SCIENCE FOUNDATIONS

DNA replication

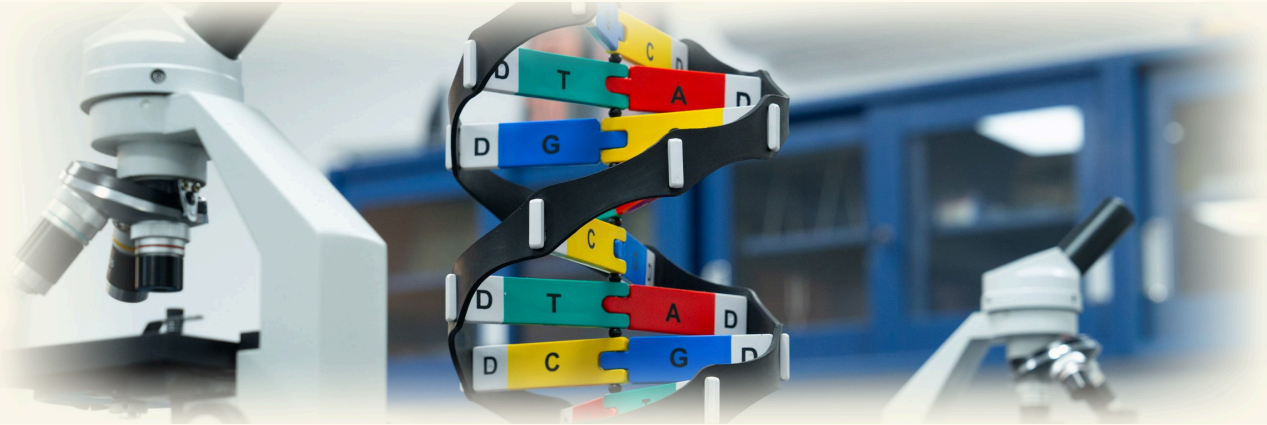
Difficulty level: Advanced

Science Foundations

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Overview of the concept

This is how every new cell in your body gets its own complete copy of your instructions, so a cut heals with cells that match the ones around them. Without an accurate copy, a new cell would be missing instructions it needs to do its job. Mistakes in copying are one way that changes in DNA appear and get passed on. Knowing how replication works tells you why your body can grow and repair itself, and why copying errors matter.

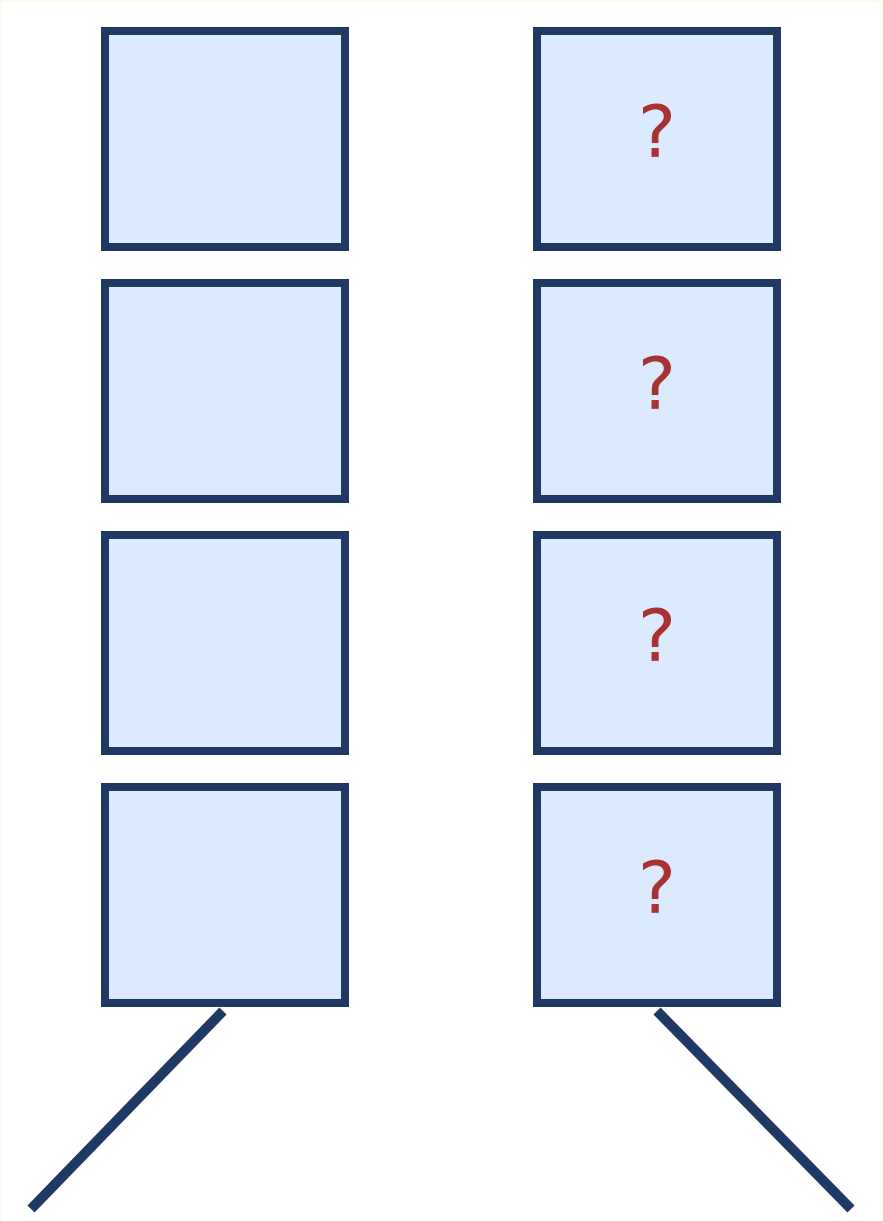


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Worked examples

EXAMPLE 1

Q What is the new partner strand for A T C G, and how many DNA molecules result?



SOLUTION

Unzip: the double strand separates into single strands.

Build on A T C G: partners are T A G C.

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The result is two helices, each with one old and one new strand.

The result is two identical DNA molecules, each semi-conservative (half old, half new).

EXAMPLE 2

Q Why is replication called semi-conservative?

SOLUTION

Each product helix has one old strand and one new strand.

Half of each product is conserved from the original.

That half-old, half-new pattern is the name.

The result is each new helix keeps one original strand.

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Practice questions

1 **Replicate the short strand G C A T. What is the new partner strand, and how many DNA molecules result?**

- **A** C G T A, two identical DNA molecules
- **B** G C A T, two identical DNA molecules
- **C** C G T A, one DNA molecule
- **D** T A G C, two identical DNA molecules

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2 **Which base pairs with adenine (A) in DNA?**

- **A** Thymine (T)
- **B** Guanine (G)
- **C** Cytosine (C)
- **D** Adenine (A)

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3 **A new strand is built with the sequence T T A G. What was the old (template) strand it was built on?**

- **A** T T A G
- **B** G C A T
- **C** A A T C
- **D** C C G G

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4 How many old strands does each new DNA helix contain?

- **A** One
- **B** Two
- **C** None
- **D** Four

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5 Replication is semi-conservative. If it were conservative instead, what would the two new DNA helices look like?

- **A** One helix entirely old, one entirely new
- **B** Each helix half old and half new
- **C** Each helix a mix of old and new pieces
- **D** Both helices entirely new

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How many DNA molecules result from replication?

A Two

B One

C Four

D Three

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Are the two products identical?

A Yes

B No

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8 What separates first in replication?

A The two strands

B The new strands

C The nucleus

D The cell

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9 What does each old strand do?

A Templates a new strand

B Copies itself exactly

C Breaks apart permanently

D Joins the two new strands

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When does replication happen?

A Before cell division

B After cell division

C During cell division

D Only in adult cells

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ANSWER KEY

1. C G T A, two identical DNA molecules

2. Thymine (T)

3. A A T C

4. One

5. One helix entirely old, one entirely new

6. Two

7. Yes

8. The two strands

9. Templates a new strand

10. Before cell division

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