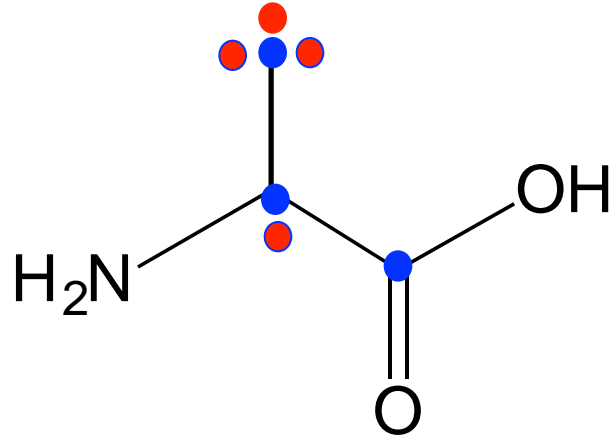


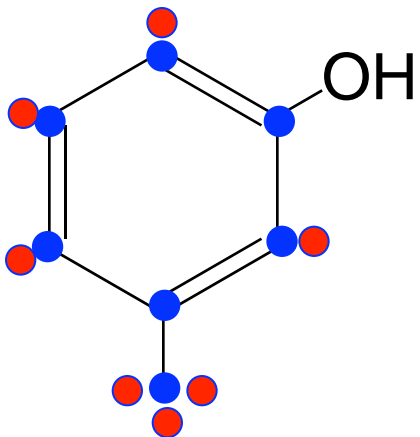
For alanine



Put a blue dot for each **C atoms** (*C at corners and ends of lines*)

Put a red dot for each **H atoms** (*C has a valency of four*)

Write the **chemical formula**: **$C_3H_7O_2N$**



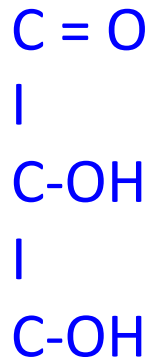
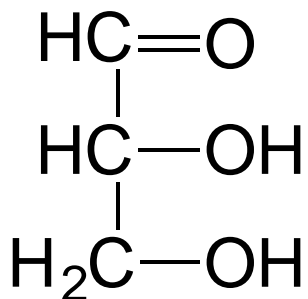
For 3- methyl Phenol

Put a blue dot for each C atom

Put a red dot for each H atom

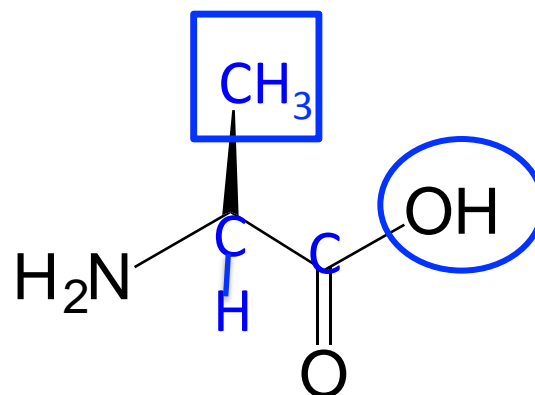
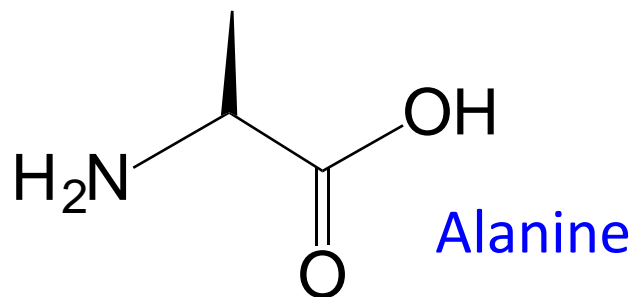
Write the chemical formula C_7H_8O

Draw Glyceraldehyde as a line angle drawing



Write the chemical formula $C_3H_6O_3$

Polar vs nonpolar molecules



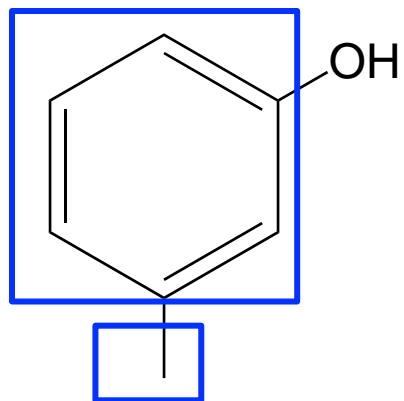
Draw the **full structure**.

Give the **chemical formula** $C_3H_7O_2N$

Star (*) **electronegative element(s)** (*look for atoms that attract electrons*) *These are O and N*

Circle **polar groups** (*with unequal electron distribution (or dipole)*)

Box a **nonpolar group**. (*equal electron distribution, often C,H only*)

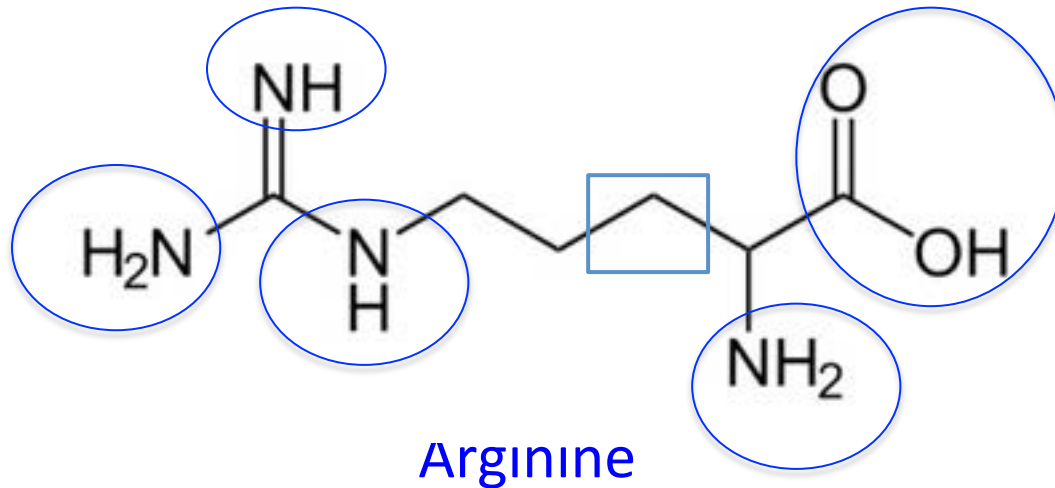


3- methyl Phenol

Does 3- methyl Phenol contain polar groups? Circle YES or NO.
The -OH group is polar

If YES, indicate the dipoles (δ^+ and δ^-). $-\text{O}^{\delta-}\text{H}^{\delta+}$

Does 3- methyl Phenol contain nonpolar groups? Circle YES or NO.
They are boxed on the schematic



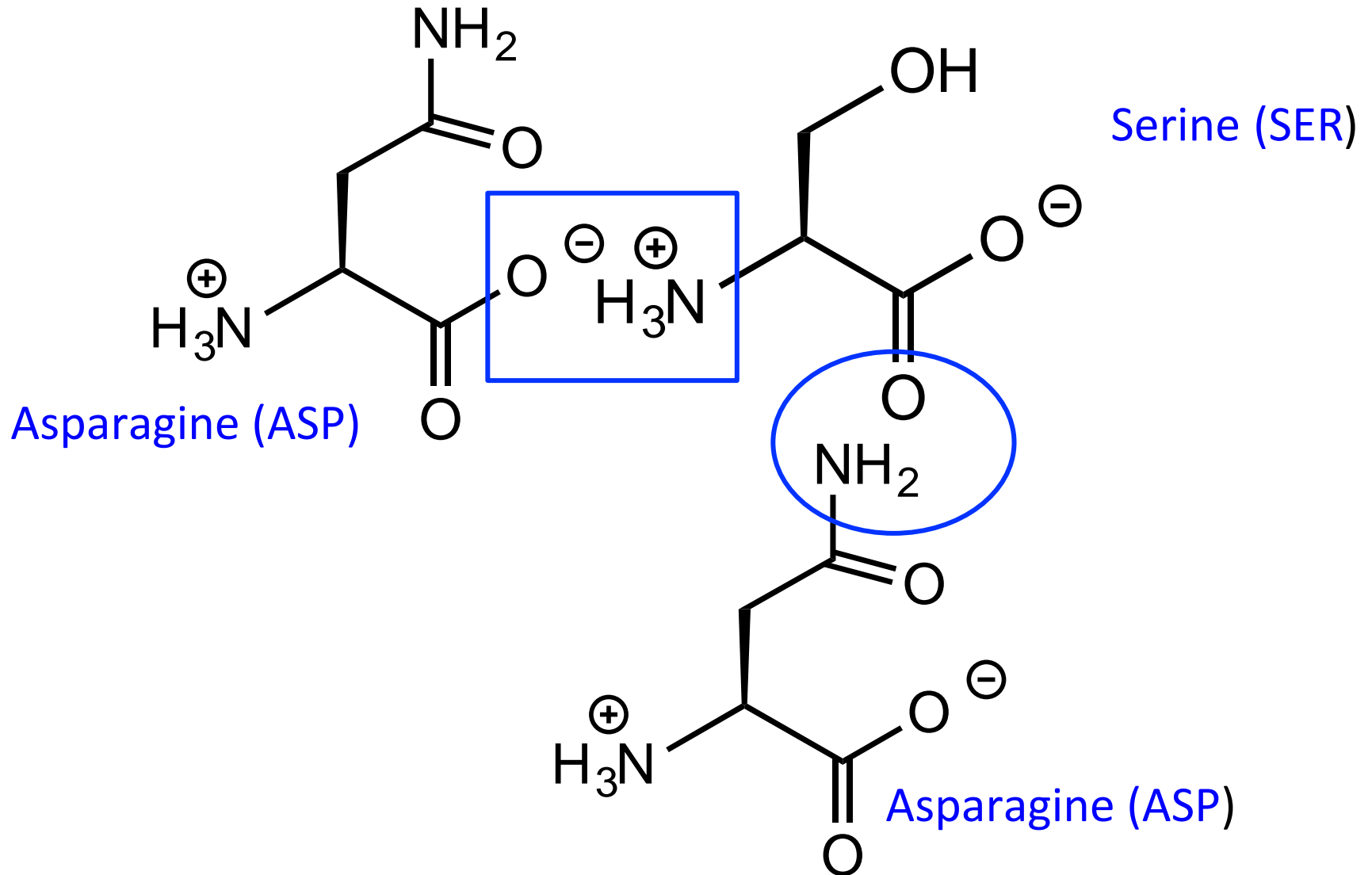
Circle all polar groups

Box a non-polar group

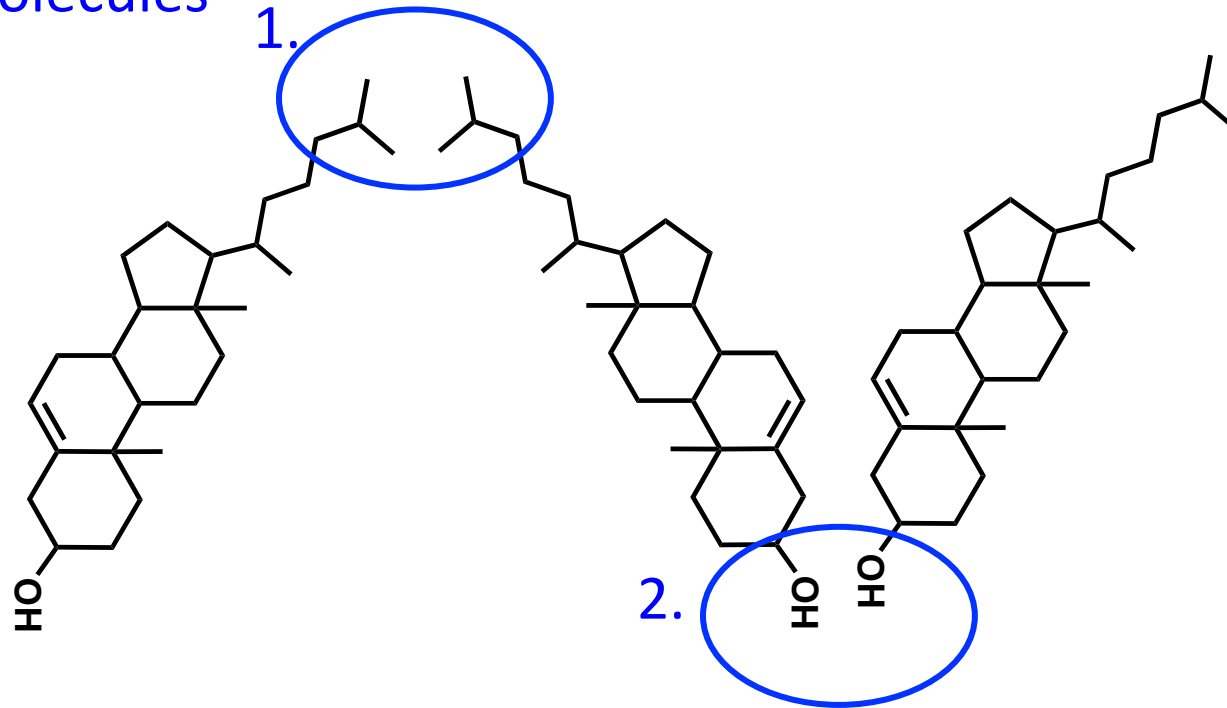
Is this molecule polar or nonpolar? **Explain** your choice .

It is polar, hydrophilic as shown by the presence of multiple polar groups relative to nonpolar region.

Circle where a hydrogen bond will form
Put a box where an ionic bond will form



For interactions between
Cholesterol molecules



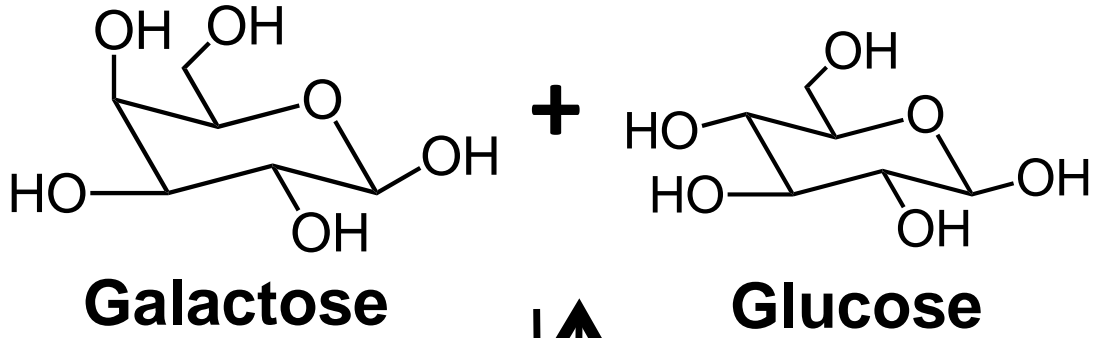
What type of bond will likely form in region 1?

Hydrophobic/ VDW

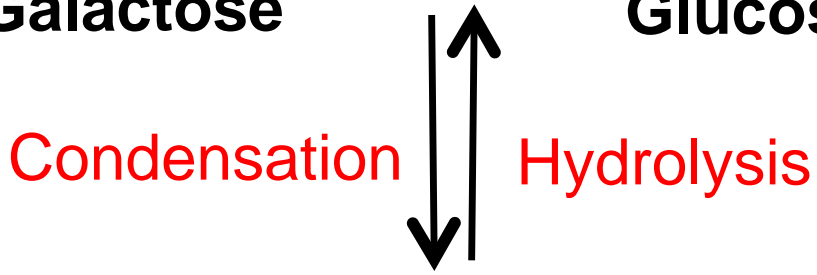
What type of bond will likely form in region 2?

Hydrogen bond

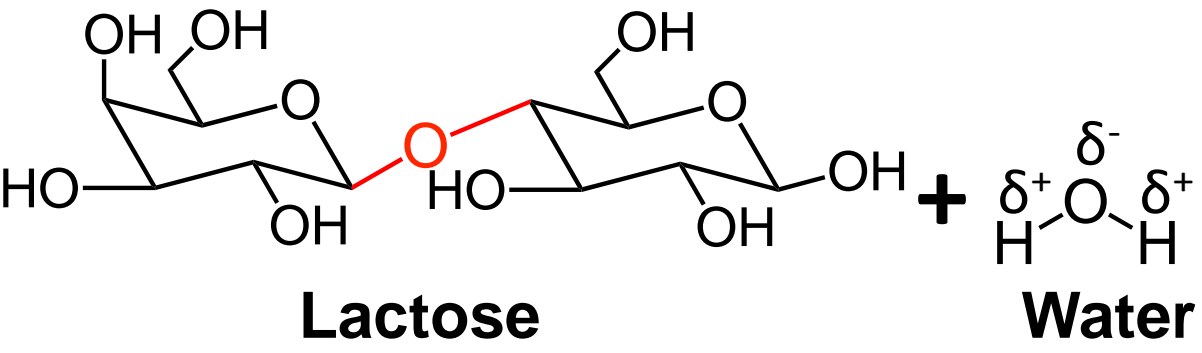
Summary: Condensation and hydrolysis reactions

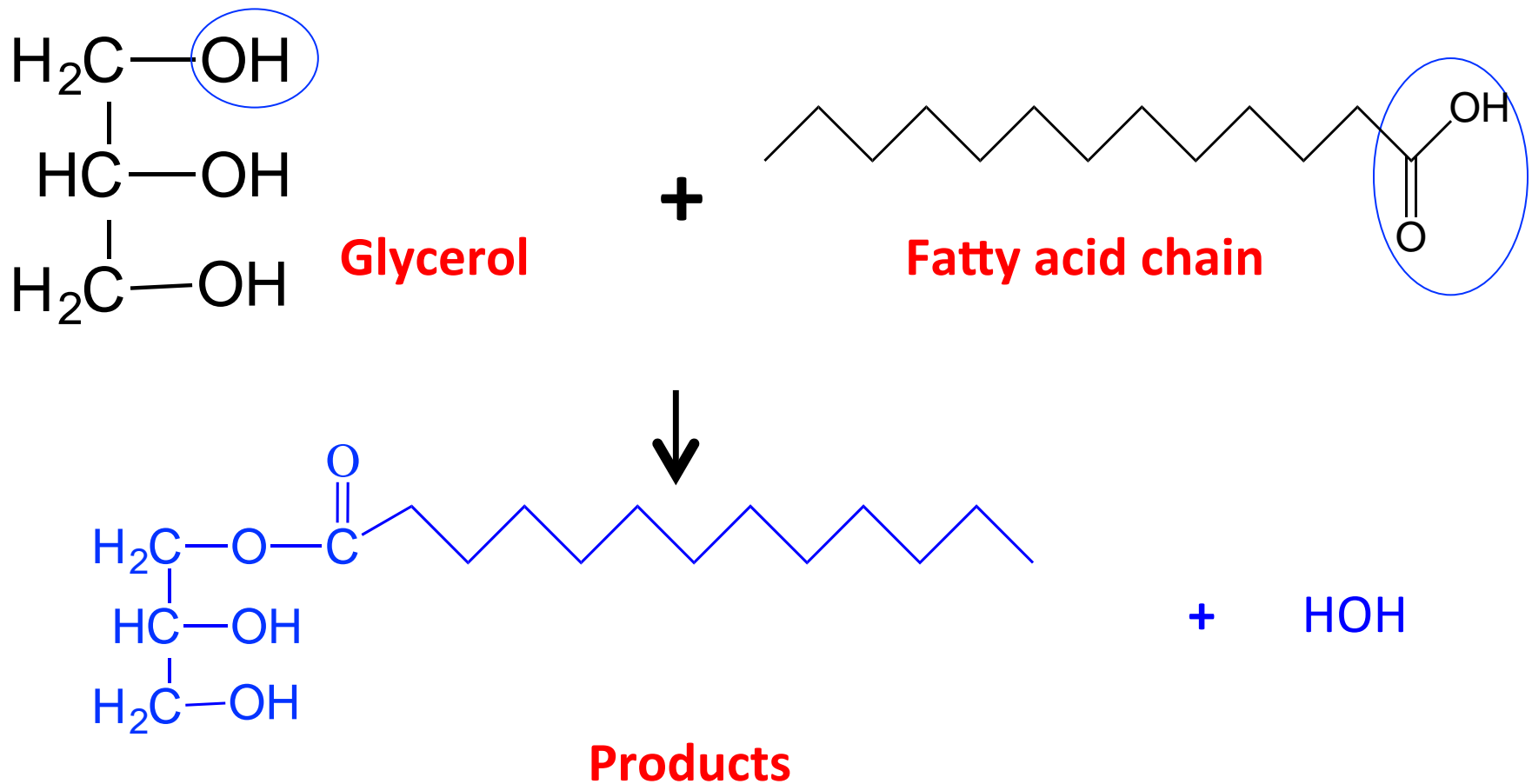


Condensation:
covalently joins
monomers to form
polymers.



Hydrolysis: Hydrolyzes
polymers

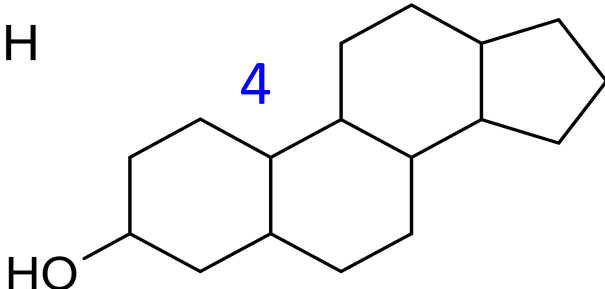
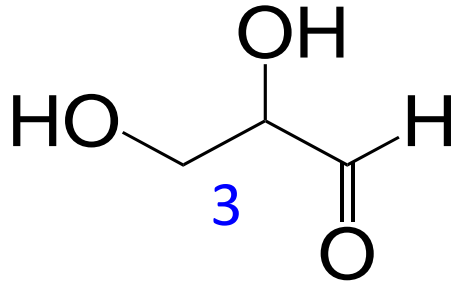
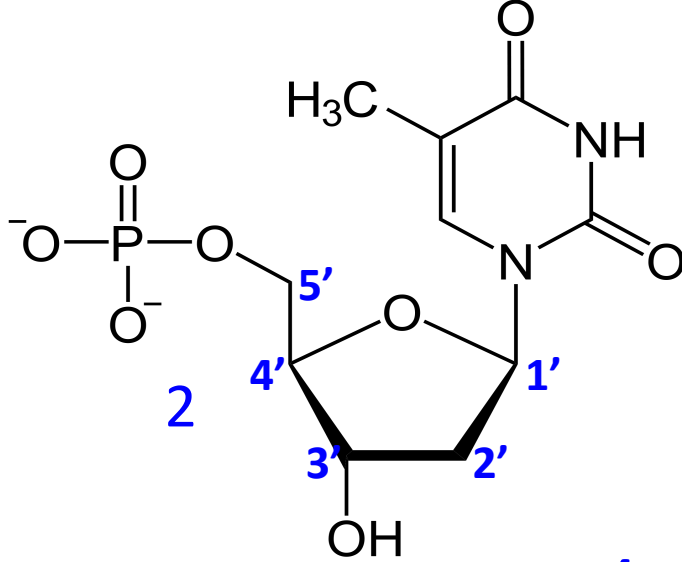
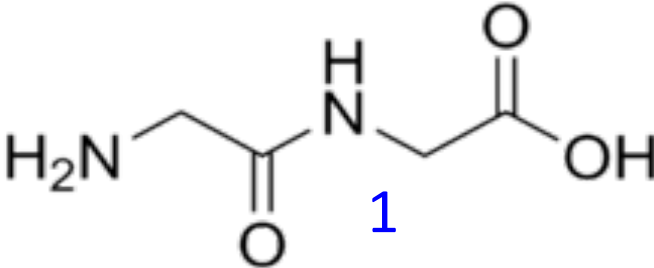




Draw the products of condensation reaction.

Circle the groups participating in condensation reaction.

Identify macromolecules



What numbers correspond to a carbohydrate? *3 and pentose sugar in 2*

pentose sugar? Label the C atoms 1'-5'. *It's a part of molecule 2*

nonpolar molecule? *4, it has multiple rings made of C and H*

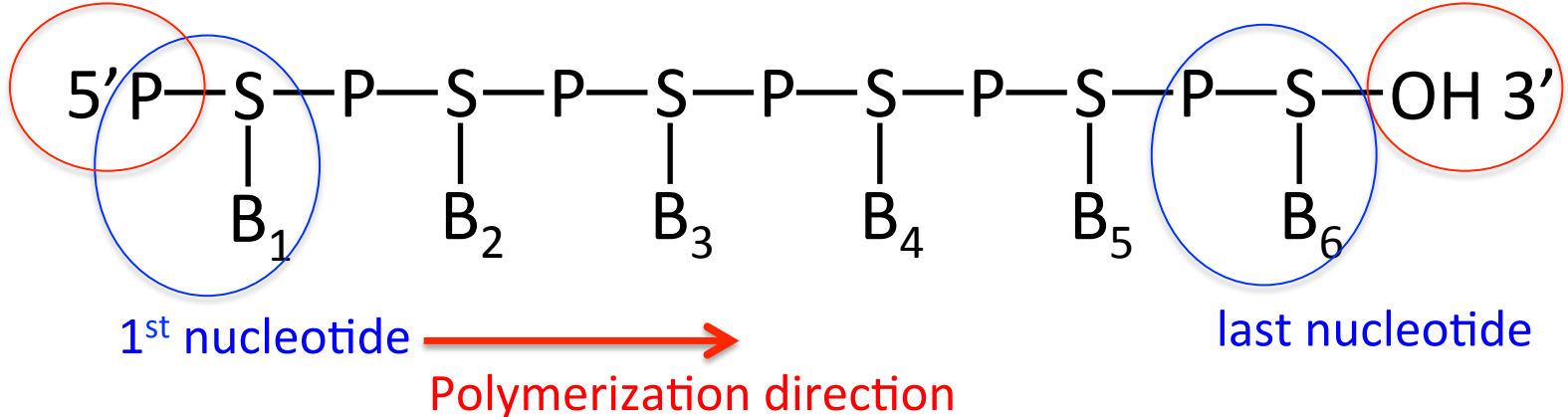
Two amino acid monomers covalently bonded to make a dipeptide? Circle the side-chains of each. *1 (They both have -H as their side-chain)*

molecule that contains a base? *(nucleotide): 2*

Summary: Nucleic acid polymer: direction and information

Free phosphate
on 1st nucleotide

Free hydroxyl group
on last nucleotide



S-P backbone is not written, just the bases + polarity
ALWAYS write 5' and 3' on each nucleic acid strand!!

5' B₁B₂B₃B₄B₅B₆ 3' e.g. 5'GAATCC3'

- Base order = INFORMATION*
- Polarity = 5' and 3' ends: shows*
 - *first to last nucleotide added*
 - *direction to read information*

For the nucleic acid molecules below:

5'P-ATCGACTG-3'OH

Label the 3' end
(it has the free hydroxyl)
Arrow direction of synthesis
(5' to 3' synthesis)

5'TTCCGG3'

Label the 5' end

5'AGCAG3' + 5'A3'

Circle where the incoming Adenine nucleotide will add to the polymer

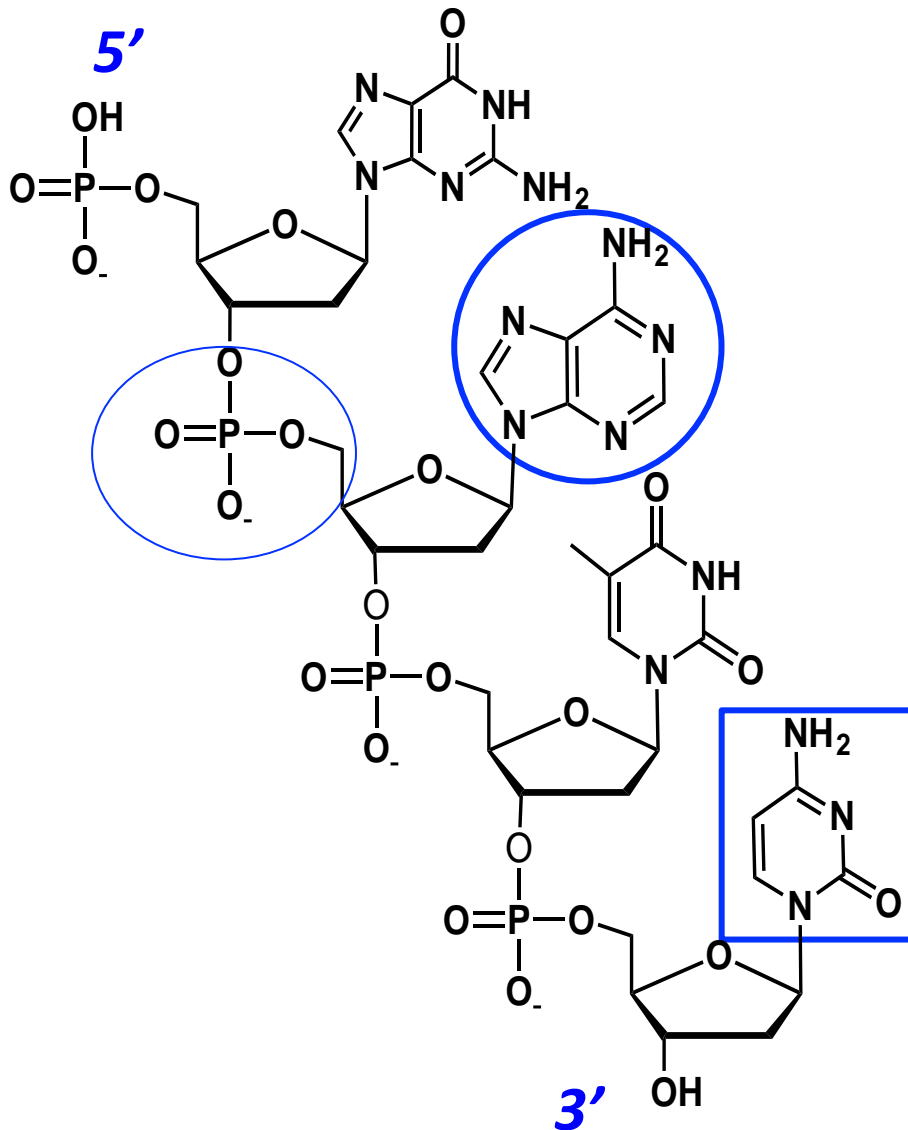
a. 5'AGCATG3'

b. 5'GTAGGA3'

c. 3'GTACGA5'

These DNA molecules contain the same information, *circle all correct options*

- a+b
- a+c
- b+c
- a+b+c
- they are all different



Label the 5' and 3' end of nucleic acid chain. (*look for the free phosphates and 3'OH group in sugar phosphate backbone.*)

Identify the **growing end**.
3'OH end

Circle a **purine** and box a **pyrimidine**.

Reaction that links circled blue groups: Condensation or hydrolysis?

Summary: Primary, Secondary, Tertiary and Quaternary Protein Structure

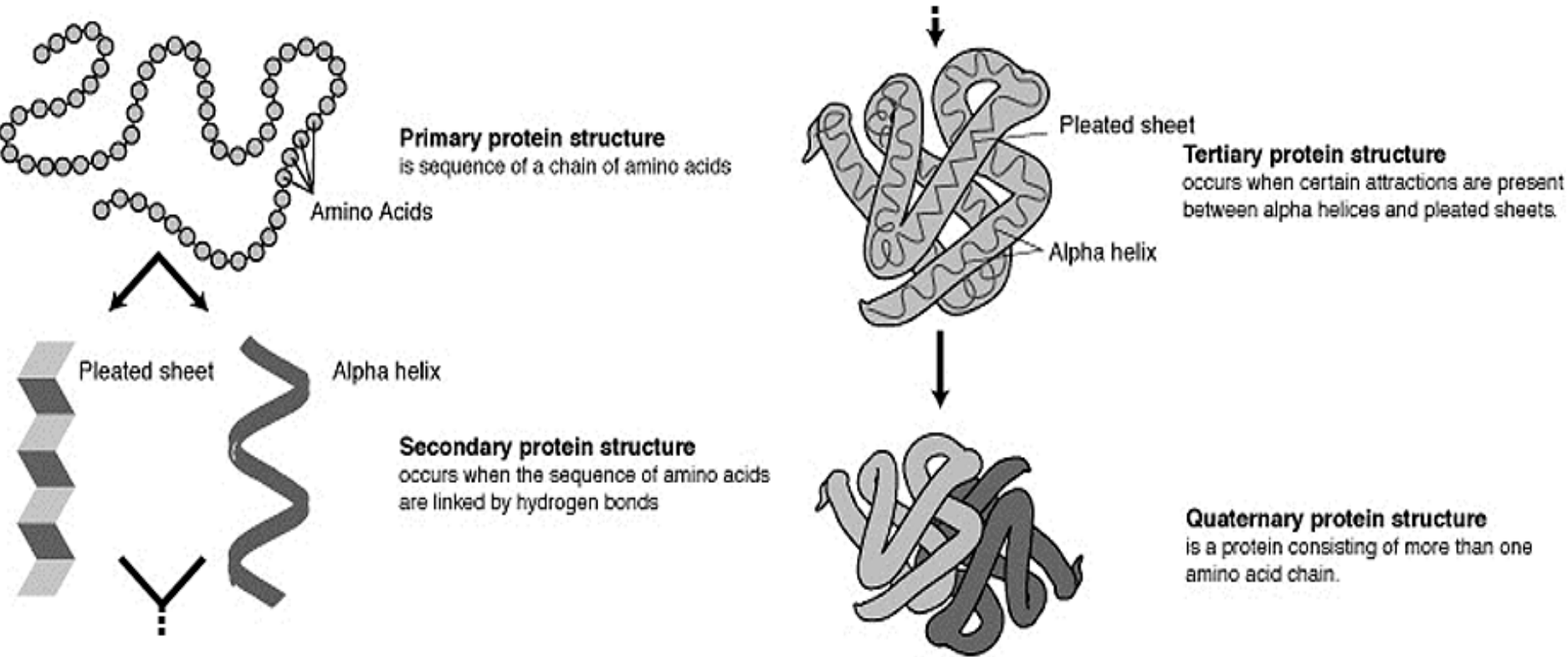
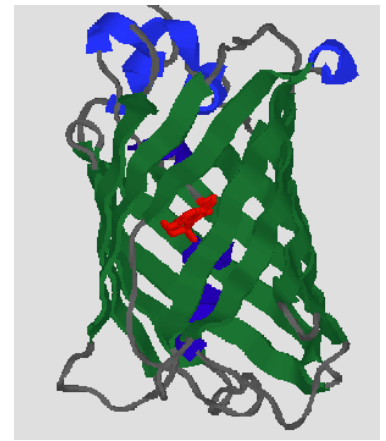


Image by the National Human Genome Research Institute. Public domain.

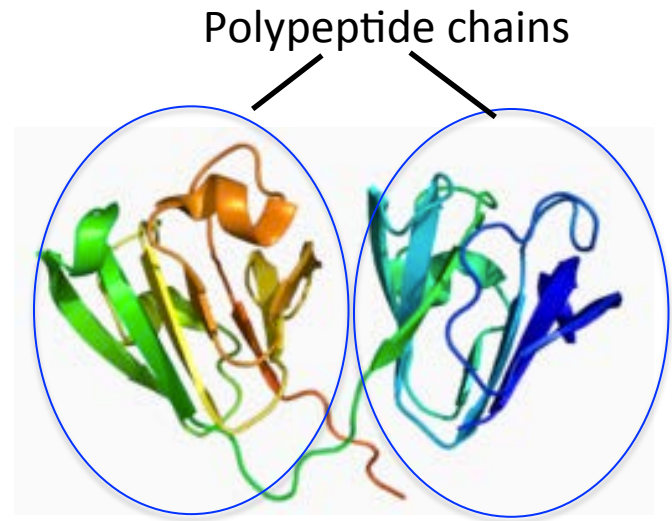
Protein structures



Protein 1



Protein 2



Protein 3

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Identify the secondary structures in Protein 1

Alpha helix

beta Sheets

Both

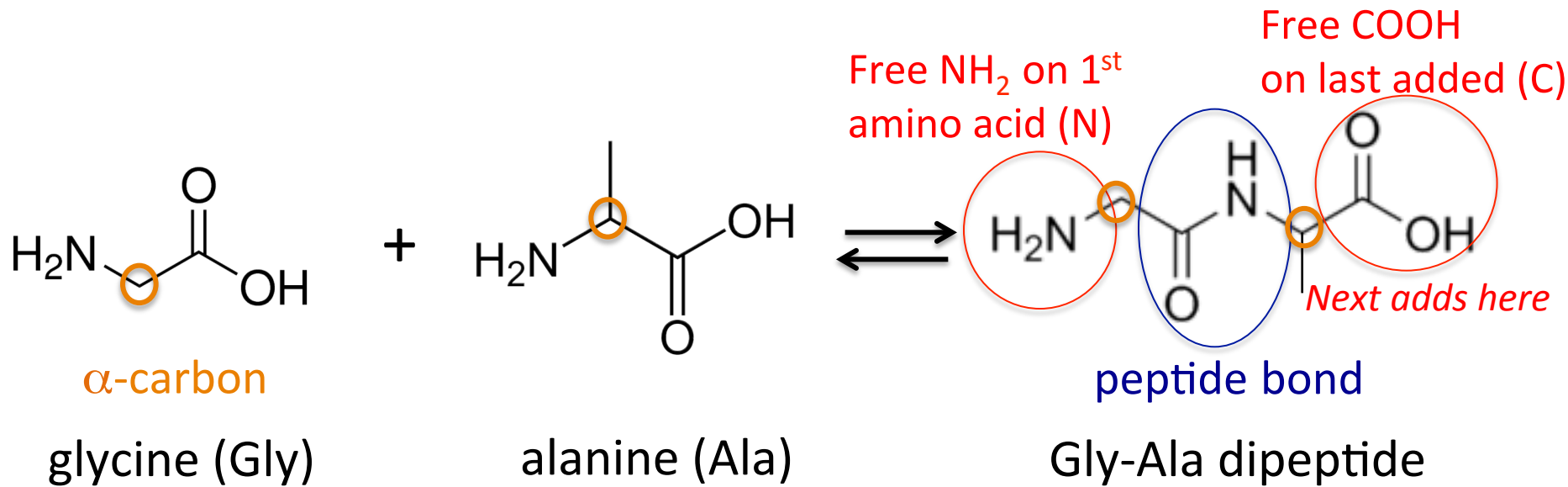
Highest order of protein structure for

-Protein 1: Tertiary (one polypeptide chain)

-Protein 2: Tertiary (one polypeptide chain)

-Protein 3: Quaternary (two polypeptide chains each with tertiary as their highest order of protein structure)

Summary: Protein polymer: direction and information



Proteins are written with three or one letter amino acid code

ALWAYS write N and C on each protein

e.g. N-Gly-Ala-C
1 2

e.g. N-Ser-Val-Met-Gly-C
1 2 3 4
1st → last, next adds here
Polymerization direction

Amino acid order = INFORMATION

Polarity = N and C ends: shows

- first to last amino acid added

On the peptide chain below:

NH₂- Met-Cys-Cys-Ile-Gln-**C**

Label the C terminus
(*proteins have N -> C polarity*)
arrow direction of synthesis
(*N -> C synthesis*)

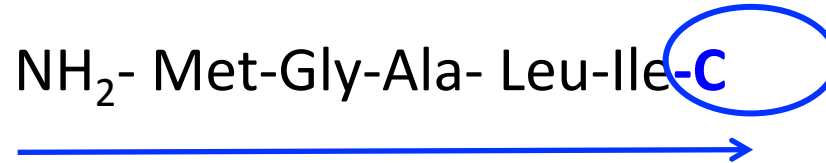
C-Arg-Tyr-Asn-Val-**N**

Label the N end

N-Met-Leu-Ile-Val-**C** + Trp

Circle where Trp will add
to the polymer

On the peptide



Label the C terminus

Arrow direction of synthesis (*N -> C synthesis*)

Circle where the next amino acid will add.

Is the peptide **hydrophobic**, hydrophilic, both? (Circle all correct)

All the amino acids have nonpolar, hydrophobic side-chains making the peptide hydrophobic.

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7.013 Introductory Biology
Spring 2018

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