BIOLOGY

BOOKS - TRUEMAN BIOLOGY

PHOTOSYNTHESIS IN HIGHER PLANTS

Multiple Choice Questions

1. In the 1930s C.B. van Niel correctly hypothesized that oxygen atoms in the oxygen gas released by plants come from

A. H_2O

B. CO_2

C. $C_6H_{12}O_6$

D. O_3

Answer: A

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2. One of the earliest experiments on photosynthesis was done in 1770 by Joseph Priestley.He demonstrated that

A. sunlight is the energy source

B. water is required

C. plants and animals "restore" the air for each other

D. chlorophyll captures light energy

Answer: C

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3. Maximum absorption of light occures in the region (PAR) of

A. 400-700 nm

B. 700-900 nm

C. 1000-1200 nm

D. 1500-2000 nm

Answer: A

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4. Photosynthesis, a process of manufacture of organic compounds is

A. 1)catabolic exothermic, reductive process

B. 2)anabolic endothermic, oxidative reductive process

C. 3)both anabolic and catabolic process

D. 4)a chemical process

Answer: B

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5. What is the common value of PQ (Photosynthetic quotient) of a leaf ?

A. gt1

B. lt1

C. 1

D. 0

Answer: C

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6. Most effective wavelength of light for photosynthesis is

A. Green

B. UV light

C. Red

D. Yellow

Answer: C

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7. Hydrogen for the synthesis of organic compounds in photosynthesis comes from

A. $NADH_2$

B. $FADH_2O$

C. H_2O

D. CO_2

Answer: C

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8. The correct summary of photosynthesis is

A.

$$6CO_2 + 6H_2O + \text{ light } \rightarrow C_6H_{12}O_6 + 6H_2O + 6O_2$$

B.

$$6CO_2 + 12H_2O + \text{light} \rightarrow C_6H_{12}O_6 + 6O_2 \uparrow + 6H_2O$$

C.

$$C_6H_{12}O_6 + 6O_2 + 6H_2O + \text{light} \rightarrow 6CO_2 \uparrow + 12H_2O$$

D.

$$6CO_2 + 6H_2O + \text{light} \rightarrow C_6H_{12}O_6 + 3O_2 \uparrow + 6H_2O$$

Answer: B

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9. It is advantageous to use Hydrilla to demonstrate photosnthesis than land plants as

A. it respires slowly

B. it does not transpire

C. it photosynthesizes rapidly

D. oxygen bubbles can be collected over water

Answer: D

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10. Which of the following is least effective in photosynthesis

A. sunlight

B. red light

C. blue light

D. green light

Answer: D

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11. Photosynthesis is the fastest in

A. Blue light

B. Intermittent white light

C. Red light

D. Green light

Answer: B

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12. Both respiration and photosynthesis require

A. sunlight

B. green cells

C. cytochromes

D. organic substrate

Answer: C

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13. A photosynthetic organism which does not release oxygen is

A. blue green alga

B. green sulphur bacterium

C. green alga

D. algal component of lichen

Answer: B

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14. What is true for photosynthesis

A. Both carbon dioxide and water are oxidised

B. Both carbon dioxide and water are reduced

C. carbon dioxide is oxidised and water reduced

D. Carbon dioxide is reduced and water oxidised

Answer: D

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15. Who was the first to explain the evolution of oxygen during photosynthesis

A. Dutrochet

B. Joseph Priestley

C. V.Helmont

D. Wilstatter

Answer: B

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16. The role of water in photosynthesis was experimentally confirmed by

A. T.D.Saussure

B. Barnes

C. Liebig

D. J.R.Mayer

Answer: A

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17. Who proved that oxygen evolved in photosynthesis comes from water ?

A. Mayer

B. Calvin

C. Ruben and Kamen

D. Emerron

Answer: C

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18. Which technique has helped in inverstigation of calvin cycle ?

A. X-Ray cyrstallography

B. X-Ray technique

C. Radioactive isotope (autoradiography) technique

D. Intermittent light

Answer: C

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19. Radioactive isotopes employed to study photosynthesis are

A. ^{11}C and ^{32}P

B. ^{15}C and ^{32}P

C. ^{16}C and ^{15}N

D. ^{14}C and ^{18}O

Answer: D

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20. The first step in photosynthesis is the

A. formation of ATP

B. ionization of water

C. excitation of chlorophyll by photon of light

D. attachment of CO_2 to carbon sugar

Answer: C

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21. The oxygen in H_2O produced during ETC comes from

A. water

B. carbon dioxide

C. both (1) and (2)

D. oxygen in air

Answer: C

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22. Dark reaction of photosynthesis occurs in

A. grana of chloroplast

B. stroma of chloroplast

C. matrix of mitochondrion

D. cytoplasm

Answer: B

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23. Moll's half leaf experiment shows

A. unequal transpiration from two surfaces of leaf

B. CO_2 is essential for photosynthesis

C. relation between transpiration and absorption

D. chlorophyll is essential for photosynthesis

Answer: B

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24. Where does the primary photochemical reaction occur in choroplast or where does the light reactions of photosynthesis take place or Light reaction takes place in

A. Stroma

B. Periplast cavity

C. Quantosomes

D. Inner membrane of chloroplast

Answer: C

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25. One of the following pigments does not occur in chloroplast.

A. Chlorophyll

B. Carotene

C. Anthocyanin

D. Xanthophyll

Answer: C

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26. Which colour of light gives maximum absorption peak of chlorophyll a

A. Red

B. Blue

C. green

D. Yellow

Answer: B

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27. Algae aften float on surface of water during day but sink down during night due to

A. evolution and trapping of oxygen bubbles during day in their photosynthesis

B. becoming light as they consume most of their food in the night

C. warming action of sun during the day

D. release of absorbed air by warming of water

Answer: A

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28. Thylakoids removed from chloroplasts were kept in illuminated culture having CO_2 and water. It did not produce sugar because of

A. absence of enzymes

B. non linking of PS I and PS II

C. absence of light trapping molecules

D. non formation of assimilatory power

Answer: A

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29. The evidence that during photosynthesis oxygen comes from water is

A. photosynthesis bacteria employ H_2S and CO_2 to form carbohydrates, water and sulphur

B. isolated illuminated chloroplasts release oxygen if provided with potassium ferrocyanide

C. isotopic ^{18}O provided as $H_2{}^{18}O$ appears as $^{18}O_2$ liberated in photosynthesis

D. all the above

Answer: D

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30. If the rate of translocation of food is slow, what will be the effect on photosynthesis

A. increase

B. decrease

C. remain unchanged

D. become zero

Answer: B

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31. Aerobic bacteria collect near illuminated phytoplankton due to

A. Manufactured food

B. Light

C. Oxygen

D. Reduced CO_2 concentration

Answer: C

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32. Maximum O_2 evolution occurs from

A. forests

B. marine phytoplankton

C. crops

D. land mass

Answer: B

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33. Photo-oxidation or photolysis of water (in photosynthesis) occurs in association of

A. Cytochrome B_6

B. Plastocyanin

C. PS II

D. PS I

Answer: C

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34. Law of limiting factors in photosynthesis was given by

A. R.Hill

B. Calvin

C. Krebs

D. Blackman

Answer: D

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35. The enzyme that catalyses carbon dioxide fixation in C_4 plants is

A. RuBP carboxylase (RUBISCO)

B. PEP carboxylase (PePco)

C. Carbonic anhydrase

D. Carboxy dismutase

Answer: B

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36. The first stable product in CAM/C_4 plants is

A. malic acid

B. oxalo acetic acid

C. phosphogylyceric acid

D. aspartic acid

Answer: B

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37. C_4 plants can absorbs CO_2 from

A. its much low concentration

B. much high concentration

C. carbonates

D. bicarbonates

Answer: A

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38. The first carbon fixation in C_4 pathway occurs in chloroplasts of

A. guard cells

B. mesophyll

C. bundle sheath

D. all of these

Answer: B

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39. In C_4 plants, Calvin cycle operates in

A. stroma of bundle sheath chloroplasts

B. grana of bundle sheath chloroplasts

C. grana of mesophyll chloroplsts

D. stroma of mesophyll chloroplasts

Answer: A

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40. Carotenoids

A. do not take any part in photosynthesis

B. also absorb light energy and transfer it to chloropyll

C. absorb only heat energy

D. only help to colour the young leaves and pericarps

Answer: B

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41. A chlorophyll molecule has the magnesium located in the

A. phytol chamber

B. centre of porphyrin

C. corner of porphyrin

D. isocyclic ring

Answer: B

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42. The common xanthophyll occuring in leaves is

A. 1)lutein

B. 2)ß-carotene

C. 3)fucoxanthin

D. 4)Bacterioviridin

Answer: A

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43. Carotenes absorb_____ light and transmit_____ and hence are orange in colour

A. blue and green, orange and red

B. Red and yellow, blue and green

C. blue and red, orange and yellow

D. green and yellow, blue and red

Answer: A

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44. the empirical formula for chlorophyll a is

A. 1)$C_{35}H_{72}O_5N_4Mg$

B. 2)$C_{65}H_{70}O_6N_4Mg$

C. 3)$C_{55}H_{72}O_5N_4Mg$

D. 4) $C_{45}H_{70}O_6N_4Mg$

Answer: C

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45. Pigment system-II is concerned with

A. reduction of CO_2

B. flowering

C. photolysis of water

D. none

Answer: C

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46. Chlorophyll b is

A. $C_{54}H_{70}O_6N_4Mg$

B. $C_{55}H_{70}O_6N_4Mg$

C. $C_{55}H_{72}O_5N_4Mg$

D. $C_{45}H_{72}O_5N_4Mg$

Answer: B

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47. Chlorophyll a occurs in

A. all photosynthetic autotrophs

B. in all higher plants

C. all oxygen liberating autotrophs

D. all plants except fungi

Answer: C

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48. Discovery of Emerson effect has already shown in existence of

A. photorespiration

B. photophosphorylation

C. light and dark reactions

D. two distinct photochemical reactions

Answer: D

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49. Which is the stable intermediate of photosynthesis

A. glucose

B. formaldehyde

C. phosphoglyceric acid

D. phosphoglyceraldehyde

Answer: C

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50. Flow of electrons in non-cyclic photophosphorylation is

A. from PS I to PS II

B. bidirectional

C. unidirectional

D. both (2) and (3)

Answer: C

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51. Photolysis of water results in the release of

A. electrons, protons $\left(H^{+}\right)$ and oxygen

B. electrons and protons $\left(H^{+}\right)$

C. protons $\left(H^{+}\right)$ and oxygen

D. electrons and oxygen

Answer: A

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52. ATP in non-cyclic photophosphorlyation is formed when electron passes from

A. plastocyanin to P_{700}

B. plastoquinone to ferrodoxin

C. cytochrome *f* to plastoquinone

D. cytochrome b to cytochrome *f*

Answer: D

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53. Cyclic photophosphorylation operates absorbing light of

A. more than $680\mu m$ wavelength

B. less than 680 μm wavelength

C. less than 660 μm wavelength

D. wavelength between 660-680 μm wavelength

Answer: A

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54. During light reaction of photosynthesis, which of the following phenomena is observed during cyclic and non-cyclic photophosphorylation ?

A. Formation of ATP

B. Formation of $NADH_2$

C. Release of O_2

D. Involvement of PS I and PS II both

Answer: A

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55. How many full turns of the Calvin cycle are required to make one molecule of glucose

A. one

B. two

C. four

D. six

Answer: D

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56. In a controlled experiment of photosynthesis, CO_2 supply is suddenly withheld, which of the following will

accumulate in the plant cell?

A. 3-phosphoglyceraldehyde

B. Ribulose diphosphate

C. glucose

D. phosphoglyceric acid

Answer: B

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57. Through which of the following substances the photosystem-I passes an electron to NADP during light reactions

A. Cytochrome

B. Ferrodoxim

C. Plastocyanin

D. Plastoquinone

Answer: B

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58. In cyclic photophosphorylation, ATP is synthesized when electron passes from

A. ferredoxin to cytochrome b_6

B. plastoquinone to cytochrome f

C. ferredoxin to plastoquinone and cytochrome b_6 to cytochrome f

D. all the above are wrong

Answer: C

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59. In pigment system II, active chlorophyll is

A. P_{680}

B. P_{830}

C. P_{700}

D. P_{673}

Answer: A

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60. Which of the following constitutes Hill reaction

A. Photolysis by chloroplasts

B. Photolysis of water by isolated chloroplasts forming ATP and NADPH

C. Photolysis of water by isolated illuminated chloroplasts causing reduction of some chemicals and liberation of oxygen

D. Photolysis of water liberating oxygen and hydrogen by illuminated isolated chloroplasts

Answer: C

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61. The organism/s used in discovering Calvin's cycle was/were

A. Chlorella

B. chlorella and volvox

C. chlorella and chlamydomonas

D. Chlorella and Scenedesmus

Answer: D

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62. Which of the following occures during dark phase of photosynthesis ?

A. Hydrogen is released

B. ATP is produced

C. Molecular oxygen is released

D. PGAL is synthesized

Answer: D

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63. If an angiosperm is kept at compensation point

A. It will die after some time

B. it's growth will be normal

C. it's growth will be faster

D. its growth will stop, but it will not die

Answer: A

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64. During dark reaction for fixation of carbon, the three carbon atoms of each molecule of 3-phosphoglyceric acid (PGA) are derived from

A. RuBP Only

B. RuBP + CO_2

C. CO_2 only

D. RuBP + CO_2 + PEP

Answer: B

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65. The first stable compound in C_4 plants is

A. Oxalic acid

B. Malic acid

C. Oxalo-acetic acid

D. Pyruvic acid

Answer: C

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66. The CO_2 stored by succulents during night is used during the day time in

A. Hatch & Slack pathway

B. Calvin cycle

C. CAM

D. TCA Cycle

Answer: B

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67. Deactivation of enzymes above $40^{\circ}C$ affects the _____ of photosynthesis and decreases the rate of

photosynthesis

A. light reaction

B. dark reaction

C. photolysis of water

D. excitation of chlorophyll

Answer: B

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68. Rate of photosynthesis is _____than that of respiration during the day time

A. higher

B. lower

C. same

D. equal

Answer: A

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69. During photosynthesis when PGA is changed into phosphoglyceraldehyde, which of the following reaction occur

A. Oxidation

B. Reduction

C. Electrolysis

D. Hydrolysis

Answer: B

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70. Which products of Hill reaction are used in Blackman's reaction

A. ATP,NADPH

B. ATP, NADH

C. ADP, NAD

D. ATP, NAD

Answer: A

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71. Acid concentration in CAM plants is more at

A. night

B. daytime

C. dawn

D. dusk

Answer: A

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72. In PS-II, first known electron acceptor is

A. Cytochrome

B. Quinone

C. FRS

D. Ferredoxin

Answer: B

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73. For synthesis of a molecule of glucose, the requirement of ATP and $NADPH$ is respectively

A. 18 and 12

B. 33 and 22

C. 12 and 8

D. 30 and 12

Answer: D

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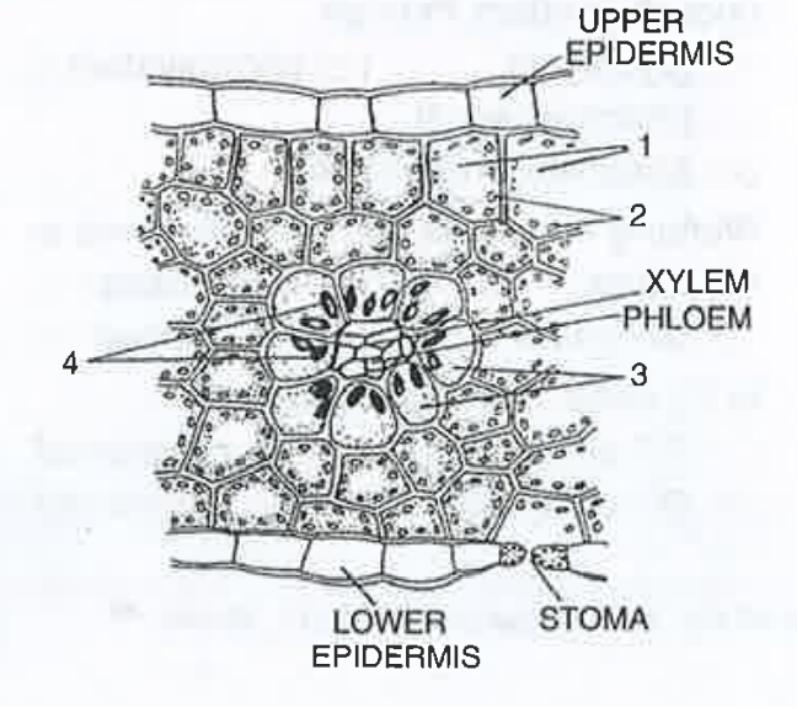
74. The given diagarm is a cross section



A. of a leaf

B. showing Kranz anatomy

C. dimorphic chloroplast

D. all of the above

Answer: D

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75. In photorespiration, RuBP carboxylase combines with oxygen to yield

A. 1)Two molecules of phosphoglycerate

B. 2)Two molecules of phosphoglycolate

C. 3)One molecule of phosphoglycerate and one molecule of phosphoglycolate

D. 4)Two molecule of glucose

Answer: C

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76. C_4 plants are abundant in

A. temperate region with more humid conditions

B. temperature region with more dry conditions

C. tropical region with more humid conditions

D. tropical region with more dry conditions

Answer: D

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77. What is correct about Dark Reactions ?

A. It is called Hill reaction

B. It is biochemical, enzymatic, rate determining slow reaction

C. It is independent of temperature

D. All of these

Answer: B

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78. Choose the correct one for photorespiration that occurs in C_3 plants.

A. Photorespiration is common in plants having high CO_2compensation point

B. Photorespiration is caused by high CO_2 and low O_2

C. It is not affected by light, temperature

D. all of the above

Answer: A

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79. Positive effect of photorespiration

A. reduces O_2 injury to chloroplast in C_3 plant

B. balance the $O_2 / CO - (2)$ ratio of plant

C. increase the yield of plant

D. do not have any positive effect

Answer: A

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80. Photorespiration is also known as

A. C_2 cycle

B. C_3 cycle

C. C_4 cycle

D. C_1 cycle

Answer: A

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81. Emerson found red drop in the wavelength

A. 660 nm

B. 670 nm

C. lt 680 nm

D. gt 680 nm

Answer: D

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82. Cardinal temperature is related to

A. minimum temperature

B. maximum temperature

C. minimum, maximum and optimum temperature

D. minimum and maximum temperature

Answer: C

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83. How much assimilatory power is produced per molecule of oxygen produced in light reaction ?

A. $2ATP + 1NADPH_2$

B. $2ATP + 2NADPH_2$

C. $1ATP + 1NADPH_2$

D. $1ATP + 2NADPH_2$

Answer: B

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84. Dicarboxylic acid cycle is also known as

A. Calvin cycle

B. Hatch & Slack cycle

C. EMP cycle

D. TCA Cycle

Answer: B

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85. The first reaction in photorespiration is

A. phosphorylation

B. decarboxylation

C. oxygenation

D. carboxylation

Answer: C

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86. During photorespiration, the oxygen consuming reaction (s) occur in

A. grana of chloroplasts and peroxisomes

B. stroma of chloroplasts

C. stroma of chloroplasts and mitochondria

D. stroma of chloroplasts and peroxisomes

Answer: D

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87. In photorespiration glycolate is converted to CO_2 and serine in

A. Mitochondria

B. Chloroplast

C. Peroxisome

D. Vacuole

Answer: A

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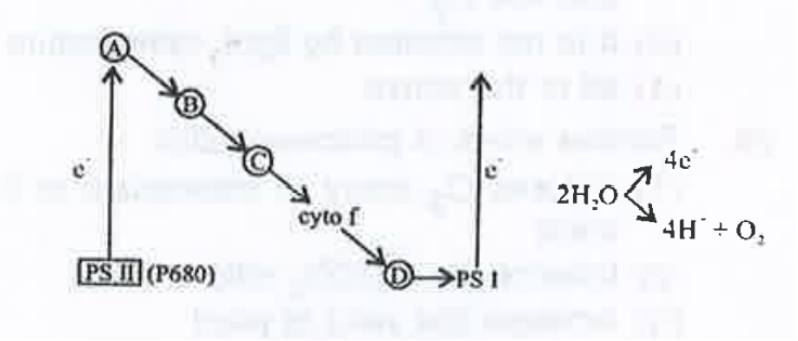
88. In the schematic diagram given, which is plastocyanin ?



A. A

B. B

C. C

D. D

Answer: D

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89. NH_3 released from

A. photorespiration

B. dark respiration

C. CAM

D. all of these

Answer: A

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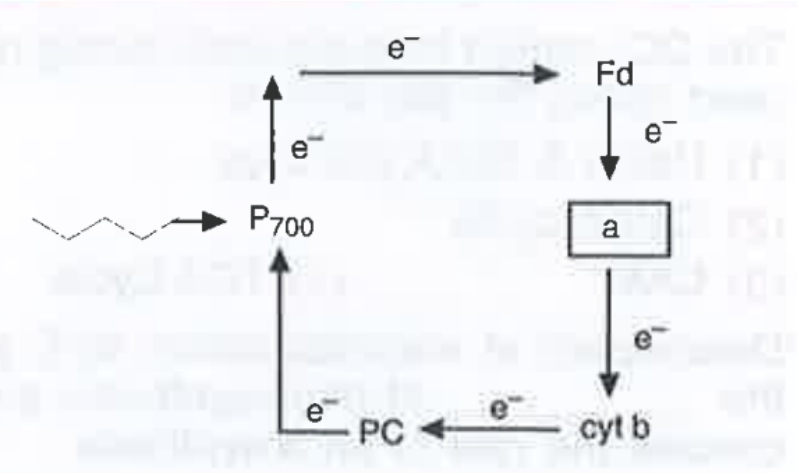
90. In the chart of photophosphorylation, what does 'a' represent



A. Cyt a

B. PQ

C. FRS

D. Cyt a_3

Answer: B

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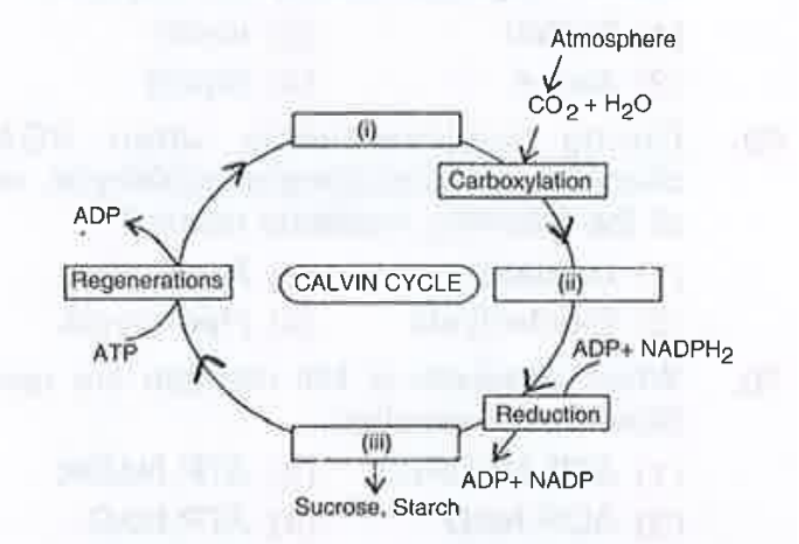
91. Choose the correct combinations of labelling the carbohydrate molecule involved in the Calvin cycle.



A. (i) RuBP (ii) Triose phosphate (iii) PGA

B. (i) PGA (ii) RuBP (iii) Hexose phosphate

C. (i) PGA (ii) Triose Phosphate (iii) RuBP

D. (i) RuBP (ii) PGA (iii) Hexose phosphate

Answer: D

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92. When sunlight is on the chloroplast, pH is lowest in the

A. Stroma

B. Cytosal

C. Space enclosed by thylakoid membrane

D. Space enclosed by the inner and outer membrane

Answer: C

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93. $NADPH_2$ is generated in noncyclic photophosphorylation through

A. glycolysis

B. photosystem I

C. photosystem II

D. anaerobic respiration

Answer: B

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94. Warburg effect has not been observed in

A. Maize

B. Sugarcane

C. Sorghum

D. All of these

Answer: D

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95. In C_4 cycle, first CO_2 acceptor is

A. 3C compound

B. 4C compound

C. 5C compound

D. 6C compound

Answer: A

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96. Chlorophyll shows an outburst of flourescence during the first few moments of illumination. This effect is called

A. Emerson's effect

B. Kautsky effect

C. Hamburger effect

D. Hill effect

Answer: B

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97. Photophosphorylation in chloroplast is most similar to which of the following mitochondrial reactions ?

A. Oxidative phosphorylation

B. Substrate-level phosphorylation

C. Oxidative decarboxylation

D. Hydrolysis

Answer: A

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98. In an experiment, the carbon dioxide available to a C_3 plant was labelled with a radioactive isotope and the amount of radioactivity in the chloroplast was measured.As photosynthesis proceeded, in which of the following molecules did the radioactivity first appear ?

A. PGAL

B. PEP

C. PGA

D. RuBP

Answer: C

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99. Which of the following kinds of plant fixes carbon dioxide by way of crassulacean acid metabolism (CAM)

A. 1)Oak tree

B. 2)Cactus

C. 3)Grass

D. 4)Red algae

Answer: B

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100. The chemiosmotic theory of ATP synthesis in the chloroplast and mitochondria is based on

A. membrane potential

B. proton gradient

C. accumulate of NA^+

D. accumulation of K^+

Answer: B

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101. A photosystem contains

A. pigments, electron acceptor & a reaction centre

B. photons, protons pigments & hydrogen acceptor

C. PO_4, $ADP\&H^+$

D. (1) & (2) both

Answer: A

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102. Which pair is wrong

A. C_3 - Maize

B. C_4 - Kranz anatomy

C. Calvin cycle - PGA

D. Hatch & Slack cycle - OAA

Answer: A

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103. Choose the correct statement for the fixation of one CO_2 molecule

A. 3 ATP & 2 NADPH are required through calvin cycle

B. 5 ATP & 2 NADPH are required through Hatch & stack cycle

C. Photochemical reactions are involved in photolysis of water & phosphorylation of ADP into ATP

D. all of the above

Answer: D

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104. During non- cyclic photophosphorylation ATP molecules are produced through electron flow

A. from H_2O to PS II

B. from PS II and PS I

C. from PSI to NADP

D. from PSI to ferredoxine

Answer: B

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105. Emerson effect is related to

A. decrease in photosynthesis in presence of high light intensity

B. decrease in photosynthesis when lights of two different wavelengths are provided together

C. increase in photosynthesis in presence of monochromatic light

D. increase in photosynthesis when lights of two different wavelenghts are used

Answer: D

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106. Radioactive isotopes of oxygen $\left(O^{18}\right)$ was used to know the source of oxygen released through photosynthesis by

A. Hill

B. Van Niel

C. Ruben and Kamen

D. Hatch and Slack

Answer: C

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107. Which of the following photosynthetic characteristics are present in C_3 plants but not in C_4 plants-

I. CO_2 compensation point of 0-10 ppm-

II. Relatively higher rate of photorespiratory CO_2 evolution-

III. Presence of well developed bundle sheath-

IV. Initial involvement of RUBP carboxylase in CO_2 assimilation -

Select the correct answer using the codes given below

A. I, II, III

B. I, II, IV

C. I, III

D. II, IV

Answer: D

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108. The following compounds are intermediates in the pathway of photorespiration-

I. phosphoglycolate-

II. Serine-

III. Glyoxylate-

IV. Glycine-

The correct sequence of their appearance in the pathway is

A. I, II, III, IV

B. I, III, IV, II

C. II I, III, IV

D. II, I, IV, III

Answer: B

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109. C_4 plants have how many carboxylations?

A. four

B. three

C. two

D. one

Answer: C

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110. Inhibition of photosynthesis in high concentration of oxygen is mainly due to

A. distribution of RuBP carboxylase

B. inactivation of RuBP carboxylase

C. non-synthesis of RuBP carboxylase

D. RuBP carboxylase acting as oxygenase

Answer: D

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111. During light reaction of photosynthesis the electrons lost by pigment system II are compensated by

A. CO_2

B. H_2O

C. O_2

D. ATP

Answer: B

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112. Which of the following is essentially regenerated to complete the Calvin cycle

A. PGA

B. RUBP

C. PEP

D. OAA

Answer: B

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113. During photorespiration glycolic acid is oxidised to glyoxylic acid inside

A. chloroplast

B. peroxysome

C. mitochondria

D. lysosome

Answer: B

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114. C_4 plants are more expensive in terms of ATP required for CO_2 fixation, the additional number of ATP required by C_4 plants in comparison to C_3 plants is

A. $6ATP$

B. $12ATP$

C. $18ATP$

D. $24ATP$

Answer: B

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115. The plants of Cuscuta reflexa(Dodder) shows maximum photosynthesis in

A. 1)red light

B. 2)blue light

C. 3)green light

D. 4)no photosynthesis at all

Answer: D

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116. In Hatch and Slack pathway

A. has chloroplasts of same type

B. occurs in Kranz anatomy where mesophyll cells have small granal chloroplast and bundle sheath cells have agranal chloroplast

C. occurs in Kranz anatomy when mesophyll have small chloroplast whereas bundle sheath have larger granal chloroplasts

D. occurs in Kranz anatomy where mesophyll cells are diffused

Answer: B

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117. Which of the statements is not true of the C_4 pathway

A. Overcomes loss due to photorespiration

B. The CO_2 acceptor is a C_3 compound

C. Inhibited by low CO_2 concentration

D. Required more energy than the C_3 pathways fir production of glucose

Answer: C

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118. Which of the following conditions are favourable for cyclic photophosphorylation

A. Anaerobic condition and high CO_2

B. Aerobic and high CO_2

C. Aerobic and low light intensity

D. Anaerobic and low light intensity

Answer: D

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119. The light reactions of photosynthesis generate high energy electrons, which end up in _____. The light reactions also produce _____ and _____.

A. 1)oxygen, sugar, ATP

B. 2)Chlorophyll, ATP, NADPH

C. 3)NADPH, ATP, Oxygen

D. 4)FADH, NADPH, oxygen

Answer: C

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120. Secondary acceptor of CO_2 in C_4 plants is

A. PEP

B. RUBP

C. PGAL

D. Rubisco

Answer: B

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121. Which of the following is present in Calvin Cycle.

A. 1)Oxidative carboxylation

B. 2)Dark phosphorylation

C. 3)Dark respiration

D. 4)Reductive carboxylation

Answer: D

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122. Isolated chloroplasts release oxygen when illuminated. Supply of which of the following will increase the rate of oxygen production ?

A. $NADP^+$

B. NAD^+

C. FAD^+

D. ATP

Answer: A

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123. Solarisation is

A. formation of chlorophyll

B. effect of excess solar radiation

C. Destruction of chlorophyll by poisons

D. utilisation of sunlight

Answer: B

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124. There is double fixation of CO_2 both in C_4 and CAM plants. Which of the following statements brings out the main difference between the two ?

A. Carboxylising enzymes are different

B. Fixation pathways are different

C. CO_2 fixation in C_4 plants is separated by space whereas in CAM plants, it is separated by time

D. The compensation point are different

Answer: C

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125. Primary electron acceptor in cyclic photophosphorylation is

A. Rubisco

B. $NADP^+$

C. FAD

D. Iron- Sulphur containing protien (FeS)

Answer: D

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126. Source of CO_2 for photosynthesis during day in CAM plant is

A. 3 DGA

B. Malic acid

C. OAA

D. Pyruvate

Answer: B

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127. CO_2 fixation in bundle sheath cells occur in

A. C_4 plants

B. C_3 plants

C. CAM

D. all of these

Answer: A

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128. Match the sites in column I with the process in column II and choose the correct combination

A. A-II B-III C-IV D-I

B. A-I B-II C-III D-IV

C. A-II B-III C-I D-IV

D. A-I B-III C-II D-IV

Answer: A

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129. How much oxygen is formed from 264 g of CO_2 and 216 g of H_2O ?

A. 96 g

B. 216 g

C. 264 g

D. 192 g

Answer: D

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130. With reference to photosynthesis, what is the $CF_0 - CF_1$ complex?

A. ATP synthetase

B. Ferrodoxin - NADP reductase

C. Cytochrome (b_6) / (fCOMPLEX)

D. RuBP carboxylase

Answer: A

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131. Which set of terms most accurately describes the pathway taken by a molecule of CO_2 from the atmosphere to the point where it enters the calvin cycle ?

A. stomatal aperture, inter cellular space, mesophyll cell, chloroplast

B. stomatal aperture, epidermal cell, mesophyll cell, chloroplast

C. stomatal guard cell, intercellular space, mesophyll cell membrane, chloroplast

D. stomatal guard cell, intercellular space, phloem serve tube, chloroplast

Answer: A

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132. During non-cyclic photophosphorylation in which of the following , $4e^-$ produced through photolysis will enter

A. PQ

B. PC

C. PS-II

D. PS-I

Answer: B

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133. The number of P_{700} molecules present in PS II comlex are

A. one

B. two

C. three

D. none

Answer: D

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134. Red colour of tomato is due to

A. phytochrome

B. anthocyanin

C. chromatochrome

D. lycopene

Answer: D

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135. Quantasomes are found in

A. stroma

B. grana

C. mitochondria

D. cristae

Answer: B

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136. In the leaves of C_4 plants, malic acid formation during CO_2 fixation occurs in the cells of

A. Phloem

B. Epidermis

C. Mesophyll

D. Bundle sheath

Answer: C

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137. 3-PGA is first stable product in

A. carbon-reduction cycle

B. CAM

C. Glycolysis

D. Kreb's cycle

Answer: A

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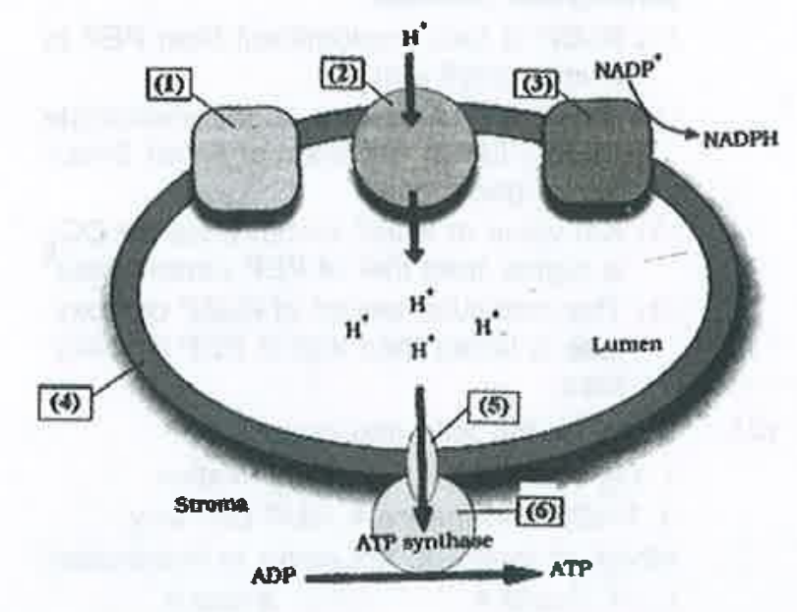
138. Go through the following figure and select the option which reflects the correct labelling



A. Photosystem II, (2) Cytochromes b 6 f, (3) Photosystem I, (4) Thylakoid membrane, (5) Fo, (6)F_1

B. Photosystem I, (2) Cytochromes b 6 f, (3) Photosystem II, (4) Thykoid membrane, (5) Fo, (6) F_1

C. Photosystem II, (2) Cytochromes b 6 f, (3) Photosystem I, (4) Thylakoid membrane, (5) F_1,(6) Fo

D. Cytochromes b 6 f, (2) Photosystem I, (3) Photosystem II, (4) Chloroplast membrane, (5) F_O, $(6)F_1$.

Answer: A

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139. Given below are some characteristics of photosynthetic plants. Which of these are true for C_4 plants

(i) Rubisco is present in the mesophyll cells

(ii) 3-carbons in the primary CO_2 acceptor

(iii) The primary CO_2 fixation product is PGA

(iv) Possess PEP case.

(v) The intitial carboxylation reaction occurs in bundle sheath cells

(vi) The calvin cycle takes place in bundle sheath cells

(vii) 4-carbon atoms in the primary CO_2 fixation product.

A. (i), (iv), (v), (vii)

B. (i), (ii), (iii), (iv), (vii)

C. (ii), (iii), (iv), (vi), (vii)

D. (ii), (iv), (vi), (vii)

Answer: D

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140. RuBP carboxylase is a less efficent enzyme for CO_2 fixation in photosynthesis than PEP carboxylase because:

A. RuBP is less predominant than PEP in a mesophyll cell

B. RuBP is a 4-carbon sugar phosphate while PEP is a phosphorylated 3-carbon organic acid.

C. Km value of RuBP carboxylase for CO_2 is higher than that of PEP carboxylase

D. The molecular weight of RuBP carboxylase is larger than that of PEP carboxylase

Answer: C

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141. Consider the following processes:

O_2 evolution

2. CO_2 fixation

3. NADPH formation

4. HMP pathway

Which of these do not occur in thylakoids?

A. 1, 2 and 4

B. 2,3 and 4

C. 3 and 4

D. 2 and 4

Answer: D

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142. Consider the following compounds:-

1. Phosphoenol pyruvate-

2. Malic acid-

3. Pyruvic acid-

4. Oxaloacetic acid-

What is the correct sequence of these intermediate compounds as they form in C_4 dicarboxylic acid pathway flowing the PEP-carboxylation reaction?

A. 1,2,3,4

B. 2,4,3,1

C. 4,1,3,2

D. 4,2,3,1

Answer: D

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143. An aquatic plant was placed in a test tube containing water. The tube was then stopered and left outdoors for 24 hours. The pH value of water was measured at regular intervals. What must have been the result?

A. pH value was the lowest just before sunrise

B. pH value was the highest iust before sunrise

C. pH value was the lowest at noon

D. pH value was the lowest just before sunset

Answer: A

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144. Compared to C_3 plants, C_4 plants

A. Remove oxygen from the air spaces between cells in the leaves and thereby avoid photorespiration

B. Fix carbon dioxide into a four carbon sugar at night, and then release the carbon dioxide during the day

C. Concentration oxygen in cells, thereby overcoming the problem of photorespiration

D. Have adaptations which concentrate carbon dioxide in the photosynthetic cells

Answer: D

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145. Which statement best explains why C_4 grasses often do better than C_3 grasses in hot dry environments?

A. C_4 grasses open their stomata at night

B. C_4 grasses generate a positive turgor pressure under high temperatures

C. The rate of cellular respiration is higher for a C_3 grass than for a C_4 grass at higher temperatures

D.

Answer: B

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

A. In PP, synthesis is of ATP while in OP it is of ADP

B. In PP, oxygen is evolved while in OP oxygen is taken up

C. Both cannot take place in light

D. PP can take place in green leaves while OP cannot occur in green leaves

Answer: B

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147. Hill reaction occurs in

A. High altitude plants

B. Total darkness

C. Absence of water

D. Presence of ferricyanide

Answer: D

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148. Photosynthetic oxygen-producing cells differ from non-oxygen producing cells in that the former

A. Produce three ATP whereas the latter produce five

B. Produce no NADPH whereas the latter do

C. Reduce ferredoxin whereas the latter do not

D. Contain and use both photosystems I and II

Answer: D

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149. Assertion :C_4 photosynthesis is more sensitive to low temperature as compared to C_3 photosynthesis .

Reason : the rubisco found in C_4 plants is more sensitive to low temperature as compared to C_3 plants.

A. If both A and R are true and R is the correct explanation of A

B. If both A and R are true but R is not the correct explanation of A

C. If A is true but R is false

D. If both A and R are false

Answer: C

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150. Assertion : Besides chlorophyll a, blue - green and red algae show the presence of phycobiliproteins .

Reason : Chlorophyll and phycobiliproteins are integrated into thylakoids.

A. If both A and R are true and R is the correct explanation of A

B. If both A and R are true but R is not the correct explanation of A

C. If A is true but R is false

D. If both A and R are false

Answer: C

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151. Assertion : In oxidative phosphorylation , the electrons flow from NADH to O_2.

Reason :In photosynthesis , the electrons flow from H_2O to NADP.

A. If both A and R are true and R is the correct explanation of A

B. If both A and R are true but R is not the correct explanation of A

C. If A is true but R is false

D. If both A and R are false

Answer: B

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152. Assertion : Carotenoids play a protective role for the chloroplasts during photolysis of water.

Reason : Carotenoids pick the nascent oxygen by means of their double bonds and convert the same into molecular state.

A. If both A and R are true and R is the correct explanation of A

B. If both A and R are true but R is not the correct explanation of A

C. If A is true but R is false

D. If both A and R are false

Answer: A

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153. Identify the correct sequence of enzymes given below which participate in regeneration phase of Calvin cycle

1. Ribulose 5-phosphate epimerase

2. Ribulose 5-phosphate kinase

3. Transketolase

4. Triose phosphate isomerase.

A. 1,3,2

B. 2,3,1

C. 1,2,3

D. 3,1,2

Answer: A

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154. Consider the following:-

1. Cytochrome b_6 -

2. Cytochrome f-

3. Plastocyanin-

4. Plastoquinone-

What is the correct sequence of these in the photo-induced electron carries between PS-II to PS-I in photosynthesis?

A. 4,1,2,3

B. 3,4,1,2

C. 1,2,3,4

D. 2,3,4,1

Answer: A

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155. The substrate for photorespiration is

A. C_6 - acid

B. C_4 - acid

C. C_3 - acid

D. C_2 - acid

Answer: D

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156. In what respects are the photosynthesis adaptations of C_4 plants and CAM plants similar?

A. In both cases, the stomata normally close during the day

B. Both types of plants make their sugar without the Calvin-Benson cycle

C. In both cases, an enzyme other than rubisco carries out the first step in carbon fixation

D. Neither C_4 plants nor CAM plants have grana in their chloroplasts

Answer: C

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157. Consider the following statement:

A.The layer of bundle sheath cells in the leaves of C_4 plants lacks intercellular spaces-

B. The bundle sheath cells in the leaves of C_4 plants lack mitochondria and peroxisomes.-

C. The bundle sheath cells of C_4 plants have large number of chloroplasts and thick walls.-

D.Neither C_4 plants nor CAM plants have grana in their chloroplasts and thick walls. -

Which of the statements given above is/are correct?

A. A and B only

B. B and C only

C. A and C only

D. None

Answer: C

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158. Find out the wrong statement

A. CAM plants open their stomata at night and close during day time

B. Spilitting of water takes place in the chloroplasts membrane

C. PSI is found in stromal as well as granal thylakoids

D. Current availability of CO_2 levels is limiting to the C_3 plants

Answer: B

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159. A plant biochemist received a spicemen from a fellow scientist who noticed that the plant's stomata are closed during the day. The biochemist observed that radioactive carbon supplied in the form of carbon dioxide fed to the plant at night, was first found in organic acids that accumulated in the vacuole.During the day, the label moved to sugars being manufactured in the chloroplast. What was the conclusion of the biochemist?

A. It is a CAM plant

B. It is a C4 plant

C. It is a C3 plant

D. It is a plant showing pentose phosphate pathway

Answer: A

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160. The C_2 glycolate cycle is also known as

A. PCR

B. PCO

C. PPP

D. EMP

Answer: B

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161. Carotenoids are

A. Glycoprotiens

B. Hydrocarbons

C. Polysaccharides

D. Lipoproteins

Answer: B

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162. Consider the following statement: -

1. PEP carboxylase has a high specificity for carbon dioxide and it never picks up oxygen -

2. Kranz anatomy and C_4 metabolism are found in only monocosts of hot climates and not in dicots. -

Which of the statement given above is/are correct?

A. 1 only

B. 2 only

C. Both 1 and 2

D. Niether 1 and 2

Answer: A

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163. Consider the following statements

A. The chloroplast pigments are fat soluble.

B. All the pigments of chloroplast are located in the thylakoid membranes.

Which of the statements given above is/are correct?

A. A only

B. B only

C. Both A and B

D. Niether A nor B

Answer: C

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164. Which of the following statements is true for photosynthesis?

A. Dark reactions occur only in dark

B. Dark and light reactions always occur simultaneously

C. Dark reactions occur only when light reactions stop

D. Dark reactions may also occur in dark

Answer: D

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165. Which of the following is a true?

A. The number of O_2 molecules produeced (in photosynthesis) per quantum of light absorbed, is called quantum requirement

B. The number of light quanta needed for the production of one molecule of oxygen during photosynthesis, is called quantum yield.

C. The quantum requirement of photosythesis is 8 quanta

D. Emerson's first effect is also called photosynthetic enhancement.

Answer: C

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166. Which of the following is false statement?

A. PEP acts as first acceptor of CO_2 in both CAM plants and C_4 plants.

B. The plants undergoing crassulacean acid metabolism do not undergo C_3 cycle

C. In CAM plants there is separation of intitial carboxylation and Calvin cycle in time instead of space in C_4 plants

D. All of the above

Answer: B

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167. Select the correct statement for photosynthesis

A. One photosythetic unit has about 2500 pigment molecules

B. Carotenoids cannot develop without light

C. Due to their special anatomy C_4 plants have very high rate of photorespiration

D. According to Munch hypothesis source tissue must have high turgor pressure and increased osmotic concentration

Answer: D

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168. Select the wrong statement

A. One Calvin cycle needed to form one glucose molecule

B. Reduction of one molecule of CO_2 to carbohydrate requires a minimum of 4 quanta of light

C. Reduction of $NADP^+$ to NADPH takes place during Calvin's cycle

D. All are wrong

Answer: D

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169. Cyclic photophosphorylation results in the formation of

A. ATP, NADPH and O_2

B. ATP

C. NADPH

D. ATP and NADPH

Answer: B

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170. Palisade parenchyma is absent in leaves of

A. Soyabean

B. Gram

C. Sorghum

D. Mustard

Answer: C

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171. Chemiosmosis was first described by

A. Paul D. Boyer

B. Peter Mitchell

C. John E Walker

D. Friedrich Miescher

Answer: B

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172. The mapping of the pahtway of carbon assimilation in photosythesis earned Noble Prize in 1961 to

A. Melvin Calvin

B. Alfonso Corti

C. Henry Dixon

D. Carl Mobius

Answer: A

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173. In Photosytem-I (PSI) of light reaction which substrate works as an electron acceptor?

A. NAD^+

B. ADP

C. $NADP^+$

D. $FADH^+$

Answer: C

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174. Read the following four statement A,B,C and D and select the right opition having both correct statements.

statements

(a) Z scheme of light raction takes place in presence of PS I only .

(B) Omly PS I is functional in cyclic photosporylation

(c) Cyclic photophosphorylation results into synthesis of ATP and $NADPH_2$

(D) Stroma lamllae lack PSII as welll as NADP

A. B and D

B. A and B

C. B and C

D. C and D

Answer: A

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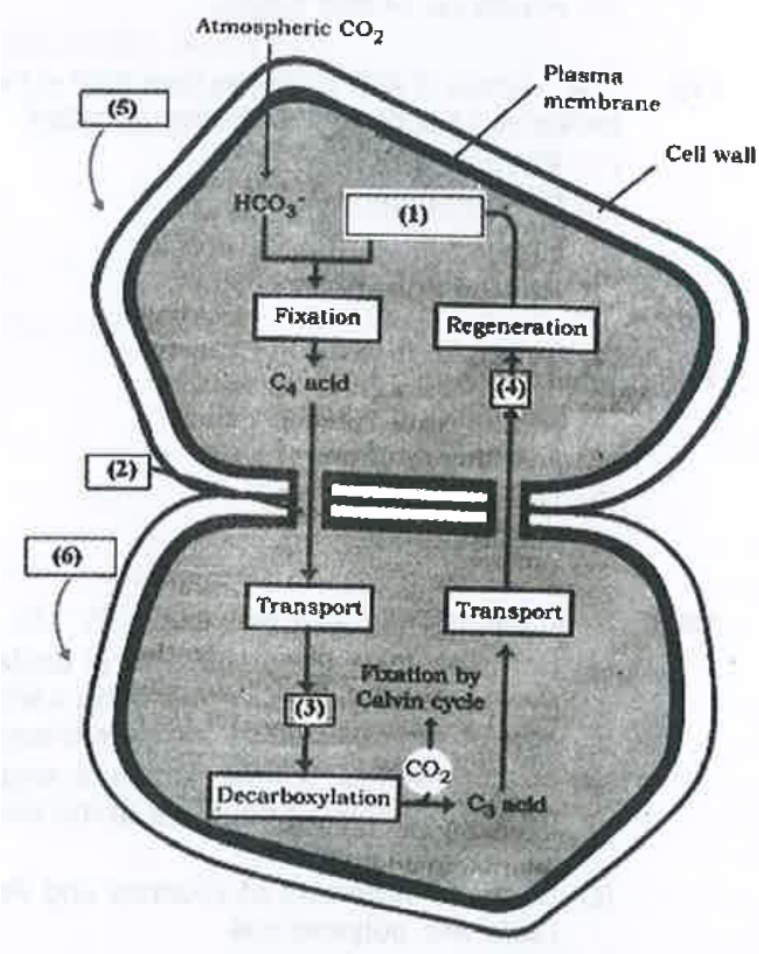
175. Go through the following figure and find out the option which reflects the correct labelling



A. (1) RuBP, (2) Plasmodesmata, (3) C_4 acid, (4) C_3 acid, (5) Bundle sheath cell, (6) Mesophyll cell

B. (1) Phosphoenol pyruvate, (2) Plasmodesmata, (3) C_3 acid, (4) C_4 acid, (5) Mesophyll cell, (6) Bundle sheath cell

C. (1) Phosphoenol pyruvate, (2) Plasmodesmata, (3) C_4 acid, (4) C_3 acid, (5) Mesophyll cell, (6) Bundle sheath cell

D. (1) RuBP, (2) Plasmodesmata, (3) C_4 acid, (4) C_3 acid, (5) Mesophyll cell, (6) Bundle sheath cell

Answer: C

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176. Kranz anatomy is one of the characteristics of the leaves of

A. Potato

B. Wheat

C. Sugarcane

D. Mustard

Answer: C

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177. C_4 plants are more efficient in photosynthesis than C_3 plants due to

A. Lowest rate of photorespiration

B. Higher leaf area

C. Presence of larger number of chloroplasts in the leaf cells

D. Presesnce of thin cuticle

Answer: A

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178. The process of ATP synthesis from ADP in the presence of light in chlororplasts is called

A. Photoelectron transport

B. Photophosphorylation

C. Photo system-II

D. Photorespiration

Answer: B

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179. CAM helps the plants in

A. Conserving water

B. Secondary growth

C. Disease resistance

D. Reproduction

Answer: A

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180. Read the following four statements (A-D)

(A) Both, photophosphorylation and oxidative phoshorylation involve up hill transport of protons across the membrane

(B) In dicot stems, a new cambium origanets from the cell of pericycle at trhe time of secondary growth

(C) Stamens in flowers of Gloriosa and Petunia are polyandrous

(D) Symbiotic nitrogen-fixers occur in the free-living state also in soil

How many of the above statements are right

A. i) Four

B. ii) One

C. iii) Two

D. iv) Three

Answer: D

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181. A process that makes important diference between C_3 and C_4 plants is

A. Glycolysis

B. Photosynthesis

C. Photorespiration

D. Transpiration

Answer: C

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182. The correct sequence of cell organelles during photorespiration is

A. Chloroplast-Rough Endoplasmic reticulum-Dictyosomes

B. Chloroplast-peroxisome-mitochondria

C. Chloroplast-vacuole-peroxisome

D. Chloroplast-Golgibodies-Mitochondria

Answer: B

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183. In Calvin cycle, to form one molecule of glucose how many number of ATP and NADPH molecules are utilized?

A. 12ATP and 9NADPH

B. 6ATP and 4NADPH

C. 18ATP and 12NADPH

D. 20ATP and 24NADPH

Answer: C

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184. The substrate for photorespiration is

A. Phosphoenol pyruvic acid

B. Ribulose bi phosphate

C. ATP

D. RuBis CO

Answer: B

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185. The oxygen evolved during photosynthesis comes from water molecules. Which one of the following pairs of elements is involved in this reaction

A. Manganese and Chlorine

B. Manganese and Potassium

C. Magnesium and Molybdenum

D. Magnesium and Chlorine

Answer: A

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186. In photosynthesis, the light-independent re- actions take place at

A. Thylakoid lumen

B. Photosystem I

C. Photosystem II

D. Stromal matrix

Answer: D

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187. A plant in your garden avoids photore- spiratory losses, has improved water use ef- ficiency, shows high rates of photosynthe- sis at high temperatures and has improved efficiency of nitrogen utilisation. In which of the following physiological groups would you assign this plant

A. C_4

B. CAM

C. Nitrogen fixer

D. C_3

Answer: A

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188. Emerson's enhancement effect and Red drop have been instrumental in the discovery of

A. Two photosystems operating simultaneously

B. Photophosphorylation and cyclic electron transport

C. Oxidative phosphorylation

D. Photophosphorylation & non-cyclic electron transport

Answer: A

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189. In a chloroplast the highest number of pro- tons are found in

A. Lumen of thylakoids

B. Inter membrane space

C. Antennae complex

D. Stroma

Answer: A

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190. The process which makes major difference between C_3 and C_4 plants is

A. Glycolysis

B. Calvin cycle

C. Photorespiration

D. Respiration

Answer: C

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191. PEP is primary CO_2 acceptor in

A. C_3 plants

B. C_4 plants

C. C_2 plants

D. C_3 and $C_4 plants$

Answer: B

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192. With reference to factors affecting the rate of photosynthesis, which of the following statements is not correct?

A. Light saturation for CO_2 fixation occurs at 10% of full sunlight.

B. Increasing atmospheric CO_2 concentration up to 0.05% can enhance CO_2 fixation rate.

C. C_3 plants responds to higher temperatures with enhanced photosynthesis while C_4 plants have much lower temperature optimum.

D. Tomato is a greenhouse crop which can be grown in CO_2- enriched atmosphere for higher yield.

Answer: C

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193. Oxygen is not produced during photosynthesis by

A. Chara

B. Cycas

C. Nostoc

D. Green sulphur bacteria

Answer: D

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194. Stomatal movement is not affected by

A. CO_2 concentration

B. O_2 concentration

C. Light

D. Temperature

Answer: B

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195. Which of the following is not a product of light reaction of photosynthesis ?

A. Oxygen

B. NADPH

C. NADH

D. ATP

Answer: C

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