

VISIBLE  BODY®

Cell Life Cycle

A cells and tissues lab activity using Visible Body Suite

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PRE-LAB EXERCISES

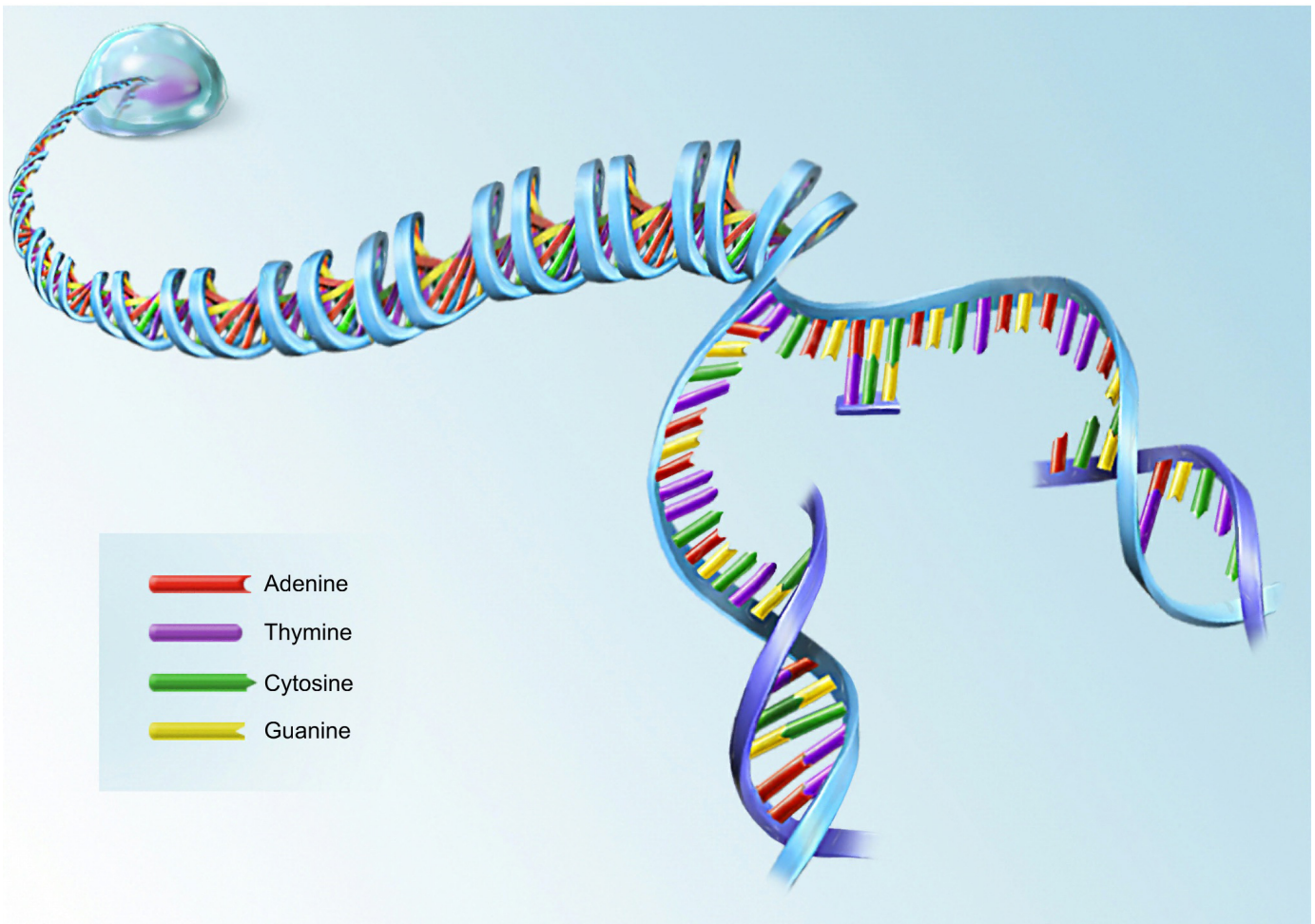
Open Visible Body Suite. From the main menu, choose Anatomy & Physiology and select the Cells and Tissue unit. Scroll to Chapter 3. Cell Life Cycle.

Use the modules to guide your exploration of the life cycle of cells. Be sure to use the book icon to learn more about the cellular concepts that you are exploring.

You are responsible for the identification of **all bold terms** and all answers to the questions.

A. DNA Replication and the Cell Cycle

1. Examine the illustration in Module 3.1 Replication to learn about the principles of **DNA replication**. Use this module to answer the following questions.



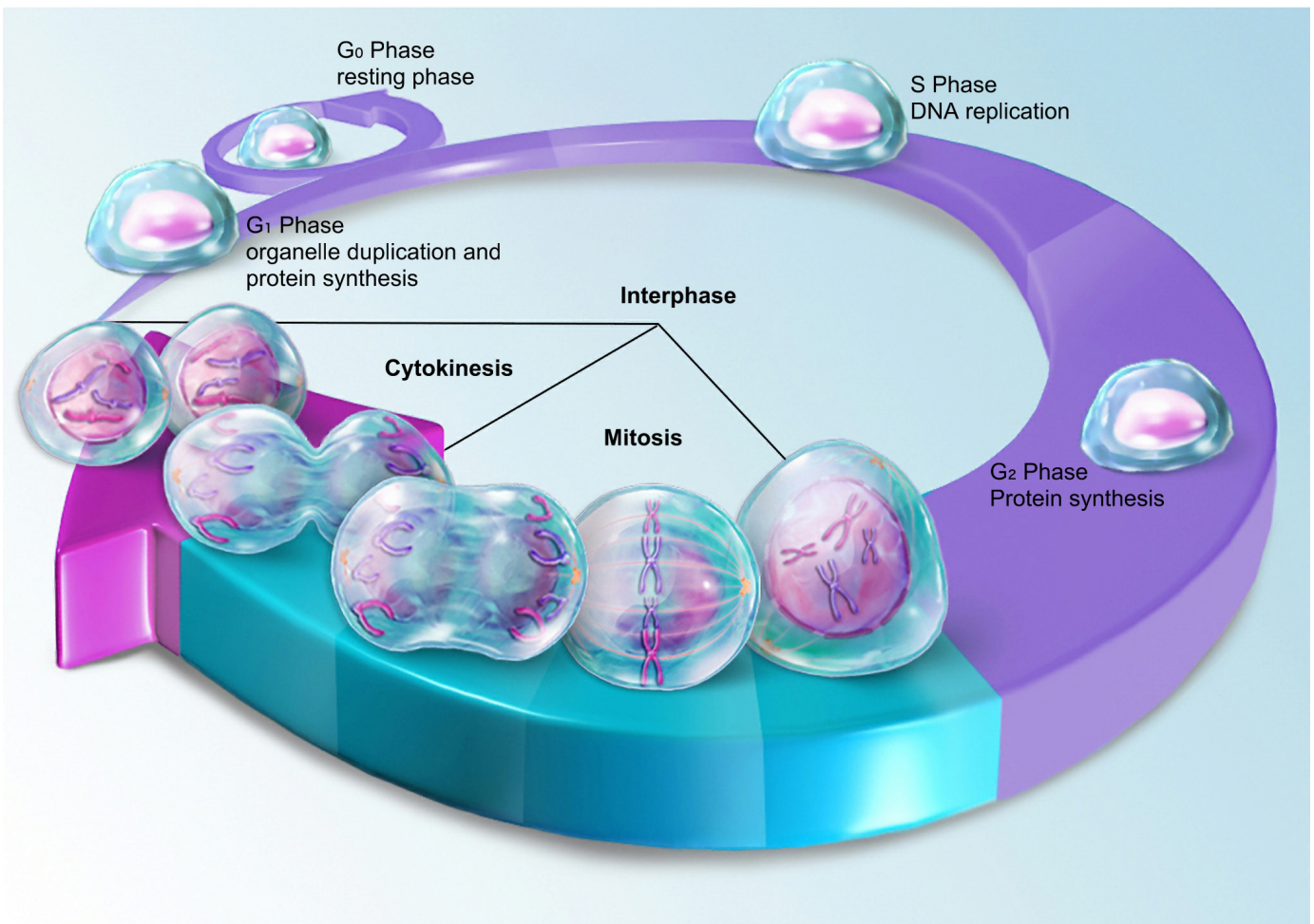
a. DNA is made of two long strands of nucleotides that form a double helix. The nucleotides in each strand pair up with a specific complementary base on the other strand. In the following illustration, examine a short piece of DNA, and based on the nucleotides that are labeled, fill in the blank nucleotides.

	G	T		A		
A			C		T	G

A= Adenine
 T= Thymine
 C= Cytosine
 G= Guanine

b. When do cells copy their DNA?

2. Examine the illustration in Module 3.2 Cell Cycle and use it to match each of the following terms with the correct description.



A. **G0 Phase**

B. **G1 Phase**

C. **S Phase**

D. **G2 Phase**

E. **Interphase**

F. **Mitosis**

G. **Cytokinesis**

_____ DNA replication, or synthesis, occurs during this phase.

_____ One cell splits into two cells during this phase.

_____ This phase is characterized by cell growth, organelle duplication, and protein synthesis.

_____ This phase includes all the phases except mitosis and cytokinesis.

_____ This phase includes a series of events that a cell undergoes leading up to cell division.

_____ This phase follows the S phase.

_____ In this phase, cells are not actively progressing through the cell cycle. These cells are sometimes described as existing in a resting stage.

IN-LAB EXERCISES

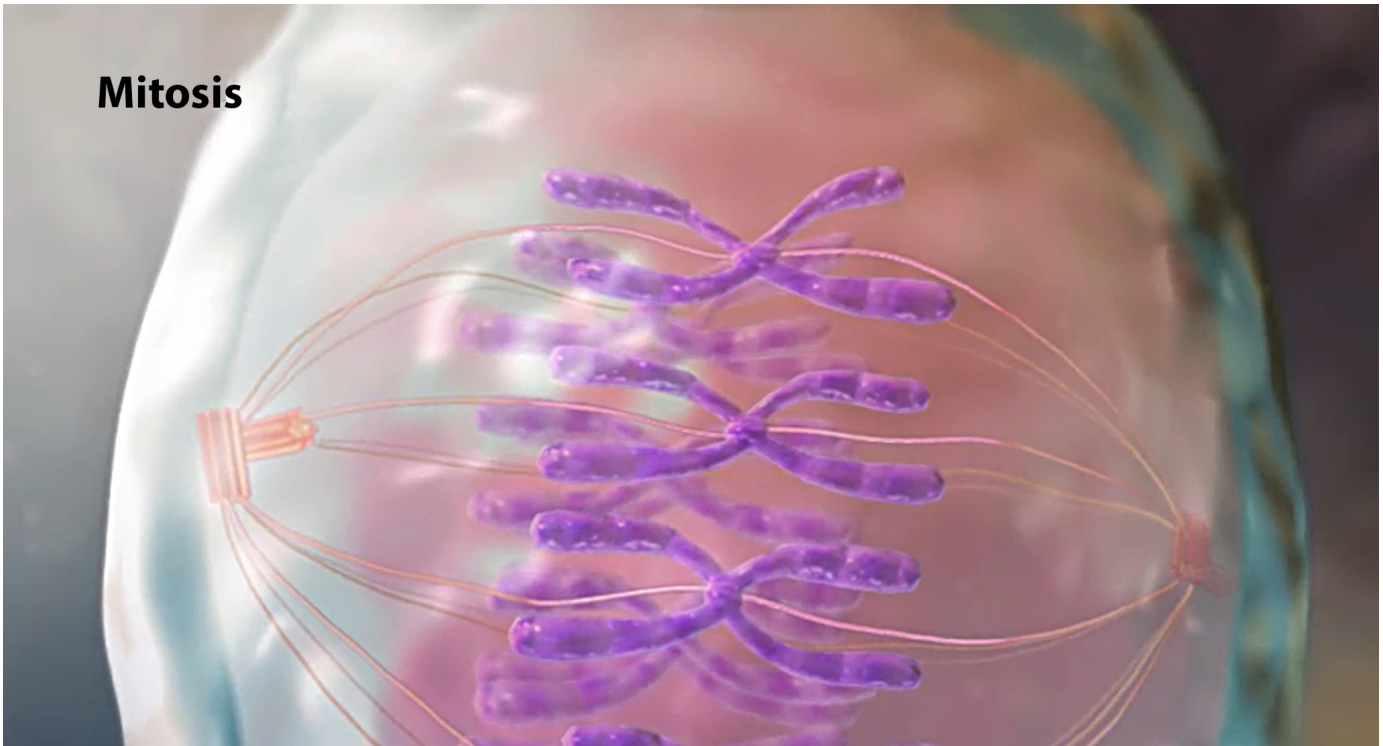
Use the following modules in Visible Body Suite to guide your exploration of the cell cycle. Be sure to select the book icon under the structure name to read information specific to that structure.

You are responsible for the identification of **all bold terms** and all answers to the questions.

Open Visible Body Suite. From the main menu, choose Anatomy & Physiology and select the Cells and Tissue unit. Scroll to Chapter 3. Cell Life Cycle.

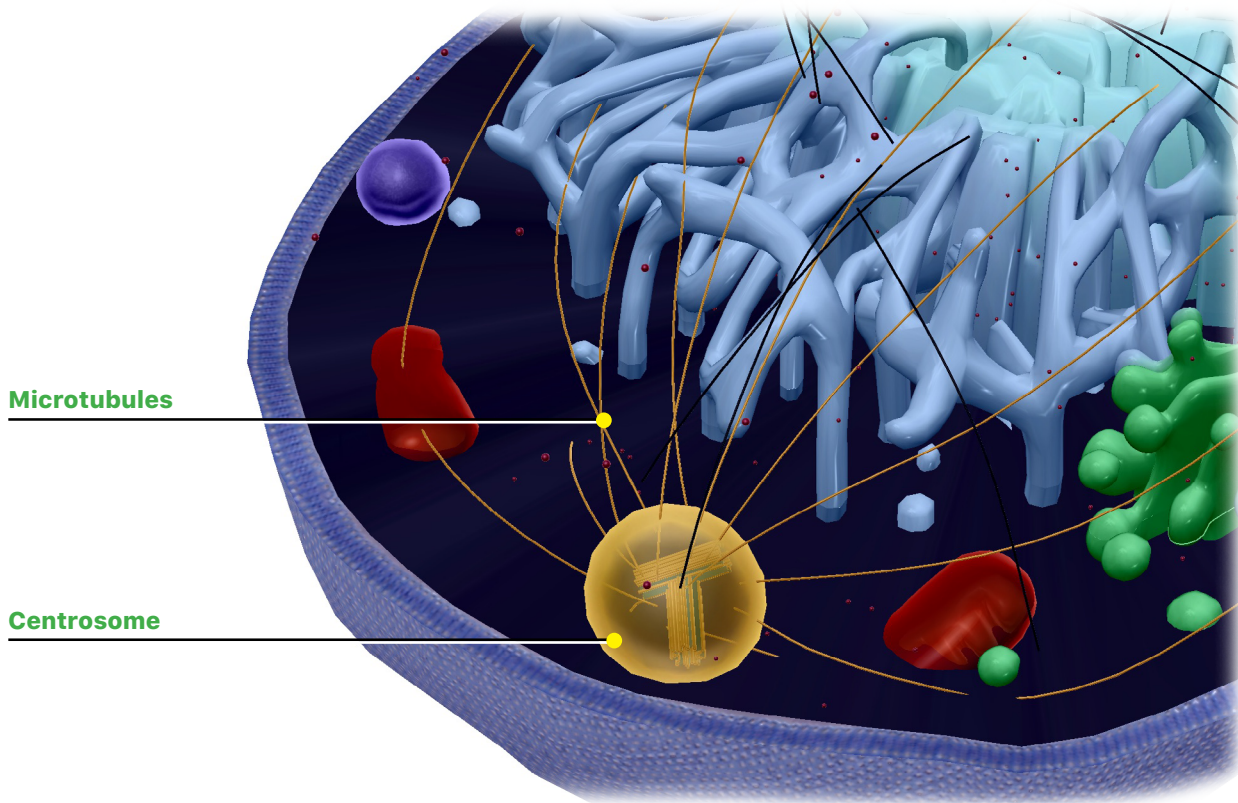
A. Mitosis and Meiosis

1. Watch the video in Module 3.3 Mitosis and answer the following questions.



- a. In which stage of mitosis do the **chromosomes** condense and organize into chromatid pairs?
- b. In which stage of mitosis do the **chromatid** pairs line up along the cell's midline?
- c. In which stage of mitosis are the chromatid pairs pulled apart, each toward an opposite end of the cell?
- d. In which stage of mitosis does the nuclear membrane reform?

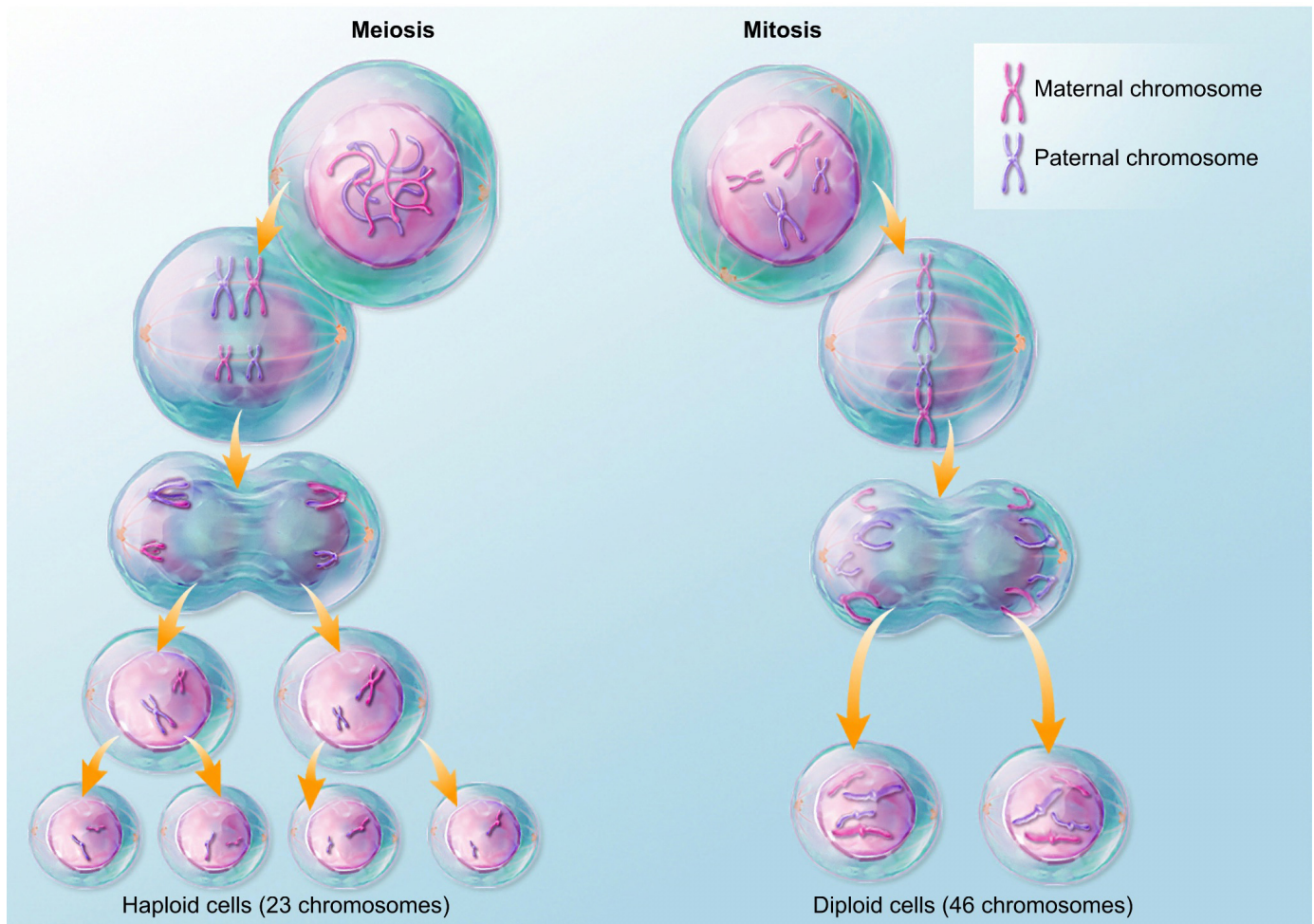
2. Explore the 3D anatomical view in Module 3.4 Mitotic Spindle and answer the following questions.



a. The **mitotic spindle** is composed of a network of which cytoskeletal filaments?

b. Some types of chemotherapeutic drugs, used to treat cancer, disrupt microtubules and the mitotic spindle. Why are drugs that disrupt the mitotic spindle effective cancer treatments?

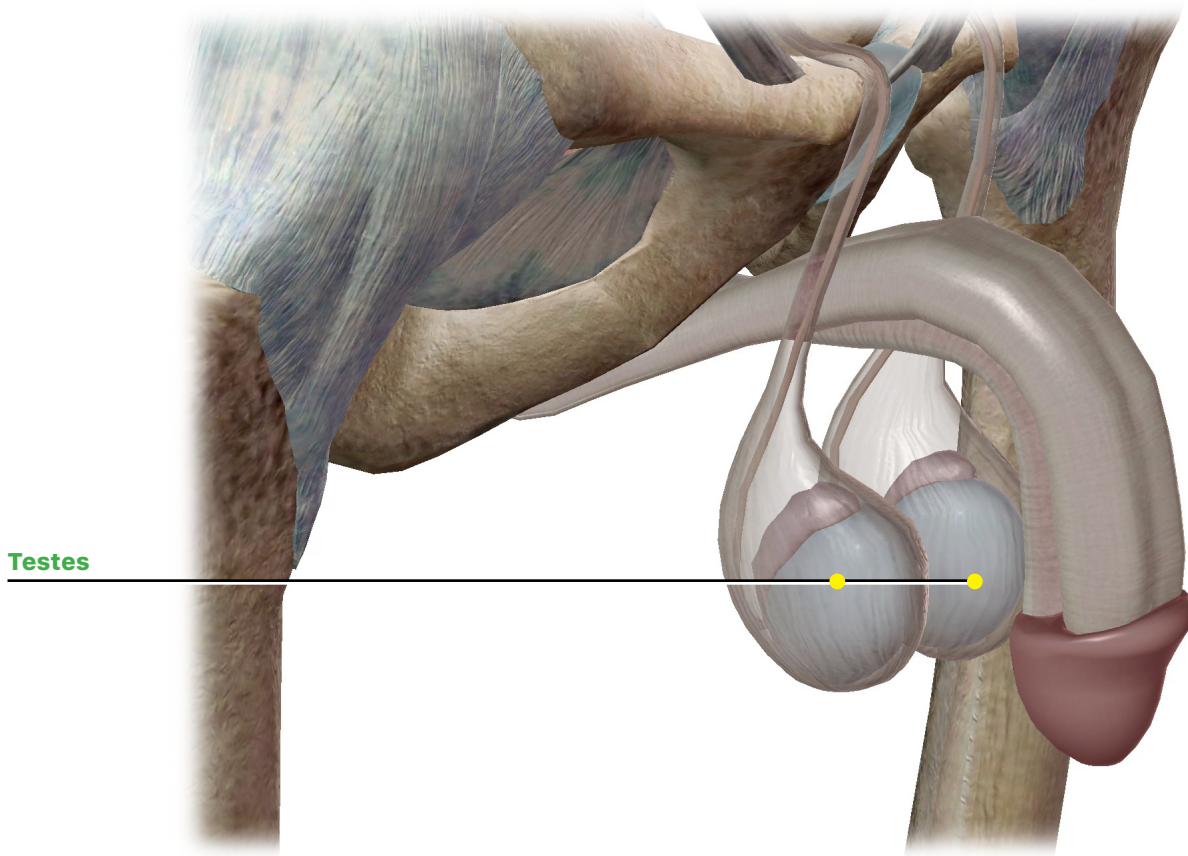
3. Examine the illustration in Module 3.5 Meiosis, comparing cells undergoing meiosis and mitosis, and answer the following questions.



a. In humans, both meiosis and mitosis start with a cell that has _____ duplicated chromosomes. Remember, cells duplicate their DNA during S phase in the cell cycle; this happens prior to meiosis or mitosis. Meiosis includes two rounds of cell division, whereas mitosis only has one. As a result, cells that arise from meiosis have _____ chromosomes and cells that arise from mitosis have _____ chromosomes.

b. What is the difference between a diploid cell and a haploid cell?

4. Explore the 3D anatomical view in Module 3.6 Meiosis and Gametes and answer the following questions.



1. Where does meiosis occur?

2. Why is mitosis incompatible with the production of sex cells, specifically, sperm and oocytes?

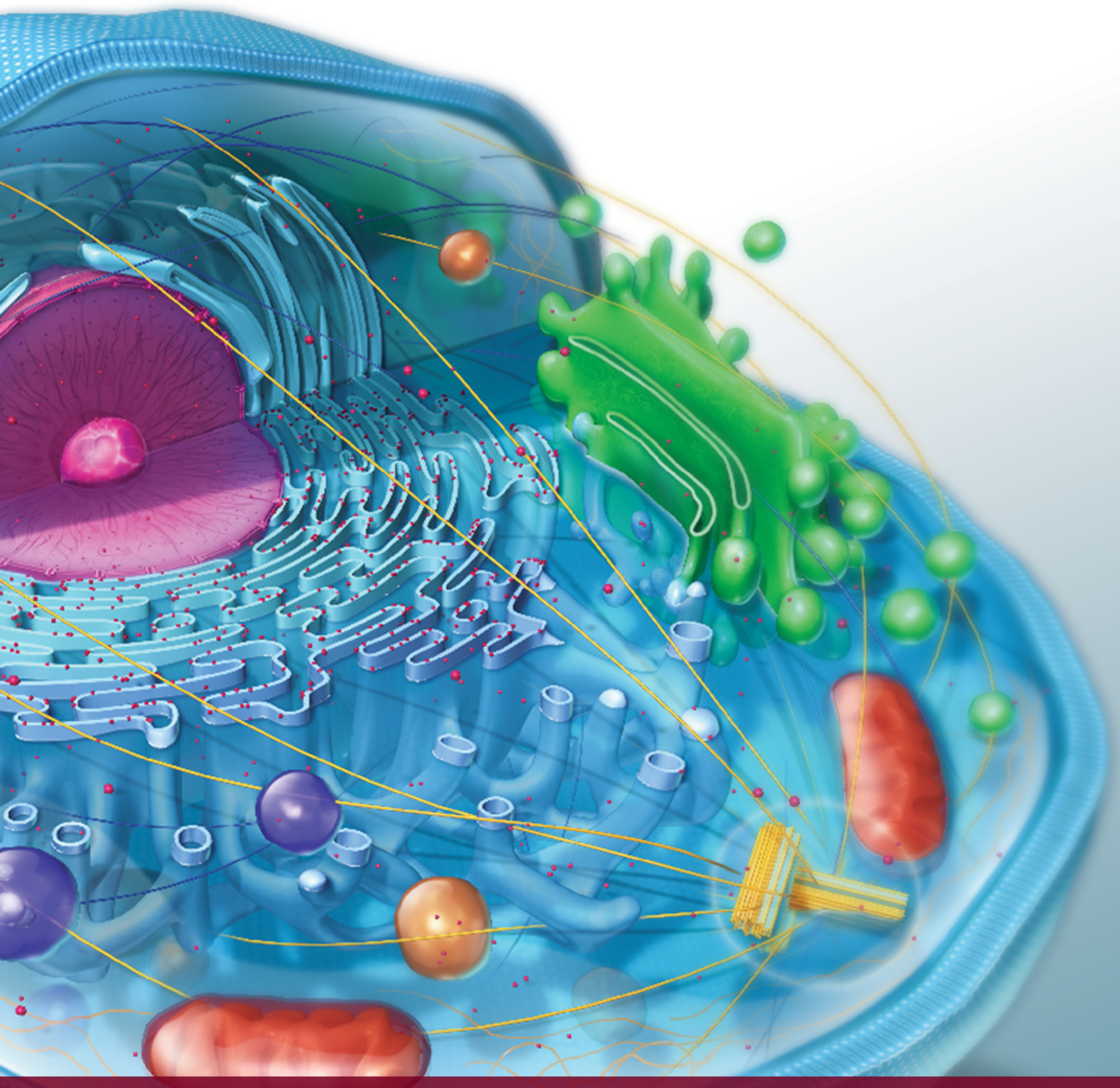
PUTTING IT ALL TOGETHER

In cellular physiology, there are almost always exceptions to the rules! Here are a few examples of rule breakers in the world of the cell cycle.

1. During the first few days of human development, cell proliferation is very rapid, and as cells divide by mitosis, the G1 and G2 phases are very short. How do you think this impacts cell size during this period of development?

2. The cells in red bone marrow that produce blood platelets are called megakaryocytes, which can be loosely translated as big nucleus cells. These cells continue to move through the cell cycle, but they skip mitosis and cytokinesis. Review the steps of the cell cycle. What do you think the result of this modified cell cycle would be?

3. Cell growth and progression through the cell cycle is a process that requires tight regulation. We have specific genes that can inhibit the progression of a cell through the cell cycle. If these genes are damaged through a mutation, what could be the consequence?

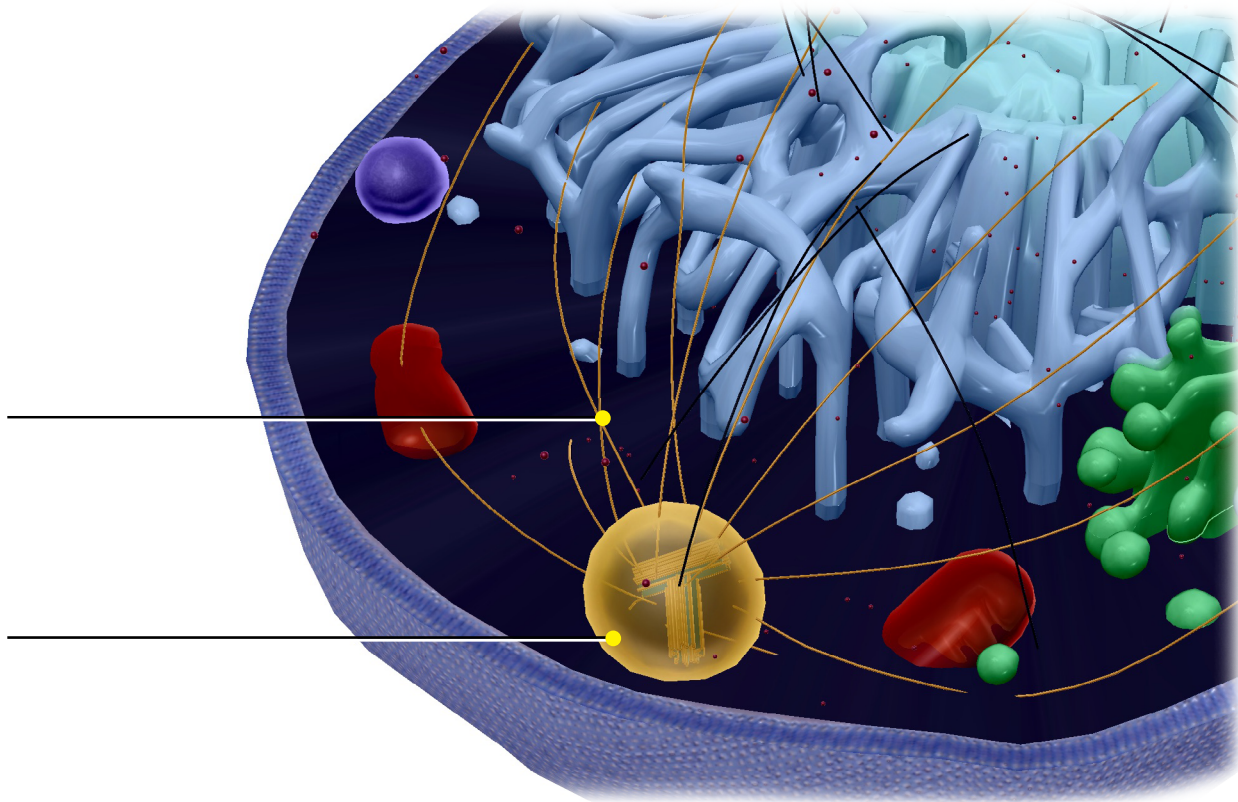


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Student Practice

Label the structures in the following figures.

Module 3.4 Mitotic Spindle



Module 3.6 Meiosis and Gametes

