MCB 102 Citric Acid Cycle Worksheet Answer Key
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1. Which of the following is *not* true of the reaction catalyzed by the pyruvate dehydrogenase complex?
A) Biotin participates in the decarboxylation. *
B) Both NAD^+ and a flavin nucleotide act as electron carriers.
C) The reaction occurs in the mitochondrial matrix.
D) The substrate is held by the lipoyl-lysine "swinging arm."
E) Two different cofactors containing —SH groups participate.

2. Glucose labeled with ^{14}C in C-3 and C-4 is completely converted to acetyl-CoA via glycolysis and the pyruvate dehydrogenase complex. What percentage of the acetyl-CoA molecules formed will be labeled with ^{14}C, and in which position of the acetyl moiety will the ^{14}C label be found?
A) 100% of the acetyl-CoA will be labeled at C-1 (carboxyl).
B) 100% of the acetyl-CoA will be labeled at C-2.
C) 50% of the acetyl-CoA will be labeled, all at C-2 (methyl).
D) No label will be found in the acetyl-CoA molecules. *
E) Not enough information is given to answer this question.

3. Which of the following is *not* true of the citric acid cycle?
A) All enzymes of the cycle are located in the cytoplasm, except succinate dehydrogenase, which is bound to the inner mitochondrial membrane. *
B) In the presence of malonate, one would expect succinate to accumulate.
C) Oxaloacetate is used as a substrate but is not consumed in the cycle.
D) Succinate dehydrogenase channels electrons directly into the electron transfer chain.
E) The condensing enzyme is subject to allosteric regulation by ATP and NADH.

4. Malonate is a competitive inhibitor of succinate dehydrogenase. If malonate is added to a mitochondrial preparation that is oxidizing pyruvate as a substrate, which of the following compounds would you expect to decrease in concentration?
A) Citrate
B) Fumarate *
C) Isocitrate
D) Pyruvate
E) Succinate

5. Oxaloacetate uniformly labeled with ^{14}C (i.e., with equal amounts of ^{14}C in each of its carbon atoms) is condensed with unlabeled acetyl-CoA. After a single pass through the citric acid cycle back to oxaloacetate, what fraction of the original radioactivity will be found in the oxaloacetate?
A) all
B) 1/2 *
C) 1/3
D) 1/4
E) ¾

6. Conversion of 1 mol of acetyl-CoA to 2 mol of CO_2 and CoA via the citric acid cycle results in the net production of: