Ministry of Education and Technical Education
Central Administration for General Education
Science Consultant office



Biosphere



Atmosphere

INTEGRATED SCIENCE

2026/2027

First Academic Term

1st Year of Secondary stage



Geosphere



Hydrosphere

Review

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Preparation

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رئيس الإدارة المركزية التعليم العام
والمشرف على مستشاري المواد الدراسية
د/ هالة عبد السلام خفاجي

مستشار العلوم
د/ عزيزة رجب خليفة

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Homework

First: Choose the correct answer

1) **Which of the following represents the correct scientific definition of the cell in living organisms?**

A) It is the inorganic part responsible only for protecting the chitin material.

B) It is the gelatinous membrane that surrounds the blood plasma outside the organ systems.

C) It is the intermediate compound that comes out of catabolic reactions unchanged.

D) It is the basic structural and functional unit of all living organisms.

2) **Bacteria are unicellular prokaryotic organisms that have a cell wall which gives them shape and rigidity. What is the distinctive chemical substance that enters into the composition of this wall?**

A) Cellulose

B) Chitin

C) Peptidoglycan

D) Chlorophyll

3) **Water is found in the bodies of mammals in two main locations (inside the cells and outside them). Which of the following represents the correct distribution of water outside the cells?**

A) It is found in the chloroplasts to produce energy.

B) It is found in blood plasma and other body fluids and represents about 23 % of body mass.

C) It is composed entirely of chitin and salt-permeable cellulose.

D) It represents 47 % of body mass and is found inside the central nucleus.

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4) If a student examined a living cell under the microscope and found that it completely lacks a cell wall, has a thin plasma membrane surrounding its contents, and its vacuoles are small in size and numerous, then these cells belong to ……

A) The plant kingdom
B) The fungi kingdom
C) The animal kingdom
D) Prokaryotic bacteria

5) During cellular respiration inside the mitochondria, a glucose molecule is broken down to produce energy, carbon dioxide, and water. This biochemical reaction is classified as an example of ……..

A) Anabolic processes that consume thermal energy.
B) Catabolic processes that break bonds to release energy.
C) A mechanism for reducing enzyme activity at the optimum pH.
D) The structural balance of the gelatinous salt-permeable cytoplasm.

6) An enzyme was isolated that works at maximum efficiency at an optimum pH of 8. If this enzyme is placed in a strongly acidic medium with a pH of 4 what is the expected result for the enzyme's activity?

A) The enzyme's activity doubles as a result of increased activation energy.
B) The reaction rate decreases then rises again at the central temperature.
C) The enzyme builds complex glucose molecules from amino acids.
D) The enzyme's activity stops completely due to the large deviation from the optimum value.

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7) **What is the fundamental role played by chlorophyll found inside the chloroplasts in plant cells?**

A) Breaking the bonds of glucose to release stored energy in cellular respiration.

B) Absorbing light energy to carry out photosynthesis to produce food.

C) Regulating the passage of substances and salts into and out of the cell through a thin membrane.

D) Giving the bacterial cell its shape and mechanical rigidity against external forces.

8) **What is the biological outcome of the stability of the enzyme's chemical structure and its remaining unchanged after the products are formed?**

A) The enzyme is immediately ready to catalyze another reaction of the same type with high efficiency and minimal activation energy.

B) The enzyme is completely consumed and breaks down into simple amino acids.

C) The activation energy required to start the current reactions in the cytoplasm increases.

D) Metabolism stops and the catabolic process turns into an energy-consuming anabolic process.

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Second: Essay Questions

Q9: **Explain why enzymes are classified as specialized "catalytic or activating agents inside the cells of living organisms, and what is their basic chemical composition?**

Q10: **Compare briefly in twopoints between the cell wall and the cell membrane (plasma membrane) in eukaryotic cells in terms of: the type of living organisms in which each is found, and their permeability to water and substances.**

Q11: **Explain the great biological importance of water being the most abundant chemical substance in living organisms, discussing its role in linking organic and inorganic molecules, and its presence in biochemical reactions inside and outside the cells .**

Q12: **Apply your understanding of cell components to determine the role of vacuoles in both the plant cell and the animal cell, clarifying the apparent difference between them in terms of size and number**

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Q13: **Explain: Based on the concept of chemical bonds, how does the process of building proteins from amino acids differ from the process of breaking down glucose sugar during cellular respiration in terms of energy consumption or release?**

Q14: **A farmer transfers plants from a moderate environment to a desert environment with very harsh external temperature fluctuations by day and night**
Applying your understanding of the thermal properties of water, explain how the water inside the cells of these plants will protect their biological structure and enzymes from damage, clarifying the role of specific heat capacity in this environmental application.

Q15: **What is the membranous structure responsible for transporting substances inside the eukaryotic cell, and identify the organelle that represents the energy production center which receives the substances to produce ATP.**

Q16: **Conclude how the functions of the nucleus, the cytoplasm, and the enzymes are integrated in regulating the biological activities of the living cell explaining how , water prepares the suitable medium for this biological integration?**

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Assessment

Model (A)

First: Choose the correct answer

1) **Which of the following correctly describes the cell wall and vacuoles of plan cells?**

A) Its cell wall is made of chitin, and its vacuoles are small in size and numerous.

B) Its cell wall is made of cellulose, and it has a large vacuole in the center of the cell.

C) Its cell wall is made of peptidoglycan, and it completely lacks vacuoles.

D) It has no cell wall, and its vacuoles are large and central for energy production.

2) **If a researcher measured the distribution of water in the body of a mammal weighing ١٠٠ kg, the approximate mass of water found inside the cells of this organism would be about ……..**

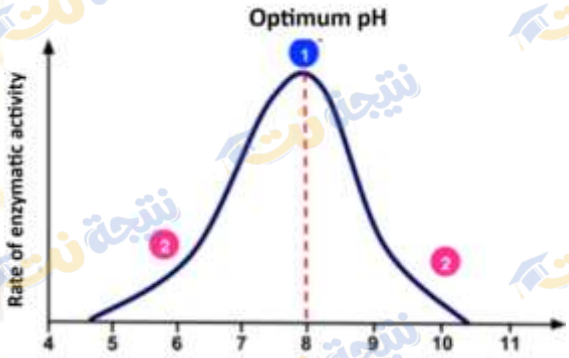
A) 70 kg

B) 23 kg

C) 47 kg

D) 31 kg

3) **Based on the enzyme activity curve shown in the adjacent figure, what happens to the rate of the biochemical reaction if the pH of the medium surrounding the enzyme changes from pH = 8 to pH = 5 ?**



A) The reaction rate gradually decreases due to moving away from the optimum pH.

B) The reaction rate increases noticeably due to an increase in activation energy.

C) The enzyme activity rate remains constant because the enzyme comes out unchanged

D) The enzyme is directly converted into a complex protein substrate

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Second: Essay Questions

Q4: **Metabolic processes (metabolism) are the fundamental basis for the continuation of an organism's life. Analyze in detail the difference between the two types of metabolism (catabolism and anabolism), clarifying how each of them deals with energy and chemical bonds, and support your answer with an example for each process from your study.**

Q5: **Compare briefly in the table between "prokaryotes" and "eukaryotes"**

Points of Comparison	Eukaryotes	Prokaryotes
Nuclear membrane		
Example of a living organism		

Q6: **Explain: How does water inside the cytoplasm act as a support that protects the living cell from the effect of the external surrounding forces?**

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Model (B)

First: Choose the correct answer

1) **Fungi differ from plants in some important structural and nutritional characteristics. Based on what you have studied, which of the following represents the characteristics of the kingdom Fungi ?**

A) Autotrophic organisms, with cell walls made of cellulose
B) They carry out photosynthesis to produce energy inside the mitochondria
C) They are always unicellular organisms, and completely lack a cell wall
D) Heterotrophic organisms, with cell walls made of chitin

2) **Water is present in mammalian cells at specific ratios that support internal balance. If the percentage of water outside the cells (in blood plasma and other body fluids) is about 23 % of body mass, then the total approximate percentage of water in this body is ……**

A) 47 %
B) 30 %
C) 70 %
D) 100 %

3) **Enzymes depend in their action on a precise mechanism known as the lock and key mechanism. How does this mechanism contribute to increasing the efficiency of biochemical reactions inside the cell?**

A) increasing the activation energy to start the chemical reaction.
B) By the enzyme's active site binding specifically to the substrate without the enzyme changing after the reaction ends.
C) By converting protein substances into inorganic lipid molecules.
D) By making the enzyme change its shape completely after each reaction to suit another substance.

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Second: Essay Questions

Q4: **Explain the role of enzymes in lowering activation energy, and explain what happens to the enzyme's action if it is exposed to a temperature or pH that is far from the optimum value?**

Q5: **Based on your study of the components of the muscle cell, identify the organelle or structure responsible for each of the following functions in eukaryotic cells:**

Regulating the passage of substances into and out of the cell and separating its contents from the surrounding medium

Energy-producing centers in the cell
Storing excess food, water, and salts

Q6: **Explain why: Water plays a major role as a universal solvent in facilitating transport processes and the elimination of wastes inside the organism?**

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Model (C)

First: Choose the correct answer

1) All living cells on planet Earth share basic common structures that no cell is without (whether prokaryotic or eukaryotic). Which of the following represents these common structures?

A) A membrane-bound nucleus, chloroplasts, and a cellulose wall.
B) The plasma membrane, cytoplasm, and genetic material.
C) A peptidoglycan cell wall and a large central vacuole.
D) The endoplasmic reticulum, chitin, and the vertebral column.

2) While studying biochemical reactions inside a plant cell, a process was observed in which complex starch molecules are formed from simple glucose molecules with the consumption of an amount of energy. This process falls under the category of:

A) Catabolic processes that release stored energy.
B) Anabolic processes (anabolism) that consume energy.
C) Cellular respiration of glucose to produce carbon dioxide.
D) The lock-and-key mechanism for inhibiting the enzyme's active site.

3) Why is the high specific heat capacity of water a critical property for protecting the cells of living organisms from death when the seasons change?

A) Because it helps living organisms maintain stable internal temperatures despite external fluctuations.
B) Because it rapidly breaks the peptidoglycan bonds in the cell wall.
C) Because it makes the enzyme work efficiently at any pH without the need for an optimum value.
D) Because it converts the cytoplasm from a gelatinous substance into a volatile aqueous solution.

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Second: Essay Questions

Q4: **Eukaryotic organisms are classified into four main kingdoms.**

- Explain the distinctive characteristics of the kingdom "Protista" and the kingdom "Animalia" in terms of: number of cells, mode of nutrition (autotrophic or heterotrophic), and the presence of a cell wall, mentioning the classification of animals into vertebrates and invertebrates with examples from your study.

Q5: **Mention the cellular organelles responsible for carrying out the following functions in the eukaryotic plant cell:**

.Containing chlorophyll and carrying out photosynthesis

.Containing the genetic material and controlling all the activities of the cell

Transporting various substances from one place to another inside the cell .through a network of membranes

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Q6: **Explain: Based on your understanding of activation energy, why can't living cells do without enzymes to complete their biochemical reactions?**

***** End of Questions *****

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