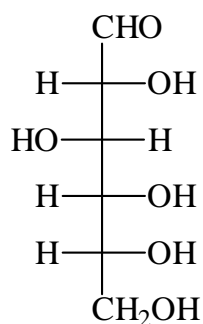
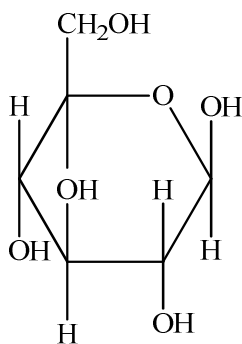


The open chain form of D-glucose has the structure shown.

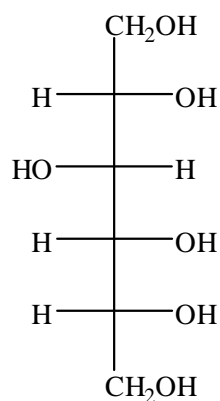


Draw the Haworth projection of  $\beta$ -D-glucopyranose.

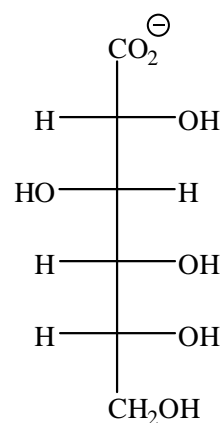


Draw the major organic product of the reaction of D-glucose with the following reagents.

1.  $\text{NaBH}_4$     2.  $\text{H}^+ / \text{H}_2\text{O}$



$[\text{Ag}(\text{NH}_3)_2]^\oplus / \text{OH}^\ominus$



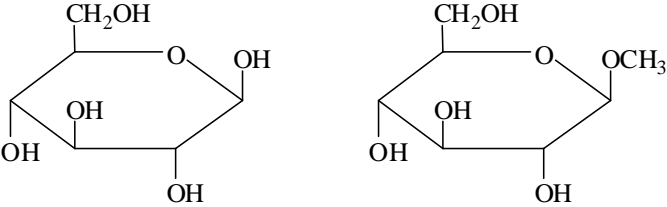


Would you expect D-glucose to be water soluble? Why?

**D-glucose will be water soluble as it has numerous alcohol functional groups which can hydrogen bond with the water molecules.**

**Marks  
5**

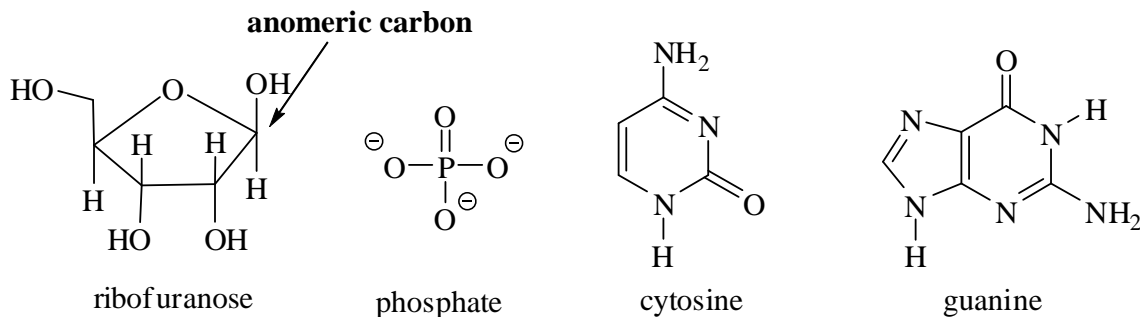
**Marks**  
**3**

- Using a chemical test, how would you distinguish between the following pairs of compounds? Indicate the reagent you would use and the observations you would make.

Compounds	Reagent and observation
	<p><b>Tollens' reagent,</b>  <math>[\text{Ag}(\text{NH}_3)_2]/\text{OH}^-</math></p> <p><b>The first compound will cause a silver precipitate to form. No reaction with the second compound as it does not contain hemi-acetal group.</b></p>
	<p><math>\text{Cr}_2\text{O}_7^{2-}/\text{H}^+</math></p> <p><b>Orange reagent will go green with first compound. No reaction with the second compound.</b></p>
	<p><b><math>\text{Br}_2</math> solution.</b></p> <p><b>First compound will decolourise the orange/brown <math>\text{Br}_2</math> solution. No reaction with the second compound.</b></p>

Marks  
8

- The following species represent some of the building blocks of RNA.



Is the sugar depicted the  $\alpha$ - or the  $\beta$ - form? Circle the one correct answer.

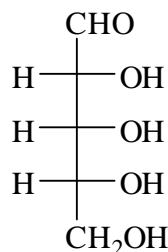
$\alpha$     **$\beta$**

Is the sugar depicted a reducing sugar or a non-reducing sugar? Circle the one correct answer.

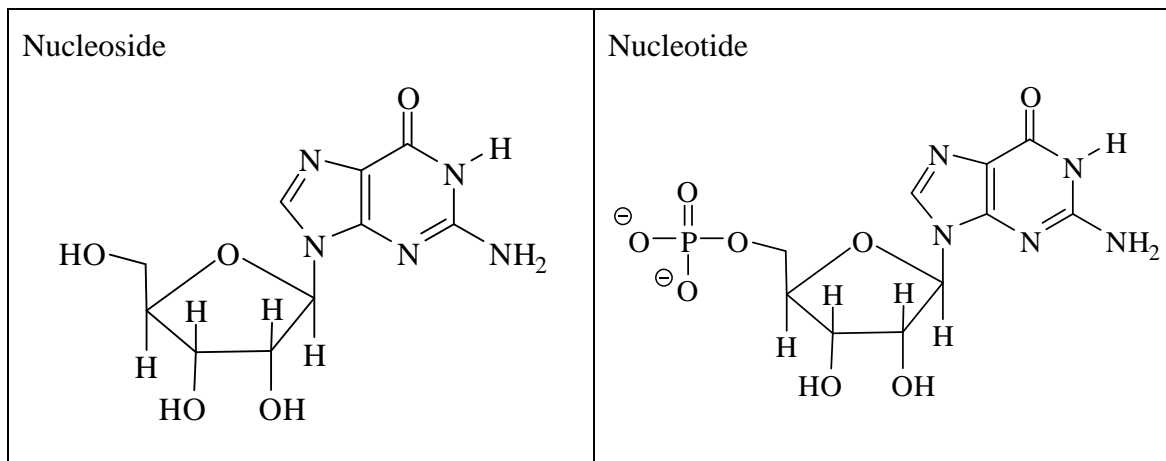
**reducing**   non-reducing

Indicate on the above structure the 'anomeric' carbon atom that gives rise to the  $\alpha$  or the  $\beta$  form.

Draw the Fischer projection of D-ribose.

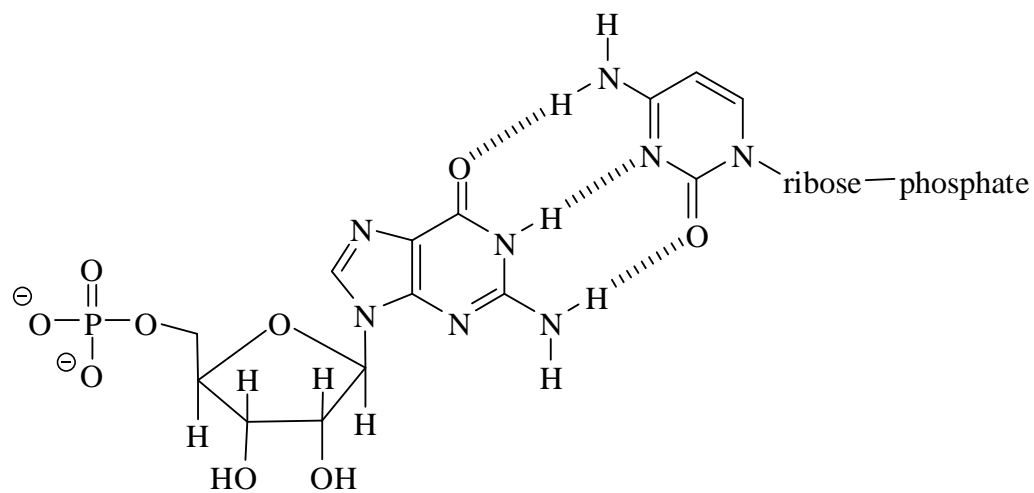


Using a selection of the species given, draw a nucleoside and a nucleotide.

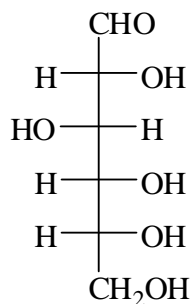


**ANSWER CONTINUES ON THE NEXT PAGE**

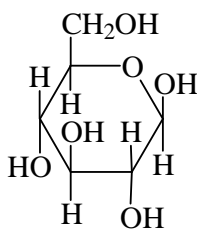
Indicate the likely hydrogen-bonding interactions between complementary strands of RNA containing cytosine and guanine.



- The open chain form of D-glucose has the structure shown.

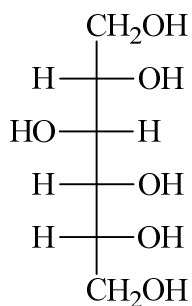


Draw the Haworth projection of  $\beta$ -D-glucopyranose.

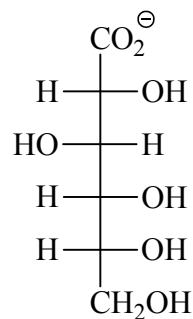


Draw the major organic product of the reaction of D-glucose with the following reagents.

1.  $\text{NaBH}_4$     2.  $\text{H}^+ / \text{H}_2\text{O}$



$[\text{Ag}(\text{NH}_3)_2]^+ / \text{OH}^-$

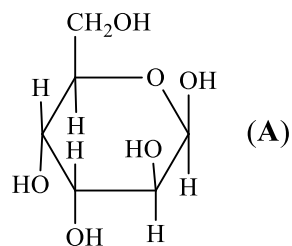
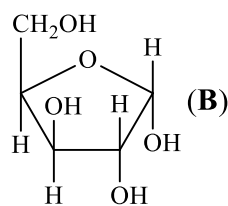


Would you expect D-glucose to be water soluble? Why?

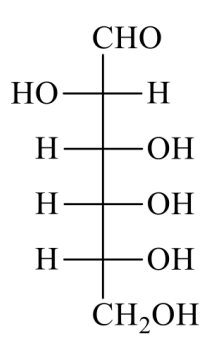
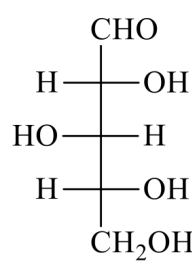
**Yes - it contains a large number of alcohol groups which will form hydrogen bonds with water.**

**Marks**  
**6**

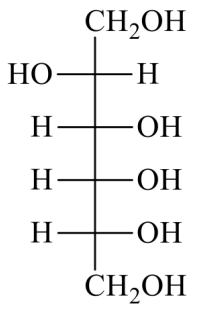
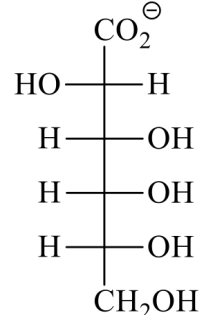
- Consider the following two monosaccharides, (A) and (B).


 $\beta$ -D-altropyranose

 $\alpha$ -D-xylofuranose

Draw Fischer projections of the open chain forms of (A) and (B).

(A)	(B)
	

Draw the major organic product of the reaction of D-altropyranose with the following reagents.

<p>1. <math>\text{NaBH}_4</math>    2. <math>\text{H}^{\oplus} / \text{H}_2\text{O}</math></p> <div style="text-align: center;">  </div>	<p><math>[\text{Ag}(\text{NH}_3)_2]^{\oplus} / \text{OH}^{\ominus}</math></p> <div style="text-align: center;">  </div>
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