Good Evening, Most Excellent Metabolites

For all questions, choose the single BEST answer from those offered, and enter it onto the appropriate space on the scantron sheet.

You must use a number 2 pencil to get the machine to register your answer. So this time, it’s no pencil, no grade.

On the provided scantron sheet, make sure to bubble in your NAME and your ID # in the appropriate places.

How to fill in your ID #: ONLY USE the NUMBERS, not the letter. Just drop the letter. So eight numerical digits, entered and bubbled. Start in the first slot of the “IDENTIFICATION NO.” slot (which unfortunately is labeled “A”) and use just the numbers. So for example, if your ID # is B12345678, you would enter it like this:

<table>
<thead>
<tr>
<th>A</th>
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<td>1</td>
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</tbody>
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Get it? Just the numbers, starting in column A. Then bubble away!!

You will keep this question sheet after the exam. Use it to know your final score as follows:

Write your final answer beside each question first, and only then enter the correct bubbled-in position on the scantron sheet. When you take the test home, you will have a record of your answers, and be able to see how you did by checking the key on the website.

By the time you get home, the answer key will be posted.

Post test input ("pregrades"): In want your input. You have until tomorrow at 8am to email me (rhampton@ucsd.edu) any issues you have with questions. Like a question you think has more than one valid answer, or a question that seems unfair, unclear, etc.

If I think you have a valid point, I could change the key to improve the test. No guarantees, but I have done it before.

Good luck! Have a fantastic Summer! Eat more plants, less manufactured food, and get some endurance exercise goin’ on! Also, don’t run a half marathon a few hours after fracturing your toe…
1. The pentose phosphate pathway
   A) reduced glucose at the 6 carbon
   B) oxidizes glucose at the 6 carbon
   C) reduces NADH
   D) generates NADPH as a product

2. Complex I:
   A) consumes NADPH
   B) consumes NADH
   C) donates electrons to succinate
   D) produces ubiquinone

3. Lipoic acid
   A) will carry an acetyl group
   B) will accept electrons
   C) will accept electrons and carry an acetyl group
   D) will covalently react with pyruvate

4. Molecules C, B, and A, have reduction potentials of -0.33, -0.02 and +0.22 electron volts, respectively, in the cell. If they are involved in a set of sequential reactions that allow electrons to be passed from one to the next, which order delivers the most energy?
   A) electrons are passed from B to C, then from C to A
   B) electrons are passed from A to B, then from B to C
   C) electrons are passed from C to B, then from B to A
   D) electrons are passed from A to C, then from C to B

5. UDP-glucose
   A) is a substrate of glycogen synthase
   B) is a substrate of glycogen phosphorylase
   C) is a substrate in the Calvin cycle
   D) accepts electrons during the Krebs cycle

6. Inorganic phosphate ion
   A) is a substrate of glycogen synthase
   B) is a substrate of glycogen phosphorylase
   C) is a substrate of RUBISCO
   D) accepts electrons during the Krebs cycle

7. Which anapleurotic enzyme includes oxaloacetate as a product?
   A) malic enzyme
   B) pyruvate kinase
   C) PEP kinase
   D) pyruvate carboxylase
8. The $F_1$ subunit of the ATP synthase
A) is reduced by electrons as they reach the end of the respiratory chain
B) binds both ADP and ATP
C) is found in the intermembrane space of the mitochondrion
D) transports protons across the membrane

9. Isocitrate lyase and malate synthase are enzymes that allow the synthesis of glucose from fatty acids. In what biochemical process do they function?
A) the Cori cycle
B) the malate-aspartate cycle
C) the glyoxalate cycle
D) the Krebs cycle

10. The alpha ketoglutarate dehydrogenase complex
A) is found in the cytosol of mammalian cells
B) uses PLP to convert pyruvate into alanine
C) uses TPP, lipoic acid, FAD, and NAD$^+$ as cofactors
D) does not function in absence of oxygen

11. Which enzyme is $\alpha$-ketoglutarate dehydrogenase most like?
A) malate dehydrogenase
B) triose phosphate isomerase
C) glucose-6-phosphate dehydrogenase
D) pyruvate dehydrogenase

12. The cofactor TPP
A) activates CO$_2$ for a number of transfer reactions
B) functions in moving amino groups from one molecule to another
C) interacts with H$^+$ ions to allow cleavage of peptide bonds
D) forms a covalent intermediate with carbonyl carbons

13. The pictured structure is part of what cofactor
A) biotin
B) PLP
C) CoA-SH
D) cobalamin

14. What molecule includes this structural motif?
A) NAD$^+$
B) NADP$^+$
C) both
D) neither
15. Which gluconeogenic step requires an enzyme not used in glycolysis?
   A) conversion of fructose-6-phosphate to glucose-6-phosphate
   B) conversion of 2-phosphoglycerate to 3-phosphoglycerate
   C) conversion of 1,3 bPG and NADH to G3P, phosphate, and NAD+
   D) conversion of fructose 1,6 bisphosphate to fructose 6 phosphate

16. If you knew $\Delta G^\circ$ for a reaction, what do you need to calculate the $\Delta G$ for the actual conditions in which the reaction is occurring?
   A) You need the concentrations of all reactants and products
   B) You need $\Delta G^\circ$, the activation energy, as well
   C) You need to know the Km and Vmax for the enzyme involved
   D) The $\Delta G^\circ$ is the activation energy and does not pertain to the reaction's $\Delta G$

17. Km is a measure of
   A) how tightly a ligand binds to a protein
   B) how easily an enzyme is saturated with a substrate
   C) an enzyme's maximum rate of catalysis
   D) how specific an enzyme is for its substrate

18. If the activation energy of a reaction decreases by 6kJ/mole
   A) the reaction will be accelerated by a factor of $e^{6/RT}$
   B) The $\Delta G$ will be decreased by 6kJ/mole
   C) the reaction will be slowed by a factor of $e^{6/RT}$
   D) the reaction will be accelerated by a factor of 6/RT

19. An enzyme is added to a beaker of substrate and product. The enzyme accelerates the forward reaction rate by a factor of $10^7$. What else occurs in the beaker with the added enzyme?
   A) The equilibrium constant is changed to favor higher substrate concentrations
   B) The equilibrium constant is changed to favor higher product concentrations
   C) The reverse reaction is slowed by a factor of $10^7$
   D) The reverse reaction is increased by a factor of $10^7$

20. An enzyme has a Km of 10 micromolar. At what substrate concentration $[S]$ is the rate $\frac{3}{4}$ of saturation?
   A) When $[S]$= 10 micromolar
   B) When $[S]$= 20 micromolar
   C) When $[S]$= 30 micromolar
   D) When $[S]$= 0.75 x Km
21. The picture shown is a Lineweaver-Burke plot for enzymes A and B. Which statement is the most accurate?
A) B has a smaller Vmax than A
B) B has a bigger Vmax than A
C) A and B have the same Vmax
D) A and B have the same Km

22-27 An Eight Step Program
The following questions are about the Krebs cycle depicted in the picture, from Garland Press. The STEPS each represent an enzyme. The metabolites (products and substrates) are simply depicted by carbon number.

22. What is the 5C product in step 3?
A) oxaloacetate
B) succinate
C) succinyl-CoA
D) α-ketoglutarate

23. Which step produces a C=C double bond?
A) STEP 5
B) STEP 6
C) STEP 1
D) STEP 5 and 8

24. Which steps make it impossible for the Krebs cycle to produce glucose from acetyl CoA?
A) STEPS 6 and 7
B) STEPS 5 and 6
C) STEPS 1 and 2
D) STEPS 3 and 4

25. Which molecule is also produced by pyruvate carboxylase
A) the product of STEP 8
B) the product of STEP 5
C) the product of STEP 1
D) none, pyruvate carboxylase is a glycolytic enzyme
26. Which reaction produces free CoA?
A) STEP 1
B) STEP 5
C) STEP 4
D) STEPS 1 and 5

27. Which reaction produces a metabolite that provides carbon for fatty acid and cholesterol synthesis?
A) STEP 8
B) STEP 5
C) STEP 1
D) STEP 7

28. Which reaction has an optically active tricarboxylic acid product?
A) STEP 1
B) STEP 2
C) STEP 1 and 2
D) STEP 1, 2 and 7

End of “Eight Step Program” section

29. Which is a reaction of fermentation
A) formation of NAD+ by converting DHAP into 3-phosphoglycerate
B) formation of NADP+ from pyruvate
C) formation of ethanol from pyruvate
D) formation of AcCoA from pyruvate

30. Which metabolic reaction occurs in the cytosol
A) production of GTP during oxidation of α-ketoglutarate
B) reduction of cytochrome c by complex III
C) production of NADH during fatty acid oxidation
D) production of NADPH from glucose oxidation

31. Thermogenin
A) is a protein that moves protons across the mitochondrial inner membrane
B) improves the efficiency of ATP synthesis in newborns and hibernating bears
C) is a drug that moves protons across the mitochondrial inner membrane
D) stops the respiratory chain by blocking ATP synthase
32. An inhibitor of complex II would
A) shut down the electron transport chain
B) stop the consumption of NADH by the electron transport chain
C) still allow consumption of NADH by the electron transport chain
D) still allow the conversion of succinate into fumarate

33. A yeast cell with a null mutation in triose phosphate isomerase (TPI) would
A) Not undergo glycolysis and not undergo gluconeogenesis
B) Be unable to regulate glycolysis, but would still regulate gluconeogenesis
C) Not undergo gluconeogenesis, but would undergo glycolysis (because impaired glycolysis would still go on, as students pointed out. Nice!)
D) Be unable to regulate glycolysis and unable to regulate gluconeogenesis

34. Cytochrome c oxidase
A) plays a role in respiration
B) plays a role in cell death
C) plays a role in photosynthesis
D) plays a role in fat synthesis

35. When fructose 2,6 bisphosphate is elevated
A) glycolysis is slowed
B) gluconeogenesis is hastened
C) glycolysis is hastened and gluconeogenesis is slowed
D) glycolysis is slowed and gluconeogenesis is hastened

36. The Cori cycle
A) is the cycle that puts CO2 into plant anabolism
B) is one way that gluconeogenesis is involved in metabolism
C) involved breakdown of glucose from the muscle in the liver
D) is when ketone bodies cycle between the liver where they are made and the muscle where they are consumed.

37. In the Calvin cycle, ribulose 1,5 bisphosphate is produced
A) by the direct action of RUBISCO
B) from glyceraldehyde-3-phosphate by transaldolases and transketolases
C) during glucose synthesis from lactate provided by muscle cells
D) by decarboxylation of glucose

38. What enzyme is missing in muscle but present in liver?
A) Glycogen phosphorylase
B) Glycogen synthase
C) Phosphoglucomutase
D) Glucose 6-phosphatase
39-42. Thrift Shop Question! (recycled). The graph from the 2009 final shows an experiment where isolated mitochondria are measured for \( O_2 \) consumption and ATP production. Each arrow indicates the addition of the indicated substance to the reaction mix. Answer the following questions about the graph:

39. Succinate provides
A) phosphate groups for ATP
B) electrons transferred to Q
C) carbon for glucose
D) electrons transferred to NAD+

40. If the succinate and the ADP were added in the opposite order
A) both line slopes would increase when the succinate was added
B) both lines would go up only after ADP addition
C) only the thin line would go up upon succinate addition
D) only the thick line would go up upon succinate addition

41. What is the best description of X's effect (see picture on last page)
A) both \( H_2O \) production and ATP production are blocked
B) only \( H_2O \) production is blocked
C) The consumption of \( O_2 \) is blocked
D) \( H_2O \) production continues but ATP production ceases

42. As you may recall, X is a weak organic acid. What does this agent do in this experiment?
A) It blocks the ATP synthase Fo subunit in the inner membrane
B) It inhibits complex II from accepting electrons
C) It causes H\(^+\) ions to cross the inner membrane
D) It blocks ADP binding in the F1 ATPase

End of “Thrift Shop Question” section

43. Glucagon stimulates the liver to
A) increase glycogen synthesis
B) increase gluconeogenesis
C) increase glycolysis
D) both A and B

Take a breath (\( O_2 \) in, \( CO_2 \) out)
44. A molecule of pyruvate is labeled on the -CH₃ methyl carbon (the #3 carbon, the "Ch" of Ch-Co-Co) with ¹⁴C. This labeled molecule is metabolized by the PDH, and then enters the Krebs cycle. What is the structure of the resulting Krebs cycle molecule that is produced during the first turn of the cycle? All or no answer accepted due to arrow being in the wrong place! The correct answer would have been B but with the arrow shifted one to the left….grrrrr

45. The pictured molecule on the right
A) is a glycolytic pathway intermediate
B) is fructose 2,6 bisphosphate, the regulatory molecule
C) is a pentose phosphate pathway intermediate
D) is an intermediate of the Calvin cycle

46. The cytochrome b₆f complex of photosystem II
A) Is most like complex I
B) Is most like complex II
C) Is most like complex III
D) Is most like ATP synthetase

47. In photosynthesis, Mn²⁺ ion is most directly involved in
A) reduction of water
B) oxidation of water
C) reduction of NADP⁺
D) oxidation of NADPH

48. What is the strategy used by C₄ plants in carbon fixation
A) They have a separate cellular compartment for generation of CO₂
B) they bypass the use of RUBISCO to avoid cross reactions with oxygen
C) they use an altered version of RUBISCO that is less reactive with O$_2$
D) they use leghemoglobin to scavenge excess O$_2$

49. **Glucagon in the blood increases**
   A) when glucose levels increase
   B) **when glucose levels decrease**
   C) when insulin is released
   D) when fatty acids enter the bloodstream

50. **The liver can not make glucose from:**
   A) fatty acids
   B) glycerol
   C) alanine
   D) lactate

51. **Insulin does NOT**
   A) decrease the activity of glycogen synthase
   B) decrease the activity of the gluconeogenic pathway
   C) increase levels of fructose 2,6 bisphosphate
   D) increase activity of glycogen synthase

52. **Which is true about tissue-specific removal of insulin receptors discussed in class:**
   A) removal of muscle insulin receptors caused diabetes
   B) removal of liver insulin receptors had no effect
   C) removal of brain insulin receptors caused obesity
   D) removal of adipocyte insulin receptors had no effect

53. **What is the first blood-born carrier of fatty acid molecules that have been taken up by the gut?**
   A) LDL
   B) VLDL
   C) HDL
   D) chylomicrons (misspelled as chlomicrons…)

54. **Carnitine is used in metabolism**
   A) in muscle as an acceptor of active phosphate
   B) **to transport fatty acids across a membrane**
   C) in the synthesis of fatty acids
   D) as a cofactor in glycolysis.

55. **Creatine is used in metabolism**
   A) **in muscle as an acceptor of active phosphate**
   B) to transport fatty acids across a membrane
   C) in the synthesis of fatty acids
56. Triglycerides consumed when eating Carl's Jr's "Sloppy-is-the-New-Cool" Bacon Burgers:
   A) are absorbed directly from the gut and distributed to cells for use
   B) are directly synthesized into phospholipids in the intestinal epithelium
   C) are converted into new triglycerides in the gut
   D) are transported to the liver and converted into new triglycerides

57. Malonyl-CoA is produced
   A) during odd carbon number fatty acid metabolism
   B) during fatty acid synthesis
   C) during ketone bodies synthesis
   D) during the Krebs cycle

58. Ibuprophen and aspirin
   A) inhibit O2 dependent synthesis of bioactive lipids
   B) block the synthesis of fatty acids
   C) decrease the action of the F1 ATPase slowing the respiratory chain
   D) increase uptake of bacterial products by macrophages

59. Citrate lyase
   A) functions in synthesis of cholesterol and fatty acids
   B) functions in the synthesis of fatty acids
   C) functions in the synthesis of cholesterol
   D) functions in the Krebs cycle

60. Citrate lyase
   A) consumes acetyl-CoA and oxaloacetate in the matrix
   B) produces acetyl-CoA and oxaloacetate in the cytosol
   C) is inhibited by statins for lowering blood cholesterol
   D) is an enzyme of the glycoxylate cycle

61. The statins block an enzyme that
   A) functions in the synthesis of fatty acids
   B) functions in the Krebs cycle
   C) functions in synthesis of cholesterol and fatty acids
   D) functions in the synthesis of cholesterol

62. Acetyl-CoA carboxylase
   A) functions in the synthesis of fatty acids
   B) functions in the synthesis of cholesterol
   C) functions in synthesis of cholesterol and fatty acids
   D) functions in the Krebs cycle
63. For what biochemical process is the enzyme isocitrate lyase required?
A) net synthesis of glucose from acetate
B) generating AcCoA in the cytosol
C) the Krebs cycle
D) formation of amino acids from α-keto acids

64. The best description of one cycle of fatty acid synthesis is:
A) reduction with NADH, removal of H₂O, reduction with NADH
B) oxidation with NAD⁺, addition of H₂O, oxidation with NAD⁺
C) reduction with NADPH, reduction with NADPH, removal of water
D) reduction with NADPH, removal of H₂O, reduction with NADPH

65. An acetyl group with the carbonyl carbon labeled with ¹⁴C is used in the final reaction cycle during synthesis of palmitic acid (16 carbons long). Which carbon is labeled in the final product? (Fatty acids are numbered with the carboxyl group being number 1).
A) carbon number 15
B) carbon number 16
C) carbon number 1
D) carbon number 2

66. Ketone body synthesis
A) occurs during anabolic states, like right after a meal, due to insulin
B) occurs when Ac-CoA production is high and Krebs cycle activity is low
C) is inhibited by the statin drugs
D) is caused by excessive glycolysis when Krebs cycle activity is low

67. What is this molecule?
A) a saturated diglyceride
B) a phospholipid
C) a diglyceride
D) an unsaturated triglyceride

68. Double bond formation in fatty acids
A) occurs in mammals and plants
B) only occurs in mammals
C) only occurs in plants
D) includes both cis and trans double bonds

69. What is this molecule:
A) one of the molecules called a ketone body
B) an intermediate in cholesterol synthesis
C) a molecule made in the Krebs cycle
70. **What is the correct order of intermediates that appear in the cholesterol synthetic pathway**
   A) squalene, mevalonate, AcCoA, cholesterol
   B) AcCoA, squalene, mevalonate, cholesterol
   C) malonyl-Coa, mevalonate, squalene, cholesterol
   D) AcCoA, mevalonate, squalene, cholesterol

71. **Malonyl-CoA**
   A) is an intermediate in ketone body synthesis
   B) **is made in the synthesis of fatty acids**
   C) is an intermediate in odd number carbon fatty acid oxidation
   D) is an intermediate in the pathway of cholesterol synthesis

72. **Glycerol and fatty acids result from hydrolysis of triglycerides when bears hibernate. Which is true about these two products in bears:**
   A) Glucose can be made from either
   B) Glucose can be made from fatty acids but not glycerol
   C) Glucose can be made from neither
   D) **Glucose can be made from glycerol but not fatty acids**

73. **The Ahlborg et al. (6 men on a bike) study about people doing low-intensity exercise for 4 hours. Which of the following was observed in that experiment.**
   A) Glucagon levels went down several fold during exercise
   B) The muscles continuously increased their usage of blood glucose during the exercise time
   C) **Glucagon went up several fold during exercise**
   D) Gluconeogenesis stayed steady during the exercise trial

74. **The annamox bacteria we discussed in class**
   A) live in legume roots and convert N₂ into NH₃
   B) generate hydrogen during photosynthesis
   C) live in legumes and convert NH₃ into N₂
   D) **generate hydrazine (NH₂-NH₂) from ammonia**

75. **Which metabolic reaction is involved with carrying electrons from the cytosol to the matrix:**
   A) oxidation of cytochrome c by complex IV
   B) oxidation of QH₂ by complex III
   C) oxidation of succinate to fumarate
   D) **transamination between asparate and α ketoglutarate**

76. **In people, excess nitrogen is excreted**
   A) as ammonia
77. In urea produced biochemically, the 2 nitrogen atoms
   A) both come from carbamoyl phosphate
   B) both come from ammonia
   C) come from ornithine and carbamoylphosphate
   D) come from ammonia and aspartate

78. The C in urea (pictured to the right) comes from:
   A) arginine
   B) aspartate
   C) pyruvate
   D) carbonate

79. The urea or ornithine cycle
   A) occurs in both the cytosol and the matrix
   B) occurs only in the cytosol
   C) occurs only in the mitochondrial matrix
   D) occurs in peroxisomes

80. Ornithine
   A) is most similar to the amino acid arginine
   B) most similar to the amino acid lysine
   C) is most similar to the amino acid aspartate
   D) is most similar to the amino acid histidine

81. The disease gout
   A) is due to a lack of xanthine oxidase
   B) is alleviated by activators of xanthine oxidase
   C) is alleviated by inhibitors of xanthine oxidase
   D) is a deficiency purine salvage

82. When comparing purine and pyrimidine synthesis
   A) the purine base is made as a free molecule and added to PRPP
   B) the pyrimidine base is assembled "upon the PRPP ring"
   C) the purine base is assembled on the PRPP ring
   D) two of the above are true

83. Glutamine synthetase (GS)
   A) is regulated by phosphorylation
   B) is involved in nitrogen anabolism and catabolism
   C) is involved in nitrogen catabolism
D) is involved in nitrogen anabolism

84. What enzyme transfers nitrogen from glutamine to diverse substrates?
   A) glutamine transcarbamoylase
   B) glutamate synthetase
   C) glutamine deaminase
   D) glutamine amidotransferase

85. Phenylketourea (PKU)
   A) is caused by defective synthesis of phenylalanine
   B) is caused by defective synthesis of multiple amino acids from phenylalanine
   C) is caused by defective catabolism of phenylalanine
   D) is caused by defective production of urea from amino acids

86. Ribonucleotide reductase
   A) methylates a pyrimidine to one found in DNA
   B) converts deoxynucleotides in nucleotides
   C) modifies messenger RNA by altering purines
   D) converts nucleotides into deoxynucleotides

87. PRPP is used
   A) in all three below
   B) in synthesis of purines
   C) in salvage of purines
   D) in synthesis of pyrimidines

88. The Ronald Evans experiments discussed in class show that PPARδ can
   A) change muscles to a more type II fiber character
   B) change muscles to a more type I fiber character
   C) make mice more prone to obesity because they catabolize more lipid
   D) both B and C

89. The studies we covered on C. elegans aging indicate:
   A) increased insulin signaling increases aging
   B) increased insulin signaling decreases aging
   C) decreased insulin signaling increases aging
   D) caloric intake causes aging through insulin signaling

90. C. elegans mutations that slow the electron transport chain
   A) increase mitochondrial activity
   B) increase aging rate
   C) increase lifespan
91. In C. elegans, decreasing eating rate
   A) will kill the worms
   B) causes production of more ROS
   C) causes an increase in lifespan
   D) causes a decrease in lifespan

92. Genetic and physiological studies of ageing indicate that
   A) diminished SIR2 activity appears to be correlated with longevity
   B) increased SIR2 activity appears to be correlated with longevity
   C) diminished SIR2 activity is a result of the ageing process
   D) increased SIR2 activity is a result of the ageing process

93. ROS such as O$_2^-$
   A) are a product of mitochondrial respiration
   B) are made in the cytosol and damage various molecules
   C) are made as a byproduct of mitochondrial respiration
   D) are made during photosynthesis

94. NEAT stands for
   A) No Eating Allowed Today
   B) Non-Exercise Activity Thermogenesis
   C) Non-Exercise Activity Training
   D) Nondirected Exercise And Thermogenesis

95. James “Get Up!” Levine’s study showed that NEAT is
   A) higher in comparable groups of people with lower BMIs
   B) A measure of the calories we burn due to exercise
   C) higher in comparable groups of people with higher BMIs
   D) affected by weight gain or loss

96. Type I fibers in muscle
   A) can not use lipids as fuel
   B) are most important in high intensity exercise
   C) have lower glycolytic capacity than other fibers
   D) have higher glycolytic capacity than other fibers

97. PPY and ghrelin
   A) are drugs that inhibit purine metabolism
   B) are peptides produced in the brain that control energy metabolism
   C) are peptides produced in the gut that both lower appetite
   D) are gut peptides with opposing effects on appetite
98. The Pima people of the Southwest US and Sonora, Mexico
   A) settled long ago in an environment where lipids were an abundant part of diet
   B) have a genetic predisposition for type I diabetes and obesity
   C) have a genetic predisposition for type II diabetes and obesity
   D) have genetically-caused hypertension that leads to diabetes

99. Type 1 and type 2 diabetes
   A) are similarly common in our population
   B) are caused by defects in insulin regulation of metabolism
   C) are caused by defective production of insulin
   D) are caused by poor muscle response to insulin

100-120 True that, False this!
   for each question, choose the best answer. Use bubble A for TRUE, B for FALSE

   _F__100.  RUBISCO uses biotin in its carboxylation reaction

   _F__101.  Leptin deficiency is the cause of most human obesity

   _T__102.  Gluconeogenesis and glycolysis are both cellular processes with negative ΔG’s

   _F__103.  Pyruvate (misspelled) dehydrogenase is used in the Cori cycle

   _F__104.  Citrate lyase (misspelled) is one of the glyoxalate cycle enzymes

   _T__105.  The catalytic triad mechanism includes formation of a covalent intermediate during peptide hydrolysis

   _T__106.  The F_o ATPase subunit transfers protons across the mitochondrial membrane

   _T__107.  The peroxisome produces peroxide when oxidizing fatty acids
108. The Krebs cycle employs oxygen as a substrate

109. Both insulin and glucagon alter fructose 2,6 bisphosphate to regulate glucose metabolism

110. The majority of muscle glycogen is not converted to free glucose

111. The majority of liver glycogen is converted into free glucose

112. Type II muscle fibers are more dependent on anaerobic metabolism than Type I fibers

113. The $k_{cat}$ is important in determining an enzymes maximum rate

114. NADPH is usually employed as a reducing agent in biochemical pathways

115. In normal, respiring cells, an inhibitor of ATP synthase would slow glycolysis

116. Galactose is metabolized in cells by altering its structure to allow entry into the glycolytic pathway

117. The inner mitochondrial membrane is impermeable to NADH

118. The conversion of glucose into fatty acids requires citrate synthase

119. PRPP is required for de novo synthesis of orotate, from which all pyrimidine bases are made.

120. The structure on the right is AcCoA

Have a great Summer!!!

1) May extreme bossness rule all your days
2) Please read Fast Food Nation
3) Thank you for not smoking

RH