

What is DNA Structure?

Worksheet

DNA is a double helix of two complementary strands linked by hydrogen-bonded base pairs (A-T, G-C); it replicates semiconservatively, with each new molecule keeping one original strand and one newly synthesized strand.

Questions

1. Which base pairs with adenine in DNA?

- A) Cytosine
- B) Guanine
- C) Thymine
- D) Uracil

2. A primer has 10 G/C and 10 A/T bases. What is its T_m by the Wallace rule?

- A) 40C
- B) 50C
- C) 60C
- D) 70C

3. What is DNA replication called because each new molecule has one old and one new strand?

- A) Conservative
- B) Semiconservative
- C) Dispersive
- D) Discontinuous

4. Which enzyme joins Okazaki fragments together?

- A) Helicase
- B) Primase
- C) DNA polymerase
- D) DNA ligase

5. A short DNA primer has 12 G/C bases and 8 A/T bases. Estimate its melting temperature using the Wallace rule.

6. A 20-base primer has 8 G/C bases and 12 A/T bases. Find its T_m .

7. Estimate the T_m of the sequence ATCGGCTA (8 bases).

8. Define: What shape is DNA?

9. Define: Which bases pair together?

10. Define: What does 'semiconservative replication' mean?

Answer Key

1. C) Thymine - Adenine pairs with thymine via two hydrogen bonds.
2. C) $60C - T_m = 4(10) + 2(10) = 40 + 20 = 60C$.
3. B) Semiconservative - Semiconservative replication preserves one parental strand in each new double helix.
4. D) DNA ligase - DNA ligase seals the gaps between Okazaki fragments into a continuous strand.
5. $T_m = 4(G+C) + 2(A+T)$ $T_m = 4(12) + 2(8) = 48 + 16 = 64C$
6. $T_m = 4(G+C) + 2(A+T)$ $T_m = 4(8) + 2(12) = 32 + 24 = 56C$
7. Count bases: A,T,C,G,G,C,T,A $G/C = 4$ (C,G,G,C), $A/T = 4$ (A,T,T,A) $T_m = 4(4) + 2(4) = 16 + 8 = 24C$
8. A double helix - two strands twisted around each other like a spiral staircase.
9. Adenine (A) pairs with thymine (T); guanine (G) pairs with cytosine (C), via hydrogen bonds.
10. Each new DNA molecule keeps one original (parental) strand and one newly synthesized strand.

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