BIOLOGY

BOOKS - TRUEMAN'S BIOLOGY (ENGLISH)

RESPIRATION IN PLANTS

Multiple Choice Questions

1. Respiration is

A. anabolic and exothermic

B. anabolic and endothermic

C. catabolic and endothermic

D. catabolic exothermic

Answer: D

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2. in the process of repiration in plants 180 gms of sugar plus 192 gms of oxygen produce

A. $132gCO_2 + 54gH_2O + 337k$ cal

B. $264gCO_2 + 108gH_2O + 686k$ cal

C. 528 g CO_2 + 216 g water+ 686 kcal

D. Large amount of CO_2 and energy

Answer: B

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3. When respiratory substrate is fat, respiration Is called

A. protoplasmic respiration

B. floating respiration

C. cellular respiration

D. dark respiration

Answer: B

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4. The efficiency of respiration is approximately

A. 45%

B. 50%

C. 90%

D. 30%

Answer: C

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5. Glyceraldehyde phosphate is oxidised in glycolysis. What is the fate of hydrogen atom and electron liberated. They cause

A. They reduce NAD^+

B. They oxidise NAD^+

C. They are transferred to Pyruvic acid

D. They are removed by FAD

Answer: A

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6. In the formation of Acetyl Co-A from pyruvic acid in mitochondria, pyruvic acid gets

A. oxidised

B. decarboxylated

C. both (1) and (2)

D. reduced and isomerised

Answer: C

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7. When a yeast produces wine, which is not formed ?

A. Acetaldehyde

B. Ethyl Alcohol

C. CO_2

D. Acetyl coenzymeA

Answer: D

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8. The net gain of glycolysis of one molecule of glucose is the formation of

A. 2NADH + H^+ + 4ATP+ 1 Pyruvic acid

B. 2NADH + H^+ + 2ATP+2 Pyruvic acid

C. SATP +2NADH + H^+ +2 Pyruvic acid

D. SATP+2NADH+H^+ + 2 Pyruvic acid +CO_2

Answer: B

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9. During photosynthesis oxygen in glucose comes from

A. $C_6H_{12}O_6$

B. O_2

C. CO_2

D. both (1) and (2)

Answer: B

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10. How many oxygen molecules are used in glycolysis of one molecule of glucose ?

A. $1/2$

B. 1

C. 0

D. 2

Answer: C

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11. Link between glycolysis, Krebs cycle and β-oxidation of fatty acid or carbohydrate and fat metabolism is

A. OAA

B. Cytochrome

C. Acetyl Co-A

D. Pyruvic acid

Answer: C

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12. When yeast ferments glucose, the products are:

A. (a) $C_2H_5OH + CO_2$ + Energy

B. (b) C_2H_5OH + Energy

C. (c) $CO_2 + H_2O$ + Energy

D. (d) $CH_3OH + H_2O$ + Energy

Answer: A

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13. Energy required to form glucose from pyruvate is equivalent to

A. 32 ATP

B. 16 ATP

C. 8 ATP

D. 4 ATP

Answer: C

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14. Which is formed through phosphorylation in glycolysis?

A. Fructose 1-6 Biphosphate

B. DHA-3- phosphate

C. Both are correct

D. Glyceraldehyde-3-phosphate

Answer: A

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15. Which step of glycolysis requires pyruvic kinase, Mg^{++}, K^{+} and ADP?

A. Conversion of PEP into pyruvic acid

B. Conversion of 3PGA into 2PGA

C. Cleavage of Fructose 1-6 Biphosphate

D. All of the above

Answer: A

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16. One molecule of glucose requires 2 ATP to get phosphorylated to form Fructose 1--6 Biphosphate in glycolysis. How many ATP are used in the same process if the substrate is fructose ?

A. 1

B. 2

C. 0

D. 4

Answer: B

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17. Amphibolic cycle that occurs only in aerobic condition is

A. EMP pathway

B. Glycolysis

C. Krebs' cycle

D. ETC

Answer: C

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18. During respiration, pyruvic acid is

A. broken to form a 2-carbon compound and CO_2

B. produced in Krebs' cycle

C. formed only if fat is used

D. produced only in aerobic condition

Answer: A

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19. Krebs' cycle starts with the formation of a six carbon compound by reaction between

A. OAA and puruvic acid

B. OAA and Acetyl Co- A

C. Pyruvic acid and Acetyl Co-A

D. OAA and citrate synthetase

Answer: B

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20. Aerobic glycolysis is _____ times efficient than anaerobic glycolysis

A. 2 times

B. 4 time

C. 10 times

D. 18 times

Answer: D

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21. Ratio of CO_2 produced in aerobic and anaerobic respiration is

A. $3:1$

B. $2:1$

C. $4:1$

D. $1:1$

Answer: A

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22. Each molecule of pyruvic acid entering the Kreb's cycle produces

A. 3

B. 2

C. 4

D. 6

Answer: A

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23. Number of ATP molecules which can be built on complete oxidation of pyruvic acid is

A. 38

B. 30

C. 8

D. 15

Answer: D

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24. How much energy is conserved as ATP per mole of O_2 reduced into H_2O ?

A. 36

B. 38

C. 6

D. 36 in eukaryotes and 38 in prokaryotes.

Answer: C

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25. Amount of energy available per mole of oxygen used in biological oxidation is

A. 150

B. 3600

C. 686

D. 114

Answer: D

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26. Flow of electons in ETS is

A. $Fe + + + \rightarrow Cu^{+} > Fe + +$

B. $Fe + + \rightarrow Fe + + +$

C. $Fe^{2+} \rightarrow Fe^{3+} \rightarrow Fe^{2+}$

D. 110

Answer: C

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27. Kreb's cycle was discovered by Krebs in pigeon muscles in 1940. Which step is called gateway step. Link reaction/transition reaction in respiration.

A. Glycolysis

B. Formation of acetyl Co-A

C. Citric acid formation

D. ETS Terminal oxidation

Answer: B

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28. In Kreb's cycle

A. Acetyl coenzyme A undergoes 4 oxidations and 2 decarboxylations

B. Pyruvic acid undergoes 4 oxidations and 2 decarboxylations

C. TCA undergoes 4 oxidations and 4 decarboxylations

D. OAA undergoes 4 oxidations and 2 decarboxylations

Answer: A

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29. Flow of electrons in ETS is $NADH + H^+ \left(NADPH + H^+\right) \rightarrow FMNFeS$ protein $CoQ \rightarrow cytb \rightarrow$ .At three steps ATP is formed (oxidative phosphorylation). Where does II ATP is formed?

A. Between $NADH_2$ and FMN

B. $Cytb$ and $Cytc_1$

C. $Cyta$ and $Cyta_3$

D. $FMN \rightarrow FeS$ protein

Answer: B

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30. For formation of ethanol, pyruvic acid is first changed to acetaldehyde by enzyme

A. decarboxylase

B. dehydrogenase

C. decarboxylase and dehydrogenase

D. oxidase and decarboxylase

Answer: C

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31. Oxidation of one molecule of glucose yields 38 mols of ATP in the proportion of

A. all the 38 mols in mitochondrion

B. 8 outside mitochondrion and 30 inside mitochondrion

C. two glycolysis and 36 inside the Kreb cycle

D. two outside and 36 inside the mitochondrion

Answer: B

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32. Inner mitochondrial membrane possesses enzymes

A. ATPase, succinate dehydrogenase cytochrome oxidase .

B. Malate dehydrogenase, citrate synthetase

C. Diphosphokinase and cyclase

D. citrate synthetase

Answer: A

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33. In electron transport system (ETS) which of the following cytochromes reacts with oxygen

A. cyt b

B. $cytc_1$

C. cyt a

D. $cyta_3$

Answer: D

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34. The molecule that regularly enters through the inner membrane of mitochondrion is

A. ATP

B. pyruvic acid

C. glucose

D. citric acid

Answer: B

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35. Cyt a_3 possesses

A. Fe and Cu

B. Fe

C. Mn

D. Fe, Mn + Cl

Answer: A

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36. Which of the following connects glycolysis to Krebs cycle ?

A. Substrate level phosphorylation

B. Photophosphorylation

C. $FADH_2$ formation

D. Both occur in matrix of mitochondria

Answer: A

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37. ETS in bacteria is found

A. cell membrane

B. cell wall

C. cytoplasm

D. mitochondrion

Answer: A

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38. In cell respiration, which does not involove EMP pathway?

A. Pyruvic acid into CO_2 and H_2O

B. Glucose into lactic acid

C. Glucose into CO_2 and H_2O

D. Glucose into alcohol

Answer: A

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39. Zymosis is also called

A. fermentation

B. action of zymogens

C. pasteurization

D. synapsis of chromosomes

Answer: A

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40. Correct sequence of events in Krebs' cycle is

A. Acetyl CoA $\rightarrow$ citrate $\rightarrow$ pyruvate a-ketoglutarate $\rightarrow$ succinate $\rightarrow$ malate $\rightarrow$ fumarate $\rightarrow$ OAA

B. Acetyl CoA $\rightarrow$ citric acid $\rightarrow$ a-keto-glutaric acid $\rightarrow$ succinic acid $\rightarrow$ fumaric acid $\rightarrow$ malic acid $\rightarrow$ OAA

C. Acetyl CoA $\rightarrow$ citric acid $\rightarrow$ malic acid $\rightarrow$ α-ketoglutaric acid $\rightarrow$ succinic acid $\rightarrow$ OAA

D. Pyruvic acid $\rightarrow$ Acetyl CoA $\rightarrow$ citrate $\rightarrow$ malate $\rightarrow$ fumarate

Answer: B

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41. RQ is

A. $\frac{\text{vol of } CO_2 \text{released in respiration}}{\text{vol of } O_2 \text{consumed in respiration}}$

B. $\frac{\text{vol of } CO_2 \text{consumedinphotosynthesis}}{\text{vol of } O_2 \text{consumedin respiration}}$

C. $\frac{\text{vol of } CO_2 \text{taken in photosynthesis}}{\text{vol of } CO_2 \text{releasedin respiration}}$

D. $\frac{\text{vol of } CO_2 \text{taken in photosynthesis}}{\text{vol of } CO_2 \text{released in photosynthesis}}$

Answer: A

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42. During starvation, RQ value will be

A. (a) zero

B. (b) less than unity

C. (c) more than unity

D. (d) unity

Answer: B

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43. When respiratory substrate is cereal/ starch/ sprouting potato tuber, then RQ value is

A. (a) zero

B. (b) unity

C. (c) greater than unity

D. (d) less than unity

Answer: B

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44. In anaerobic condition, value of RQ will be

A. 1

B. 2

C. infinity

D. 0

Answer: C

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45. If a substance is rich in oxygen, then value of RO (Respiratory Quotient) will be

A. unity

B. ess than 1

C. greater than 1

D. 0

Answer: C

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46. RO value in succulents/CAM plants in night is

A. >1

B. unity

C. <1

D. Zero

Answer: D

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47. When production of CO_2 is more than intake of O_2, the respiratory substrate is

A. sucrose

B. organic acid

C. glucose

D. fat/protein

Answer: B

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48. Enzyme ATPase is found in ..... of oxysome.

A. (a) Head (F_1)

B. (b) Base (F_0)

C. (c) Stalk

D. (d) $F_0 - F_1$

Answer: A

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49. Which of the following observations most strongly support the view that mitochondria contain electron transport enzymes aggregated into compact association ?

A. (a) Mitochondria have a highly folded inner membrane

B. (b) Disruption of mitochondria yield membrane fragments which are able to synthesize ATP

C. (c) contractile protein able to utilize ATP is found in mitochondria

D. (d) None of the above.

Answer: B

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50. The Nobel Prize for the discovery of TCA cycle and ATP biosynthesis was awarded to

A. Hans Krebs

B. Lipman

C. Krebs and Lipman jointly

D. Vishniac and Ochoa

Answer: C

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51. In anaerobic respiration, pyruvic acid in muscles forms

A. ATP

B. Lactic acid

C. Acetyl Co- A

D. NAD

Answer: B

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52. Terminal oxidation in ETC is

A. (a) stoppage of oxidation

B. (b) final release of protons

C. (c) only step where actual oxidation using O_2 occurs

D. (d) ETS initiation

Answer: C

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53. Krebs' cycle also called TCA (Tricarboxylic acid cycle) or citric acid cycle (organic acid cycle). It is also called metabolic sink as it is

A. common pathway for carbohydrates . fats and proteins (amino acids)

B. common pathway for carbohydrates and fats only

C. common pathway for carbohydrates and organic acids only

D. none of the above

Answer: A

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54. One turn of Krebs' cycle for the oxidation of 1 mol of sucrose produce how many ATP molecules ?

A. 12

B. 24

C. 22

D. 11

Answer: A

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55. Acetaldehyde is intermediate product in

A. lactic acid fermentation

B. ethyl alcohol fermentation

C. Kreb's cycle

D. glycolysis

Answer: B

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56. One molecule of sucrose yields ..... ATP in anaerobic respiration

A. 2

B. 4

C. 38

D. 36

Answer: B

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57. One molecule of $NADH + H^+ / NADPH + H^+$ has sufficient energy to generate 3 ATP through ETS. This energy is approximately

A. 52.6 k cal

B. 21.9 k cal

C. 18 k cal

D. 36 k cal

Answer: B

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58. Proteins enter into Krebs' cycle through

A. $\propto$ -Ketoglutarate

B. OAA

C. both (1) and (2)

D. None of these

Answer: C

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59. If fructose 1-6 Bisphosphate is oxidised in aerobic respiration, the ATP production will be

A. 36

B. 38

C. 32

D. 40

Answer: D

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60. Respiration of starved leaves (consuming proteins) is called

A. protoplasmic respiration

B. floating respiration

C. photorespiration

D. oxidative phosphorylation

Answer: A

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61. To start respiration, a living cell requires

A. only glucose

B. glucose + O_2

C. glucose, ATP and enzymes

D. glucose + enzymes

Answer: C

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62. The rate of oxidative phosphorylation and ATP synthesis is related with

A. quantasomes

B. ribosomes

C. elementary particles

D. lysosomes

Answer: C

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63. Enzymes involved in oxidative decarboxylation of pyruvic acid are found in

A. cytoplasm

B. matrix of Mitochondrion

C. $F_0 - F_1$ particles

D. oxysomes

Answer: B

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64. As compared to anaerobic respiration, the energy gained during aerobic respiration is

A. 8 times

B. 19 times

C. 12 times

D. 36 times

Answer: B

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65. Cytochromes are found in

A. entire inner mitochondrial membrane

B. cristae only

C. matrix of mitochondria

D. oxysomes

Answer: A

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66. Cytochrome oxidase is related with

A. Cyt b

B. Cyt a_3

C. Cyt c_1

D. Cyt. c

Answer: B

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67. Cytochromes are

A. O_2 acceptor

B. H_2 acceptor

C. Electron acceptor

D. All of these

Answer: C

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68. Rate of respiration shall

A. where no light is present

B. in winter

C. in high temperature

D. in rainy season

Answer: C

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69. All enzymes of TCA cycle except succinic dehyd rogenase and cytochrome oxidase are found in

A. cytosole and oxysomes

B. matrix of mitochondrion

C. inner membrane of mitochondrion

D. outer membrane of mitochondrion

Answer: B

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70. In the electron transport system, the reduced coenzymes are regenerated by

A. gain of protons

B. loss of electrons

C. addition of hydrogen

D. gain of electrons .

Answer: B

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71. Poisons like cyanide inhibit Na^+ influx during cellular transport. This inhibitory effect is reversed by an injection of ATP. This demonstrates that

A. $Na^+ - K^+$ pump operates in all cells

B. ATP is carrier protein

C. Energy for $Na^+ - K^+$ pump come from ATP

D. ATP is hydrolysed by ATPase to release energy

Answer: C

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72. Proton channel occurs in

A. (a) F_0

B. (b) F_1

C. (c) F_4

D. (d) F_5

Answer: A

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73. The first 5C dicarboxylic acid in Krebs' cycle which is used in nitrogen metabolism is

A. (a) OAA

B. (b) Citric acid

C. (c) α-ketoglutaric acid

D. (d) Acetyl Co-A

Answer: C

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74. Hydrogen atoms released at succinate level in Krebs cycle are accepted by

A. FAD

B. NAD

C. ADP

D. FMN

Answer: A

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75. Fructose-6-phosphate is changed to Fructose 1-6 biphosphate with the help of enzyme

A. phosphoglycerate

B. enolase

C. phosphofructokinase

D. phosphatase

Answer: C

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76. In ETS, ATP is not formed in which of the following steps

A. FMN- UQ

B. Cyt c-cyt a

C. Cyt b - cyt c

D. Cyt a- cyt a_3

Answer: B

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77. Krebs' cycle is completed with the formation of

A. (a) citric acid

B. (b) OAA

C. (c) succinic acid

D. (d) malic acid

Answer: B

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78. The end product of oxidative phosphorylation is

A. ATP

B. O_2

C. $NADH_2$

D. $ATP \& H_2O$

Answer: D

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79. How many ATP are formed in ETS from reduced NAD generated in one turn cycle of Krebs' cycle ?

A. 3

B. 6

C. 12

D. 9

Answer: D

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80. Krebs' cycle starts with reaction between

A. OAA+Acetyl CoA

B. OAA+Pyruvic acid

C. Acetyl CoA+Citric acid

D. OAA+Citric acid

Answer: A

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81. ATP formation in chloroplast and mitochondrion is explained by

A. Lock and Key Theory of Fisher

B. Chemiosmotic Theory of Mitchell

C. Lipmann and Lohmann Theory

D. Chemical coupling theory

Answer: B

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82. What is the main feature of -P bond in ATP

A. 2 bonds having high energy

B. 2 Molecules of phosphrous in ATP

C. 3 atoms of high energy phosphate

D. None of these

Answer: A

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83. Which would be the last substrate to be used in respiration ?

A. Fat

B. Protein

C. Organic acid

D. starch

Answer: B

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84. A mass of living cells are kept in a culture medium under anaerobic conditions. The cells were supplied with labelled c^{14} glucose. Pick up the true statement

A. CO_2 will contain C^{14}

B. cell would burst

C. water will have radioactivity

D. ATP will have radioactivity

Answer: A

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85. Differences between photophosphorylation (PP) and oxidative phosphorylation (OP) is

A. (a) In PP it is the synthesis of ATP while in OP it is of ADP

B. (b) In PP, O_2 is evolved while in OP O_2 is used up

C. (c) Both can not take place in light .

D. (d) PP occurs in green leaves while OP cannot occur in green leaves

Answer: B

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86. Which one is absent in erythrocytes ?

A. Krebs' cycle

B. Enzymes

C. EMP pathway

D. Hyaloplasm

Answer: A

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87. Calorific value of carbohydrates, proteins & fats are

A. $4:6:9$

B. $6:4:9$

C. $4:4:9$

D. $4:9:9$

Answer: C

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88. Which one of the following is the source of energy that produces the chemiosmotic gradient in mitochondria ?

A. Electrons moving down the electro n transport chain

B. The production of NAOH

C. An ATP-dependent proton pump

D. The components of the electron transport chain

Answer: A

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89. When O_2 is not available to a muscle, NAOH formed in glycolysis does not pass electrons to the ETC. Instead it passes them to

A. Acetyl Co A

B. pyruvic acid

C. fructose

D. ADP

Answer: B

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90. Number of Oxygen atoms required for complete oxidation of pyruvic acid is

A. 6

B. 12

C. 3

D. 8

Answer: A

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91. Cyanide kills the organisms/stop cell activity by

A. (a) reducing water potential

B. (b) decreasing diffusion of oxygen

C. (c) interfering in respiratory mechanism by preventing transfer of electron from copper of cyt a_3 to oxygen

D. (d) coagulating proteins of carriers in ETC

Answer: C

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92. During oxidative phosphorylation, protons return to

A. (a) matrix from outside

B. (b) outside from matrix

C. (c) in both directions

D. (d) mitochondria to cytoplasm

Answer: A

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93. The energy from electron transport is utilized in transporting proton $\left(H^{+}\right)$ from

A. (a) matrix to outside

B. (b) outside to matrix

C. (c) in both directions

D. (d) none of these

Answer: A

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94. Enzyme helping in oxidative decarboxylation of pyruvate is

A. (a) pyruvate kinase

B. (b) pyruvate dehydrogenase

C. (c) succinic dehydrogenase

D. (d) pyruvate oxidase

Answer: B

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95. Glyceraldehyde phosphate is oxidised in glycolysis. What is the fate of hydrogen atom and electron liberated?

A. (a) reduce NAD^+

B. (b) oxidise NAD^+

C. (c) transferred to pyruvic acid

D. (d) eliminated

Answer: A

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96. In Which step, CO_2 is not released ?

A. (a) Glycolysis

B. (b) Lactic acid fermentation

C. (c) Oxidation of malic acid into OAA

D. (d) All of the above

Answer: D

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97. General equation for aerobic respiration is

A. $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

B. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + 686$ Kcal

C. $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2 + 2ATP$

D. $C_{22}H_{22}O_{116}O_2 \rightarrow 6CO_2 + 6H_2O + 686\text{cal}$

Answer: B

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98. The number of glucose molecules required to produce 38 ATP molecules under anaerobic conditions by a yeast cells is

A. (a) 2

B. (b) 1

C. (c) 19

D. (d) 38

Answer: C

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99. One turn of Krebs' cycle produces

A. 1 $FADH_2$, 1 NADH and 1 ATP

B. 1 $FADH_2$, 2 NADH and 1 ATP

C. 1 $FADH_2$, 3 NADH and 1 ATP

D. 2 $FADH_2$, 2 NADH and 2 ATP

Answer: C

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100. Excess of ATP inhibits respiration by inhibiting one of the following enzymes

A. (a) phosphofructokinase

B. (b) pyruvic dehydrogenase

C. (c) isomerase

D. (d) acomitase

Answer: A

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101. Anaerobic respiration of animals/humans produces

A. (a) CO_2 and H_2O

B. (b) C_2H_5OH and CO_2

C. (c) Lactic acid and H_2O

D. (d) Glucose and O_2

Answer: C

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102. Choose the correct statement

A. respiration is carried out by only leaf cells

B. end product of anaerobic respiration is CO_2 + Pyruvic acid

C. substrate level phosphorylation occurs when α-ketoglutaric acid changes to succinic acid

D. dark respiration in plants occurs only in night

Answer: C

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103. In alcoholic fermentation by yeasts, the $NADH_2$ produced during glycolysis is used to reduce

A. Acetaldehyde to ethanol

B. NADP to $NADPH_2$

C. Pyruvic acid to lactic acid

D. Lactic acid to pyrvic acid

Answer: A

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104. Maximum energy is obtained by the oxidation of

A. glucose

B. palmitic acid

C. malic acid

D. amino acid

Answer: B

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105. Fat has two components, glycerol and fatty acids. They enter common pathway of respiration as

A. DHAP and ketoglutarate

B. Di-HAP and acetyl CoA

C. Glycolic acid and acetyl CoA

D. OAA and Glyceric acid

Answer: B

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106. If it is calculated that less than 5% of the energy of glucose is recovered as ATP in glycolysis, the remaining energy is left in

A. CO_2 and NADPH

B. Pyruvate and $FADH_2$

C. Pyruvate and NADH

D. CO_2 and $NADH_2$

Answer: C

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107. Why the usual RQ for humans lies between 0.7 and 1.0 because

A. (a) they respire fat and protein

B. (b) they utilize and respire carbohydrate and fat

C. (c) they respire carbohydrate and proteins

D. (d) they respire proteins and carbohydrate

Answer: B

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108. How many molecules of NADH are left at the end of anaerobic respiration

(a) 2

(b) 4

(c) 6

(d) 0

A. 2

B. 4

C. 6

D. 0

Answer: D

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109. In Beta oxidation, ATPs are produced

A. Flavin & Acetyl CoA

B. Fatty acid

C. NADH

D. NAD^+

Answer: B

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110. A business man of 70 kg weight requires 2800 kcal energy daily. How many glucose molecules and ATP molecules does he require to produce this much energy ?

A. 20 molecules of glucose and 384 molecules of ATP

B. 11 molecules of glucose and 380 molecules of ATP

C. 1 Molecule of glucose and 38 molecules of ATP

D. 6 molecules of glucose and 584 molecules of ATP

Answer: B

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111. Which intermediate product is found in all three of the following process

(a) anaerobic respiration

(b) aerobic respiration

(c) photosynthesis

A. succinic acid

B. lactic acid

C. Ri bulose diphosphate

D. Phosphoglyceric acid

Answer: D

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112. In glycolysis, enzyme enolase produces

A. PGA

B. PEP

C. PGAL

D. Pyruvate

Answer: B

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113. Number of carbon atoms available in acetyl CoA is

A. 6

B. 4

C. 3

D. 2

Answer: D

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114. Which can readily respire without oxygen ?

A. Anabaena

B. Saccharomyces

C. Mushroom

D. Fish

Answer: B

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115. Cytochrome is a component of ETC in mitochendria/chloroplast, acting as electron acceptor. It is a

A. glycoprotein

B. lipid

C. $Ca2^{+}$ containing metallo flavoprotein

D. Fe^{+++} containing prophyrin pigment protein

Answer: D

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116. First oxidative decarboxylation during aerobic respiration occur in

A. cytoplasm

B. mitochondrial inner spac

C. mitochondrial outer space

D. mitochondrial matrix.

Answer: D

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117. One mole of glucose on complete oxidation in aerobic respiration yields ?

A. 2870 KJ

B. 5000 KJ

C. 686 KJ

D. 1870 KJ

Answer: A

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118. Protons $(as NADH, FADH_2)$ taking par in oxidative phosphorylation enter mitochondira as

A. OAA

B. Acetyl-CoA

C. Pyruvic acid

D. Acetaldehyd

Answer: C

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119. Number of multiprotein complexes in ETS in mitochondria is

A. 2

B. 3

C. 4

D. 5

Answer: D

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120. Complex V in ETC consists of

A. (a) $F_0 - F_1$

B. (b) ATP synthase

C. (c) Both a) and b)

D. (d) Cytochrome C oxidase

Answer: C

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121. In which one of the following do the two names refer to one and the same thing

A. Citric acid cycle and Calvin cycle

B. Krebs' cycle and Calvin cycle

C. TCA cycle and urea cycle

D. Tricarboxylic acid cycle and citric acid cycle

Answer: D

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122. ETC is also called

A. (a) photooxidation

B. (b) oxidative phosphorylation

C. (c) cyclic phosphorylation

D. (d) noncyclic phosphorylation

Answer: B

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123. Which one of the following enzymes is absent in electron transport system ?

A. NADH dehydrogenase

B. Cytochrome C-oxidas

C. Succinate Q-reductase

D. G_e phosphate dehydrogenase

Answer: D

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124. Which one of the following enzymes of respiratory pathway has the coenzyme FAD hnked with it?

A. Citric acid synthetase

B. Fumerase

C. Succinic acid dehydrogenase

D.

Answer: C

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125. During the reaction $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ which compound is reduced ?

A. Oxygen

B. Carbon dioxide

C. Glucose

D. Water

Answer: A

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126. Glyceraldehyde-3-phosphate is

A. produced from glucose during glycolysis

B. part of PS-I

C. produced from pyruvate before entering the mitochondria

D. an amino acid used for making protein

Answer: A

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127. Dough kept overnight in warm weather becomes soft and spongy due to

A. absorption of carbon dioxide from atmosphere

B. fermentation

C. cohesion

D. osmosis

Answer: B

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128. Fatty acids enter cellular respiration as

A. one carbon fragment

B. two carbon fragments

C. three carbon fragments

D. long chain of 16 to 20 carbon atoms

Answer: B

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129. In glycolysis, during oxidation electrons are removed by

A. ATP

B. GAP

C. NAD^+

D. molecular oxygen

Answer: C

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130. The production of ATP by oxidative phosphorylation is driven by energy from

A. coenzyme A

B. cytochromes

C. formation of NADH

D. diffusion of protons from inter membrane space to the matrix of mitochondrion

Answer: D

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131. Both mitochondria and chloroplasts

A. use a hydrogen ion (proton) gradient to produce ATP

B. obtain electron from water

C. reduce NAD^+, forming NADP

D. release oxygen as a by product

Answer: A

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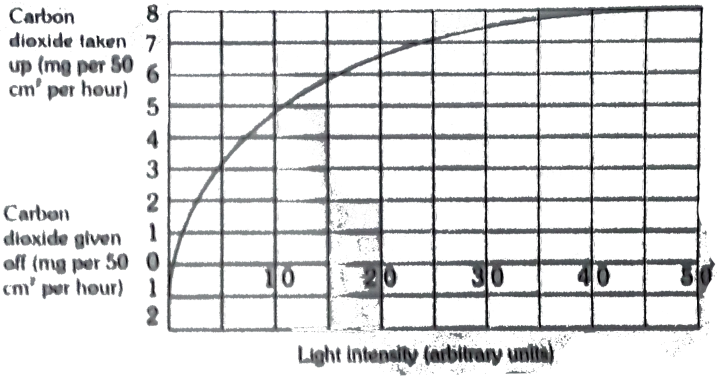
132. The graph shows the relation between light intensity and the giving off and taking up of carbon dioxide by the leaves of a plant. Why is most carbon dioxide given off when the light intensity is zero units.



A. because it is just the start of the experiment

B. only respiration is taking place at this intensity of light

C. the rate of photosynthesis is equivalent to the rate of respiration

D. the rate of photosynthesis is more than the rate of respiration

Answer: B

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133. Chemiosmosis is

A. (a) synthesis of ATP using the driving force of proton gradient across mitochondrial inner membrane

B. (b) synthesis of ATP by the discharge of chemical potential created by protons on different sides of a membrane

C. (c) chemical synthesis of ATP by taking energy rich bond from a respiratory substrate

D. (d) both (a) and (b)

Answer: D

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134. Which of the following process makes direct use of oxygen ?

A. (a) Glycolysis

B. (b) Fermentation

C. (c) Electron transport chain

D. (d) Krebs cycle

Answer: C

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135. Ganong's respiroscope is used to demonstrate.....

A. evolution of O_2 in photosynthesis

B. evolution of CO_2 in photosynthesis

C. evolution of CO_2 in aerobic respiration

D. evolution of heat in aerobic respiration

Answer: C

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136. During which stage in the complete oxidation of glucose are the greatest number of ATP molecules formed from ADP

Or

Largest amount of phosphate bond energy is produced in the process of respiration during

A. (a) Electron transport chain

B. (b) Glycolysis

C. (c) Krebs' cycle

D. (d) Oxidation of pyruvic acid

Answer: A

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137. In glycolysis ultimately (or end product of glycolysis is)

A. Acetyl CoA

B. pyruvate

C. ethanol

D. $CO - 2 + H_2O$

Answer: B

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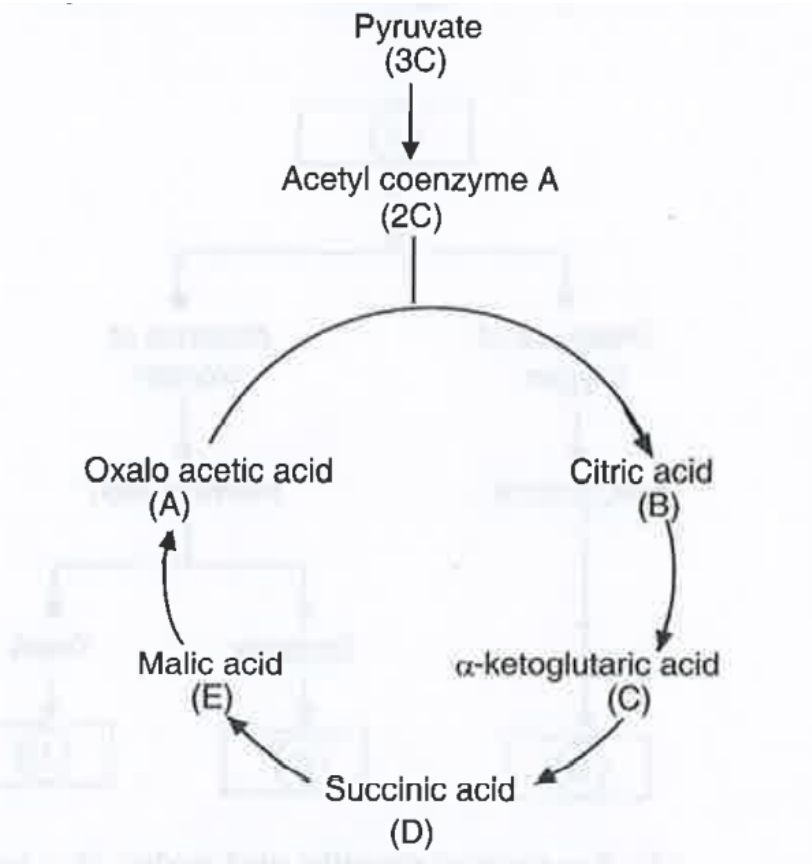
138. Choose the correct combination of labelling the number of carbon compounds in the substrate molecules, involved in the citric acid cycle



A. (A) 4C, (B) 6C, (C) SC, (D) 4C, (E) 4C

B. (A) 6C, (B) SC, (C) 4C, (D) 3C, (E) 2C

C. (A) 2C, (B) 3C, (C) 4C, (D) SC, (E) 6C

D. (A) 4C, (B) SC, (C) 6C, (D) 4C, (E) 4C

Answer: A

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139. Which is not true for glycolysis

A. End product is CO_2 and H_2O

B. Substrate level phosphorylation

C. Production of ATP

D. Expenditure of ATP

Answer: A

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140. How many ATP molecules could maximally be generated from one molecule of glucose, if the complete oxidation of one mole of glucose to

CO_2 and H_2O yields 686 kcal and the useful chemical energy available in the high energy phosphate bond of one mole of ATP is 12 kcal

A. Fifty-seven

B. One

C. Two

D. Thirty

Answer: A

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141. All enzymes of TCA cycle are located in the mitochondrial matrix except one which is located in inner mitochondrial membranes in eukaryotes and in cytosol in prokaryotes. This enzyme is

A. malate dehydrogenase

B. succinate dehydrogenase

C. lactate dehydrogenase

D. isocitrate dehydrogenase

Answer: B

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142. Which one of the following mammalian cells is not capable of metabolising glucose to carbon-dioxide aerobically ?

A. Liver cells

B. Red blood cells

C. White blood cells

D. Unstriated muscle cells

Answer: B

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143. The overall goal of glycolysis, Krebs cycle and the electron transport system is the formation of

A. sugars

B. nucleic acids

C. ATP in small stepwise units

D. ATP in one large oxidation reaction

Answer: C

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144. A competitive inhibitor of succinic dehydrogenase is

A. Malonate

B. Succinate

C. Citrate

D. Fumarate

Answer: A

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145. In Krebs cycle, the following reactions are involved in the production of 15 ATP molecules by oxidation of food stuffs

1. Oxidation of pyruvic acid to acetyl Co-A

2. Oxidation of alpha-ketoglutaric acid

3. Oxidation of isocitrate

4. Oxidation of malate

5. Oxidation of succinate

6. Conversion of succinyl Coenzyme-A to succinic acid.

The correct sequence of these reactions is:

A. 1, 2, 4, 3, 5, 6

B. 1, 3, 2, 6, 5, 4

C. 1, 4, 3, 2, 5, 6

D. 1, 2, 4, 5, 3, 6

Answer: B

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146. Carbon monoxide inhibits mitochondrial electron transport by

A. Inhibiting the electron transfer of complex

B. Blocking electron transport at the level of the cytochrome-b cytochrome Co-complex

C. Binding to the oxygen binding site of cytochrome oxidase

D. Binding to haemoglobin in the erythrocytes and therefore blocking the transport of oxygen to tissues

Answer: C

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147. Out of the following, which is the rate limiting enzyme in glycolysis?

A. Pyruvate kinase

B. Phosphofructo kinase

C. Phosphoglucoisomerase

D. Gluco kinase

Answer: B

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148. Match List-I (Compound oxidized during Kreb's cycle) with List-II (Compound formed on oxidation) and select the correct answer using the

codes given below the lists:

List- I (Compound oxidized during Kreb's cycle)	List-II (Compound formed on oxidation)
A. Pyruvic acid	1. Acetyl Co-A
B. Isocitric acid	2. Succinyl Co-A
C. α–Ketoglutaric acid	3. Oxaloacetic acid
D. Succinic acid	4. α–ketoglutaric acid
	5. Fumaric acid

A. Codes A B C D
(1) 1 3 2 5

B. Codes A B C D
(2) 2 1 3 4

C. Codes A B C D
(3) 3 1 2 5

D. Codes A B C D
(4) 1 4 2 5

Answer: D

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149. If glucose-fed yeast cells are transferred from aerobic environment to anaerobic one, the rate of glucose consumption will

A. Decrease

B. Increase

C. Alter, depending on concentration of other nutrients

D. Will not change

Answer: B

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150. Which of the following is not a substrate for decarboxylation?

A. Pyruvate

B. Citrate

C. Alpha-keto-glutarate

D.

Answer: B

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151. All of the following are four carbon compounds except

A. Malic acid

B. Succinic acid

C. Pyruvic acid

D. Oxaloacetic acid

Answer: C

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152. The citric acid cycle

A. Is the major anabolic pathway for glucose synthesis

B. Is an anaerobic process

C. Generates fewer molecules of ATP than glycolysis

D. Contains intermediates for amino acid synthesis

Answer: D

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153. During aerobic respiration, all the ATPs are synthesized as a result of

A. Oxidative phosphorylation

B. Oxidative and substrate level phosphorylation

C. Substrate level phosphorylation

D. Oxidative and photophosphorylation

Answer: B

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154. Kreb's cycle

A. Liberates a minor part of energy during respiration

B. Is operative in photorespiration

C. Reactions are independent of oxygen supply

D. Is a link between carbohydrate and nitrogen metabolism

Answer: D

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155. Consider the following

1. Succinic dehydrogenase

2. Aconitase

3. α-ketoglutarate dehydrogenase

4. Isocitric dehydrogenase

What is the correct order in which the above enzymes catalyze the reaction in Kreb's cycle?

A. 1-2-3-4

B. 2 - 4 - 1 - 3

C. 3 - 2 - 4 - 1

D. 2-4-3-1

Answer: D

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156. Which one of the following is the correct sequence of electron transport in Mitochondria?

A. (a) NADH to UQ to Cyt b to cyt c_1 to Cyt toCyt a to Cyt a_3 to O_2`

B. (b) NADH to Cyt a to Cyt a_3 to UQ to Cytb to Cyt c_1 to Cyt c to O_2`

C. (c) NADH to UQ to Cyt b to Cyta to Cyt a_3 to Cyt c to Cytc_1 to O_2`

D. (d) NADH to Cyt b to Cyt c_1 to Cyt c to UQ to Cyt a to Cyt a_3 to O_2`

Answer: A

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157. Consider the following enzymes of glycolytic pathway

1. Glyceraldehyde-3 phosphate dehydrogenase

2. Enolase

3. Pyruvate kinase

4. Phosphoglycerate kinase

The correct order in which they appear in the pathway is

A. 2,1,4,3

B. 3, 2, 1, 4

C. 4, 3, 2, 1

D. 1,4,2, 3

Answer: D

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158. Consider the following intermediates formed during Krebs cycle

1. α-ketoglutarate 2. lsocitrate

3. Succinate 4. Malate

5. Fumerates

The correct sequences in which the above intermediates are formed is -

A. 1, 2, 4, 3, 5

B. 2, 1, 5, 4, 3

C. 3, 1, 2, 5, 4

D. 2,1,3, 5,4

Answer: D

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159. Consider the following statements in Citric Acid Cycle

1. The generation of ATP is done at two steps

2. NAD is reduced to NADH at two steps

3. FAD is reduced to $FADH_2$, at one step

Which of the statements given above is/are correct?

A. 1 and 2 only

B. 3 only

C. 1 and 3 only

D. 1, 2 and 3

Answer: B

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160. Consider the following

1. Two lactate molecules

2. Two Pyruvate molecules

3. Two ATP molecules

4. Two $NADH + 2H^+$

Which of the above are the end products of aerobic glycolysis?

A. 1 and 4

B. 1 and 3

C. 1, 3 and 4

D. 2, 3 and 4

Answer: D

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161. Consider the following:

1. Succinate 2. Succinyl CoA

3. $NADH + H^+$ 4. CO_2

When α-ketoglutarate dehydrogenase enzyme acts on α-ketoglutarate, which of the above are produced?

A. 1 and 2 only

B. 1 and 3 only

C. 1, 3 and 4

D. 2, 3 and 4

Answer: D

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162. Which of the following serves as the breakdown site for beta-oxidation?

A. Cytosol

B. Extramembrane space of mitochondria

C. Matrix of mitochondria

D. Smooth endoplasmic reticulum

Answer: C

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163. The pyruvate dehydrogenase complex catalyzes the conversion of pyruvate to acetyl CoA. Which of the following changes will increase the metabolic consumption of pyruvate?

A. High levels of ATP

B. High levels of NADH

C. Low levels of glucose

D. Low levels of Acetyl CoA

Answer: D

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164. During carbohydrate metabolism, NADH is produced in which of the following location(s)?

I. Cytosol

II. Mitochondrial matrix

Ill. Nucleus

A. I only

B. II only

C. I and II only

D. I, II, and III

Answer: C

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165. When examining the TCA cycle, alpha ketoglutarate dehydrogenase complex requires the set of cofactors as which of the following?

A. Citrate synthase

B. Cis-aconitate

C. Pyruvate dehydrogenase

D. Fumarate

Answer: C

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166. For each acetyl Co-A oxidized by the citric acid cycle, what is the energy gain?

A. Two molecules of NADH, one $FADH_2$ and one nucleoside triphosphate

B. Three molecules of NADH, one $FADH_2$ and one nucleoside triphosphate

C. Two molecules of NADH, one $FADH_2$ and two nucleoside triphosphate

D. Three molecules of NADH, one $FADH_2$ and two nucleoside triphosphate

Answer: B

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167. True about citric acid cycle

A. 8 ATP molecules are produced

B. Fat soluble vitamins are required

C. Involved in fatty acid synthesis

D. O_2 is consumed

Answer: C

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168. A person with a coenzyme Q deficiency will have a defect in oxidative phosphorylation. Which of the following would be expected in this person?

A. (a) accumulation of glucose

B. (b) accumulation of lactate

C. (c) high levels of ATP

D. (d) fructose deficiency

Answer: B

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169. Fluoroacetate, a potent toxin extracted from plants, is converted to fluorocitrate, which is a strong inhibitor of the TCA cycle. Which of the following would be expected in a person exposed to fluoroacetate?

A. an increase in intracellular levels of ATP

B. an increase in intracellular levels of glucose

C. a decrease in levels of ethanol

D. a decrease in the function of the electron transport chain

Answer: D

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170. Aerobic respiratory pathway is appropriately termed

A. Amphibolic

B. Anabolic

C. Catabolic

D. Parabolic

Answer: A

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171. Which of the following membrane bound complex in mitochondria is not a proton pump?

A. NADH dehydrogenase

B. Succinate dehydrogenase

C. Cytochrome bc_1

D. Cytochrome c oxidase

Answer: B

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172. Citric acid cycle is.....step in carbohydrate metabolism

A. First

B. Second

C. Third

D. Fourth

Answer: C

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173. Respiratory quotient (R.Q.) for a fatty acid, Tripalmitin is

A. 0.9

B. 1.4

C. 1

D. 0.7

Answer: D

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174. In mitochondria, protons accumulate in the

A. Outer membrane

B. Inner membrane

C. intermembrane space

D. Matrix

Answer: C

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175. Total number of ATP molecules produced per glucose molecule in eucaryotic cell is

A. 4

B. 36

C. 2

D. 38

Answer: C

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176. Two pairs of electrons passing from NADH molecules to oxygen generate

A. (a) 3 ATP

B. (b) 4 ATP

C. (c) 6 ATP

D. (d) 2 ATP

Answer: C

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177. Which of these steps in Kreb's cycle indicates substate level phosphorylation

A. (a) Conversion of succinic acid to alpha -ketoglutaric acid

B. (b) Conversion of succinic acid to malic acid

C. (c) Conversion of succinyl CoA to succinic acid

D. (d) Conversion of citric acid to alpha-ketoglutaric acid

Answer: C

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178. EMP pathway occurs in the

A. Cytoplasm

B. Mitochondrion

C. Chloroplast

D. Lysosome

Answer: A

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179. When proteins are respiratory substrate, RQ will be

A. 0.7

B. 1

C. 0.9

D. More than one

Answer: C

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180. Anaerobic respiration in yeast yields

A. (a) Ethanol and CO_2

B. (b) Lactic acid and O_2

C. (c) CO_2 and water

D. (d) Pyruvic acid and O_2

Answer: A

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181. Arrange the following compounds of Krebs cycle in an ascending order with respect to the number of carbon atoms they possess

{A) Succinic acid (B) Acetyl Co -A

(C) a - Ketoglutaric acid

(D) Citric acid

A. A-D-C-B

B. C - A - D - B

C. B-A-C-D

D. D -C- B -A

Answer: C

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182. Which of the following biomolecules is common to respiration-mediated breakdown of fats, carbohydrates and proteins

A. Pyruvic acid

B. Acetyl CoA

C. Glucose - 6 -phosphate

D. Fructose 1, 6 - bisphosphate

Answer: B

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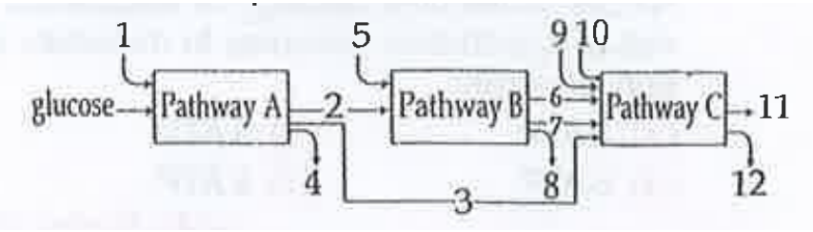
183. The three boxes in this diagram represent the three major biosynthetic pathways in aerobic respiration. Arrows represent net reactants or products.



Arrows numbered 4, 8 and 12 can all be

A. H_2O

B. FAD^+ or $FADH_2$

C. NADH

D. ATP

Answer: D

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184. In which one of the following processes CO_2 is not released

A. Lactate fermentation

B. Aerobic respiration in plants

C. Aerobic respiration in animals

D. Alcoholic fermentation

Answer: A

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185. Last e^- acceptor during ETS is

A. O_2

B. Water

C. Cytockrome C

D. Cytochrome a_3

Answer: A

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186. Which of the following biomolecules is common to respiration-mediated breakdown of fats, carbohydrates and proteins

A. Glucose-6-phosphate

B. Fructose 1, 6-bisphosphate

C. Pyruvic acid

D. Acetyl CoA

Answer: D

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187. Oxidative phosphorylation is

A. Formation of ATP by transfer of phosphate group from a substrate to ADP

B. Oxidation of phosphate group in ATP

C. Addition of phosphate group to ATP

D. Formation of ATP by energy released from electrons removed during substrate oxidation

Answer: D

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188. Which of the following cell organelles is responsible for extracting energy from carbohydrates to form ATP?

A. Lysosome

B. Ribosome

C. Chloroplast

D. Mitochondrion

Answer: D

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189. Which statement is wrong for Krebs' cycle ?

A. There are three points in the cycle where NAD^+ is reduced to $NADH + H^+$

B. There is one point in the cycle where FAD^+ is reduced to $FADH_2$

C. During conversion of succinyl CoA to succinic acid, a molecule of GTP is synthesized

D. The cycle starts with condensation of acetyl group (acetyl CoA) with pyruvic acid to yield citric acid

Answer: D

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190. Which of these statements is incorrect.

A. Oxidative phosphorylation takes place in outer mitochondrial membrane

B. Glycolysis operates as long as it is supplied with NAD that can pick up hydrogen atoms.

C. Glycolysis occurs in cytosol.

D. Enzymes of TCA cycle are present in mitochondrial matrix.

Answer: A

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