

**Discussion Worksheet – Winter 2026 - Week 2**  
**Due on January 12 at 11:59pm**

**Group 1:**

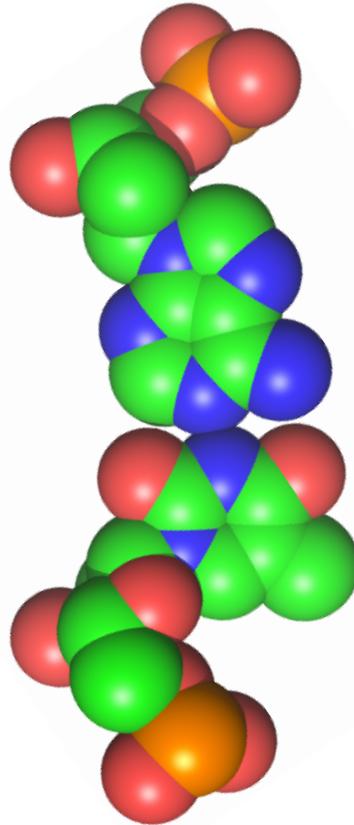
This picture shows a base pair in space filling view. On the figure, mark the followings:

Where would the helical axis be located if this base pair were found in a B, A or Z-DNA form?

Where are the pseudo-dyad axis and the short axis?

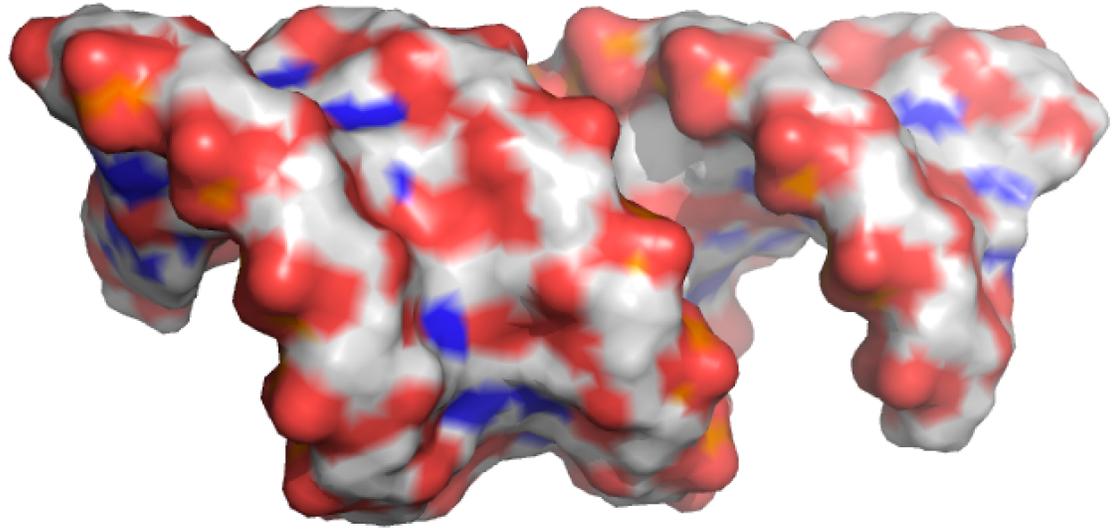
Where are the major and minor grooves?

Identify the H-bonds donors (D) and acceptors (A) in the major groove.



**Group 2:**

The picture below shows the surface representation of a nucleic acid.



Identify the location of the negative charges on the nucleic acid.

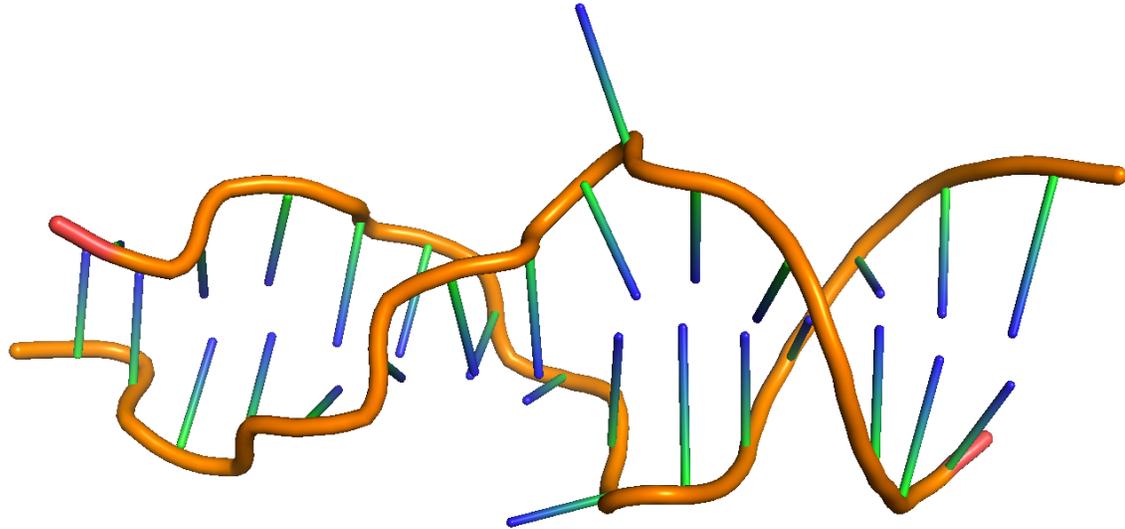
Identify all the areas corresponding to the major and minor grooves of the double helix

What type of structure is formed by this double helix; justify your answer using two independent elements that you can see from the picture.

Based on the representation shown above, what challenge would be encountered by a protein which needs to recognize the sequence of this nucleic acid?

**Group 3:**

This picture shows the structure of an unusual nucleic acid duplex in cartoon representation.



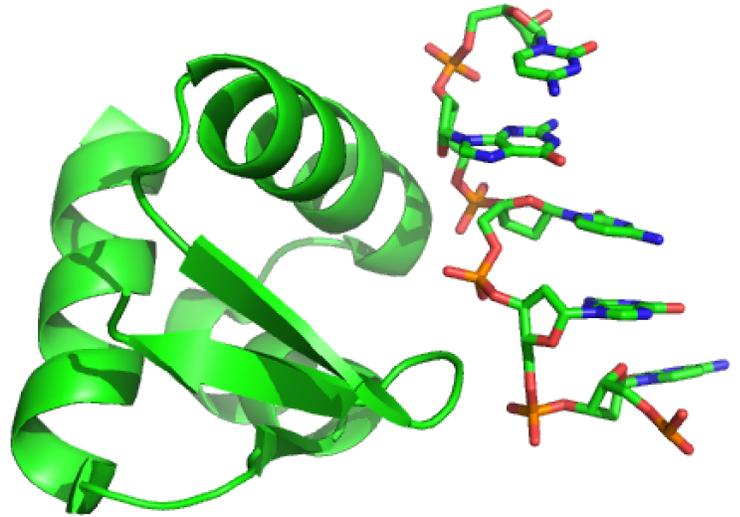
Which portion of this nucleic acid is a right-handed helix? Which portion is a left-handed double helix? Explain briefly.

What double helical conformation(s) can you visualize on this nucleic acid?

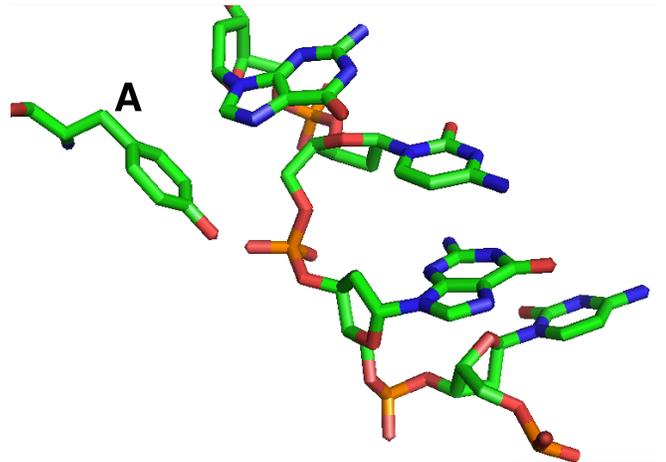
What specific structural feature is found in this structure which is not observed in A, B, or Z forms?

## Group 4

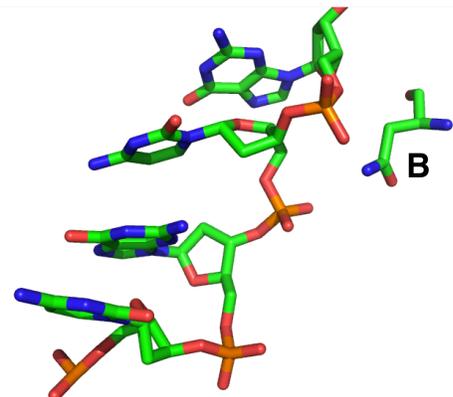
The structure of a protein that interacts with a double-stranded nucleic acid is shown on the right. Only one strand of the nucleic acid is shown (the other strand shows a complementary sequence). Two amino acids A&B that interact with the nucleic acid are shown below in more detail.



**A-** based on the structural elements of the nucleic acid chain visible on the three pictures, predict what type of double helical structure is bound by this protein. Justify your answer using at least **two** structural elements of the nucleic acid



**B-** Describe briefly what type of interactions amino acids A and B make with the nucleic acid and which chemical groups are involved



**C-** Based on the overall picture on the top and on the interactions between the amino acids shown and the nucleic acid, explain how this protein recognizes this nucleic acid specifically