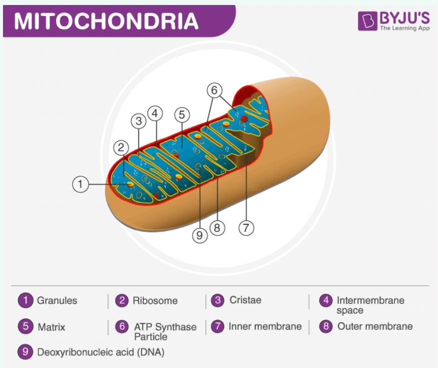
acr review Cheat Sheet

by tofu (tofu425) via cheatography.com/169049/cs/35385/

cellular respiration overview

objective	synthesize ATP (i.e. energy)
stages	glycolysis, pyruvate oxidation, krebs/citric acid cycle, electron transport/ oxidative phosphorylation
equation	$C_6H_{12}O_6 + 6\ O_2 + 36\ ADP \rightarrow 6\ CO_2 + 6\ H_2O + 36\ ATP$

mitochondrial structure



do you know what the powerhouse of the cell is called

ins and outs

glycolysis	in - 1 glucose, 2 NAD, 2 ATP, 4 ADP
	out - 2 pyruvate, 2 NADH, 2 ATP (two consumed in phase one, four produced in phase two)
pyruvate oxidation	in - 1 pyruvate, 1 NAD
	out - 1 acetyl-CoA, 1 NADH, 1 CO_2
krebs/citric acid cycle	in - 1 acetyl-CoA, 3 NAD, 1 FADH, 1 ADP
	out - 1 CoA (acetyl-CoA -> citric acid -> oxaloacetate; oxaloacetate reacts with another acetyl-CoA to form citric acid and repeat cycle), 3 NADH, 1 FADH, 1 ATP, 2 H_2O, 1 CO_2

for pyruvate oxidation and krebs cycle, the total number of products should be multiplied by two in order to calculate the number of products per glucose molecules because each process occurs once for each pyruvate formed in glycolysis

ATP structure

general reactions in CR

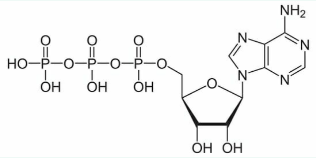
glycolysis	phosphorylation	phosphate group is transferred
	isomerization	molecule is structurally rearranged
	redox	oxidation/reduction
	lysis/cleavage	molecule is split into two
krebs cycle	phosphorylation	
	isomerization	
	redox	
	decarboxylation	carboxyl group is removed from molecule; CO_2 is produced

in glycolysis and krebs cycle, the type of phosphorylation that occurs is **substrate-level**. substrate-level phosphorylation occurs when a phosphate group is directly transferred from a substrate to another molecule. the other kind of phosphorylation, i.e. oxidative phosphorylation, is when a series of redox reactions leads to a final electron acceptor. this mode of phosphorylation occurs in the electron transportation.

electron transport chain

electron transport chain (cont)

	FAD(H_2): FAD is reduced to $FADH_2$ in previous stages of CR; delivers electrons to complex 2
	UQ (ubiquinone): shuttles electrons from complexes 1 & 2 to complex 3
	Cyt-c (cytochrome-c): shuttles electrons from complex 3 to 4
notes	$FADH_2$ bypasses protein complex 1 because the electrons exist on an energy level that is too low for complex 1 to pick up on
	energy from electrons is used to drive protein complexes; complexes pump hydrogen ions into the intermembrane space
	ATP synthase enzyme pumps one hydrogen ion back into the matrix to synthesize ATP (combines ADP and inorganic phosphate)



ATP consists of three phosphate groups, a five carbon sugar, and a nitrogenous base. The nature of this molecule is very unstable due to the negative charge of the three phosphate groups; the phosphates naturally want to break away from each other. When ATP is consumed for energy, the bond between the second and third phosphate are broken. This energy can then be used to power other (endergonic) reactions within the cell.

objective	create a proton gradient by moving hydrogen ions from the mitochondrial matrix to the intermembrane space to drive ATP synthesis
protein complexes	four protein complexes
	complex 3 collects electrons from complexes 1 & 2; complex 4 collects electrons from complex 3
electron shuttles	NAD(H): NAD is reduced to NADH in previous stages of CR; delivers electrons to complex 1 & 2