

DIAGNOSTIC TEST IN GENERAL BIOLOGY 1
S.Y. 2022-2023

Instructions: Read each question carefully and write the correct answer in a separate sheet of paper, or in the answer sheet provided to you. Do not write anything on this test questionnaire.

1. Which of the following biologist/s proposed that cell is the structural and functional unit of life?
 - A. Robert Brown
 - B. Robert Hooke
 - C. Theodore Virchow
 - D. Schleiden and Schwann
2. In the illustration below, what numbered part of the cell where many cellular processes are also taking place such as protein synthesis, glycolysis, mitosis, and meiosis?

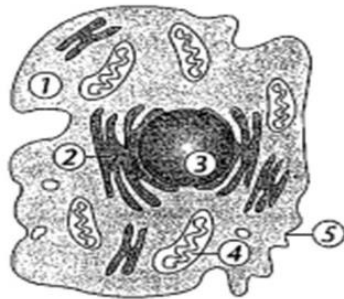


Figure 1. Animal cell
(Source: Printice Hall Inc.)

- A. Number 3, controls and regulates the activities of the cell.
 - B. Number 2, where it keeps cytoplasm from spilling out of a cell.
 - C. Number 5, where it also support and suspend organelles and cellular molecules.
 - D. Number 1, where it also helps to move materials, such as hormones, around the cell and also dissolves cellular waste.
3. What best conclusion can be made from the analogy?

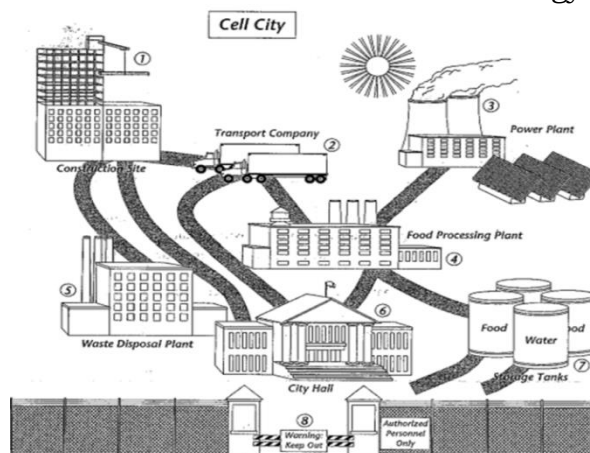
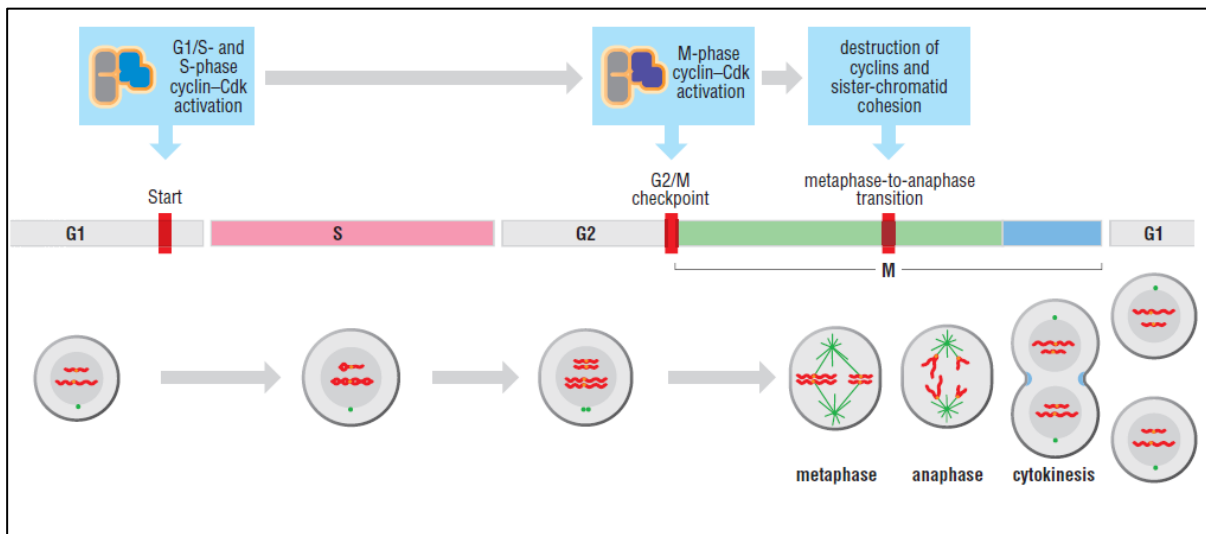


Figure 2. Cell City Model
(Source: Printice Hall Inc.)

- A. Cell city represents a plant cell because it has an ability to manufacture its own food.
 - B. Cell city represents an animal cell because it has construction site that is absent in plant cell.
 - C. Cell city represents an animal cell because it has both power plant and food processing plant.
 - D. Cell city represents a plant cell because it has a wall that prevents the entry of other materials.
4. What type of cell lacks a well-defined nucleus?
- A. Bacterial cell
 - B. Eukaryotic cell
 - C. Prokaryotic cell
 - D. Non nucleated cell
5. Which of the following is the function of the meristematic cells and tissues of plants?
- A. They serve as storage for food and water.
 - B. They comprise the photosynthetic tissue of a leaf.
 - C. They permit the continuous growth of plant throughout its life.
 - D. They serve as strengthening elements to support mature plant parts
6. Which of the following statements best illustrate the adaptation and function of modified cell?
- A. The xylem in the leaf helps the leaf to be positioned horizontally towards the sun.
 - B. The hair-like structure in the root helps to increase the surface area of root hair cell.
 - C. Red blood cell has biconcave for increasing its surface area thus diffusion of oxygen in and out of the cell becomes easy.
 - D. Guard cells are specialized in such a way that the cell wall in the inner side of the guard cell is thicker than the outer side which makes the guard cell turgid.
7. Which of the following statement are true?
- I. Cell modification is a process that occurs after cell division where the newly formed cells are structurally modified.
 - II. Cilia, flagella, and pseudopods are examples apical cell modifications that have a whip like structures.
 - III. Tight junctions, adhering junctions, and gap junctions are all found in basal surface of the cell.
 - IV. Basal Modification is specialized structures which facilitate stable adhesion of basal cells to basement membrane.
- A. I and II
 - B. II and III
 - C. I, III and IV
 - D. II, III and IV

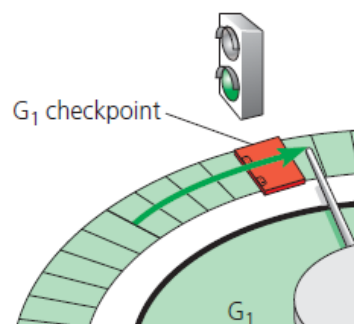
8. Which is the correct order of the idea drawn from the figure?



Source: David O. Morgan, Cell Cycle: Principles of Control, Primers in Biology (New Science Press Ltd 2007)

- I. The G1/S- and S-phase Cdks help promote the activation of M-phase cyclin–Cdk complexes, which drive progression through the second major checkpoint at the entry into mitosis (G2/M checkpoint).
 - II. Cyclin–Cdk complexes are activated during G2 Checkpoint, resulting in the phosphorylation of proteins that initiate DNA replication, centrosome duplication and other early cell-cycle events.
 - III. Metaphase-to-anaphase transition leads to sister chromatid segregation, completion of mitosis and cytokinesis.
 - IV. M-phase cyclin–Cdks phosphorylate proteins that promote spindle assembly, bringing the cell to metaphase.
- A. I, II, III, IV
 - B. I, IV, III, II
 - C. II, I, IV, III
 - D. II, I, III, IV

9. Which of the following can be correctly deduced from the figure?



Source: Jane Reece, et al., *Campbell Biology Ninth Edition*. (San Francisco, California: Pearson Benjamin

- I. The cell cycle control system proceeds on its own, driven by a built-in clock. This control system is subject to internal and external regulation at various checkpoints
- II. If a cell receives a go-ahead signal at the G1 checkpoint, the cell continues on in the cell cycle.

- III. If a cell does not receive a go-ahead signal at the G1 checkpoint, the cell continues on in cell cycle and goes into G₀, a nondividing state.
- IV. G1 is the restriction point.
 - A. I, II and III
 - B. I, II, and IV
 - C. II, III, and IV
 - D. I, II, III, and IV

10. In which phases in meiosis is variation of genetic makeup accomplished?
- A. Prophase I, Anaphase I and Anaphase II
 - B. prophase II, Anaphase I and Anaphase II
 - C. Prophase I, Metaphase I and Anaphase II
 - D. Prophase II, Metaphase I and Metaphase II

11. All of the following could be deduced from the table **except**

CRITERIA	MITOSIS	MEIOSIS
1. No. of nuclear division		
2. Synapsis/crossing over		
3. Centromere of sister chromatids at anaphase		
4 No. of daughter cells		
5. No. of chromosomes per daughter cell		
6 .Function		

- I. The mother cell in mitosis divides only once, while the mother cell in meiosis divides twice.
- II. Synapses only takes place in meiosis.
- III. Centromere of sister chromatids at anaphase separate in both mitosis and meiosis.
- IV. The number of daughter cells in mitosis is 2, while meiosis is 4.
- V. Mitosis is haploid, meiosis is diploid.
 - A. I, II, and III
 - B. I, III, IV and V
 - C. I, II and IV
 - D. I, II, III, V

- 12.All of the following is significant application of mitosis **except**

- A. Cloning
- B. Budding
- C. Formation of Gametes
- D. Stem Cell Regeneration

- 13.Which of the following statements best explain the importance of mitosis?

- I. Mitosis ensures the growth of an offspring.
- II. Mitosis helps in preserving and maintaining the genetic stability of a particular population.

- III. Mitosis ensures that the number of chromosomes of the parent cell is identical to its two daughter cells.
 - IV. Mitosis maintains the fixed number of chromosomes in sexually reproducing organisms, the most important contribution in reproduction.
- A. I only
 - B. I and II
 - C. I, II, and III
 - D. I, II, III, and IV
14. What is called when cells in the body grow uncontrollably and spread to other parts?
- A. Aneuploidy
 - B. Cancer
 - C. Polyploidy
 - D. Tumor
15. When an invasive cancer occurs?
- A. When genetic mutation occurs in a cell
 - B. Cells are abnormal and tumor are still contained within its tissue of origin
 - C. When cell's descendants mutated and divide excessively and look abnormal.
 - D. When some cells have additional mutations and allow tumors to invade other tissues through circulatory system.
16. Choose the correct description of saturated fatty acids.
- A. Their tails stay bent at low temperature.
 - B. They have no double bonds and their tails are straight.
 - C. Their tails can pack tightly together in high temperature.
 - D. They contain one or more double bonds and their tails are bent.
17. What would be the best analysis for hydrophilic and hydrophobic?
- A. Hydrophilic is nonpolar while hydrophobic is polar.
 - B. Hydrophilic contains a negatively charged phosphate group while hydrophobic consists of long, nonpolar fatty acid.
 - C. Hydrophilic contains a positively charged phosphate group while hydrophobic contains a polar fatty acid.
 - D. Hydrophilic tail moves downward contacting an aqueous fluid inside the membrane while hydrophobic head interacts with water.
18. Evaluate the statements below and choose what intermolecular process primarily drives the formation of bilayer when phospholipids are added to water?
- A. Phospholipids self-assemble into a bilayer due to the strong affinity they have for each other.
 - B. A bilayer arrangement maximizes the strength of Van der Waals forces among phospholipids.
 - C. The ordered arrangement of a bilayer is more favorable than the disordered state of individual free-floating phospholipids.
 - D. Lipids cause water to arrange in an ordered, unfavorable cage-like structure. Forcing lipids into a bilayer reduces this effect.

19. Below are the functions of the plasma membrane in cell **except one**. What do you think it is?
- It provides shape to the cell.
 - It can easily be entered by all substances which then be used by the cell.
 - It regulates the movement of substances in and out of the cell, protecting it from its surroundings.
 - It carries markers that allow cells to recognize one another and can transmit signals to other cells via receptors.
20. What are the types of passive transport?
- Osmosis
 - II. Primary Transport
 - Facilitated Diffusion
 - Symports and Anti-ports
- I only
 - II and IV
 - I and III
 - I, II and III
21. Which of the following processes includes all others?
- Osmosis
 - Diffusion of a solute across a membrane
 - Facilitated diffusion
 - Passive transport
22. Supposed that there are several foreign cells have entered your blood stream, evaluate what process that your cell in your immune system would undergo immediately?
- Exocytosis
 - Pinocytosis
 - Phagocytosis
 - Receptor-mediated cytosin
23. What would possibly happen if the cells inside your body will stop eating/drinking unnecessary substances?
- Cells will continue to function.
 - Damaged cells will be disposed.
 - Viruses will enter into the cell at the same site.
 - Pathogens will be engulfed properly to be destroyed.
24. Does enzymatic work speed up rate of reaction? Why?
- Yes, because it is biological catalyst.
 - Yes, because they lower the activation energy.
 - Yes, because they do not build up large molecules from smaller ones.
 - Yes, because they are unchanged at the end of the reaction and can be reused.
25. Does enzyme has optimum pH and temperature which they can work best?
- No, for enzyme they can work at any given temperature.
 - Yes, they have a required condition for their optimal functioning.
 - No, what is required from them is abundant space to dilute freely.
 - Yes, all enzymes work best at low pH and temperature of 40 degree Celsius.

26. Which of the following refers to beta-oxidation?
- the assembly of sugars
 - the breakdown of sugars
 - the breakdown of fatty acids
 - the removal of amino groups from amino acids
27. What is the special chlorophyll pigments that serves as primary reaction center in Photosystem I?
- P 680
 - P 700
 - Has not been identified
 - Primary reaction center
28. Plants are very unique among other organisms due to their capability to trap sunlight and make their own food. Which of the following enables plants to trap energy from the sun?
- Chlorophyll
 - Chloroplast
 - Cuticle
 - Epidermis
29. There are connections between the different stages of photosynthesis. Applying this knowledge, what is the overall outcome of the light-dependent reactions in photosynthesis?
- Sugar and ATP are produced during the light-dependent reactions and are used to power the light-independent reactions.
 - NADPH and ATP molecules are produced during the light-independent reactions and are used to power the light-dependent reactions.
 - Carbon dioxide and NADPH are produced during the light-independent reactions and are used to power the light-dependent reactions.
 - NADPH and ATP molecules are produced during the light-dependent reactions and are used to power the light-independent reactions.
30. Explain how the light reactions and light-independent reactions (Calvin cycle) of photosynthesis are interdependent on each other.
- The light reactions produce only NADPH, which is produced by the Calvin cycle.
 - The light reactions use NADPH and ATP, which are produced by the Calvin cycle.
 - The light reactions produce NADP⁺ and ADP, which are then used in the Calvin cycle.
 - The light reactions produce ATP and NADPH, which are then used in the Calvin cycle.
31. Consider the processes involved in photosynthesis and the locations where they occur. Choose the statement that makes the best case for why the light-dependent reactions of photosynthesis take place in the thylakoid.
- Light energy is absorbed by the thylakoid membrane.
 - Photosystem I is anchored to the membrane, but photosystem II is not.
 - The cytochrome complex requires a membrane for chemiosmosis to occur.
 - The light-dependent reactions depend on the presence of carbon dioxide.

32. During very active photosynthesis, much of the reduced carbon is fixed by the Calvin cycle as glyceraldehyde-3-phosphate is converted to starch. Which events below occur during the dark periods that follow?
- much more glucose are produced
 - much of water is split into O₂ and H
 - much of the starch is converted to sucrose
 - much of the RuBP produced more carbohydrates
33. Which is the correct equation for anaerobic respiration in humans?
- glucose → lactic acid
 - glucose + water + lactic acid
 - glucose → lactic acid + water
 - glucose + water → lactic acid
34. The amount of oxygen required to remove the lactic acid, and replace the body's reserves of oxygen, is called the oxygen debt. During hard exercise, what causes an 'oxygen debt'?
- A build-up of water
 - A build-up of oxygen
 - A build-up of lactic acid
 - A build-up of carbon dioxide
35. What is the function of oxygen in aerobic respiration?
- it establishes the proton gradient
 - it donates its electrons to the electron transport chain
 - it is necessary in order for ATP synthase to work properly
 - it is the final electron acceptor in the electron transport chain
36. What accounts for the different number of ATP molecules that are formed through cellular respiration?
- Most of the ATP's produced are rapidly used for the phosphorylation of certain compounds found in plants.
 - The ATPs produced are utilized in the anaplerotic reactions that are used for the replenishment of the intermediates.
 - Transport of NADH from the cytosol to mitochondria is an active process that decreases the number of ATP produced.
 - A large number of ATP molecules are used in the detoxification of xenobiotic compounds produced during cellular respiration.
37. What type of cellular respiration is represented in the following equation, and why?
- $$\text{CO}_2 + \text{H}_2 + \text{NADH} \rightarrow \text{CH}_4 + \text{H}_2\text{O} + \text{NAD}$$
- Aerobic respiration, because oxygen is the final electron acceptor.
 - Aerobic respiration, because water is being produced as a product.
 - Anaerobic respiration, because the final electron acceptor is inorganic.
 - Anaerobic respiration, because NADH donates its electrons to a methane molecule.
38. Cellular respiration breaks down glucose and releases carbon dioxide and water. Which steps in the oxidation of pyruvate produce carbon dioxide?
- Removal of an acetyl group from pyruvate releases carbon dioxide and the pyruvate decarboxylase complex comes into play.

- B. Removal of an acetyl group from pyruvate releases carbon dioxide and the pyruvate dehydrogenase complex comes into play.
 - C. Removal of a carboxyl group from pyruvate releases carbon dioxide and the pyruvate dehydrogenase complex comes into play.
 - D. Removal of a carbonyl group from pyruvate releases carbon dioxide and the pyruvate dehydrogenase complex comes into play.
39. Where in a cell in both prokaryotes and eukaryotes does glycolysis take place?
- A. Cytosol
 - B. Mitochondria
 - C. Nucleus
 - D. Plasma membrane
40. When cells break down food into chemical energy it undergoes three major processes, glycolysis, Krebs cycle and electron transport. Which of these processes provides the most number of ATP molecules?
- A. Glycolysis
 - B. Krebs cycle
 - C. Pyruvate oxidation
 - D. Electron transport chain
41. When a poison such as cyanide blocks the electron transport chain, glycolysis and the citric acid cycle also eventually stop working. Which of the following is the best explanation for this?
- A. They run out of ADP.
 - B. A high level of NADH is present in the cell.
 - C. The uptake of oxygen stops because electron transport was inhibited.
 - D. NAD⁺ and FAD are not available for glycolysis and the citric acid cycle to continue.
42. During substrate-level phosphorylation, 1 glucose molecule produced 6 ATP molecules. Calculate the total number of ATP produced by 2 glucose molecules during aerobic respiration?
- A. 8
 - B. 10
 - C. 12
 - D. 14
43. In Krebs cycle, 1 ATP will be produced from 1 molecule of Acetyl-CoA. Calculate the net ATP produced by substrate-level phosphorylation in Krebs cycle from 2 Acetyl-CoA?
- A. 0
 - B. 2
 - C. 6
 - D. 8
44. Which is the primary reason why ATP synthesis occurs in the electron transport chain?
- A. NADH pass through ATP synthase, which creates ATP
 - B. ADP accepts a protons ion and a phosphate to create ATP.
 - C. ATP is created by breaking down water as the water passes through the pumps in the membranes.

- D. A concentration gradient of protons is created across the membranes of the mitochondria and then the protons feed into ATP synthase, creating ATP.
45. Pyruvate is the product of glycolysis. If there is no oxygen available to cells of the human body, what becomes of pyruvate?
- A. CO₂
 - B. Alcohol
 - C. Lactic acid
 - D. CO₂ & Lactic acid
46. During aerobic respiration, molecular oxygen (O₂) is used for which of the following purposes?
- A. At the end of glycolysis to oxidize pyruvate
 - B. As a source of O₂ in every reaction that produces CO₂
 - C. At the end of the citric acid cycle to regenerate citric acid
 - D. At the end of the electron transport chain to accept electrons and form H₂O
47. A solution in a beaker contains all of the enzymes necessary for undergoing glycolysis. A mole of glucose is mixed into the solution. No oxygen is present and no ATP is present. Does glycolysis occur?
- A. No, because ATP is not present.
 - B. No, because oxygen is not present.
 - C. Yes, because glycolysis is anaerobic.
 - D. Yes, because glycolysis is ATP independent.
48. Fermentation is essentially glycolysis plus an extra step in which pyruvate is reduced to form lactate or alcohol and carbon dioxide. What would be the last step?
- A. Prevents pyruvate from accumulating
 - B. Extracts a bit more energy from glucose
 - C. Removes poisonous oxygen from the environment
 - D. Enables the cell to recycle the reduced NADH to oxidized NAD⁺
49. Sports physiologists at an olympic training center wanted to monitor athletes to determine at what point their muscles were functioning anaerobically. They could do this by checking for a buildup of which of the following compounds?
- A. Lactate
 - B. Carbon dioxide
 - C. ADP (Adenosine Diphosphate)
 - D. ATP (Adenosine Triphosphate)
50. Which of the following is the most primary function of the reactions that follow glycolysis in a fermentation pathway?
- A. To synthesize pyruvate from lactate
 - B. To regenerate NAD⁺ from NADH, so glycolysis can continue
 - C. To synthesize electron acceptors, so that cellular respiration can continue
 - D. To regenerate NADH from NAD⁺, so electrons can be donated to the electron transport chain