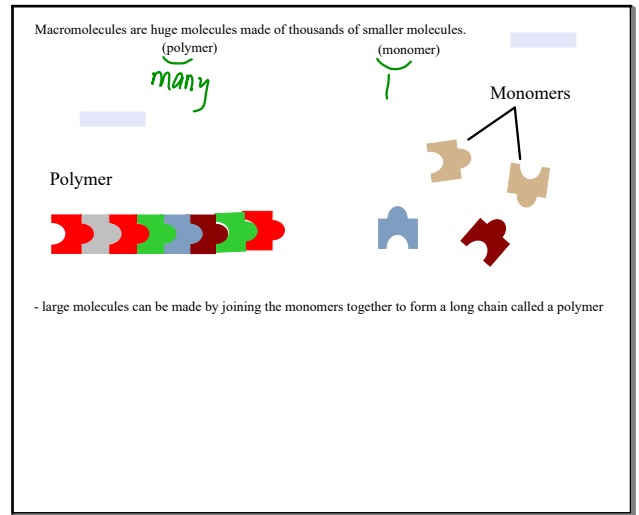
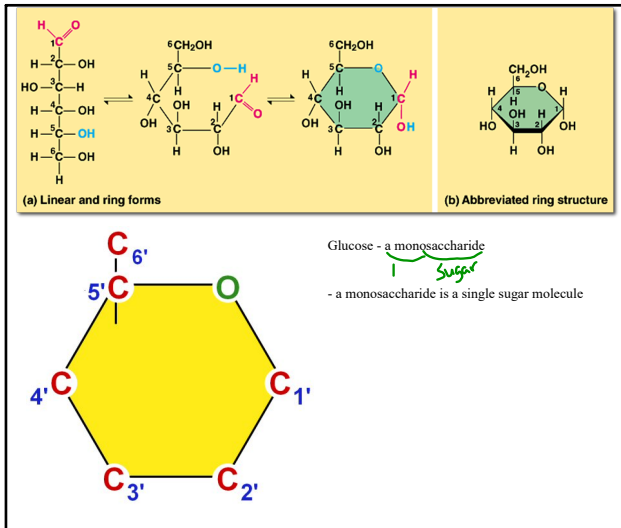


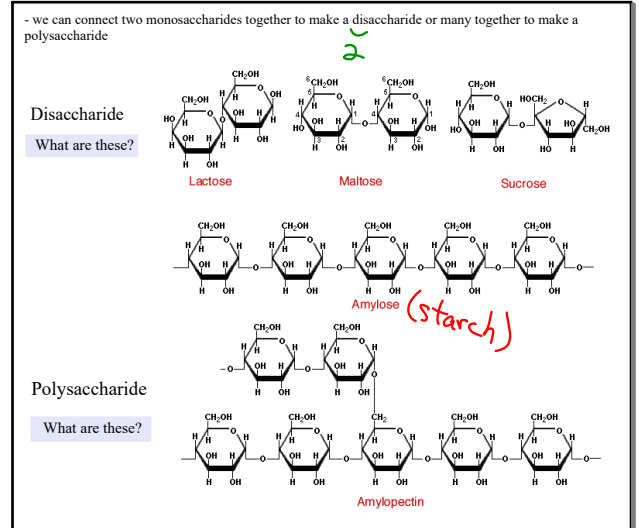
Functional Groups



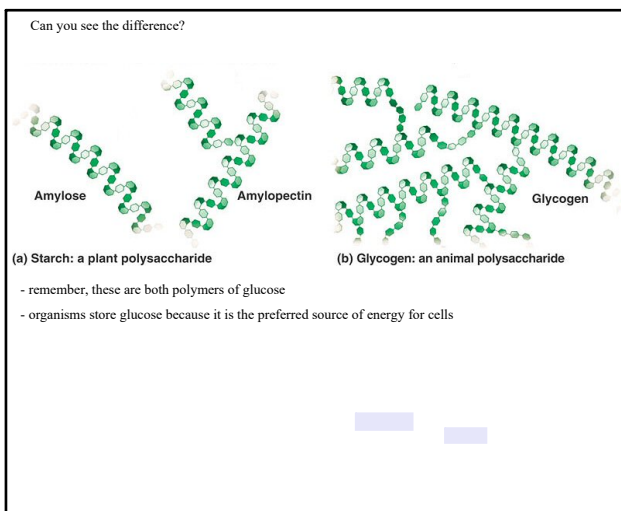
Monomers and polymers



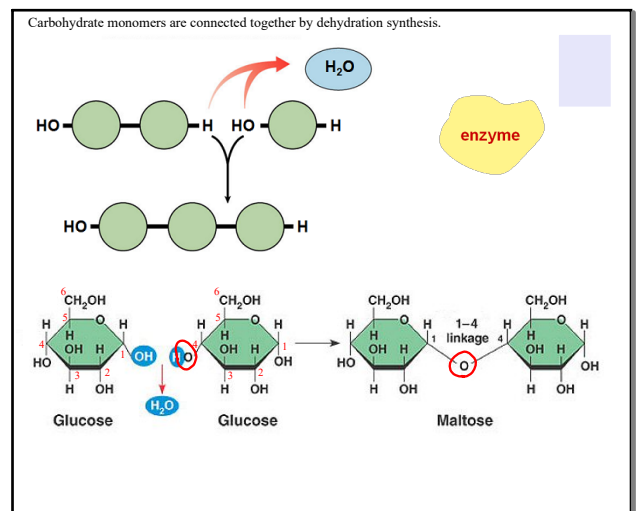
Monosaccharides



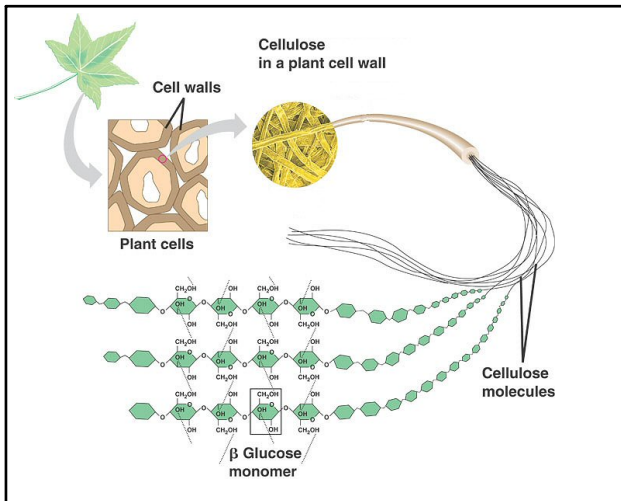
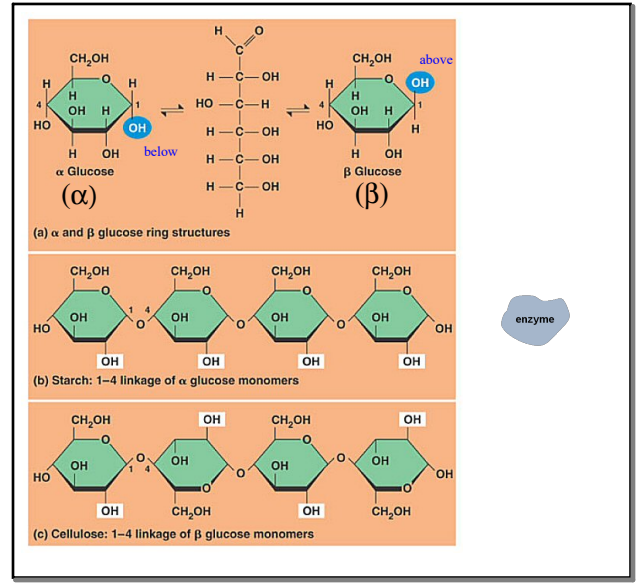
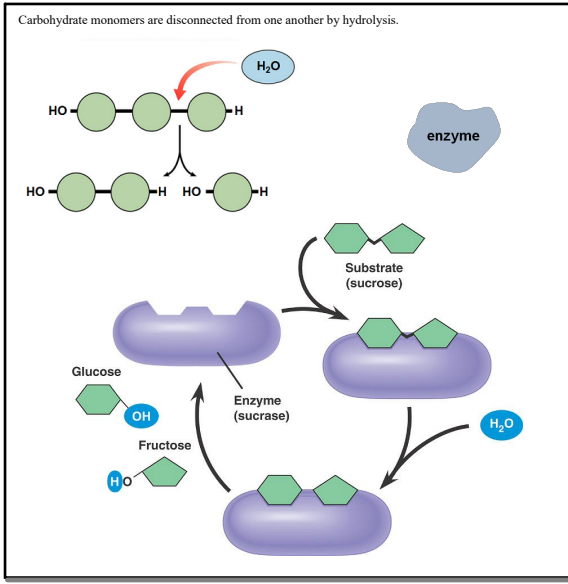
Starch



Starch and glycogen

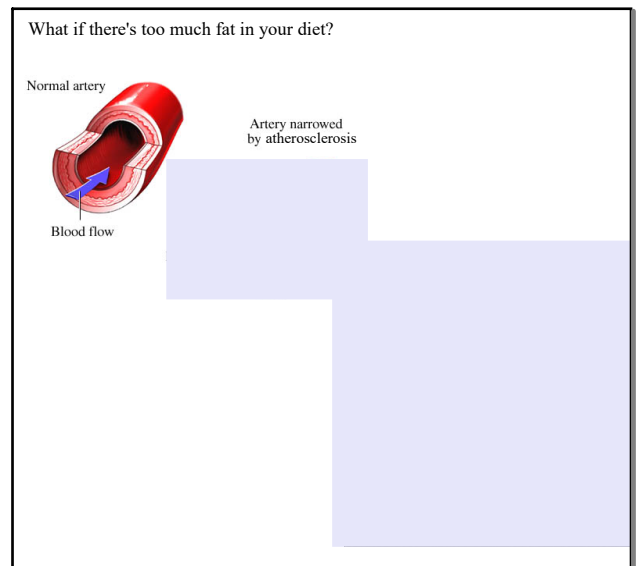
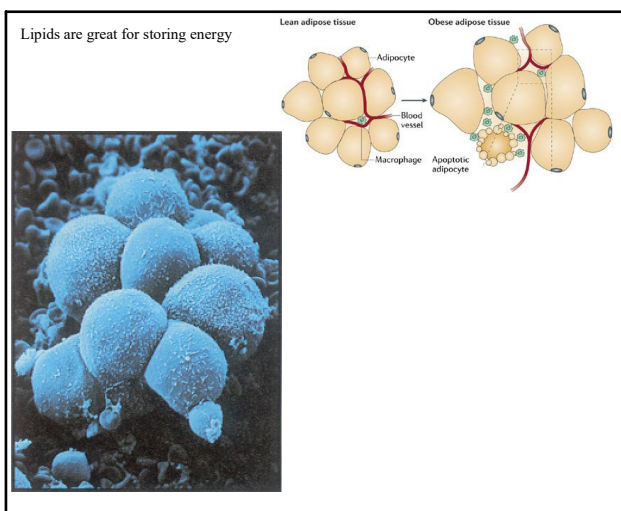


Dehydration synthesis



1. Explain the relationship between monomers and polymers, using polysaccharides as an example.
2. a) Plants make a huge amount of cellulose each year which could be an excellent source of glucose as food for humans and other organisms. Why is it not?
 b) Although it can't be digested, why is fibre (*i.e.*, cellulose) considered to be an important part of a healthy diet?
 c) Wait a second, how can herbivores like cows eat grass as the major part of their diet?

CQ



Bypass surgery

Lifestyle changes
- low-fat diet
- exercise

Stent

Treatment

A triglyceride is a common type of fat

Fatty acid (Palmitic acid)

Why are fats nonpolar?

Glycerol
(a) Dehydration synthesis

Triglycerides

Saturated fatty acids

Unsaturated fatty acids

Stearic Acid

Linoleic Acid

Oleic Acid

missing hydrogen
↓
double bond
↓
bend
↓
less close packing
↓
liquid

Saturated/unsaturated

saturated fats

unsaturated fats

	Saturated	Unsaturated
Source	Animals	Plants and fish
Hydrogen	Filled with hydrogen	Missing hydrogen
Double bonds	No	Yes
Straight	Yes	No
Packing	Close	Not as close
Phase	Solid	Liquid

Saturated/unsaturated

What about Trans fats?

Cis double bond

Trans double bond

Complete chemical hydrogenation →

side-effect of chemical hydrogenation →

Double bond in the **trans** configuration

Cis/trans

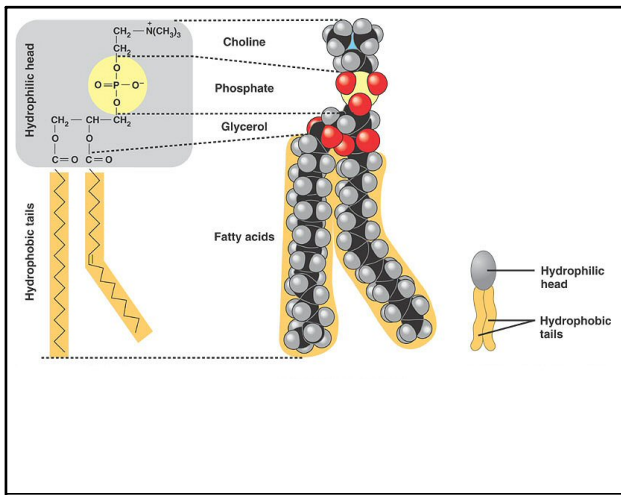
Nutrition Facts
Serving Size 1 Tbsp (14g)
Servings Per Container about 32

Amount Per Serving	Calories 100	Calories from Fat 100
Total Fat	11g	17%
Saturated Fat	2g	10%
Trans Fat	3g	
Polyunsaturated Fat	2.5g	
Monounsaturated Fat	3.5g	
Cholesterol	0mg	0%
Sodium	105mg	4%
Total Carbohydrate	0g	0%
Protein	0g	

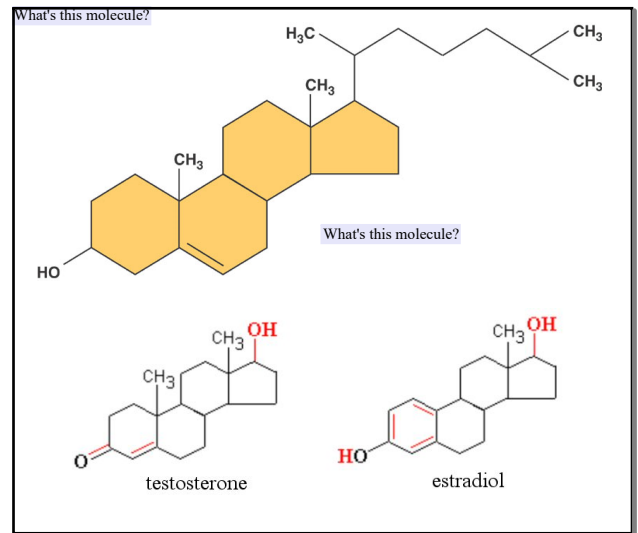
INGREDIENTS: VEGETABLE OIL BLEND (PARTIALLY HYDROGENATED SOYBEAN OIL, SOYBEAN OIL), WATER, SALT, WHEY (FROM MILK), SOY LECITHIN, VEGETABLE MONO AND DIGLYCERIDES, POTASSIUM SORBATE (USED TO PROTECT QUALITY), CITRIC ACID, ARTIFICIAL FLAVORS, VITAMIN A PALMITATE, BETA CAROTENE (FOR COLOR). CONTAINS: MILK, SOY

QUALITY GUARANTEE
If you are not completely satisfied with this product, it for a refund or replacement.

Labels



Phospholipids



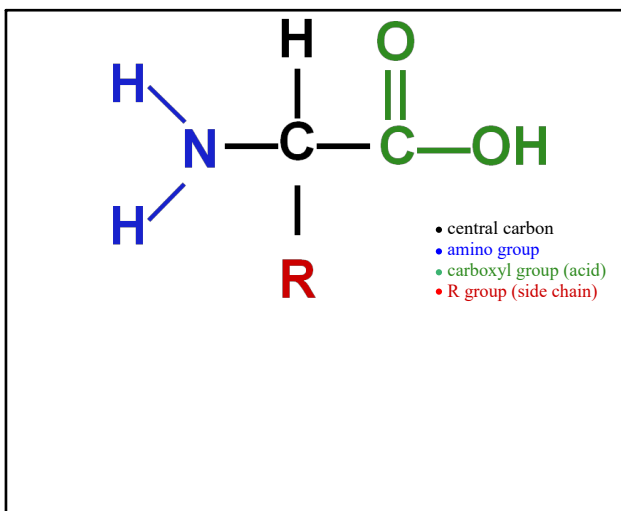
Cholesterol



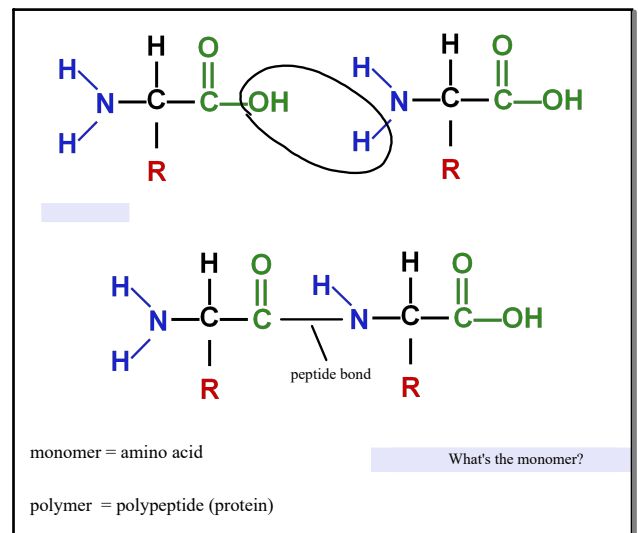
Waxes

- Lipids and carbohydrates can both be used as energy by cells. If you need quick energy, which might you choose to eat?
- Which of these things is not like the others?
 a) fiber (b) sugar (c) starch (d) cellulose (e) fat
- How does the structure of an unsaturated fatty acid differ from the structure of a saturated fatty acid? Give an example of a food that contains each
- Explain why some fatty acids are solid at room temperature while others are liquid.
- When you consume more food than you need for energy, the excess can be stored in the form of lipids. Why are lipids particularly useful for this purpose?
- a) What property do all lipids share?
 b) How does this make them ideal for building cell membranes?
- What effect does hydrogenation have on fatty acids?
- a) Cholesterol usually gets a bad rap in the media. What makes it a health risk?
 b) Should we try to eliminate it from our diet?
 c) Do we need cholesterol?

CQ



Amino acid



Peptide bond

Nonpolar

Glycine (Gly) Alanine (Ala) Valine (Val) Leucine (Leu) Isoleucine (Ile)

Methionine (Met) Phenylalanine (Phe) Tryptophan (Trp) Proline (Pro)

What do you notice about these amino acids?
 - the R groups contain mostly C and H (which are nonpolar, *i.e.*, hydrophobic)

Non-polar amino acids

Polar

What do you notice about these amino acids?
 - R groups contain OH or NH (which are polar, *i.e.*, hydrophilic)

Serine (Ser) Threonine (Thr) Cysteine (Cys) Tyrosine (Tyr) Asparagine (Asn) Glutamine (Gln)

Charged

Acidic **Basic**

Aspartic acid (Asp) Glutamic acid (Glu) Lysine (Lys) Arginine (Arg) Histidine (His)

What do you notice about these amino acids?
 - R groups have a charge

Polar and charged

11. a) Why is a protein called a polypeptide?
 b) Why is a polypeptide not a protein?

12. Why are some amino acids soluble in water while others are not?

13. Although some people are vegetarians and therefore not eating meat, why do they need to make sure to include meat alternates in their diet?

CQ

Primary structure

Does primary sequence really matter?

(a) Normal red blood cells and the primary structure of normal hemoglobin. (b) Sickled red blood cells and the primary structure of sickle-cell hemoglobin.

Primary structure

Tertiary structure

1 Hydrophobic interactions
 2 Hydrogen bond
 3 Disulfide bridge*
 4 Ionic bond

Polypeptide backbone

* $\text{H}-\text{S}-\text{H} + \text{H}-\text{S}-\text{H} \rightarrow \text{H}-\text{S}-\text{S}-\text{H} + \text{H}_2$

** $\text{C}=\text{O} \cdots \text{H}-\text{O}$
 slightly negative slightly positive

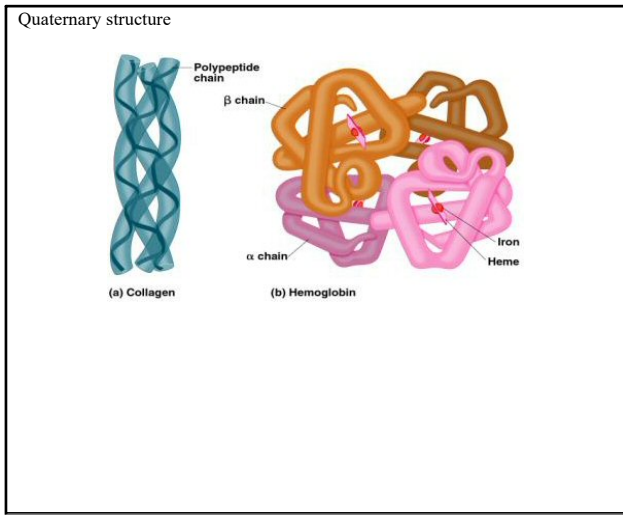
Tertiary structure

Na^+ Cl^-

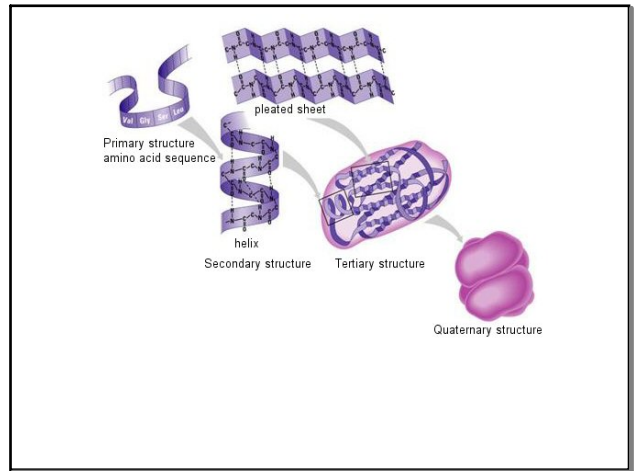
Na^+ H^+

Cl^- Cl^-

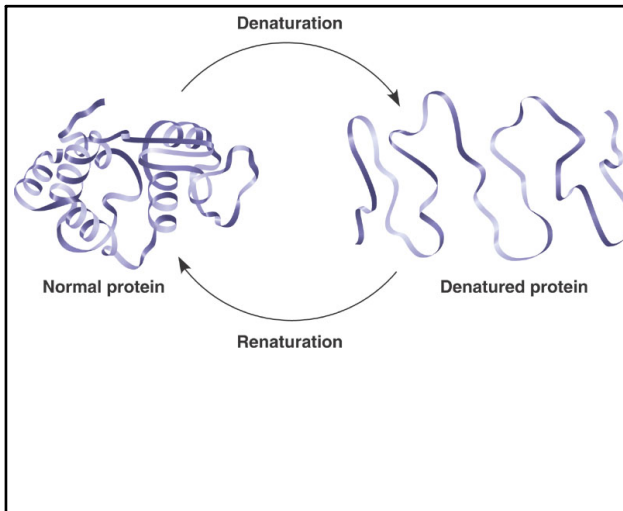
Sep 12-10:03 AM



Quaternary structure



Structure overview



Denature

14. Explain how the 3-dimensional shape of proteins is formed.
15. Discuss a couple of the interactions that can occur between the R groups of an amino acid sequence.
16. a) Some features of amino acids are common while others are not. Explain
b) How does having different R groups make amino acids ideal building blocks for proteins?
17. a) Which elements are found in proteins but in neither carbohydrates nor lipids.
b) Which element is found in nucleic acids but in neither carbohydrates nor proteins?

CQ

What's the monomer?

What's the polymer?

5' end

3' end

Phosphate group

Pentose sugar

Nucleoside

Nitrogenous base

Nucleotide

Nitrogenous bases

Pyrimidines

Cytosine (C)

Thymine (in DNA) (T)

Uracil (in RNA) (U)

Purines

Adenine (A)

Guanine (G)

Pentose sugars

Deoxyribose (in DNA)

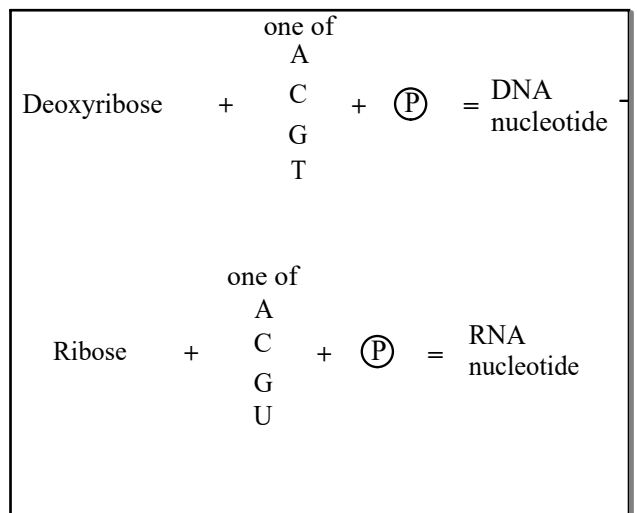
Ribose (in RNA)

Nucleoside components

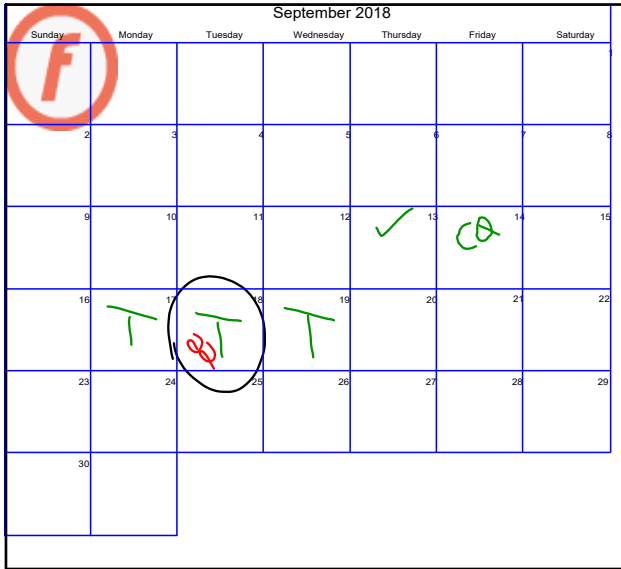
What's the monomer? nucleotide

What's the polymer? nucleic acid

Nucleic acid



Building blocks



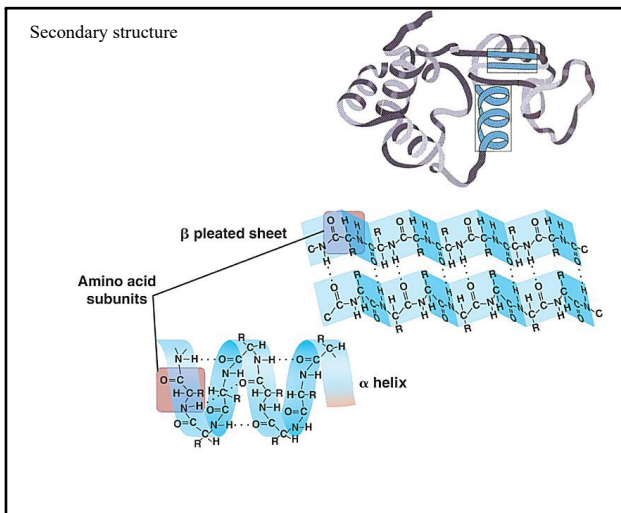
Sep 13-9:45 AM

18. Name the basic building blocks for each of the following molecules:
 a) Protein _____ (b) Triglyceride _____ (c) Carbohydrate _____
 d) Nucleic acids _____

19. Proteins are to amino acids as polysaccharides are to ____.

20. a) You connect a molecule of ribose, a phosphate, and a molecule of cytosine. What have you made?
 b) Why can you not say you've made a nucleic acid?

CQ



Secondary structure