

Selected answers to homework problems.

Chapter 21

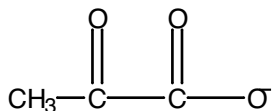
49.

- oxidations occur in the steps where NAD⁺ and FAD are reduced (steps 3, 4, 6, and 8)
- Decarboxylations occur in steps 3 and 4.
- A hydration occurs in step 7

53. One complete citric acid cycle produces four reduced coenzymes, which enter the electron transfer chain and ultimately generate ATP.

Chapter 23

31. Pyruvate is the final product of glycolysis. NADH and ATP are also formed in the final reaction.



68. Pyruvate can cross the mitochondrial membrane because it is the only molecule in glycolysis that is not a phosphate. Phosphates cannot cross the mitochondrial membrane.

Chapter 25

21. Eight molecules of ATP are formed in the catabolism of glycerol to yield acetyl SCoA —the 5.5 mentioned in problem 25.21 and additional 2.5 in the conversion of pyruvate to acetyl SCoA. A maximum of 18 molecules of ATP are released in the complete catabolism of glycerol to CO₂ and H₂O —the 8 molecules mentioned above and an additional 10 molecules for when acetyl SCoA is degraded in the citric-acid cycle.

37. Since β oxidation is an energetically favorable reaction, its exact reverse is energetically unfavorable and thus doesn't occur.

39. Fatty acids have an even number of carbons because they are synthesized from a starting material acetyl-SCoA that has an even number of carbons.

41. Each cycle of lipogenesis uses two NADPH molecules. For the synthesis of palmitic acid, which requires 7 cycles of lipogenesis, 14 molecules of NADPH are needed.

Chapter 27

13. The body's amino-acid pool, which is the collection of free amino acids that result from diet or tissue breakdown, occurs throughout the body.