Chemistry-101

الكيمياء-101

تحضيري-JU

شرح مع أسئلة الإختبارات

Ch-6.2

ملخصات يوسف زويل

تواصل مستمر مع أستاذ المادة لأي استفسار على الواتس 00966502047005

Chapter 6

6.2.1 Harvest تجميع chemical energy (ATP)

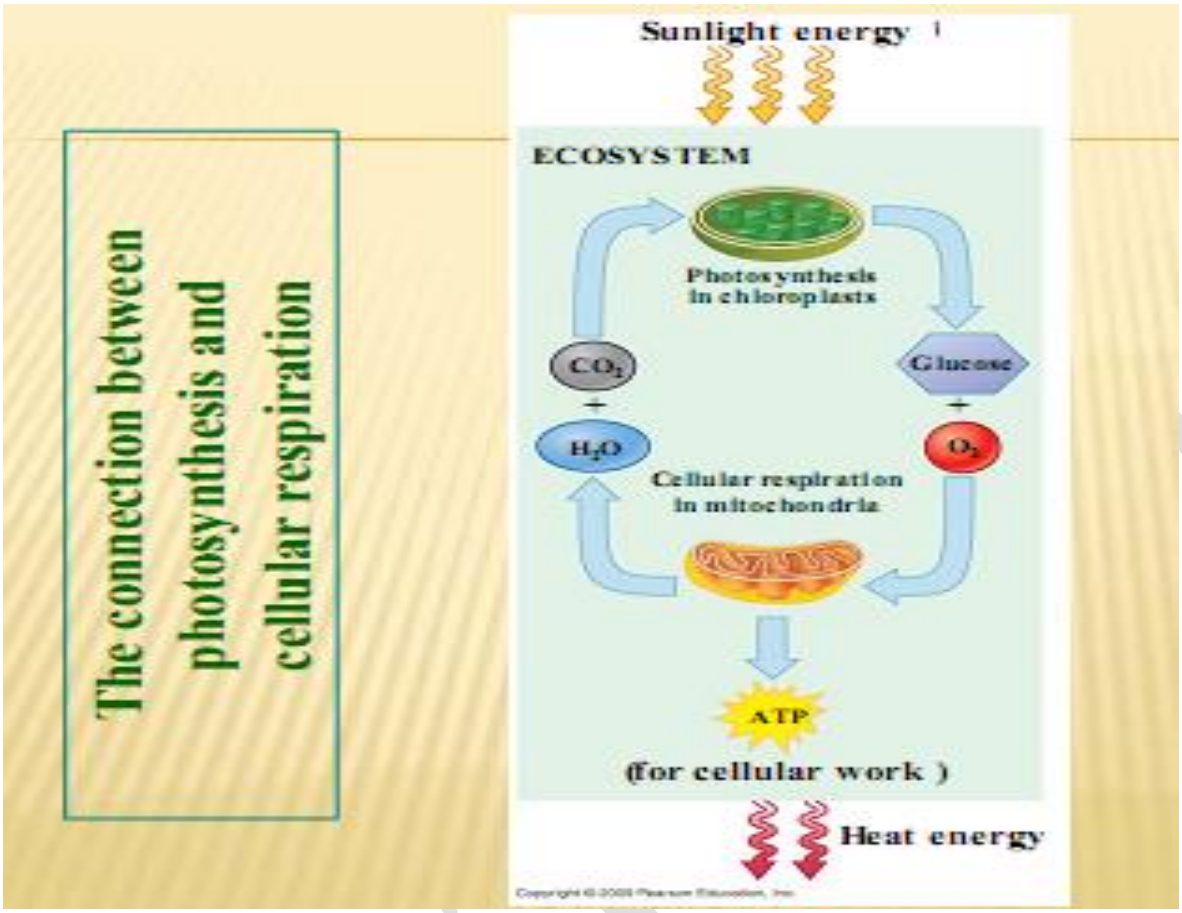
- ✓ Energy is necessary for life processes. These include growth, transport, manufacture, movement, reproduction, and others.
- ✓ Energy that supports life on Earth is captured from sun rays reaching Earth through plant, algae, protist, and bacterial photosynthesis.
- ✓ All of our cells harvest chemical energy (ATP) from our food by a process called cellular respiration.

Photosynthesis and cellular respiration provide energy for life

Energy in sunlight is used in photosynthesis to make glucose from CO_2 and H_2O with release of O_2 .

Other organisms use the O_2 and energy in sugar and release CO_2 and H_2O (cellular respiration) .

Together, these two processes are responsible for the majority of life on Earth.



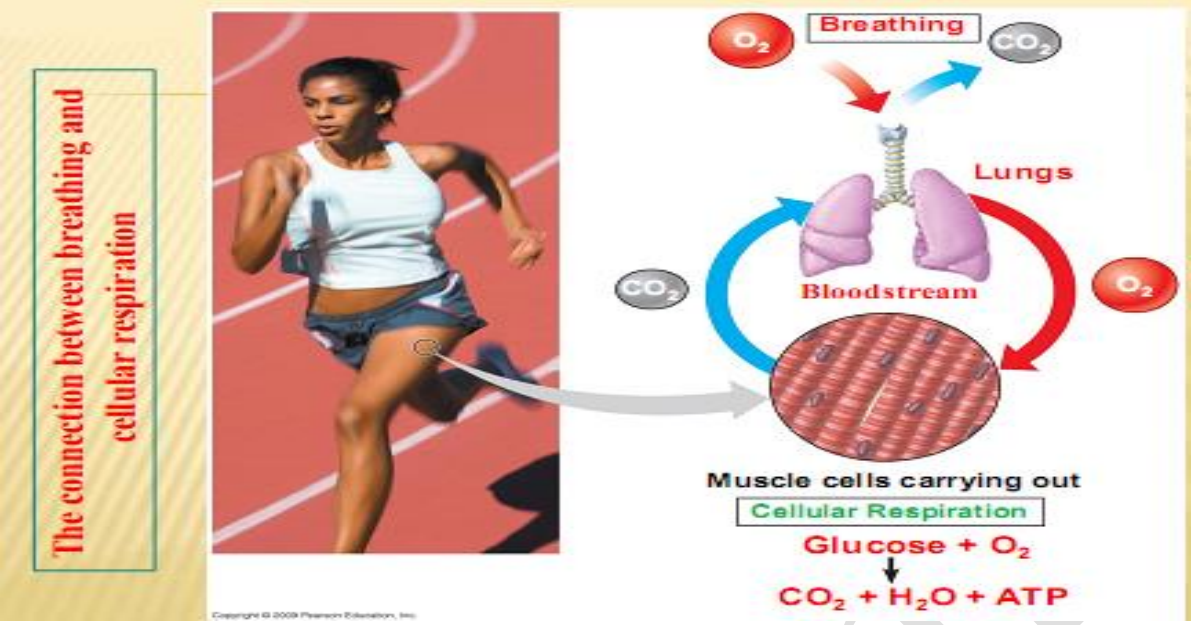
INTRODUCTION TO CELLULAR RESPIRATION

Breathing supplies oxygen to our cells for use in cellular respiration and removes carbon dioxide.

✓ Breathing and cellular respiration are closely related:

– Breathing is necessary for exchange of CO_2 produced during cellular respiration for atmospheric O_2.

– Cellular respiration uses O_2 to help harvest energy from glucose and produces CO_2 in the process.



1. (سؤال من اختبار سابق) During cellular respiration _____

- carbon dioxide is produced
- oxygen is released
- glucose is produced
- First and second choice

2. (سؤال من اختبار سابق) During cellular respiration _____

- glucose is used
- carbon dioxide is consumed
- oxygen is released
- glucose is produced

3. (سؤال من اختبار سابق) Our cells harvest chemical energy from our food by a process called_

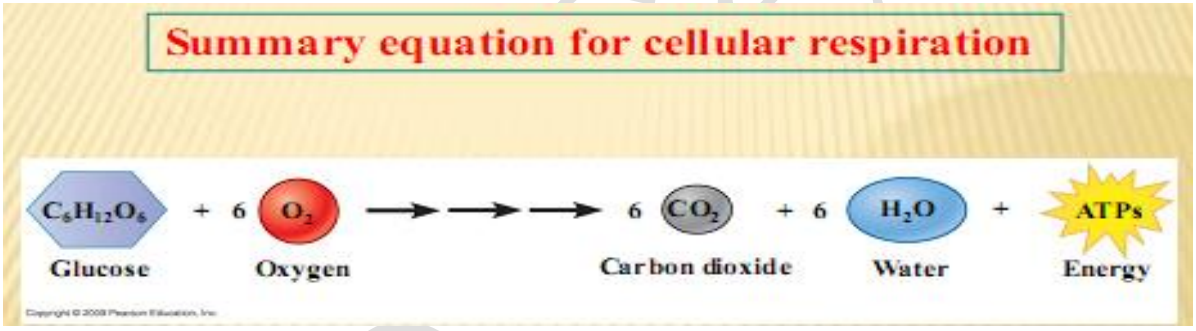
- cellular respiration
- inspiration
- expiration
- all of the above

Cellular respiration banks يخزن energy in ATP molecules

Cellular respiration is an exergonic process that transfers energy stored in glucose bonds to ATP

– Cellular respiration produces 38 ATP molecules from each glucose molecule.

– Other foods (protein and lipid) can be used as a source of energy as well.



How do cells extract energy in chemical bonds in the organic molecules (food)

- ✓ The energy necessary for life is contained in the arrangement of electrons in chemical bonds in organic molecules.
- ✓ When the carbon-hydrogen bonds of glucose are broken, electrons are transferred to oxygen.

– Oxygen has a strong tendency to attract electrons (electronegativity).

A cellular respiration equation is helpful to show the changes in hydrogen atom distribution.

– Glucose loses its hydrogen atoms and is ultimately converted to CO_2.

– At the same time, O_2 gains hydrogen atoms and is converted to H_2O.

4. (سؤال من اختبار سابق) During cellular respiration _____

- Glucose loses its hydrogen atoms
- Glucose is oxidized
- Glucose is reduced
- First and second choice

5. (سؤال من اختبار سابق) During cellular respiration, Glucose becomes _____

- carbon dioxide
- oxygen
- ATP
- none of the above

6. (سؤال من اختبار سابق) During cellular respiration _____

- oxygen is consumed
- carbon dioxide is consumed
- glucose is produced
- all of the above

7. (سؤال من اختبار سابق) During cellular respiration _____

- oxygen gains hydrogen atoms
- Glucose gains hydrogen atoms
- Glucose is reduced
- none of the above

8. (سؤال من اختبار سابق) During cellular respiration _____

- Glucose loses its hydrogen atoms
- oxygen gains hydrogen atoms
- oxygen is reduced
- all of the above

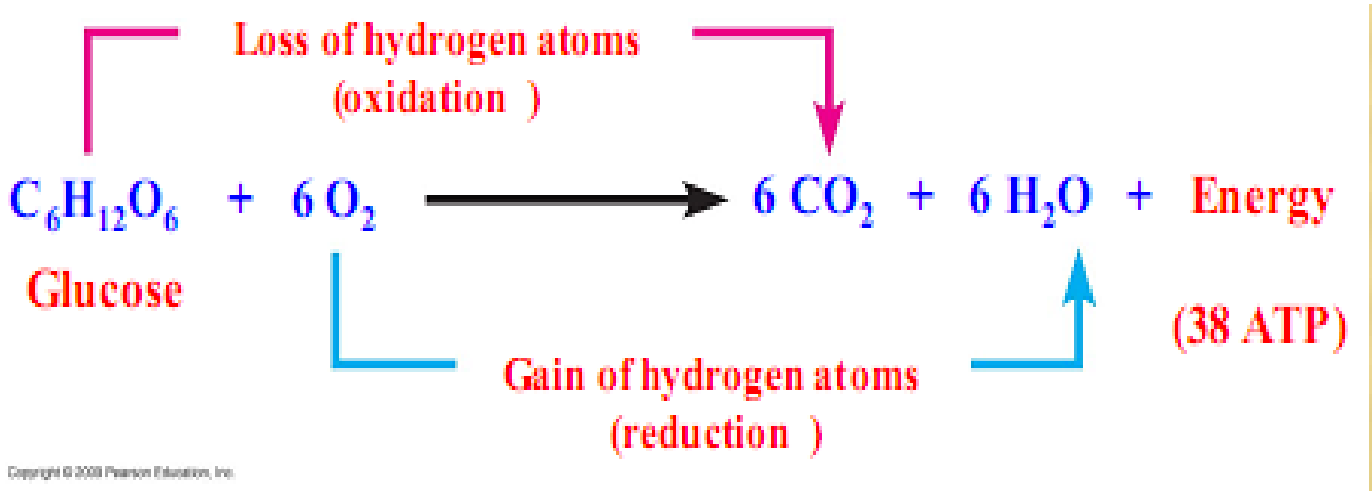
oxidation

Loss of electrons

reduction

Gain of electrons

Rearrangement of hydrogen atoms (with their electrons) in the redox reactions (Reduction & Oxidation) of cellular respiration



Redox (Reduction & Oxidation) reactions

Enzymes are necessary to oxidize glucose and other foods

The enzyme that removes hydrogen from an organic molecule is called dehydrogenase.

– Dehydrogenase requires a co-enzyme called NAD^+ (nicotinamide adenine dinucleotide) to shuttle electrons.

– NAD^+ can become reduced when it accepts electrons and oxidized when it gives them up.

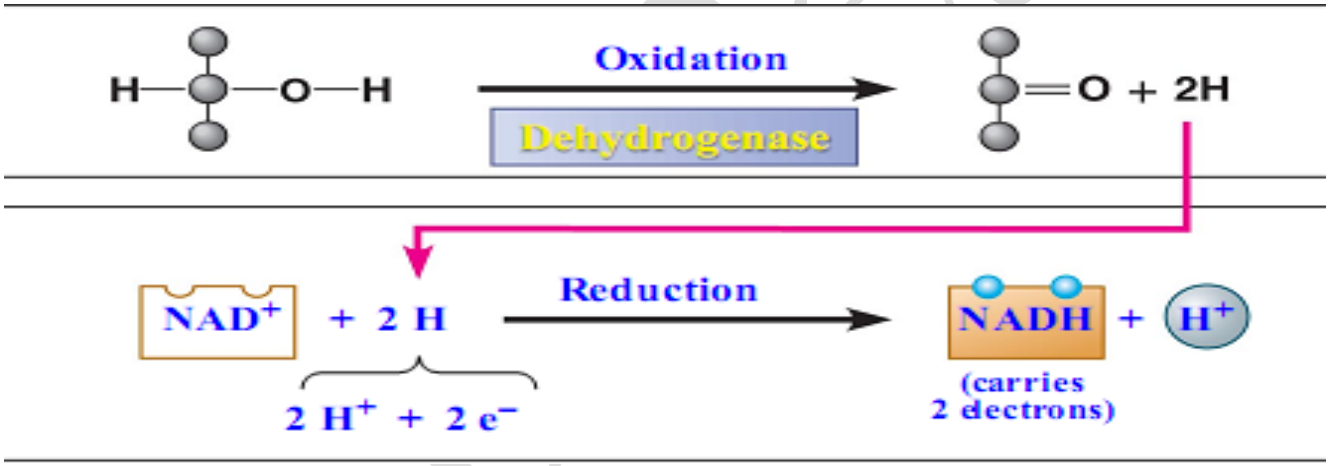
9. (سؤال من اختبار سابق) Dehydrogenase uses _____ as enzyme-co

- NAD
- ATP
- magnesium
- all of the above

10. (سؤال من اختبار سابق) The enzyme that removes hydrogen from an organic molecule is called _____

- dehydrogenase
- deoxygenase
- oxygenase
- First and second choice

A pair of redox reactions, occurring simultaneously



Cells tap energy from electrons "falling" from organic fuels to oxygen

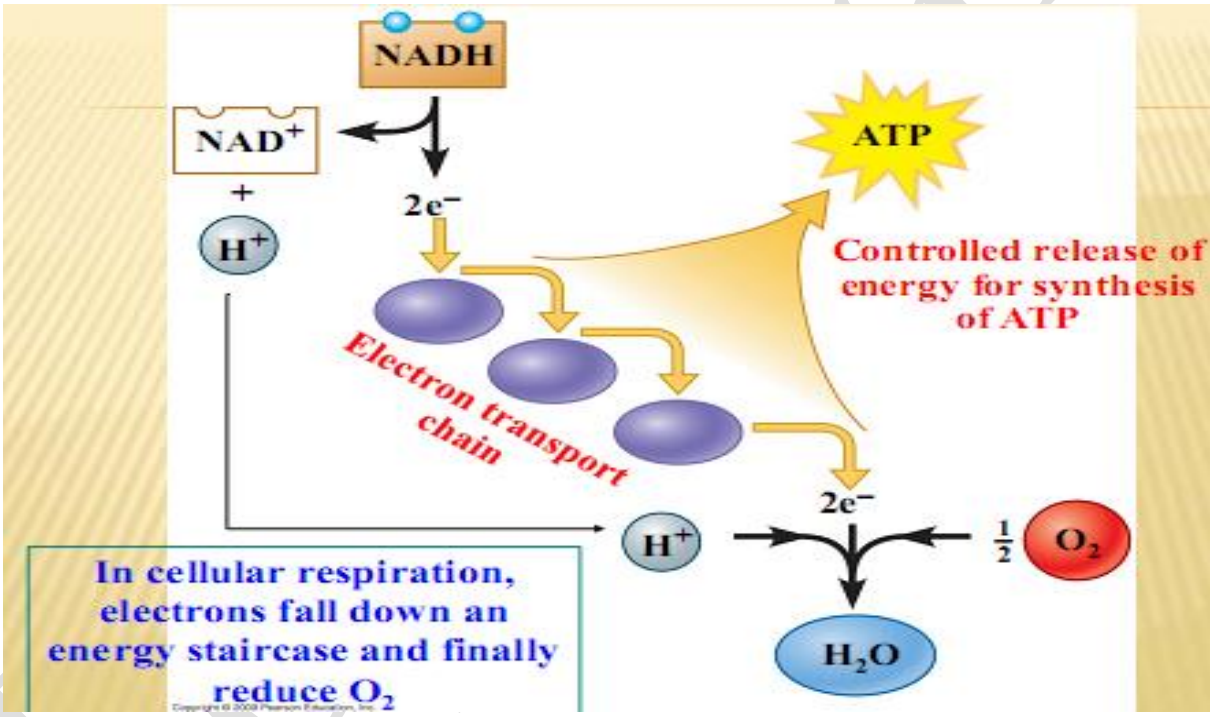
The transfer of electrons to NAD^+ results in the formation of NADH, the reduced form of NAD^+

– In this situation, NAD^+ is called an electron acceptor, but it eventually becomes oxidized (loses an electron) and is then called an electron donor.

There are other electron "carrier" molecules that function like NAD^+.

– They form a staircase where the electrons pass from one to the next down the staircase.

– These electron carriers collectively are called the electron transport chain, and as electrons are transported down the chain, ATP is generated.



Chapter 6

Bioenergetics

6.2.2 Stages of Aerobic Cellular Respiration

1. Glycolysis

- occurs in the Cytoplasm

2.The Krebs Cycle or citric acid cycle

- occurs in the mitochondria matrix

3.Oxidation phosphorylation or The Electron Transport Chain

- occurs in the mitochondria inner membrane

1) (سؤال من اختبار سابق) .Aerobic Cellular Respiration occurs in …….stages

a) two

b) three

c) five

d) six

2) (سؤال من اختبار سابق) Stages of Aerobic Cellular Respiration are ……

a) Glycolysis

b) citric acid

c) Oxidation phosphorylation

d) all of the above

3) (سؤال من اختبار سابق) Glycolysis occurs in ……..

a) mitochondria

b) cytoplasme

c) glogi apparatuse

d) none of the above

4) (سؤال من اختبار سابق) The first stage of acellular respiration is _____

a) the Krebs Cycle

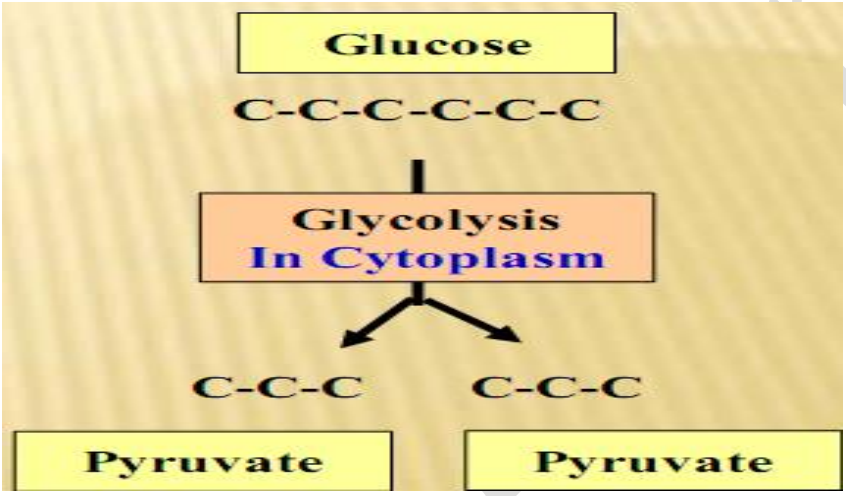
b) citric acid cycle

c) Oxidation phosphorylation

d) glycolysis

Stage 1: Glycolysis

- Glycolysis begins respiration by breaking glucose, a six-carbon molecule, into two molecules of a three-carbon compound called pyruvate.
- This stage occurs in the cytoplasm.



5) (سؤال من اختبار سابق) During Glycolysis Glucose is converted to _____

- one Pyruvate
- one oxalate
- carbon doixide
- none of the above

6) (سؤال من اختبار سابق) when the glucose molecule break down it give a three carbon molecule called……

a) glycogen

b)pyruvate

c)citrate

d) none of the above

7) (سؤال من اختبار سابق) During Glycolysis Glucose is converted to _____

- two Pyruvate
- two oxalate
- carbon doixide
- all of the above

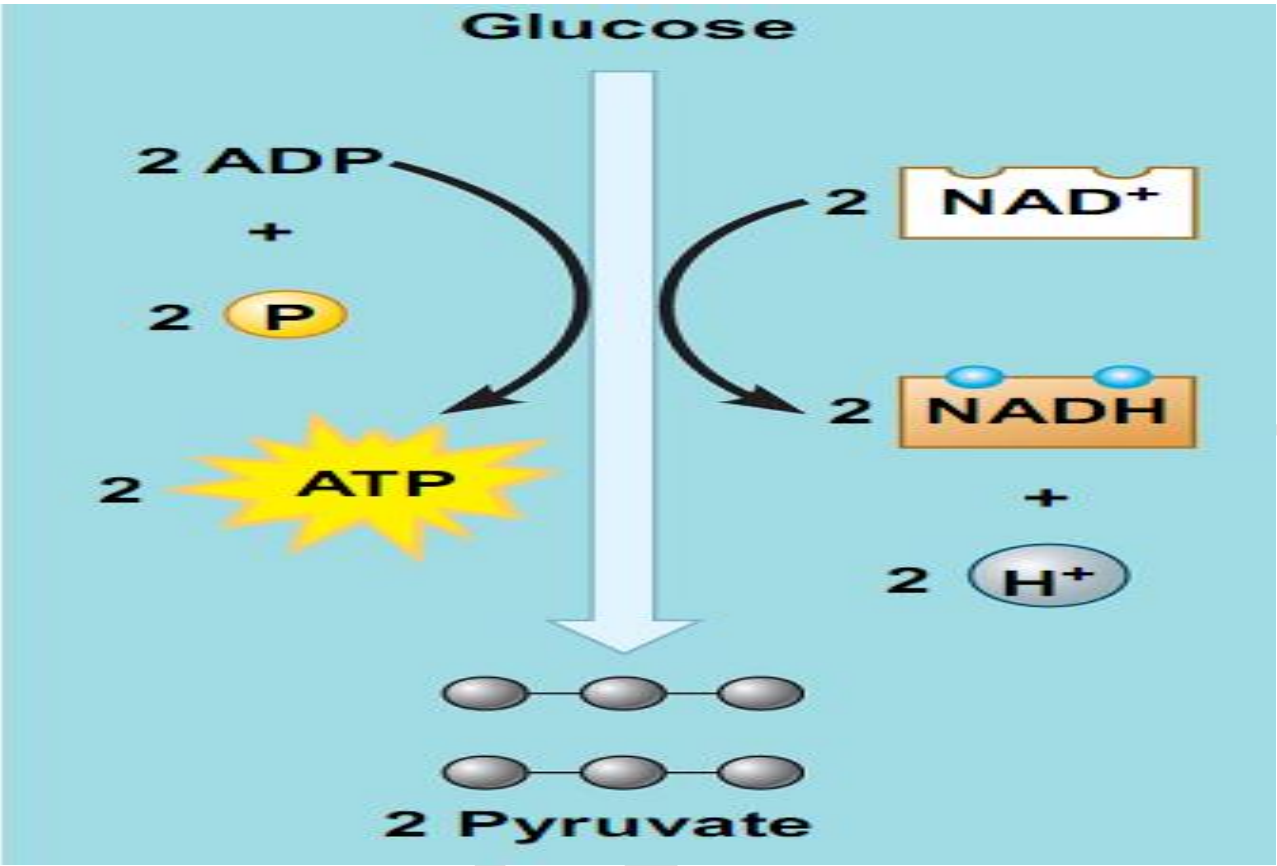
Glycolysis harvests chemical energy by

oxidizing glucose to pyruvate

-In glycolysis, a single molecule of glucose is enzymatically cut in half through a series of steps to produce two molecules of pyruvate.

-In the process, two molecules of NAD^+ are reduced to two molecules of NADH.

-At the same time, two molecules of ATP are produced by substrate-level phosphorylation.



An overview of glycolysis

8) (سؤال من اختبار سابق) In the glycolysis two molecules of NAD+ are ……to two molecules of NADH

a) oxidized

b) reduced

c) hydrolysis

d) none of the above

9) (سؤال من اختبار سابق) the glycolysis stage give ……. of ATP.

a) three

b) two

c) six

d) one

Chapter 6

Bioenergetics

6.2.3 Stage 2: The citric acid cycle (Krebs Cycle) A Little Krebs Cycle History

- Discovered by Hans Krebs in 1937.
- He received the Nobel Prize in physiology or medicine in 1953 for his discovery.

Stage 2: The citric acid cycle

1) The citric acid cycle breaks down pyruvate into carbon dioxide and supplies the third stage Oxidative phosphorylation with electrons.
2) This stage, The citric acid cycle, occurs in the mitochondria matrix.
3) For each Glucose molecule, the Krebs Cycle produces 6NADH, $2FADH_2$, $4CO_2$, and 2ATP.

1) (سؤال من اختبار سابق) The second stage of a cellular respiration is…..

a) Citric acid cycle

b) Glycolysis

c) The Electron Transport Chain

d) First and second choice

2) (سؤال من اختبار سابق) During citric acid cycle pyruvate is converted to ____

- Two carbon dioxide
- two carbon monoxide
- one carbon dioxide
- First and second choice

3) (سؤال من اختبار سابق) The citric acid cycle occurs in the …….

a) Mitochondria matrix.

b) Cytoplasm

c) Golgi apparatus

d) None of the above

4) (سؤال من اختبار سابق) For each Glucose molecule, the Krebs cycle produces 6NADH, $2FADH_2$, $4CO_2$, and ……..

a) 3 ATP

b) 4 ATP

c) 2 ATP

d) 1 ATP

5) (سؤال من اختبار سابق) The citric acid cycle is the …….

a) First

b) Second

c) Third

d) Forth

6) (سؤال من اختبار سابق) For each Glucose molecule, the Krebs cycle produces ……., $2FADH_2$, $4CO_2$, and 2ATP.

a) 5NADH

b) 3NADH

c) 2NADH

d) 6NADH

7) (سؤال من اختبار سابق) For each Glucose molecule, the Krebs cycle produces 6NADH, $2FADH_2$……. and 2ATP.

a) $3CO_2$

b) $4CO_2$

c) $5CO_2$

d) $6CO_2$

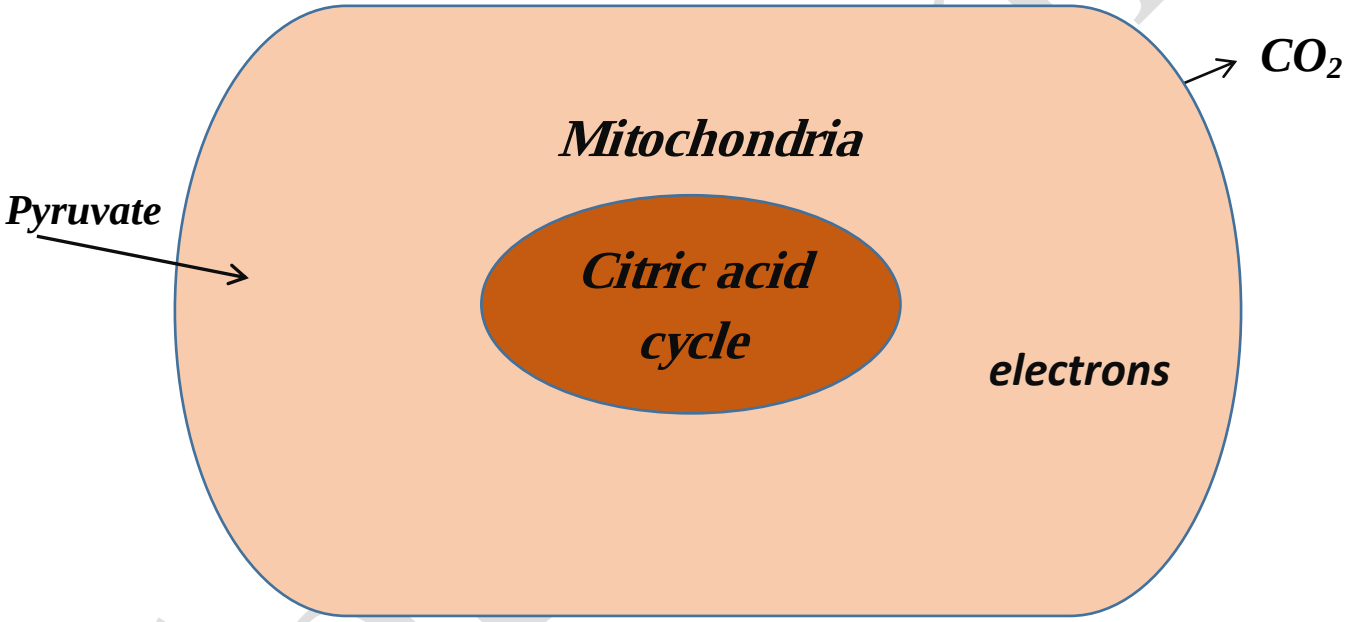
8) (سؤال من اختبار سابق) For each Glucose molecule, the Krebs cycle produces 6NADH…… $4CO_2$ and 2ATP.

a) $3FADH_2$

b) $2FADH_2$

c) $5FADH_2$

d) $1FADH_2$



Chapter 6

Bioenergetics

6.2.4 Stage 3: Oxidative phosphorylation

-electrons are shuttled through the electron transport chain.

-ATP is generated through oxidative Phosphorylation.

-(oxidation of NADH to NAD and phosphorylation of ADP to ATP).

-This stage Occurs Across Inner Mitochondrial membrane.

-In cellular respiration, electrons fall down an energy staircase and finally reduce O_2.

1) (سؤال من اختبار سابق) During Oxidative phosphorylation_____

- NADH is oxidized
- NAD is reduced
- FAD is reduced
- none of the above

2) (سؤال من اختبار سابق) During Oxidative phosphorylation _____

- ATP is generated
- NADH is oxidized
- NAD is reduced
- First and second choice

3) (سؤال من اختبار سابق) The third stage in the of Aerobic Cellular Respiration is .....

a) Glycolysis
b) Citric acid
c) Oxidative phosphorylation
d) a & b

4) (سؤال من اختبار سابق) the Oxidative phosphorylation occur in …….

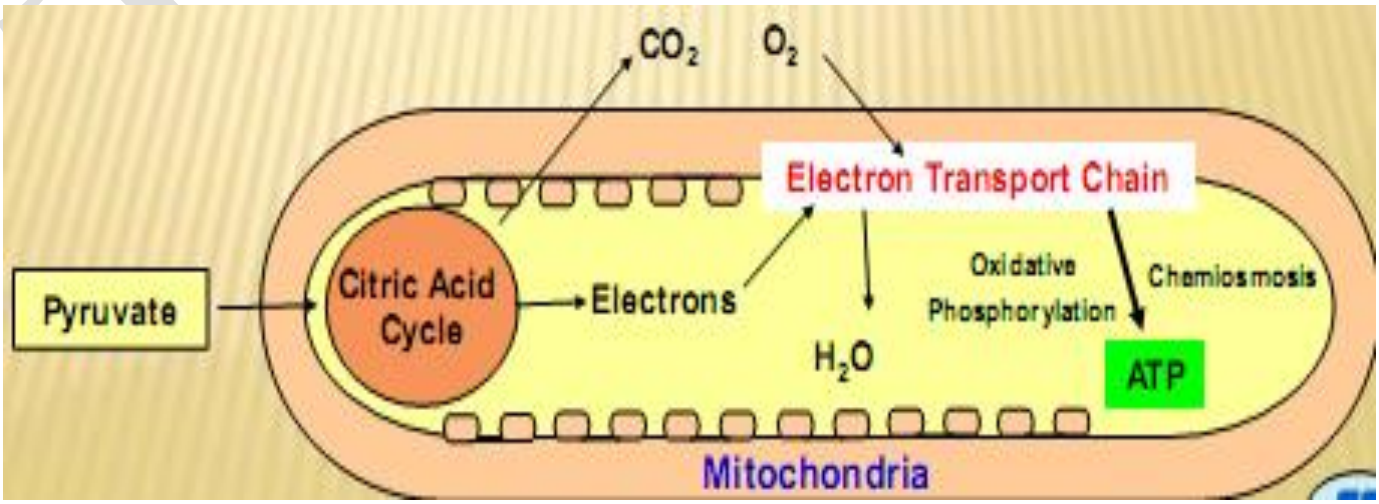
a) Cytoplasm
b) Mitochondria
c) Inner Mitochondrial membrane
d) none of the above

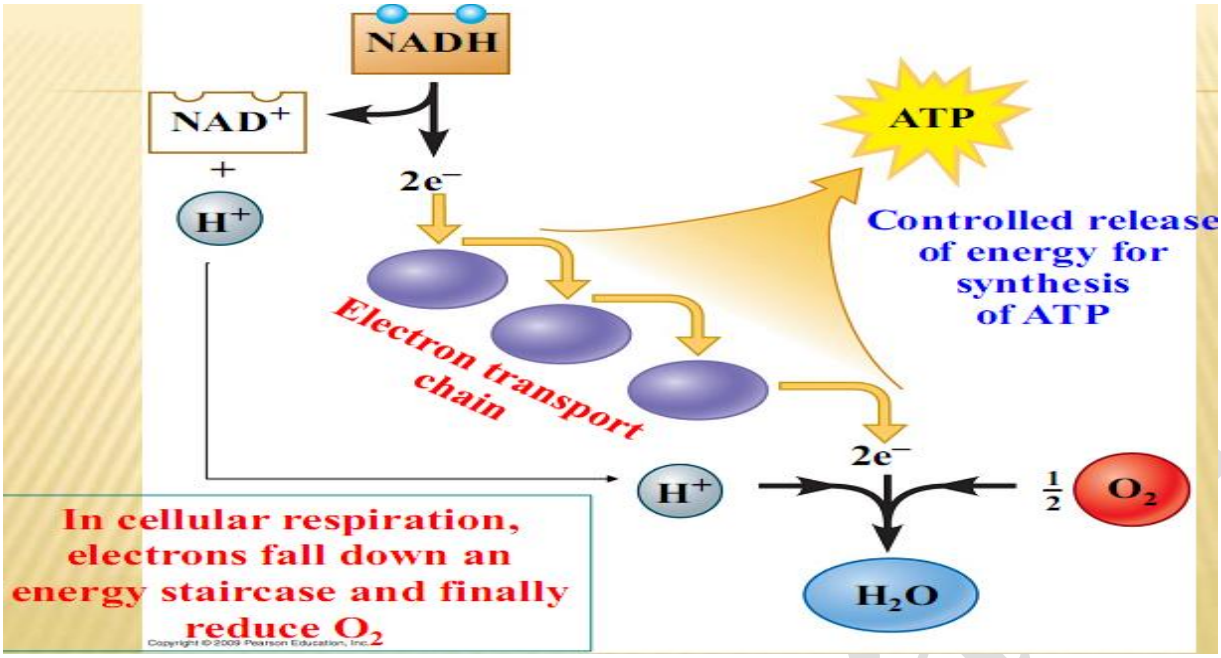
5) (سؤال من اختبار سابق) Oxidation phosphorylation or The electron Transport Chain is …….

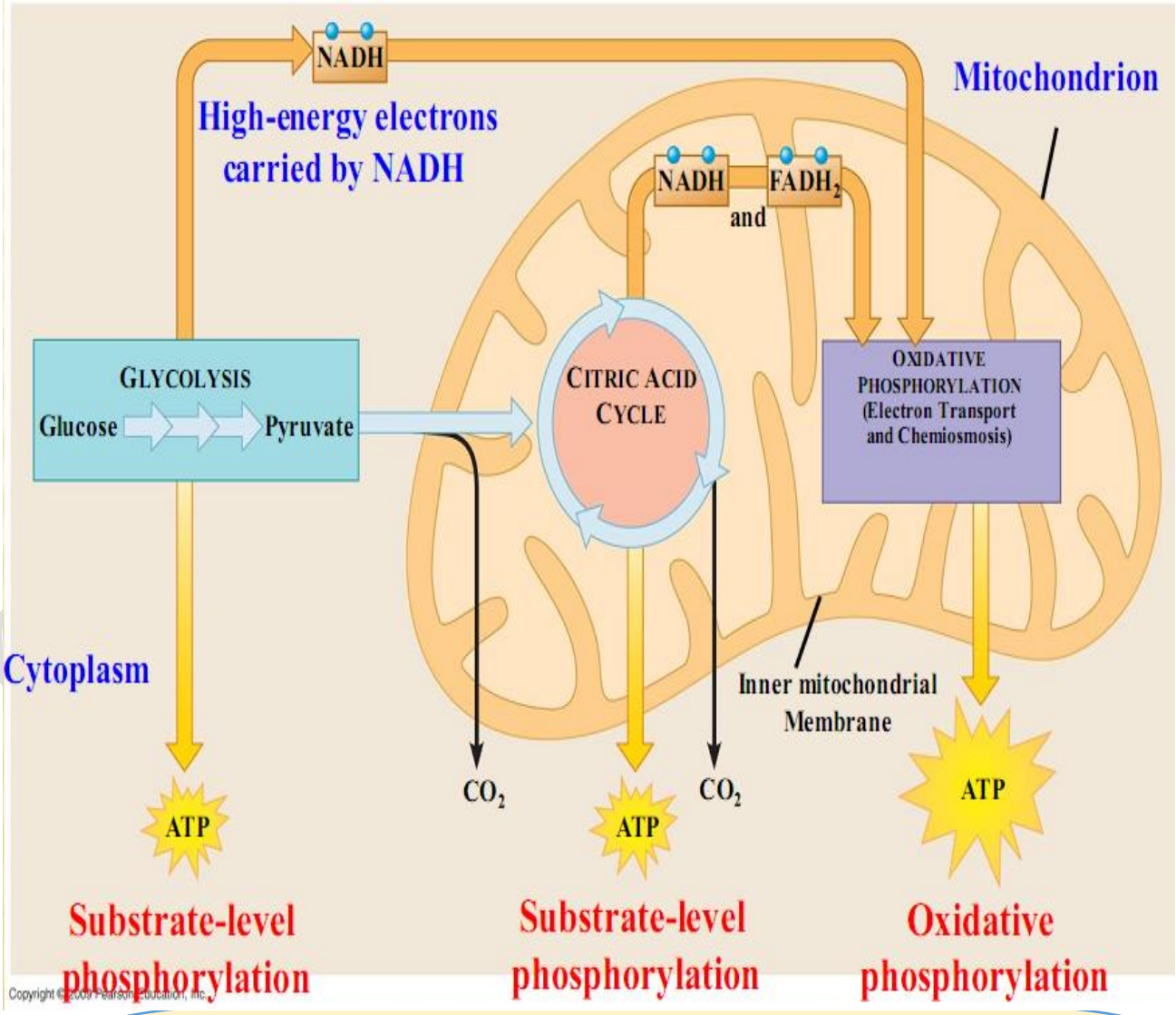
a) The first
b) The second
c) The third
d) The forth

6) (سؤال من اختبار سابق) In cellular respiration, electrons fall down an energy staircase and finally reduce ……..

a) CO_2
b) SO_2
c) O_3
d) O_2







An overview of cellular respiration