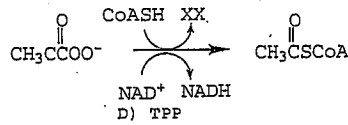


NAME _____

- Which of the following anatomical sites provides digestive enzymes for carbohydrate digestion?
A) gastric mucosa B) hepatic portal vein C) intestinal lumen D) liver E) pancreas
- Which of the following sets of glycosidic linkages must be hydrolyzed to insure the digestion of starch?
A) α 1-4 and α 1-6 B) β 1-4 and α 1-6 C) α 1- β 2 and β 1-4 D) α 1- α 1 and α 1-4
E) α 1-4 and β 1-4
- An ATP molecule consists of a pentose, three phosphate groups, and a _____.
A) molecule of adenine B) 1-4 glycosidic linkage C) molecule of nicotinamide
D) pair of reducing equivalents E) molecule of cytosine
- The second stage of glycolysis starts with the metabolite _____.
A) glyceraldehyde-3-P B) P-6-P C) 1,3 bisphosphoglycerate D) lactate E) NAD^+
- If glucose is the starting material for the glycolytic pathway, the ratio of ATP (net) produced to lactate generated is _____. NOTE: millimoles of ATP(net):millimoles lactate = ?
A) 4:2 B) 2:4 C) 1:2 D) 3:2 E) 1:1
- What is the net ATP production as one millimole of glyceraldehyde-3-P is catabolized to lactate?
A) 3 B) 1 C) 0 D) 2 E) 4
- If the glycolytic pathway is used to catabolize G-6-P, and enough G-6-P is used to produce 48 millimoles of lactate, then _____ millimoles of ATP (net) must have resulted and the system must have started with _____ millimoles of G-6-P.
A) 48 -- 48 B) 24 -- 24 C) 72 -- 48 D) 72 -- 24 E) 72 -- 16
- Early in the second stage of glycolysis, the substance NADH is produced when glyceraldehyde-3-P is oxidized and phosphorylated to 1,3 BPG. The NADH in question is subsequently converted to NAD^+ using _____ as a(n) _____ agent.
A) pyruvate -- oxidizing B) 1,3 BPG -- oxidizing C) pyruvate -- reducing
D) lactate -- reducing E) lactate -- oxidizing
- Which of the following sets of reagents represents the collection of very high energy phosphate compounds used by the glycolytic pathway to fuel the substrate level phosphorylation which provides the ATP output for the pathway?
A) pyruvate -- glyceraldehyde-3-P B) glyceraldehyde-3-P -- 1,3 bisphosphoglycerate
C) dihydroxyacetone-P -- 1,3 bisphosphoglycerate D) dihydroxyacetone-P -- phosphoenolpyruvate
E) 1,3 bisphosphoglycerate -- phosphoenolpyruvate
- If the agent 'Y-P' has a free energy of hydrolysis equal to -73 kJ ($\text{Y-P} + \text{H}_2\text{O} \rightarrow \text{Y} + \text{P}_i$; $\Delta G^\circ = -73$ kJ), estimate the value of ΔG° for the process: $\text{Y-P} + \text{ADP} \rightarrow \text{ATP} + \text{Y}$.
A) +42 kJ B) -31 kJ C) -42 kJ D) +104 kJ E) -104 kJ
- Which of the following is regarded as the major allosteric inhibitor of the glycolytic pathway?
A) ADP B) AMP C) lactate D) ATP E) phosphofructokinase
- When skeletal muscle cells are contracting, the equilibrium: $\text{ADP} + \text{ATP} \rightarrow \text{ATP} + \text{AMP}$; is forced to the _____ due to an excess of the reagent _____ in the cell.
A) left -- ADP B) right -- AMP C) left -- ATP D) right -- ATP E) right -- ADP
- Which of the following sets of products result from the oxidation of G-6-P via the hexose monophosphate shunt?
A) glyceraldehyde-3-P -- F-1,6-P B) NADP^+ and ATP C) ribulose-5-P and CO_2
D) NADP^+ and NADPH E) ribulose-5-P and F-1,6-P
- After the oxidation steps in the 'shunt', the resulting carbohydrates are made compatible with glycolysis by converting them into _____.
A) hexoses and trioses B) pentoses and trioses C) reducing agents and ATP
D) oxidizing agents and CO_2 E) lactate and pyruvate
- Every time the TCA cycle completes the loop from citrate to oxaloacetate, the process generates _____.
A) one millimole of G-6-P B) two millimoles of malate C) two millimoles of CO_2
D) one millimole of pyruvate E) one millimole of acetyl CoA
- The TCA Cycle is regarded as _____ and takes place in the cellular _____.
A) aerobic -- cytoplasm B) aerobic -- endoplasmic reticulum C) aerobic -- mitochondrion
D) anaerobic -- cytoplasm E) anaerobic -- mitochondrion
- Which of the following TCA Cycle metabolites acts as a reducing agent to convert NAD^+ into NADH ?
A) citrate B) malate C) fumarate D) succinate E) oxaloacetate
- If four millimoles of acetyl CoA are processed by the TCA Cycle, one could expect to produce _____ millimoles of CO_2 and _____ millimoles of ATP.
A) 2 -- 12 B) 4 -- 72 C) 8 -- 48 D) 8 -- 36 E) 4 -- 36
- Which of the following sets of metabolic pathways are interfaced by the group of reactions referred to as the pyruvate dehydrogenase enzyme system?
A) the shunt and glycolysis B) the shunt and the TCA Cycle C) glycolysis and glycogenesis
D) the TCA Cycle and the electron transport system E) glycolysis and the TCA Cycle

20. Identify the agent 'XX' which appears in the reaction at the right.



- A) FADH_2 B) ATP C) UDP D) TPP E) CO_2
21. A carbohydrate which is derived from a glycogen polymer will enter the glycolytic pathway in the form of _____
 A) glyceraldehyde-3-P B) F-6-P C) G-6-P D) acetyl CoA E) pyruvate
22. Which of the following sets of cellular sites is considered to represent the location of significant amounts of glycogen.
 A) adipocytes and skeletal muscle cells B) skeletal muscle cells and red blood cells
 C) brain and red blood cells D) hepatocytes and skeletal muscle cells E) hepatocytes and brain
23. The primary site for the catabolism of fructose is _____ and the carbon atoms from fructose enter the glycolytic pathway in the form of _____.
 A) liver -- glyceraldehyde-3-P B) skeletal muscle -- F-6-P C) red blood cells -- F-1-P
 D) liver -- F-6-P E) hepatic portal vein -- G-6-P
24. A failure of the enzyme aldolase, which inhibits the reaction: F-1-P \rightarrow glyceraldehyde + dihydroxyacetone; causes an intracellular shortage of _____, because of the increase in the concentration of F-1-P within the cell.
 A) glyceraldehyde-3-P B) ADP C) ATP D) fructokinase E) F-6-P
25. A study of the kinetic control points in the overall catabolism of glucose to CO_2 indicates that as [ATP] increases in a cellular environment, the concentration of _____ tends to increase.
 A) acetyl CoA B) oxaloacetate C) lactate D) G-6-P E) pyruvate

M A T C H I N G

THE ITEMS 26-30 REFER TO THE LIST AT THE RIGHT. THERE IS ONLY ONE CORRECT ANSWER FOR EACH ITEM 26-30, BUT A GIVEN RESPONSE FROM THE LIST AT THE RIGHT MAY BE USED MORE THAN ONCE.

26. Acetyl CoA reacts with this substance to start the TCA Cycle.
 A) Dihydroxyacetone-P
 B) Ribose
 C) Lactate
 D) Citrate
 E) CO_2
27. The energy for substrate-level phosphorylation can be supplied by this substance.
 AB) Isocitrate dehydrogenase
 AC) Glycerol-P
 AD) Acetyl CoA
 AE) Phosphoenolpyruvate
28. The TCA Cycle is kinetically regulated by this enzyme.
 BC) FAD
 BD) Oxaloacetate
 BE) α -ketoglyutarate
 CD) Aldolase
 CE) ATP
 DE) Pyruvate dehydrogenase
29. This substance is a component of nucleotides.
 ABC) Malate
30. When glucose is oxidized by the 'shunt', this product is obtained.

T R U E - - - F A L S E
 (A) (B)

31. When glucose is oxidized under anaerobic conditions, cells make the same number of millimoles of lactate as they make millimoles of ATP.
32. Riboflavin, a B-complex vitamin, is a component of the substance NADPH.
33. Due a lack of mitochondria, red blood cells rarely produce lactate as they catabolize glucose.
34. Most of the reactions associated with the digestion of carbohydrates take place in the stomach.
35. The reactions of the pyruvate dehydrogenase system accomplish the decarboxylation of pyruvate.

5
 1-E 2-A 3-A 4-A 5-E 6-D 7-D 8-A 9-E 10-C 11-D 12-E 13-C 14-A 15-C 16-C 17-B 18-C 19-E 20-E
 24-C 25-D 26-BD 27-AE 28-AB 29-B 30-E 31-A 32-B 33-B 34-B 35-A