What Are DNA and RNA?

Worksheet

DNA (deoxyribonucleic acid) is a double-stranded molecule that stores genetic information; RNA (ribonucleic acid) is typically single-stranded and helps read and express that information, especially during protein synthesis.

Questions

1. Which sugar is found in RNA?

A) Deoxyribose
B) Ribose
C) Glucose
D) Fructose

2. Which base replaces thymine in RNA?

A) Adenine
B) Guanine
C) Cytosine
D) Uracil

3. DNA with 40% guanine has what percentage of cytosine?

A) 10%
B) 20%
C) 40%
D) 60%

4. What is the main structural difference between DNA and RNA?

A) DNA is single-stranded, RNA is double-stranded
B) DNA is double-stranded, RNA is usually single-stranded
C) Both are always double-stranded
D) Both are always single-stranded

5. A 100-base DNA segment has 30 guanine (G) and 25 cytosine (C) bases. What is its GC content?

6. A DNA strand reads 5'-ATG CGT ACG-3'. What is the complementary strand?

7. An mRNA strand is transcribed from the DNA template 3'-TAC GCA TGC-5'. What is the mRNA sequence?

8. Define: What sugar is in DNA vs RNA?

9. Define: Which bases are unique to DNA and RNA?

10. Define: Is DNA single or double stranded?

Answer Key

1. B) Ribose - RNA contains ribose sugar; DNA contains deoxyribose.

2. D) Uracil - RNA uses uracil (U) instead of thymine (T).

3. C) 40% - G pairs with C in equal amounts, so %C = %G = 40%.

4. B) DNA is double-stranded, RNA is usually single-stranded - DNA forms a double helix; RNA is typically a single strand.

5. GC% = (G + C)/L 100 GC% = (30 + 25)/100 100 GC% = 55%

6. Pair each base: AT, TA, GC, CG ATG CGT ACG TAC GCA TGC Complementary strand (3'5'): 3'-TAC GCA TGC-5'

7. RNA polymerase pairs AU, TA, GC, CG (uses U instead of T) Template 3'-TAC GCA TGC-5' mRNA 5'-AUG CGU ACG-3'

8. DNA has deoxyribose; RNA has ribose (with an extra OH group).

9. DNA uses thymine (T); RNA uses uracil (U) instead.

10. DNA is double-stranded (a double helix); most RNA is single-stranded.