Multiple Choice Test: Membranes, Molecules and Mitochondria

ASHA Lectures

Movement Across a Membrane:

1. Oestrogen is a relatively small steroid hormone associated with the development and maintenance of biologically female characteristics, including the menstrual cycle. The molecule itself is lipophilic and non-polar. The most likely way that this molecule crosses the plasma membrane is:
    a. Simple Diffusion
    b. Facilitated Diffusion
    c. Active Transport
    d. Endocytosis

2. Ethanol is a very small non-polar molecule with a small polar end. The most likely way ethanol enters the cell via the plasma membrane is:
    a. Through a carrier protein
    b. Via endocytosis
    c. Directly through the plasma membrane
    d. Via active transport

3. The role of the plasma membrane surrounding organelles is:

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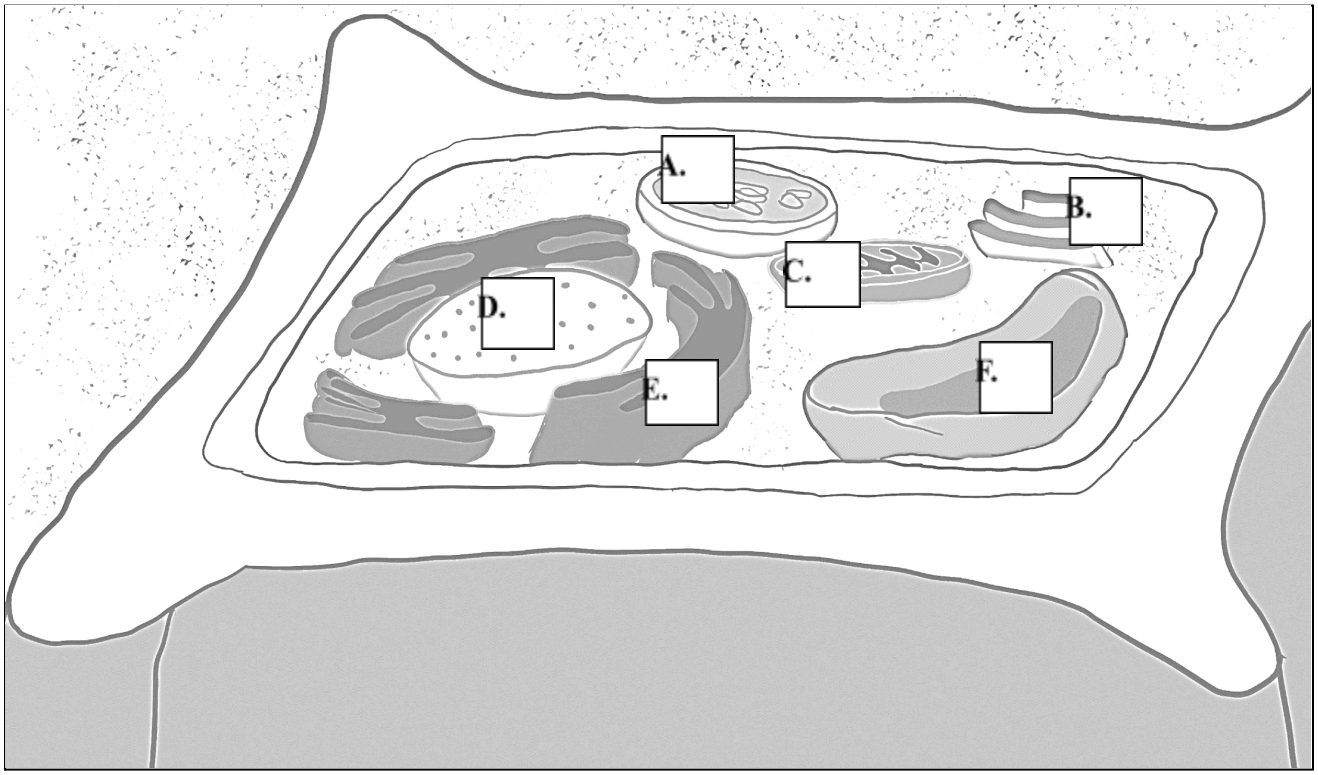
a. Compartmentalise related chemical reactions to specific regions of the cell
b. Regulate substances into and out of the cell
c. Signal to other cells that the cell they're in is undergoing oxidative stress
d. Contain cholesterol for later use in the production of steroid hormone

4. The export of a protein once it is translated requires the presence of:
    a. Mitochondria
    b. Membrane Proteins
    c. Double membrane
    d. Nucleus

5. Consider Figure 1. Below, a simplified drawing of a plant cell. Each letter labels an organelle important in the synthesis and export of a protein.



The organelle responsible for packaging and modifying proteins for transport outside the cell is:

A.
B.
C.
D.
E.
F.

6. Still considering Figure 1, the order of organelles involved in the transcription, synthesis and export of a protein is:

   a. A → B → C → D

   b. D → A → C → B

   c. D → E → C

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d. D → E → B

7. The role of the double plasma membrane around chloroplast in plants is to:
    a. Regulate the movement of materials into and out of the cell
    b. Regulate movement of sugars in and out of the chloroplast
    c. Regulate the amount of light in the chloroplast
    d. Allow the chloroplast to act separately from the plant cell

8. To predict the method of movement a molecule will take across a membrane into a cell you must consider:
    a. Charge and Size of the molecule
    b. Charge, Polarity, and Size of the molecule
    c. Charge, Polarity and Size of the molecule, and the concentration gradient
    d. Charge, Polarity and Size of the molecule, and the direction of movement

9. Pinocytosis:
    a. Occurs when cells have insufficient water
    b. Is a method of bulk transport
    c. Is the passive movement of liquids across the plasma membrane
    d. Requires digestive enzymes

10. Small non-polar molecules usually enter cells via simple diffusion. This is because:

a. The plasma membrane is semi-permeable

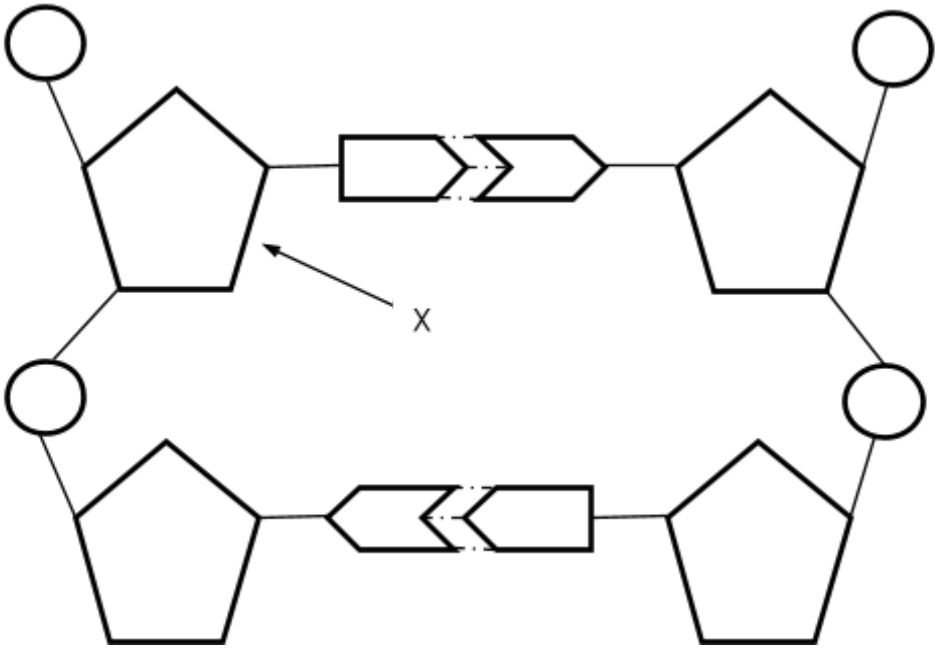
b. Non-polar molecules are not repelled by the lipophilic tails of the phospholipid molecules

c. Only small molecules are able to pass through instantaneous gaps in phospholipid molecules created by the plasma membranes fluidity

d. Both b and c

Proteins and Nucleic Acids:

11. Molecule X is a monomer in the non-circular polymer shown below. It is most likely a monomer of which polymer:



a. mRNA
b. A polypeptide
c. Nuclear DNA
d. mtDNA

12. Molecule X is found in what region/s of the cell:
    a. Nucleus only
    b. Endoplasmic reticulum only
    c. Nucleus and Mitochondria
    d. Nucleus, Mitochondria and Chloroplast

13. Groups of 3 monomers of molecule X are called:
    a. Triplets
    b. Codons
    c. Anticodons
    d. Base pairs

14. ATP, mRNA and DNA are very important molecules in the functioning of the cell. They all:
    a. Code for the production of specific polypeptides
    b. Are important in translation
    c. Contain nucleotide polymers

d. Are required for the production of enzymes involved in cellular respiration

15. In the process of synthesising polypeptides, amino acid molecules are bonded together by peptide bonds. The formation of these bonds requires energy in the form of:

    a. Glucose

    b. Heat

    c. Unloaded coenzymes

    d. Specific coenzymes

16. Y is a protein comprising of 3 polypeptide chains. Each of these polypeptide chains was formed as a result of:

    a. Hydrolysis reaction between amino acid monomers

    b. Catabolic Reaction

    c. Condensation polymerization reaction

    d. Transcription

17. The overall specific 3D shape of Y, a protein mentioned in the previous question enables it to bind to the operator region of a specific DNA sequence. This specific shape

    a. Forms instantaneously

    b. Requires energy to maintain

    c. Has a complementary shape to the specific DNA sequence

    d. Is always denatured by the presence of an acid

‘

18. The highest level of structure protein Y has is:

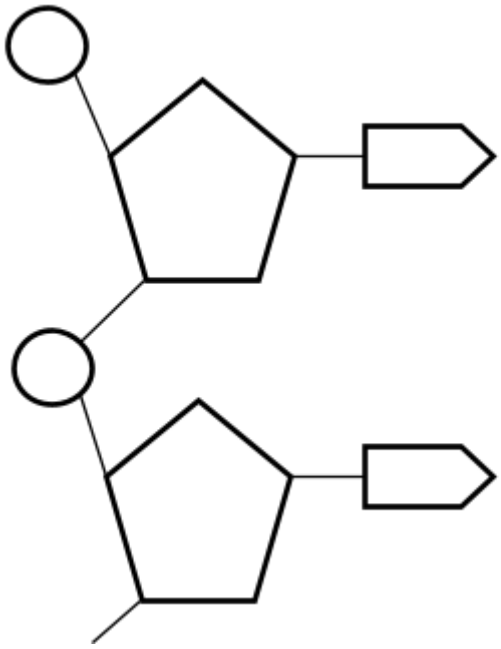
    a. Primary Structure

    b. Secondary Structure

    c. Tertiary Structure

    d. Quaternary Structure

19. The diagram below is simplistic representation of a biologically significant molecule, named molecule A. Which of the following must be true about molecule A?



    a. Molecule A codes for the production of a specific protein

    b. Molecule A contains lipid monomers

c. Molecule A is found in the nucleus of the cell

d. Molecule A is a polymer

Cellular Respiration and Photosynthesis:

20. Which of the following is true about cellular respiration?

    a. Oxygen is an input in the Krebs Cycle

    b. Only glucose is an input in glycolysis

    c. It occurs in the cytosol of the cell

    d. It is a biochemical pathway

21. (The following relates to questions 21-23) A researcher is conducting an experiment on cellular respiration. She uses a beaker containing mitochondria from plant cells and water as a solvent. The temperature, oxygen levels and pH of this beaker is kept constant to ensure the mitochondria and required mitochondrial enzymes are not damaged. If this researcher then added acetyl-CoA to the beaker, what would be the expected product?

    a. Lactic Acid

    b. Ethanol

    c. Carbon Dioxide

    d. None

22. If instead of acetyl-CoA, the researcher had added glucose to the beaker, what would you expect to see?

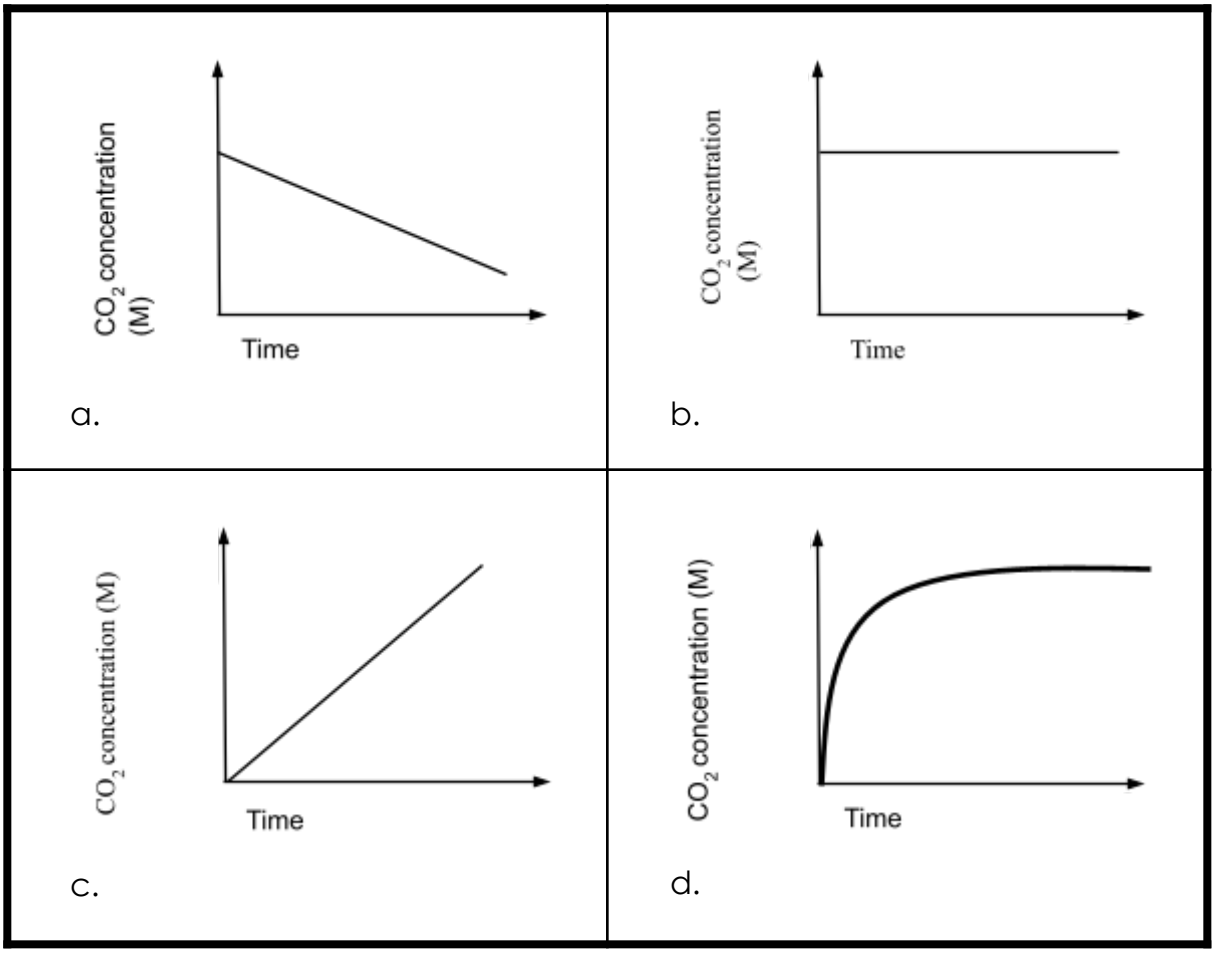
    a. Bubbling as a gas was produced

b. The production of ethanol

c. Both a and b

d. Nothing

23. If the researcher had added glucose to the beaker, what would you expect the graph of the concentration of carbon dioxide against time to look like?



24. In photosynthesis:

    a. NADPH is used to provide energy for the light independent phase of photosynthesis

    b. The light required is captured by enzymes in the stroma

    c. ATP is produced by the light independent phase

    d. Glucose is the only ever the sugar produced

25. A cell has insufficient oxygen to undergo aerobic respiration. This cell will then:

    a. Undergo anaerobic respiration until it undergoes apoptosis

    b. Break down pyruvate into lactic acid

    c. Recycle loaded coenzymes

    d. Produce ethanol

26. It is believed that the presence of mitochondria in modern day eukaryotes is a result of an evolutionary symbiotic relationship between an ancient prokaryotic organism and an ancestor of modern eukaryotes. What is considered evidence of this theory?

    a. Mitochondria have a very similar shape and colour to modern day bacteria

    b. Mitochondria do not contain enough DNA to code for all mitochondria-specific proteins

    c. Mitochondria enable cells to undergo aerobic respiration, a very useful and important process in eukaryotes

    d. Mitochondria have a double membrane

27. During intense exercise, the body cells of athletes may undergo anaerobic respiration rather than aerobic respiration. Advantages of anaerobic over aerobic respiration include the:

a. Amount of ATP produced, for the same amount of time

b. Ability to continue to produce ATP without the presence of oxygen

c. Recycling of coenzymes back into unloaded forms quickly

d. All of the above

28. During the light independent phase of photosynthesis loaded coenzymes are cycled back into their unloaded forms. One of these loaded coenzymes is:

a. NADH

b. NAD+

c. NAPH

d. NADP+

29. A student created a table of differences and similarities between aerobic and anaerobic respiration, shown below:

Which statements are correct?

a. (A), (B), (D) and (E)

b. (A), (B) and (E)

c. All except (F)

d. (A) and (E)

30. Which one of these statements about photosynthesis is correct?

a. It only occurs in plant cells

b. It requires the presence of chlorophyll, which is found in the stroma

c. The light independent stage occurs after the light dependent phase, without the presence of light

d. Temperature is an important factor in determining the rate of photosynthesis

31. Unlike anaerobic respiration, aerobic respiration:

a. Produces carbon dioxide

b. Requires t activity of enzymes

c. Produces ATP

d. Doesn't produce an acid in animals

32. For the chemical reaction below, which of the following statements is true?

$$NADP^+ + H^+ + 2e^- \rightarrow NADPH$$

a. NADP+ is a coenzyme

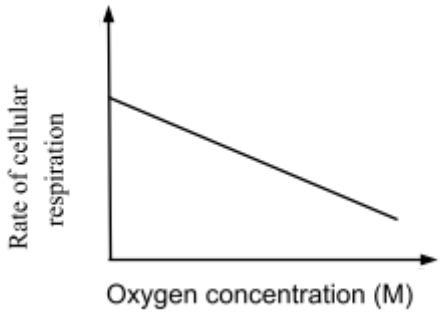
b. NADPH is utilised in cellular respiration

c. The reverse reaction occurs in the light independent phase of photosynthesis

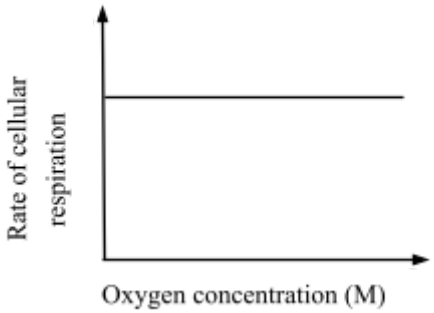
d. The reaction is required to move energy around the cell, between required reactions

33. The graph which best represents the rate of cellular respiration for a single cell as the concentration of oxygen increases is:

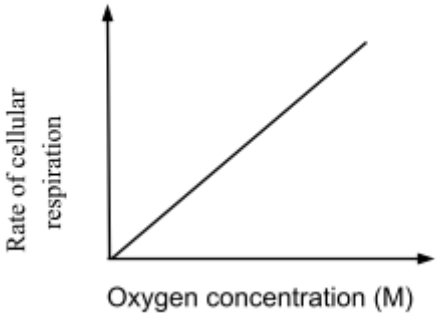
a.



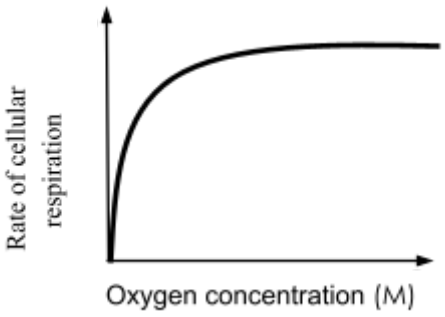
b.



c.



d.



34. The table that correctly identifies the main inputs and outputs for each stage of aerobic respiration is:

a.						
b.						
c.						
d.						

*Answers provided in solution document