

Discover!

Science



INSTRUCTOR GUIDE

6



Lesson Objectives

By the end of this lesson, your student will be able to:

- identify the stages of the cell cycle
- describe how DNA is replicated
- compare and contrast mitosis and meiosis

Supporting Your Student

Explore

Going through the process of discovering all of the things that can cause damage to our cells can be overwhelming for your student at times. This is a good time to discuss with your student the fact that our bodies really do have good systems in place that try to make sure unhealthy cells are not allowed to replicate, but they are not always successful. Talk to your student about the things they have a lot of control over (diet, not smoking, wearing sunscreen), a little control over (pollution), and no control over (genetics). Then discuss some things they can do to help their cells stay healthy!

Read (*Interphase*)

It would be a great idea to draw a large model of what the cell cycle looks like on a whiteboard so that your student can visualize what they are learning about.

Using a zipper is a great way to illustrate how DNA helicase is able to break the hydrogen bonds and unzip DNA strands for replication.

If your student participated in the relay race described at the beginning of this lesson, ask them how those events relate to the interphase portion of the cell cycle.

Practice (*DNA Replication*)

If your student is struggling to remember which nucleotides go together, help them come up with some kind of device to help them remember. A good one to try is “Apple in Tree, A goes with T. Car in Garage, C goes with G”. Then have them keep working on matching up pairs until it becomes easy for them.

Learning Styles

Auditory learners may enjoy creating a story that goes along with the cell cycle. They could perform their story as a dramatic retelling that follows the cell through the different stages.

Visual learners may enjoy creating a comic strip that shows the cell as it goes through the different phases of the cell cycle.

Kinesthetic learners may enjoy pretending to be the cell and act out what the cell is doing or “thinking” during each stage of the cycle.

Extension Activities

Learning Folder

Have your student use a simple file folder to create a learning folder about the cell cycle. They can draw in the different phases and glue in layers of paper to create folded flaps for practicing their vocabulary words. This folder can expand as they continue to learn more about mitosis and meiosis in the next lessons. Your student can look online for ideas for different elements that they can add to the learning folder.

Food Sculpture

Have your student create a sculpture of DNA replication. They should create a double helix that is split by DNA helicase and show nucleotides being placed by DNA polymerase. Food is a great media to use for this type of project because it can be modeled easily. Some good options would be colorful marshmallows and toothpicks for the DNA, a gummy bear as helicase, and a “candy person” to act as the polymerase. They could also use craft supplies or plastic building blocks to create their sculpture.

LESSON 14

The Cell Cycle

Answer Key

Explore

Some things we can do to protect our cells are to eat healthy food, drink plenty of water, stay out of the sun or use sunscreen, stay away from things like smoking, and enjoy plenty of fresh air and exercise.

Write (*Why is it important that cells do checks during the gap phases?*)

Answers may vary. Possible answer: It is important because if there is an error in the cell or in its DNA, it could replicate and spread that error to more cells. This can cause illnesses like cancer.

Write (*What is the difference between mitosis and meiosis?*)

Answers may vary. Possible answer: Mitosis goes through the prophase, metaphase, anaphase, and telophase once and creates two genetically identical cells, while meiosis goes through each of those steps twice and creates four cells with half of the organism's genetic material.

Practice (*The Cell Cycle*)

1. Gap phase 1
2. M phase
3. Cytokinesis
4. Interphase
5. S phase
6. Mitosis
7. Meiosis
8. Gap phase 2
9. G₀ phase

Practice (*DNA Replication*)

T A A C G G A T T C C C G A T

Show What You Know

1. C
2. A
3. B
4. A
5. A. Gap phase 1 (G₁)
B. S Phase
C. Gap phase 2 (G₂)
D. Mitosis or Meiosis
6. Answers may vary. Possible answers:
 - Meiosis is the process of division used by reproductive cells (gametes) and mitosis is the process used by most other cells.
 - Meiosis results in four cells with half of the organism's DNA while mitosis results in two cells with identical DNA.
 - Meiosis goes through the process of splitting twice while mitosis only goes through the process once.
7. Answers may vary. Possible answer: DNA polymerase is used to match nucleotides during replication. It uses the original DNA strand as a template for placing the new nucleotides.