COMPETIFY HUB

BIOLOGY

GRADES 5-8

Providing Free Resources for All

MEDIUM

Q1: Anatomy and Physiology

Fetal hemoglobin is known to bind to oxygen better than maternal hemoglobin. When plotting the oxygen dissociation curves, what is the expected shift from the maternal oxygen dissociation curve to the fetal oxygen dissociation curve? a. Left shift b. Right shift c. Upward shift d. Downward shift

MEDIUM

Q2: Anatomy and Physiology

Which enzymes in the mouth primarily break down carbohydrates and fats? a. Trypsin and carboxypeptidase b. Carboxypeptidase and trypsin c. Amylase and lipase d. Lipase and carboxypeptidase

MEDIUM

Q3: Anatomy and Physiology

During exercise, a person’s breathing rate and heart rate both increase. Why do these changes help the muscles work better? A. Faster breathing cools the muscles, and a faster heart rate removes extra muscle tissue. B. Increased breathing brings in more oxygen, and the heart pumps oxygen rich blood to the muscles so they can make energy. C. The heart rate increases to store oxygen in the lungs for later use. D. Faster breathing helps muscles contract directly without using the blood.

MEDIUM

Q4: Cellular Respiration

A toxin blocks ATP synthase in mitochondria. Which immediate effect would this have on the cell? A. Glycolysis would stop completely B. The electron transport chain would speed up C. Protons would accumulate in the intermembrane space D. The Krebs cycle would produce more ATP to compensate

MEDIUM

Q5: Photosynthesis

If the electron transport chain in the thylakoid membrane is inhibited, which process will be directly affected first? A. Carbon fixation in the Calvin cycle B. Production of NADPH and ATP C. Release of oxygen from water D. Regeneration of RuBP

MEDIUM

Q6: Gene Regulation

A mutation prevents a repressor protein from binding to the operator region of a prokaryotic operon. What is the most likely outcome? A. The operon will remain permanently off B. The operon will be transcribed continuously C. RNA polymerase will be unable to bind the promoter D. The operon will switch on only in the presence of a corepressor

MEDIUM

Q7: Membrane Transport

A cell is placed in a solution with a higher solute concentration than its cytoplasm. Aquaporins in the membrane are functioning normally. What will most likely happen to the cell? A. Water will move into the cell, causing it to swell B. Water will move out of the cell, causing it to shrink C. Solutes will diffuse into the cell until equilibrium is reached D. Active transport will stop due to osmotic pressure

MEDIUM

Q8: Enzymes and Temperature Sensitivity

An enzyme in human cells functions optimally at 37°C. A mutation causes the enzyme's structure to become more rigid. What is the most likely effect of this mutation on enzyme activity? A. The enzyme will become more efficient at higher temperatures due to increased stability. B. The enzyme will denature more easily at normal body temperature. C. The enzyme's activity will decrease because substrate binding becomes less flexible. D. The enzyme will catalyze reactions faster due to reduced activation energy.

MEDIUM

Q9: NADH vs. FAGH2

NADH and FAGH2 are vital electron-carrying coenzymes in cellular respirations. There are many key differences between them. Select the statement that is false. A. for NADH, electrons are at a higher energy level; for FAGH, electrons are at a lower energy level B. FADH2 is produced specifically during the Krebs Cycle C. During Oxidative Phosphorylation, NADH makes 3 ATP molecules and FADH2 makes 2 ATP molecules D. NADH has a higher ATP yield and FADH2 has a lower ATP yield E. NADH donates electrons to Complex II and FADH2 donates electrons to Complex I

MEDIUM

Q10: The Process of Oxidative Phosphorylation

There are 5 steps in the process of Oxidative Phosphorylation. What is the 4th step? A: Chemiosmosis and ATP (Adenosine Triphosphate) Synthesis B: Energy is released which powers protein to pump protons from mitochondrial matrix into intermembrane space C: Donation of Electrons D: The final receptor: Oxygen E: Electrons move to the ETC (Electron Transport Chain)

MEDIUM

S1: a. Left shift

Explanation:

Answer – a. Left shift. Fetal hemoglobin grabs oxygen more easily than the mother's. On the graph, this makes the curve move to the left so the baby can take oxygen from the mother's blood.

MEDIUM

S2: c. Amylase and lipase

Explanation:

Answer – c. Amylase and lipase. In the mouth, amylase starts breaking down carbohydrates, and lipase begins breaking down fats. Trypsin and carboxypeptidase work on proteins in the small intestine, not the mouth.

MEDIUM

S3: B. Increased breathing brings in more oxygen, and the heart pumps oxygen rich blood to the

Explanation:

Answer – B. Increased breathing brings in more oxygen, and the heart pumps oxygen rich blood to the muscles so they can make energy.. When a person exercises, faster breathing allows more oxygen to enter the lungs. The heart then pumps this oxygen rich blood through the circulatory system to the muscles. The muscles use the oxygen to produce energy, which helps them keep contracting during exercise.

MEDIUM

S4: C

Explanation:

Answer – C. ATP synthase allows protons to flow back into the mitochondrial matrix. If it’s blocked, protons cannot return, so they build up in the intermembrane space. The electron transport chain slows down eventually, but the first immediate effect is proton accumulation.

MEDIUM

S5: B

Explanation:

Answer – B. The thylakoid electron transport chain is responsible for generating the proton gradient and reducing NADP to NADPH. If the ETC is inhibited, the light reactions stop, so ATP and NADPH production halts first. Carbon fixation and RuBP regeneration depend on these molecules, so they fail later, not immediately.

MEDIUM

S6: B

Explanation:

Answer – B. If a repressor protein cannot bind the operator, RNA polymerase has nothing blocking it. That means transcription proceeds all the time, regardless of environmental signals. The operon becomes constitutively active.

MEDIUM

S7: B

Explanation:

Answer – B. When a cell is placed in a hypertonic solution , water moves out of the cell by osmosis. Aquaporins allow water to move freely, so the cell loses water and shrinks. Solutes don’t move in fast enough to compensate, and active transport doesn’t reverse osmotic flow.

MEDIUM

S8: C

Explanation:

Answer – C. Enzymes rely on slight flexibility in their active sites to bind substrates properly. This is the induced fit model, where the enzyme adj just enough to hold the substrate tightly. If a mutation makes the enzyme more rigid, it can’t shift its shape the way it normally would. Even though the temperature is still optimaa), the active site won’t fit the substrate as well. That means fewer enzyme substrate form, and the reaction rate drops.

MEDIUM

S9: E

Explanation:

Answer – E. E is the correct answer. It is the other way around. NADH donates electrons to Complex I and FADH2 donates electrons to Complex II.

MEDIUM

S10: D

Explanation:

Answer – D. D is the correct answer. In the process of Oxidative Phosphorylation, when electrons move through the ETC and reach the end of the chain, oxygen accepts the spent electrons and combines with protons to form H2O (water).

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