

Biology

Leaving Certificate

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Subject: Leaving Certificate Biology Higher Level

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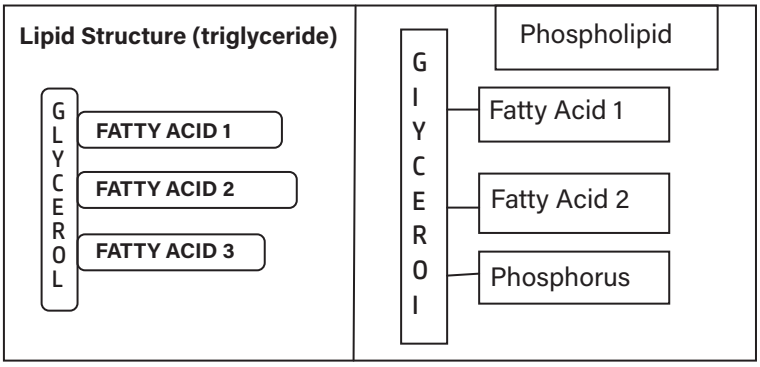
LESSON 1 Summary of Food

Functions of food:

1. Provide energy
2. Growth and repair
3. Needed to make enzymes and hormones

Categories:

4. Carbohydrates
5. Proteins
6. Lipids
7. Vitamins
8. Minerals
9. Water



	Carbohydrate	Protein	Lipids	Vitamins	Minerals	water
	Aka Groups of Biomolecules				(includes trace element)	
Elements	C,H,O	C,H,O,N	C,H,O		**Minerals:** Ca, Mg, Na Trace **Elements:** Iron, Copper Zinc	
Sources	Potatoe, bread, pasta	Meat, fish, eggs, seeds	Butter, nuts	C: citrus fruits D: milk eggs	Ca: dairy produce Iron: red meat, green veg	
Subunit/ Structure	Subunit: Monosaccha-ride de CX(H2O)yal-ways twice as many H to C and O eg $C_6H_{12}O_{6-}$ glucose	Subunit: amino acids20 different AA. 20 or more AA joined together known as polypep-tide.	Subunit: Triglyceride glycerol with 3 fatty acids at-tached. **Phospholipid:** is a triglyceride sturcture contain-ing 2 fatty acids and a phosphate ie one of the fatty acids has been replaced. Phospholipid s are found in the cell	2 types: 1.Fat soluble; A,D, K 2.Water Soluble;B,C	**Minerals: Trace Elements:** Minerals required by a living organism in **small amountseg.** Iron, Copper, Zinc	

			membrane (see diagram above of structures)			
Function	**1.Structural ; Cellulose: in cell walls of plants** Chitin: exoskeleton of animals **2. Energy Storage; Starch: plants** Glycogen: animals	Formation of: 1.Cell membrane 2.Enzymes 3.Haemoglobin 4.Antibodies 5.Muscle, skin, hair, nails	1.Store and release energy. 2.Protective layer around organs. 3.Insulation Role of phospholipids in a cell is to control what enters the cell.	D: helps absorb Calcium C: iron absorption and formation of connective tissue	**Ca**: bone formation (animal) **Iron:** haemoglo-bin formation (animal) **Magne-sium:** chlorophyll formation (plant)	1.Good solvent/2. Formation of plasma/3. Medium for chemical reactions/ 4.Transport
Deficiency disease				D: Rickets/ brittle bones C: Scurvy	**Ca:** brittle bones/ rickets **Iron:** anaemia/ fatigue **Mg:** lack of green colour (aka chlorsis)	
			Oils: liquids at room temp Fats: solid at room temp			
Test	**Starch:** use iodine. +ve result: brown to blue black **Reducing sugar (aka glucose):**Benedicts solution + water bath (with a thermometer) at 35o C for 15 mins.+ ve result: blue to brick red	**Protein/ Biuret test:** Copper sulphate + sodium hydroxide (aka biuret solution)+ve result: blue to lilac	**Fat:** brown paper test. +ve result: translucent spot forms			

Carbohydrates can be divided into 3 categories:

Monosaccharides	Disaccharidase	Poly saccharides
Single sub unit	2 monosaccharides joined together	Many monosaccharides joined together
Release energy	Release energy when bond broken	Structure and energy storage
Examples: glucose, fructose, ribose	Examples: maltose, sucrose	Examples of structural: cellulose(plant), chitin (animal Examples of energy storage: Starch (plant) glycogen (animal)

Catabolic Reaction: a reaction in which energy is released when large/complex molecules are broken down into small/simple molecules due to the breaking of bonds eg, respiration

Anabolic Reaction: a reaction which requires energy due to the forming of bonds eg, photosynthesis

Food Revision Questions

1. Name the elements found in carbohydrates and lipids
2. Define the term monosaccharide and give an example
3. Define the term disaccharide and give an example
4. Name two poly saccharides found in animals one to be structural and one to be for energy storage
5. What type of a saccharide is cellulose
6. Where in the cell is cellulose found
7. What is the function of cellulose in the cell
8. What is the difference between carbohydrates and lipids
9. What is the general chemical formula for carbohydrates
10. What two elements in carbohydrates are in the ratio 2:1
11. What is the ration of carbon to hydrogen in carbohydrates
12. Name the chemicals required to test for the presence of a reducing sugar
13. What is a positive result for the presence of a reducing sugar
14. Name the chemical used to test for the presence of starch
15. What is a positive result for the presence of starch
16. Name the element found in proteins not found in carbohydrates or lipids
17. What is a protein subunit called
18. Give examples of proteins found in the body
19. Name the test used to test for the presence of protein
20. Name the chemicals used to test for the presence of protein
21. Is heat required when testing for a reducing sugar

22. What is a positive result for the presence of protein
23. Name a protein found in the body that has a structural role
24. State the difference between a fat and an oil
25. What is a triglyceride
26. Draw the structure of a triglyceride
27. What is the difference between a lipid and a phospholipid
28. What is the function of fat in the body
29. Where in the cell can lipids be found
30. What is the function of a lipid in a cell
31. What is a positive result for the presence of lipids using brown paper
32. Vitamins can be divided into two categories. Name these categories and give an example of vitamin in each of these categories
33. What is the role of Vitamin D in the body.
34. Name a food in which vitamin D can be found
35. Name the deficiency disease associated with lack of vitamin D
36. What is the role of vitamin C in the diet
37. Name a food that contains vitamin C
38. 38. State the deficiency diseases associated with the lack of vitamin c in the body
39. Explain the term trace elements
40. Give an example of trace elements in the human diet
41. State the role of iron and calcium in the diet
42. State the role of magnesium in the plant
43. Name a deficiency disease associated with lack of Iron in the diet
44. Name a deficiency disease associated with lack of calcium in the diet
45. Name a deficiency disease associated with lack of magnesium in a plant
46. State three functions of water in the body
47. Explain the term catabolic reaction
48. Give an example of a catabolic reaction
49. Explain the term anabolic reaction
50. Give an example of an anabolic reaction

Food Exam Paper Questions

2015 Q1

Answer any five of the following parts (a) to (f):

(a) What name is given to the simplest units of carbohydrates?

_____

(b) Name a catabolic process that produces these simplest units.

_____

(c) The general formula of carbohydrates is $C_x(H_2O)_y$
What is the most common value of y in the carbohydrates used for energy by human cells?

_____

(d) Name a structural polysaccharide found in plants. _____

(e) Name a polysaccharide, other than the one referred to in part (d), commonly found in plants.

_____

(f) Which carbohydrate is always found in DNA?

_____

2014 Q2

(a) the following biochemical reactions took place in some living cells:

(i) A $\longrightarrow$ B + C + D

Is this an example of anabolism or catabolism?

_____

(ii) Fat $\xrightarrow{X}$ Fatty Acids + Y

Idenity X and Y.

X. _____ Y. _____

(b) (i) how does a phospholipid differ from a far?

Phospholipid: _____

Fat: _____

(ii) Name a fat-soluble vitamin.

_____

(iii) State a disorder due to a dietary deficiency of the vitamin referred to in (b) (ii).

_____

(iv) Give any two functions of minerals in organisms.

1. _____

2. _____

2013 Q1

In the case of any five of the following pairs of terms, clearly distinguish between the first term and second term by writing a brief sentence about each.

(a) Starch. _____

Glucose. _____

(b) Amino acids.

_____

Proteins. _____

(c) Cellulose.

_____

Keratin. _____

(d) Enzymes.

_____

Hormones. _____

(e) Biuret test.

_____

Benedict's (Fehling's) test. _____

(f) Fats. _____

Oils. _____

2012

(a) Name a monosaccharide

_____

(b) Give the formula of the monosaccharide referred to in (a)

_____

(c) Name a polysaccharide that can be formed from the monosaccharide referred to in (a)

_____

(d) Give one way in which an amino acid differs from a monosaccharide, in terms of chemical composition.

_____

(e) What do carbohydrates and fats have in common, in terms of chemical composition?

_____

(f) How may one fat differ from another, in terms of chemical composition?

_____

2011

(a) Which food type may be identified in the laboratory by the use of Sudan III or brown paper? _____

(b) Give one role for a named mineral in plants

(c) What colour indicates a strong positive result of the Fehling's or Benedict's test for reducing sugar?

(d) Give a role of lipids in cells.

(e) Give a role of water in the human body other than as a component of cytoplasm and body fluids.

(f) How many common amino acids are found in proteins?

2010

(a) In relation to the human diet, what is meant by a trace element? .....

(b) Give an example of a trace element

(c) State **one** way in which an oil differs from a fat

(d) Vitamins may be divided into two groups depending upon their solubility.
Name these **two** groups.

(i). .....

(ii). .....

(e) What is a triglyceride? .....

(f) Give an example of a catabolic reaction in a cell .....

Q8. For which purpose did you use each of the following in the course of your practical studies?

1. Biuret solution or alkaline copper sulphate in food testing

2. Brown paper or Sudan III in food testing

2009

(a) In carbohydrates, which two elements are in the ratio 2:1?

(b) Cellulose is a polysaccharide. Explain the term polysaccharide.

(c) Name a polysaccharide other than cellulose.

(d) Where precisely in a plant cell would you expect to find cellulose?

(e) Name a test or give the chemicals used to demonstrate the presence of a reducing sugar.

(f) In relation to the test referred to in (e) which of the following is correct?

1. No heat needed.
2. Heat but do not boil.
3. Boil.

2008

(a) Biomolecules of the general formula $C_x(H_2O)_y$ are examples of

.....

(b) Give **two** functions of water in a living organism.

.....

.....

(c) Is energy release a feature of anabolic or catabolic reactions?

.....

(d) How do fats differ from oils at room temperature?

.....

(e) Name the test or give the chemicals used to detect the presence of protein in a food sample .....

(f) Name a structural polysaccharide .....

.....

2006

Give an example of each of the following;

(a) A catabolic reaction in an animal. .....

(b) An anabolic reaction in a plant. .....

(c) A fat-soluble vitamin. .....

(d) A reducing sugar. .....

(e) A polysaccharide .....

(f) A trace element in the human diet

2007

(a) In the human diet zinc, iron and copper are examples of .....

(b) The walls of xylem vessels are reinforced with .....

(c) Where in a cell would you expect to find phospholipids? .....

(d) Vitamin ..... is an example of a water-soluble vitamin.

(e) Name a disorder associated with a deficiency of the vitamin that you have **named** in (d) or of .....

Another named vitamin in the human diet

(f) What are the final products of the digestion of a protein?

.....

State a use of each of the following in the biology laboratory.

(i) Biuret test (copper sulphate and sodium hydroxide sol tions)

(ii) Benedict's (or Fehling's) test

.....