, and Genes



The Relationship between Gene and Allele

