INKBIOLOGY FLASHCARDS

Respiration and cellular energy

Unit B12 · 24 cards · fronts and backs

Print double-sided, flipping on the long edge, and each answer lands behind its question. Cut along the card borders.

Definitions in mark-scheme wording, and the misconceptions that lose marks. These cards and each lesson's whole-lesson check run on the website with spaced-repetition scheduling, at inkphysics.co.uk/biology/flashcards.

DEFINITION

Define: ATP.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

Define: Hydrolysis of ATP.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

Define: Phosphorylation.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

Define: Glycolysis.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

Define: Substrate-level phosphorylation.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

Define: Coenzyme.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

Define: Oxidation.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

Define: Link reaction.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

The breaking of the bond to the terminal phosphate by addition of water, catalysed by ATP hydrolase, giving ADP and inorganic phosphate and releasing about 30.5 kJ per mole.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

Adenosine triphosphate: a phosphorylated nucleotide made of adenine, ribose and three phosphate groups, used as the immediate source of energy in every cell.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

The splitting of glucose into two molecules of pyruvate in the cytoplasm, producing a net gain of two ATP and two reduced NAD, without oxygen.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

The addition of a phosphate group to a molecule. The phosphate released from ATP is often added to another molecule, making it more reactive.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

A non-protein molecule that an enzyme needs in order to work. NAD accepts hydrogen from a substrate and carries it elsewhere, so it is a hydrogen carrier.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

The direct transfer of a phosphate group from a substrate molecule onto ADP, as opposed to ATP made using a proton gradient.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

The oxidative decarboxylation of pyruvate in the mitochondrial matrix, producing carbon dioxide, reduced NAD and a two-carbon acetyl group carried by coenzyme A.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

In respiration, most easily read as the loss of hydrogen. A substrate that hands hydrogen to NAD has been oxidised; the NAD has been reduced.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

Define: Decarboxylation.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

Define: Dehydrogenation.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

Define: Acetyl coenzyme A.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

SPOT THE ERROR

Say what is wrong with this claim:

ATP is the cell's energy store, so cells build up a supply and draw on it when they need it.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

Define: Krebs cycle.

THE KREBS CYCLE AND OXIDATIVE PHOSPHORYLATION

DEFINITION

Define: Dehydrogenase.

THE KREBS CYCLE AND OXIDATIVE PHOSPHORYLATION

DEFINITION

Define: Decarboxylase.

THE KREBS CYCLE AND OXIDATIVE PHOSPHORYLATION

DEFINITION

Define: FAD.

THE KREBS CYCLE AND OXIDATIVE PHOSPHORYLATION

DEFINITION

Removal of hydrogen from a molecule, catalysed by a dehydrogenase, with the hydrogen taken up by a coenzyme.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

Removal of a carbon atom from a molecule, released as carbon dioxide.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

SPOT THE ERROR

Cells store energy as glycogen and triglyceride, not as ATP. An adult holds about 50 g of ATP at any moment and turns over close to their own body mass of it in a day, so the whole pool would be gone in about ninety seconds without resynthesis.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

The two-carbon acetyl group attached to coenzyme A, which carries it into the Krebs cycle.

SPENDING ATP TO MAKE ATP: GLYCOLYSIS AND THE LINK REACTION

DEFINITION

An enzyme that catalyses the removal of hydrogen from a substrate, passing it to a coenzyme such as NAD or FAD.

THE KREBS CYCLE AND OXIDATIVE PHOSPHORYLATION

DEFINITION

A closed series of reactions in the mitochondrial matrix in which an acetyl group is combined with a four-carbon acceptor and completely oxidised, releasing carbon dioxide and reducing coenzymes, and regenerating the acceptor.

THE KREBS CYCLE AND OXIDATIVE PHOSPHORYLATION

DEFINITION

A hydrogen-carrying coenzyme like NAD, but one that hands its electrons to the transport chain further along, so it yields less ATP per molecule.

THE KREBS CYCLE AND OXIDATIVE PHOSPHORYLATION

DEFINITION

An enzyme that catalyses the removal of a carbon atom from a substrate, released as carbon dioxide.

THE KREBS CYCLE AND OXIDATIVE PHOSPHORYLATION

DEFINITION

Define: Electron transport chain.

THE KREBS CYCLE AND OXIDATIVE PHOSPHORYLATION

DEFINITION

Define: Chemiosmosis.

THE KREBS CYCLE AND OXIDATIVE PHOSPHORYLATION

DEFINITION

Define: Oxidative phosphorylation.

THE KREBS CYCLE AND OXIDATIVE PHOSPHORYLATION

DEFINITION

Define: Final electron acceptor.

THE KREBS CYCLE AND OXIDATIVE PHOSPHORYLATION

SPOT THE ERROR

Say what is wrong with this claim:

Oxygen burns the glucose in respiration, in the same way it burns petrol in an engine.

THE KREBS CYCLE AND OXIDATIVE PHOSPHORYLATION

DEFINITION

Define: Anaerobic respiration.

ANAEROBIC RESPIRATION AND THE RESPIRATORY QUOTIENT

DEFINITION

Define: Fermentation.

ANAEROBIC RESPIRATION AND THE RESPIRATORY QUOTIENT

SPOT THE ERROR

Say what is wrong with this claim:

Anaerobic respiration is what happens when your muscles run out of energy.

ANAEROBIC RESPIRATION AND THE RESPIRATORY QUOTIENT

DEFINITION

The synthesis of ATP driven by the movement of protons down an electrochemical gradient through ATP synthase.

THE KREBS CYCLE AND OXIDATIVE PHOSPHORYLATION

DEFINITION

A series of carrier proteins in the inner mitochondrial membrane that pass electrons from one to the next, releasing energy used to pump protons into the intermembrane space.

THE KREBS CYCLE AND OXIDATIVE PHOSPHORYLATION

DEFINITION

The molecule that takes electrons from the end of the chain. In aerobic respiration it is oxygen, which combines with protons to form water.

THE KREBS CYCLE AND OXIDATIVE PHOSPHORYLATION

DEFINITION

The formation of ATP from ADP and inorganic phosphate using energy from the electron transport chain, with oxygen as the final electron acceptor.

THE KREBS CYCLE AND OXIDATIVE PHOSPHORYLATION

DEFINITION

The release of energy from an organic molecule without oxygen, in which glycolysis continues because reduced NAD is oxidised by a reaction other than the electron transport chain.

ANAEROBIC RESPIRATION AND THE RESPIRATORY QUOTIENT

SPOT THE ERROR

No glucose molecule ever meets an oxygen molecule inside you. The carbon has already left as carbon dioxide before oxygen appears, and oxygen's only job is to accept spent electrons at the end of the chain and combine them with protons to make water.

THE KREBS CYCLE AND OXIDATIVE PHOSPHORYLATION

SPOT THE ERROR

Nothing runs out of energy: glucose and glycogen are still there. What runs short is oxygen, and the immediate casualty is a coenzyme. Glycolysis needs oxidised NAD, and lactate production exists to regenerate it when the electron transport chain cannot.

ANAEROBIC RESPIRATION AND THE RESPIRATORY QUOTIENT

DEFINITION

The anaerobic conversion of pyruvate to lactate or to ethanol and carbon dioxide, regenerating oxidised NAD.

ANAEROBIC RESPIRATION AND THE RESPIRATORY QUOTIENT