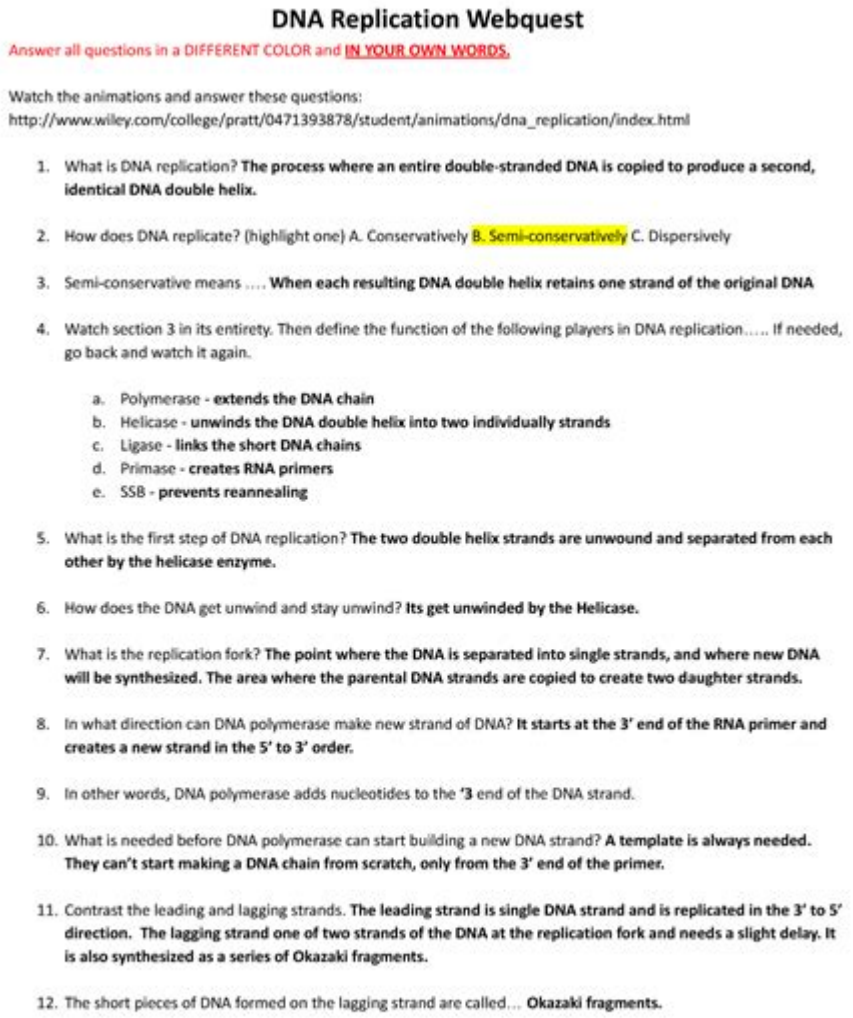
Dna Replication Webquest Answer Key



DNA Replication Webquest

Answer all questions in a DIFFERENT COLOR and IN YOUR OWN WORDS.

Watch the animations and answer these questions:
http://www.wiley.com/college/pratt/0471393878/student/animations/dna_replication/index.html

1. What is DNA replication? **The process where an entire double-stranded DNA is copied to produce a second, identical DNA double helix.**
2. How does DNA replicate? (highlight one) A. Conservatively B. Semi-conservatively C. Dispersively
3. Semi-conservative means …. **When each resulting DNA double helix retains one strand of the original DNA**
4. Watch section 3 in its entirety. Then define the function of the following players in DNA replication….. If needed, go back and watch it again.
   a. Polymerase - **extends the DNA chain**
   b. Helicase - **unwinds the DNA double helix into two individually strands**
   c. Ligase - **links the short DNA chains**
   d. Primase - **creates RNA primers**
   e. SSB - **prevents reannealing**
5. What is the first step of DNA replication? **The two double helix strands are unwound and separated from each other by the helicase enzyme.**
6. How does the DNA get unwind and stay unwind? **Its get unwinded by the Helicase.**
7. What is the replication fork? **The point where the DNA is separated into single strands, and where new DNA will be synthesized. The area where the parental DNA strands are copied to create two daughter strands.**
8. In what direction can DNA polymerase make new strand of DNA? **It starts at the 3' end of the RNA primer and creates a new strand in the 5' to 3' order.**
9. In other words, DNA polymerase adds nucleotides to the '**3** end of the DNA strand.
10. What is needed before DNA polymerase can start building a new DNA strand? **A template is always needed. They can't start making a DNA chain from scratch, only from the 3' end of the primer.**
11. Contrast the leading and lagging strands. **The leading strand is single DNA strand and is replicated in the 3' to 5' direction. The lagging strand one of two strands of the DNA at the replication fork and needs a slight delay. It is also synthesized as a series of Okazaki fragments.**
12. The short pieces of DNA formed on the lagging strand are called… **Okazaki fragments.**

DNA replication webquest answer key is a critical resource for students and educators alike, serving as a guide to understanding the complex processes involved in DNA replication. This article will delve into the intricacies of DNA replication, the importance of webquests in learning, and provide a structured answer key that can help students reinforce their understanding of this essential biological process.

Understanding DNA Replication

DNA replication is the biological process by which a cell duplicates its DNA, ensuring that each daughter cell receives an identical set of genetic information. This process is fundamental to cell division, growth, and repair.

Key Stages of DNA Replication

DNA replication can be divided into several key stages:

1. **Initiation**: The process begins at specific locations on the DNA molecule called origins of replication. Enzymes called helicases unwind the double helix, creating a replication fork.
2. **Elongation**: DNA polymerases synthesize new DNA strands by adding nucleotides complementary to the template strands. This occurs in the 5′ to 3′ direction.
3. **Termination**: Once the entire DNA molecule has been replicated, the process concludes. Any remaining RNA primers are replaced with DNA, and the strands are proofread for errors.

Key Enzymes Involved in DNA Replication

Several enzymes play crucial roles during DNA replication:

- **DNA Helicase**: Unwinds and separates the DNA strands.
- **DNA Polymerase**: Synthesizes new DNA strands by adding nucleotides.
- **Primase**: Synthesizes RNA primers necessary for DNA polymerase to begin synthesis.
- **Ligase**: Joins Okazaki fragments on the lagging strand.

The Role of Webquests in Learning

Webquests are inquiry-based learning activities that encourage students to explore a topic by conducting research online. They facilitate active learning and critical thinking, making them an effective educational tool, especially for complex subjects like DNA replication.

Benefits of Using Webquests

Utilizing webquests in teaching DNA replication offers several benefits:

- **Engagement**: Students are more engaged when they interact with the subject matter through digital means.
- **Collaboration**: Webquests often involve group work, fostering teamwork and collaboration among students.
- **Research Skills**: Students develop important research skills by navigating various online resources.
- **Critical Thinking**: Students are encouraged to analyze and synthesize information, promoting higher-order thinking skills.

Creating a DNA Replication Webquest

Designing an effective webquest focused on DNA replication involves several steps:

1. Define the Objective

Establish clear learning objectives for the webquest. For instance, students should be able to explain the process of DNA replication and identify key enzymes involved.

2. Research Resources

Curate a list of reliable online resources for students to explore. This could include:

- Educational websites (e.g., Khan Academy, HHMI Biointeractive)
- Scientific journals and articles
- Interactive animations and videos demonstrating DNA replication

3. Assign Roles

Divide the class into groups and assign specific roles, such as researcher, presenter, and note-taker. This encourages collaboration and ensures that each student is involved in the learning process.

4. Develop Questions

Create a set of guiding questions that students will answer during their research. Examples might include:

- What are the key steps in DNA replication?
- What roles do different enzymes play in the process?
- How is the leading strand synthesized differently from the lagging strand?

5. Presentation and Reflection

Have students present their findings to the class, either through a digital presentation or a poster session. Following the presentations, facilitate a reflection discussion to reinforce learning and address any misconceptions.

Sample DNA Replication Webquest Answer Key

The following is a sample answer key that can be used to assess students' understanding of DNA replication:

Question 1: What are the key steps in DNA replication?

Answer: The key steps in DNA replication are initiation, elongation, and termination. During initiation, the DNA strands are unwound at the origins of replication. In elongation, DNA polymerases synthesize new strands, and in termination, the replication process concludes, with any remaining RNA primers replaced by DNA.

Question 2: What roles do different enzymes play in the process?

Answer:

- DNA Helicase: Unwinds the DNA double helix.
- DNA Polymerase: Adds nucleotides to synthesize new DNA strands.
- Primase: Synthesizes RNA primers required for DNA polymerase activity.
- DNA Ligase: Joins Okazaki fragments on the lagging strand.

Question 3: How is the leading strand synthesized differently from the lagging strand?

Answer: The leading strand is synthesized continuously in the 5' to 3' direction, following the replication fork. In contrast, the lagging strand is synthesized discontinuously in short sections called Okazaki fragments, which are later joined by DNA ligase.

Conclusion

In summary, understanding DNA replication through a webquest format provides an engaging and effective approach to learning. By emphasizing inquiry-based research, collaboration, and critical thinking, students can gain a deeper comprehension of this vital biological process. The provided answer key serves as a valuable tool for educators to assess students' grasp of DNA replication and to encourage further exploration of genetics and molecular biology. As students navigate the complexities of DNA replication, they not only learn about the mechanisms of life but also develop essential skills that will benefit them in their academic pursuits.

Frequently Asked Questions

What is the primary purpose of DNA replication?

The primary purpose of DNA replication is to ensure that each daughter cell receives an identical copy of the DNA during cell division.

What are the key enzymes involved in DNA replication?

The key enzymes involved in DNA replication include DNA helicase, DNA polymerase, and DNA ligase.

What is the role of DNA helicase in the replication process?

DNA helicase unwinds and separates the double-stranded DNA, creating two single strands that serve as templates for replication.

How does DNA polymerase contribute to DNA replication?

DNA polymerase adds complementary nucleotides to the growing DNA strand, synthesizing new DNA in a 5' to 3' direction.

What is the significance of the leading and lagging strands in DNA replication?

The leading strand is synthesized continuously, while the lagging strand is synthesized in short fragments (Okazaki fragments) due to the antiparallel nature of DNA.

What are Okazaki fragments and how are they connected?

Okazaki fragments are short sequences of DNA synthesized on the lagging strand during DNA replication. They are connected by DNA ligase, which seals the gaps between them.

How can errors in DNA replication lead to mutations?

Errors during DNA replication can lead to incorrect nucleotide incorporation, which, if not corrected by proofreading mechanisms, can result in permanent mutations in the DNA sequence.

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DNA 的结构和功能是什么? - 知乎

DNA，全称为脱氧核糖核酸（Deoxyribonucleic acid），是生物体内存储遗传信息的分子，是构成生物体的基本遗传物质之一。DNA的结构和功能如下：DNA的结构：1. 双螺旋结构：DNA分子由两条反向平行的链组成，这两条链以右手螺旋的方式相互缠绕，形成双螺旋结构。2. 核苷酸单元：DNA链由核苷酸单元组成 …

DNA 是如何储存遗传信息的? - 知乎

DNA就是遗传信息，存在于染色体上，染色体上有遗传物质的结构和功能单位——基因（gene），基因是决定一定功能产物的DNA序列。这种功能产物主要是蛋白质和RNA。蛋白质和RNA决定了 不同生物的性状不同，也决定了 同种生物不同个体之间的性状差异。1、DNA的组成 DNA，中文全称脱氧核糖核苷酸 …

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为什么**DNA**会呈现双螺旋结构? - 知乎

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外源DNA准备：提取和纯化含有目的基因的外源DNA，并将其溶解在合适的缓冲液中。授粉与处理：在植物开花期进行人工授粉，授粉后一定时间（如12-24小时），用微量注射器将外源DNA溶液注入柱头或花柱。

转染时，为什么要将*PEI*加到质粒*DNA*中混合，而不是相反的?

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