BIOLOGY

BOOKS - MTG BIOLOGY (ENGLISH)

PHOTOSYNTHESIS IN HIGHER PLANTS

Mcqs

1. Synthesis of complex organic substances from simple inorganic raw materials in the presence of sunlight and chlorophyll is called as ___ which is a ___ process.

A. photosynthesis, anabolic

B. photosynthesis, catabolic

C. respiration, anabolic

D. respiration, catabolic

Answer: A

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2. Which of the following correctly depicts the biochemical reaction of photosynthesis?

A. $C_6H_{12}O_6 + 6O_2 \xrightarrow{\text{Enzymes}} 6CO_2 + 6H_2O + \text{energy}$

B. $C_6H_{12}O_6 + 6O_2 + 6H_2O \rightarrow 6CO_2 + 12H_2O + \text{energy}$

C. $6CO_2 + 6H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2$

D. $6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2 + 6H_2O$

Answer: D

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3. Moll's half-leaf experiment proves that___ is essential for photosynthesis to take place

A. chlrophyll

B. CO_2

C. Light

D. H_2O

Answer: B

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4. Who demonstrated that green plansts purifty the foul air produced by breathing animals and burning candles?

A. Priestley

B. Ingenhousz

C. Sachs

D. Engelmann

Answer: A

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5. Which of the following scientists concluded by his experiments that green plant parts play a role in purifying the noxious air only in the pressure of sunlight?

A. Preistley

B. Ingenhousz

C. Sachs

D. Engelmann

Answer: B

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6. Ingenhousz in an experiment showed that in bright sunlight, small bubbles were formed around the green parts of the plant, while in the dark, they did not. He identified these bubbles to be of

A. CO_2

B. H_2O

C. O_2

D. H_2

Answer: C

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7. Who provided the evidence that glucose is formed during photosynthesis and is then stored in the form of starch?

A. Sachs

B. Engelmann

C. van Niel

D. Blackmann

Answer: A

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8. Who used prism, green alga Cladophora and aerobic bacteria and plotted the first action spectrum of photosynthesis?

A. Sachs

B. Amon

C. Arnold

D. Engelmann

Answer: D

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9. Who, after conducting experiments on purple and green sulphur bacteria, inferred that O_2 evolved during photosynthesis comes from H_2O not from CO_2?

A. Sachs

B. Engelmann

C. van Niel

D. Blackmann

Answer: C

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10. Which one of the following equation suggests that O_2 released during photosynthesis comes from water?

A. $6CO_2^{18} + 12H_2O \rightarrow 6O_2^{18} + C_6H_{12}O_6 + 6H_2O^{18}$

B. $6CO_2 + 12H_2O^{18} + \rightarrow 6O_2 + C_6H_{12}O_6 + 6H_2O^{18}$

C. $6CO_2^{18} + 12H_2O \rightarrow 6O_2^{18} + C_6H_{12}O_6 + 6H_2O$

D. $6CO_2 + 12H_2O^{!8} \rightarrow 6O_2^{18} + C_6H_{12}O_6 + 6H_2O$

Answer: D

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11. If green plant cells are incubated with O^{18}- labelled water, which of the following molecuels will become radioactive when the cells are exposed to light?

A. O_2

B. CO_2

C. H_2O

D. Sugar

Answer: A

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12. During high light intensity, the chloroplasts align themselves

A. in vertical position along lateral walls

B. along tangential walls

C. in centre and get scattered

D. perpendicular to light.

Answer: A

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13. Select the correct match.

A. Stroma-Light reactions

B. Membrane system-Trapping of light energy

C. Thylakoids $-CO_2$ fixation

D. Stromal lamellae-Synthesis of ATP

Answer: B

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14. Photosynthetic pigmetns such as chl a,chl b,xanthophyll and carotene can be separated by which of the following techniques?

A. paper chromatography

B. Gel Electophoresis

C. X-ray diffusion

D. ELISA test

Answer: A

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15. Chlorophyll a appears ___ in colour and chlorophyll b appears___ in colour in the chromatogram.

A. bluish green, yellowish green

B. yellowish green, bluish green

C. blue, blue

D. green,green

Answer: A

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16. Study the following statements regarding chl a molecule.

(i) Molecular formula of chl a is $C_{55}H_{72}O_5N_4Mg$.

(ii) It is the primary photosynthetic pigment.

(iii) In pure state, it is red in colour and thus it absorbs more blue wavelength of light than the red wavelength.

(iv) It is soluble in water as well as pertroleum ether. Which of the above statements is/are not correct

A. a) i and iii

B. b) iii and iv

C. c) ii only

D. d) iv only

Answer: B

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17. Red colour of tomatoes, carrots and chillies is due to the presence of a type of carotene pigment called as

A. lutein

B. lycopene

C. fucoxanthin

D. phycoerythrin.

Answer: B

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18. Yellowish colour of autumn foliage is due to the presence of a type of xanthophyll pigment called as

A. lutein

B. lycopene

C. fucoxanthin

D. zeaxanthin.

Answer: A

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19. Which of these is a type of phycobilin pigments?

A. Phycocyanin

B. Allophycocyanin

C. Phycoerythrin

D. All of these

Answer: D

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20. Visible part of electromagnetic spectrun consists of radiations having a wavelength in the range of

A. 400-800nm

B. 300-2600nm

C. 390-760 nm

D. 650-760nm

Answer: C

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21. Indigo and red regions of VIBGYOR, respectively fall in the range of wavelenght

A. 430-470nm and 660-760nm

B. 300-390 nm and 600-650 nm

C. 390-760 nm and 430-470nm

D. 660-760 nm and 430-470nm

Answer: A

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22. Absorption spectrum of 'chl a' shows maximum absorption in ___ and ___ regions of light

A. blue and green

B. blue and red

C. red and green

D. red and far red

Answer: B

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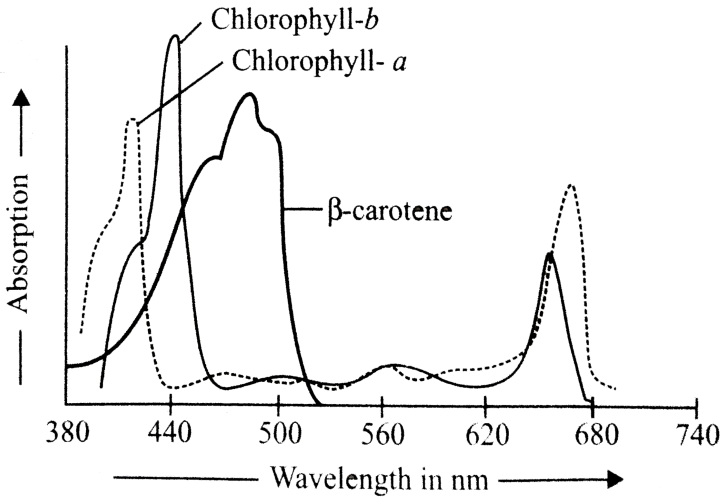
23. Given graph represents the absorption specra of three photosynthetic pigments chl a, chl b and β-carotene.



Select the correct statement regarding this.

A. The curve showing the amount of absorption of different wavelengths of light by a photosynthetic pigment is called as absorption spectrum

B. chl a and chl b absorb maximum light in blue and red wavelengths of light.

C. Rate of photosynthesis is maximum in blue and red wvelengths of light.

D. All of these

Answer: D

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24. Study the following statements.

(i) Red light falling in the ragne of wavelength 660-760nm is the most effective for photosynthesis.

(ii) Green light falling in the range of wavelength 500-580 nm is the least effective for photosynthesis.

(iii) Chl a,chl b carotenses and xanthophylls are soluble in organic solvents.

(iv) Phycobilins (phycocyanin, allophycocynin and phycoerythrin) are soluble in water

Which of the above statements is/are incorrect?

A. ii and iii

B. iii and iv

C. i only

D. None of these

Answer: D

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25. Accessory photosynthetic pigments in most green plants are

A. chlorophyll a

B. chlorophyll b

C. carotenoids and xanthophylls

D. both b and c

Answer: D

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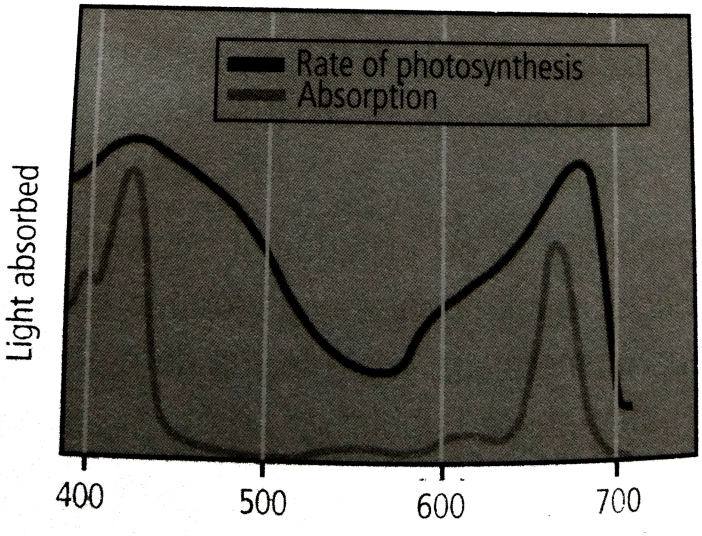
26. Consider the above given figure and select the option that can be best concluded from it.



A. The action spectrum shows a graphic representation of amount of light of different wavelenghts absorbed by a pigment.

B. Asorption spetrun shows a graphic representation of amount of light of different wavelenghts absorbed by a pigment.

C. Absorption spectrum depicts the relative rates of photsynthesis at different wavelenghts of light

D. Action spectrum corresponds closely to absorption spectra of chl a.

Answer: C

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27. Which of the following is produced during the light phase of photosynthesis?

A. ATP

B. NADPH _ (2)

C. Both ATP and $NADPH_2$

D. Carbohydrates

Answer: C

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28. Photochemical phase does not include

A. light absorpiton

B. water splitting and O_2 release

C. ATP and NADPH formation

D. CO_2 fixation.

Answer: D

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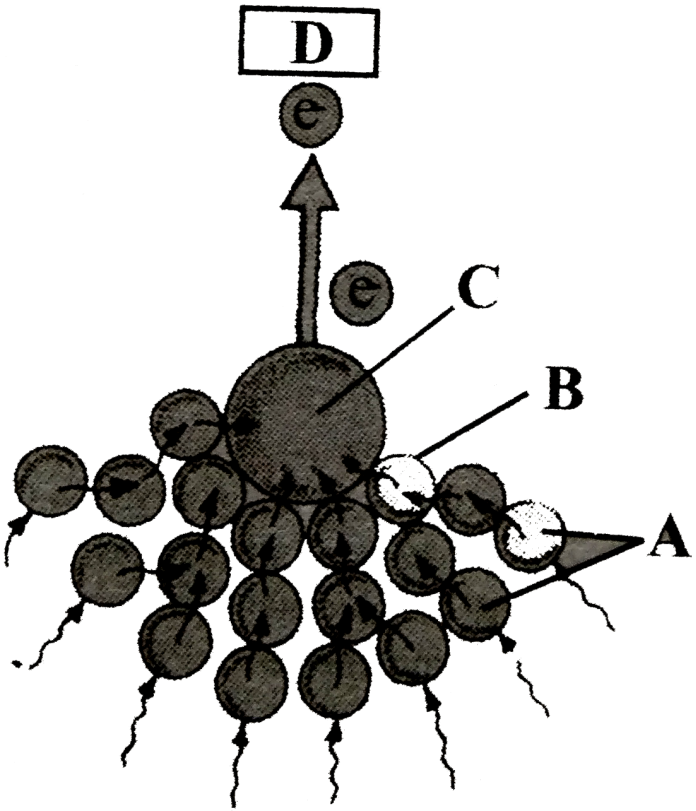
29. Given figure depicts the light harvesting comples (LHC) of photosystem I (PS I)



Select the correct identification for A,B,C and D

A. A Core molecuels B Antenna molecule C P_{680} D primary

B. A Antenna molecuels B Core C P_{700} D Primary

C. A Antenna molecuels B Core C P_{700} D Plastocyanin

D. A Core molecules B Reaction centre C P_{680} D Plastocyanin

Answer: B

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30. Reaction centre of PS I is ____ and reaction centre of PS II is___

A. P_{680}, P_{700}

B. P_{700}, P_{680}

C. P_{800}, P_{600}

D. P_{700}, P_{900}

Answer: B

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31. In PS I, the reaction centre chl a has absorption maxima at___whereas in PS II, the reaction centre Chl a has absorption maxima at ___

A. 700nm ,680nm

B. 680nm,700nm

C. 400nm,500nm

D. 700nm,800nm

Answer: A

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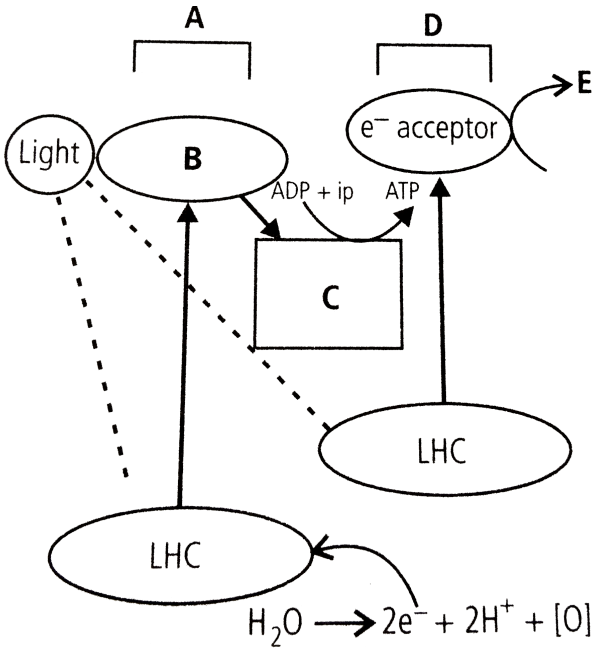
32. Identify A,B,C,D and E in the given flow chart showing Z-Scheme of light reaction.



A.

A	B	C	D	E
P_{700}	H^+ acceptor	e^- acceptor	P_{680}	$NADP^+$

B.

A	B	C	D	E
Photosystem I	e^- acceptor	e^- transport	photosystem II	NAD

C.

A	B	C	D	E
Photosystem II	H^+ acceptor	e^- acceptor	P_{700}	$NADPH$

D.

A	B	C	D
Photosystem II	e^- acceptor	$e(-)$ transport system	Photosyste

Answer: D

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33. The biochemical objective of PS I is to

A. oxidise NADPH

B. hydrolyse ATP

C. phosphorylate ADP

D. reduce NADP$(+)$

Answer: D

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34. Which one is involved in Z-scheme of photosynthesis?

A. PS I

B. PS II

C. e^- carriers

D. All of these

Answer: D

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35. For NADPH + H^+ formation

A. only PS I is required

B. only PS II is required

C. both PS I and PS II are required

D. only stroma is required.

Answer: C

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36. Which of the following is/are formed during Z-scheme of photophosphorylation?

A. ATP

B. $NADPH_2$

C. O_2

D. All of these

Answer: D

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37. The Z scheme of photophosphorylation follows the following sequence.

Which of the following option is correct for A,B,C and D tranfer of electrons?

A. $\underset{\text{Uphill}}{A}$ $\underset{\text{Downhill}}{B}$ $\underset{\text{Uphill}}{C}$ $\underset{\text{Downhill}}{D}$

B. $\underset{\text{Downhill}}{A}$ $\underset{\text{Uphill}}{B}$ $\underset{\text{Downhill}}{C}$ $\underset{\text{Uphill}}{D}$

C. $\underset{\text{Downhill}}{A}$ $\underset{\text{Uphill}}{B}$ $\underset{\text{Uphill}}{C}$ $\underset{\text{Downhill}}{D}$

D. $\underset{\text{Uphill}}{A}$ $\underset{\text{Downhill}}{B}$ $\underset{\text{Downhill}}{C}$ $\underset{\text{Uphill}}{D}$

Answer: A

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38. During Z scheme, electrons excited by absorption of light if PS I are transferred to the primary acceptors, and tehrefore must bereplaced. The

replacements come directly form

A. NADP

B. ATP

C. PS II

D. Water.

Answer: C

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39. Refer to the given reaction.

$2H_2O \rightarrow 4H^+ + O_2 + 4e^-$

Where does this reaction take place in the chloroplasts of plants?

A. Outer surface of thylakoid membrane

B. inner surface of thylakoid membrane

C. in the matrix (stroma)

D. intermembrane space

Answer: B

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40. Which one of the following ions is essential for photolysis of water?

A. Mangnaese

B. Zinc

C. Copper

D. Boron

Answer: A

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41. During photocatalytic splitting of water, liberation of O_2 requires

A. Mn^{2+}

B. Cl^{-}

C. Ca^{2+}

D. all of these.

Answer: D

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42. ___ is the process of synthesis of ATP from ADP and Pi in the presence of light.

A. Phosphorylation

B. Photophosphorylation

C. Photosystem

D. Oxidative phosporylation

Answer: B

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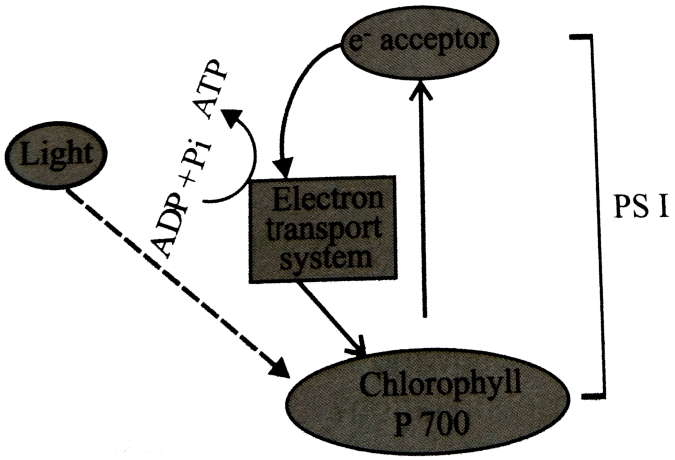
43. What does the given diagram represent with respect to the various photosynthetic process?



A. C_2 cycle

B. Cyclic photophosphorylation

C. Non-cyclic photophosphorylation

D. Z-scheme of phosphorylation

Answer: B

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44. PS II is located on

A. inner side of thylakoid, membrane

B. outer side of thylakoid membrane

C. lumen of thylakoid membrane

D. stroma lamellae.

Answer: A

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45. Read the following statements and selct the correct ones.

(i) PS I is involved in non-cyclic photophosphroylation only.

(ii) PS II is involved in both cyclic and non-cyclic photophosphorylation.

(iii) Stoma lamellae membranes possess PS I only whereas grana lamellae membranes possess both PS I and PS II.

A. i only

B. ii only

C. iii only

D. i,ii and iii

Answer: C

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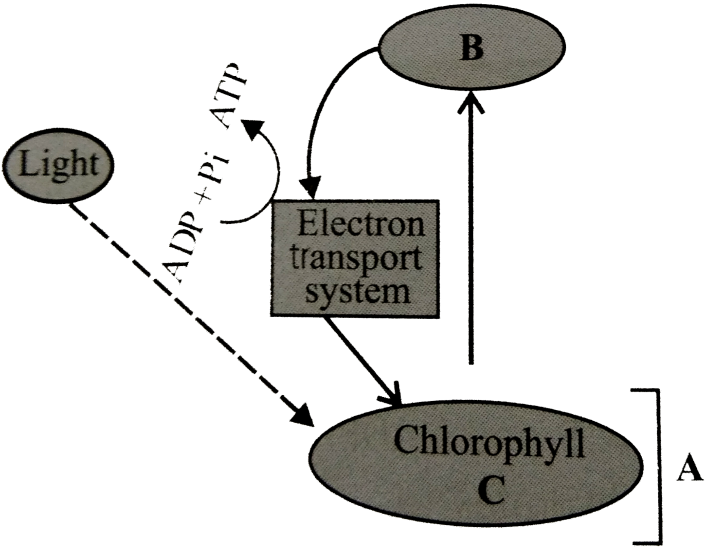
46. Study the given flow chart of cyclic photophosphorylation and selct the correct answer for A,B and C



A.
A	B	C
PS I	e^- acceptor	P_{680}

B.
A	B	C
PS I	e^(-)$aep \rightarrow r$	P_{700}

C.
A	B	C
PS II	Cytochrome	P_{700}

D.
A	B	C
PS II	Cytochrome	P_{680}

Answer: B

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47. In cyclic photophosphorylation, the electron released by reaction centre (P_{700}) is ultimately accepted by

A. ferrdoxin

B. $NADP^+$

C. reaction centre (P_{700})

D. plastocyanin.

Answer: C

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48. During non-cyclic photophosporylation, electrons arecontinously lost from the reaction centre of PS II. Which source is used to replace these electrons?

A. Sunlight

B. O_2

C. H_2O

D. CO_2

Answer: C

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49. Read the given statements and select the correct option.

Statement 1: In photosyntheis, during ATP synthesis, protons accumulate in the lumen of thylakoid.

Statement 2: In respiration, during ATP synthesis protons accumulate in the intermembranal space of mitochondria.

A. Both statement 1 and 2 are correct.

B. Statement 1 is correct but statement 2 is incorrect.

C. Statement 1 is incorrect but statement 2 is correct

D. Both statements 1 and 2 are incorrect.

Answer: A

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50. Assume a thylakoid which is somehow punctured so that the interior of the thylakoid is no longer separated from the stroma. This damage will have the most direct effect on which of the following processes?

A. Splitting of water

B. Absorption of light energy by chlorophyll

C. Flow of electrons from photosystem II to photosystem I

D. Synthesis of ATP

Answer: D

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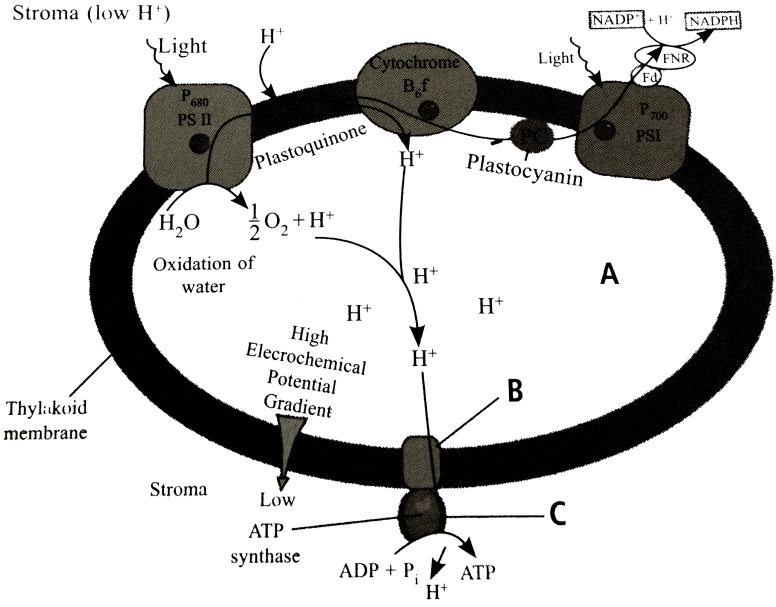
51. Identify the parts marked as A,B and C in the given figure showing ATP synthesis thorugh chemiosmosis.



A.

A	B	C
Thylakoid lumen	CF_0	CF_1

B.

A	B	C
Thylakoid lumen	CF_1	CF_0

C.

A	B	C
Chloroplast lumen	CF_0	CF_1

D.

A	B	C
Chloroplast lumen	CF_1	CF_0

Answer: A

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52. Breakdown of proton gradient developed during chemiosmosis leads to the release of

A. oxygen

B. water

C. energy

D. protons.

Answer: C

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53. During chemiosomotic synthesis of ATP, protons diffuse through CF_0 channels that activates ATPase enzyme As a result, one molecule of ATP is formed when___passes thorugh ATPase.

A. $4H^+$

B. H^+

C. $2H^+$

D. $6H^+$

Answer: C

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54. The herbicide DCMU kills the weeds because it inhibits

A. respiration

B. CO_2 fixation

C. cell division

D. NO_3^{2-} uptake

Answer: B

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55. Which of the following statements about dark reactions is correct?

A. They occur in darkness.

B. They are not light dependent.

C. They are dependent upon the products syntesised during light reactions.

D. All of these

Answer: C

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56. Following table summarises the differences between light reactions and dark reactions.

Which of the above paris of difference is/are incorrect?

A. i and iv

B. iii and iv

C. ii only

D. i only

Answer: D

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57. If green plant cells are incubated with O^{18}labelled CO_2. Which of the following molecules will become radioactive when the cells are exposed to light?

A. ATP

B. Water

C. Sugar

D. O_2

Answer: C

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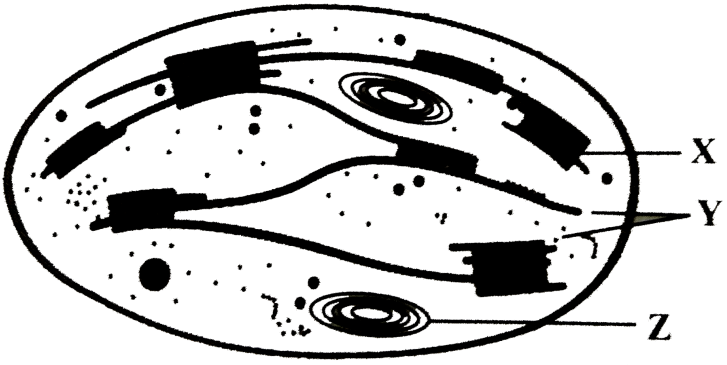
58. Refer to the given diagrammatic representation of an electron micrograph of a section of chloroplast and answer the



Select the option that correct identifes X,Y and Z.

A. X Stroma Y Grana Z Chloroplast DNA

B. X Stroma Y Grana Z Starch granule

C. X Grana Y Stroma Z Starch granule

D. X Grana Y Stroma Z Chloroplast DNA

Answer: C

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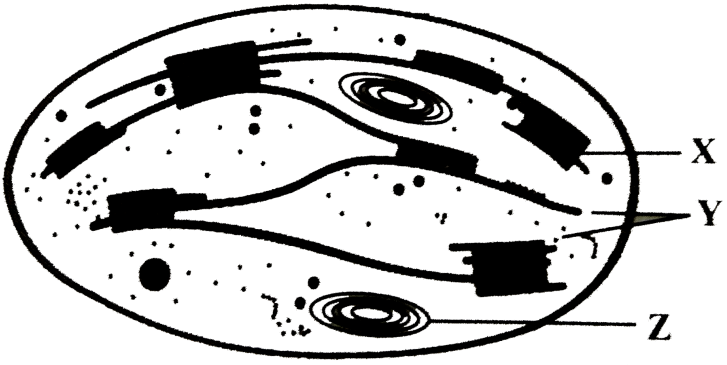
59. Refer to the given diagrammatic representation of an electron micrograph of a section of chloroplast and answer the



Select the option which correctly depicts the functions of parts X,Y and Z

A.

X	Y	Z
Dark reaction	Light reaction	Cytoplasmic inheritance

B.

X	Y	Z
Light reaction	Carbohydrate synthesis	Carbohydrate storage

C.

X	Y	Z
Light reaction	Carbohydrate storage	Carbohydrate synthesis

D.

X	Y	Z
Carbohydrate synthesis	Carboyhydrate storage	Cytoplasmic inhe

Answer: B

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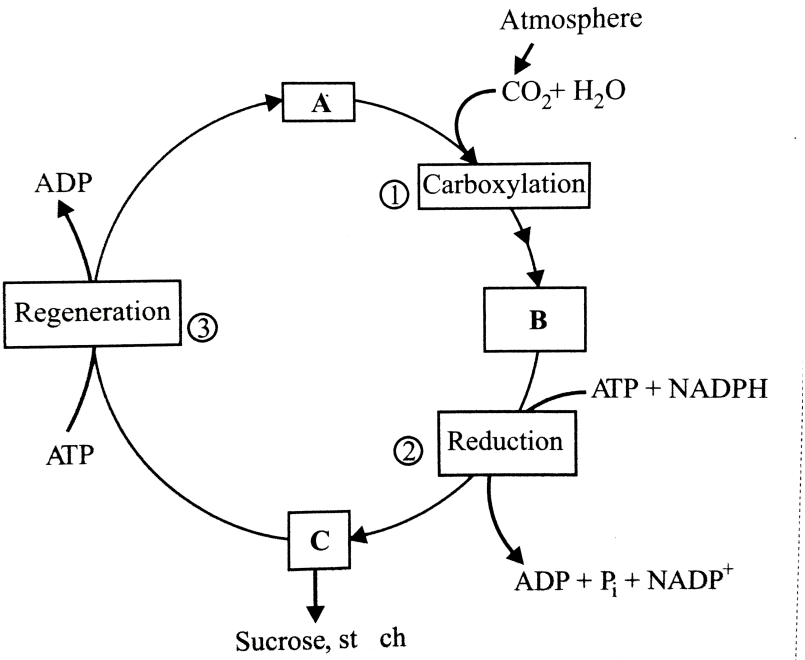
60. In the given representation of Calvin cycle, identify A, B and C and slect the correct option.



A. A B C
3PGA RuBP Triose phosphate

B. A B C
RuBP $3PGA$ Triose phosphate

C. A B C
PEP $Q\forall$ Malic acid

D. A B C
PEP $RuBP$ OAA

Answer: B

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61. Read the given statements and select the correct option.

Statement 1 : Carboxylation is the most crucial step of Calvin cycle where CO_2 is utilised for the carboxylation of RuBP.

Statement 2: Carboxylation is catalysed by the enzyme RuBis CO which results in the formation of two molecules of 3PGA.

A. Both statement 1 and 2 are correct.

B. Statement 1 is correct but statement 2 is incorrect.

C. Statement 1 is incorrect but statement 2 is correct

D. Both statements 1 and 2 are incorrect.

Answer: A

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62. Identify the correct sequence of stages of Calvin cycle.

A. Reduction $\rightarrow$ Carboxylation $\rightarrow$ Regeneration

B. Carboxylation $\rightarrow$ Regeneration $\rightarrow$ Reduction

C. Carboxylation $\rightarrow$ Reduction $\rightarrow$ Regeneration

D. Reduction $\rightarrow$ Regeneration $\rightarrow$ Carboxylation

Answer: C

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63. CO_2 combines with RuBP in the presence of enzyme RuBisCO to from 3PGA This process of Calvin cycle is included under

A. (a) carboxylation

B. (b) oxygenation

C. (c) reduction

D. (d) regeneration

Answer: A

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64. RuBisCO is

A. RuBP carboxylase

B. RuBP oxygenase

C. RuBP carboxylase-oxygenase

D. RuBP carboxydismutase.

Answer: C

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65. Glucose synthesis occurs during which stage of C_3 cycle?

A. Carboxylation

B. Oxygenation

C. Reduction

D. regeneration.

Answer: C

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66. During fixation of one molecule of CO_2 by C_3 plants, number of ATP and NADPH_(2)` required are

A. 3ATP and $2NADPH_2$

B. 5ATP and $NADPH_2$

C. 12 ATP and $12NADPH_2$

D. 2ATP and 3 $NADPH_2$

Answer: A

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67. How many ATP and NADPH molecuels are respectively required to mae one molecule of glucose through Calvin cycle?

A. 3 and 2

B. 9 and 6

C. 18 and 12

D. 12 and 18

Answer: C

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68. How many number of CO_2 molecules are required to synthesise one molecule of glucose during C_3 cycle?

A. One

B. Three

C. Six

D. Five

Answer: C

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69. Which of the following statements is incorrect regarding the Calvin cycle of C_3 plants?

A. First stable product of Calvin cycle in C_3 plants is 3-Phosphoglyceric acid.

B. Sunflower is an example of C_3 plants.

C. Calvin cycle occurs in bundle sheath cells of C_3 plants.

D. Enzyme PEP case is absent in C_3 plants.

Answer: C

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70. Kranz anatomy is not exhibited by which of the following plants?

A. Maize

B. Sorghum

C. Sugarcane

D. Sunflower

Answer: D

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71. Select the incorrect statement as far as Kranz anatomy is concerned.

A. (a) Undifferentiated mesophyll cells occur in concentric layers around vascular bundles.

B. (b) Centrifugal chloroplasts are present in bundle sheath cells.

C. (c) Large sized bundle sheath cells are arranged in a wreath-like manner in one to several layers.

D. (d) Chloroplasts of bundle sheath cells possess well developed grana lamellae.

Answer: D

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72. During Hatch and stack pathway, PEP combines with CO_2 in the presence of enzyme PEPcase, to form OAA. This process of initial fixation of CO_2 occurs in

A. mesophyll cells

B. bundle sheath cells

C. both a and b

D. None of these

Answer: A

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73. Consider following statements with respect to the C4 pathway and select the correct ones.

(i) Mesophyll cells possess both RuBisCO and PEPcase enzymes.

(ii) Initial CO_2 fixation occurs in mesophyll cells.

(iii) Final CO_2 fixation occurs in bundle sheath cells.

A. (a) i and iii

B. (b) ii and iii

C. (c) i and iii

D. (d) i, ii and iii

Answer: B

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74. In C_4 plants, Calvin cycle enzymes are present in

A. chloroplasts of mesophyl cells

B. chloroplasts of bundle sheath cells

C. cytoplasm of guard cells

D. cytoplasm of epidermal cells.

Answer: B

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75. Select the correct statement regarding the first stable product formed in Hatch and slack pathway in C_4 plants.

A. Oxaloacetate is formed by carboxylation of phosphoenol pyruvate (PEP) in the bundle sheath cells.

B. Oxaloacelate is formed by carboxylation of phosphoenol pyruvate (PEP) in the mesophyll cells.

C. Phosphoglyceric acid is formed in the mesophyll cells.

D. Phosphoglyceric acid is formed in the bundle sheath cells.

Answer: B

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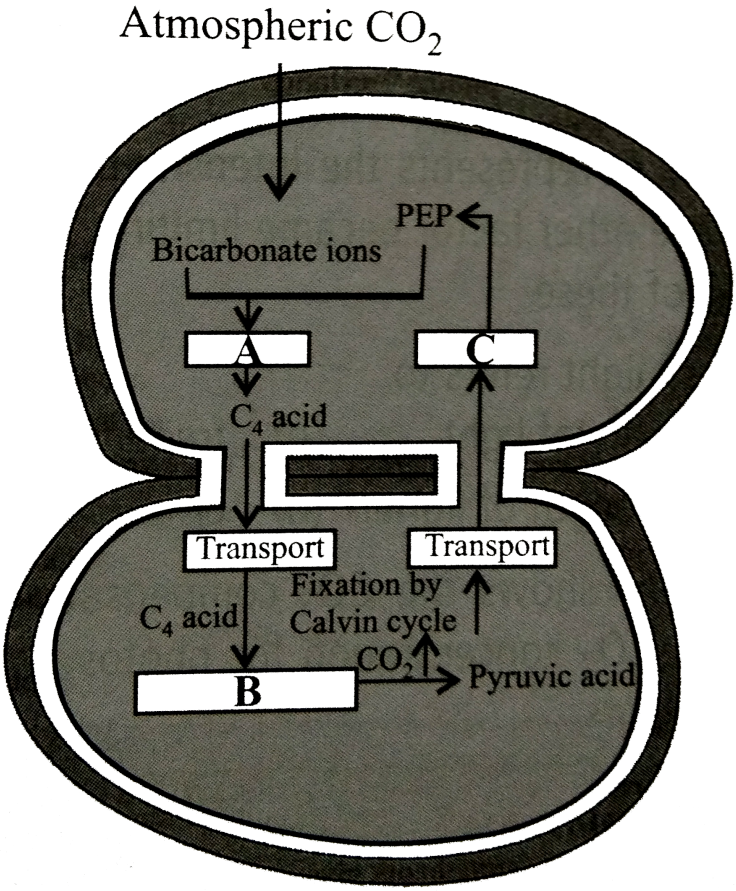
76. Given figure represents C_4 pathway. Select the suitable options for A,B and C.



A. (a) A Decarboxylation B Reduction C Regeneration

B. (b) A Fixation B Transamination C Regeneration

C. (c) A Carboxylation B Decarboxylation C Reduction

D. (d) A Fixation B Decarboxylation C Regeneration

Answer: D

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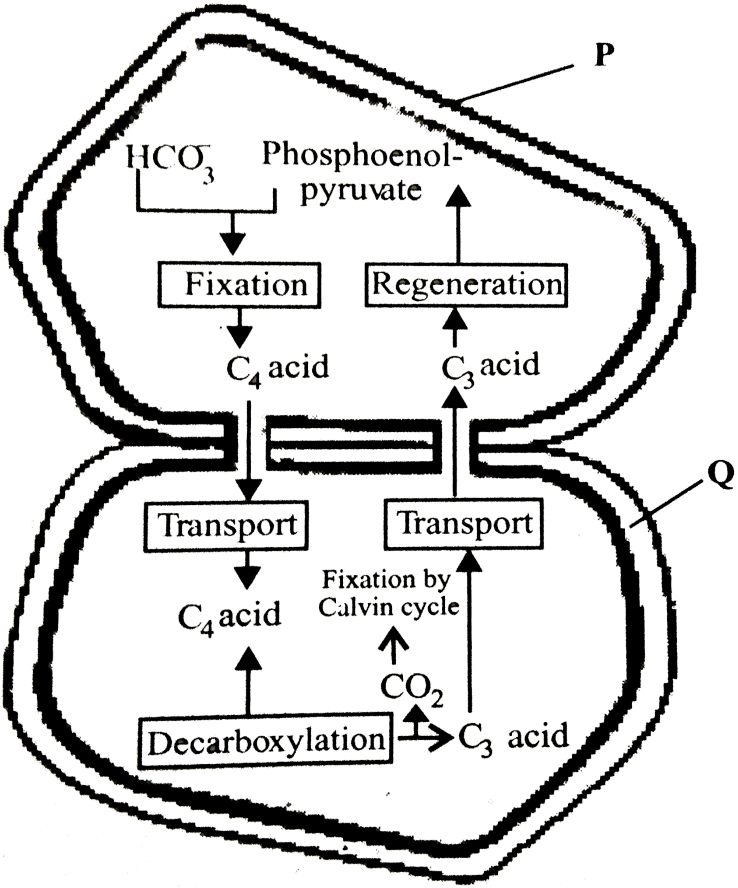
77. Which kind of cells are represented by letter P and Q in the given figure showing C_4 pathway?



A. *P* Palisade parenchyma *Q* Spongy parenchyma

B. *P* Spongy parenchyma *Q* Palisade parenchyma

C. *P* Mesophyll cell *Q* Bundle sheath cell

D. *P* Bundle sheath cell *Q* Mesophyll cell

Answer: C

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78. In an experiment in which photosynthesis is perforemd during the day. You provide a plant with radioactive carbon dioxide $\left(.^{14}CO_2\right)$ as a metabolic tracer. The $.^{14}C$ is incorporated first into oxaloacetic acid. The plant is best characterised as a

A. C_4 plant

B. C_3 plant

C. CAM plant

D. Insectivorous plant.

Answer: A

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79. Select the incorrect pair.

A. 2-carbon compound-Aspartic acid

B. 3-carbon compound-PGA

C. 4-carbon compound-Malic acid

D. 5-carbon compound-RuBP

Answer: A

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80. Optimum temperature conditions for photosynthesis in C_3 and C_4 plants are respectively

A. $10^\circ C - 25^\circ C$ and $30^\circ C - 45^\circ C$

B. $30^\circ C - 45^\circ C$ and $10^\circ C - 25^\circ C$

C. $0^\circ C - 10^\circ C$ and $10^\circ C - 30^\circ C$

D. $25^\circ C - 30^\circ C$ and $40^\circ C - 50^\circ C$.

Answer: A

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81. Read the given statements and select the correct option.

Statement 1: Crassulacean acid metabolism occurs in succulent plants which grow in xeric conditions.

Statement 2: Stomata are generally sunken in succulent plants.

A. Both statement 1 and 2 are correct.

B. Statement 1 is correct but statement 2 is incorrect.

C. Statement 1 is incorrect but statement 2 is correct

D. Both statements 1 and 2 are incorrect.

Answer: A

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82. Mathc column I with column II and selct the correct option from the given codes.

Column I	Column II
C_3Plants	(i)Kalanchoe,Opuntia
C_4plants	(ii)Maize,sugarcane
C_4plants	(iii)Maize,sugarcane

A. ii,iii,i

B. i,ii,iii

C. iii,ii,i

D. i,iii,ii

Answer: C

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83. Mathc column I with column II and select the correct option from the given codes.

column I	column II
C_4plants	(i)Succulents
Chlorophyll b	(ii)Accessory photosynthetic pigment
PS II	(iii)Photoxidation ofH_2O
CAM	(iv)Kranz anatomy

A. iv,ii,iii,i

B. iii,ii,iv,i

C. i,iii,ii,iv

D. i,ii,iii,iv

Answer: A

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84. The enzyme RuBisCO has

A. (a) more affinity for CO_2 than for O_2

B. (b) more affinity for O_2 than for CO_2

C. (c) equal affinity for both

D. (d) more affinity for sugars than for CO_2

Answer: A

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85. Refer to the given reaction.

$$RuBP + O_2 \xrightarrow[\text{oxygenase}]{\text{RuBP}} \text{Phosphoglyceric acid} + \text{Phosphoglycolic acid}$$

It is the first reaction of

A. C_3 pathway

B. C_4 pathway

C. C_2 pathway

D. glycolysis.

Answer: C

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86. Read the given statements and selct the correct option.

Statement 1: Photorespiration interferes with the successful functioning of Calvin cycle.

Statement 2: Photorespiration oxidises ribulose-1,5 biphosphate which is an acceptor of CO_2 in Calvin cycle.

A. Both statement 1 and 2 are correct.

B. Statement 1 is correct but statement 2 is incorrect.

C. Statement 1 is incorrect but statement 2 is correct

D. Both statements 1 and 2 are incorrect.

Answer: A

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87. How many ATP and $NADPH_2$ are produced respectively in the process of photorespiration?

A. (a) 2 and 4

B. (b) 1 and 2

C. (c) 4 and 6

D. (d) 0 and 0

Answer: D

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88. During C_2 cycle, there occurs

A. (a) synthesis of sugars

B. (b) utilisation of ATP

C. (c) synthesis of ATP

D. (d) synthesis of NADPH

Answer: B

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89. Which organelle out of these does not participate in photorespiration?

A. Peroxisomes

B. Mitochondria

C. Chloroplasts

D. Golgi bodies

Answer: D

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90. The law of limiting factors was given by ___ in the year___

A. Blackman, 1905

B. Blackman, 1804

C. Engelemann, 1909

D. Warburg, 1920

Answer: A

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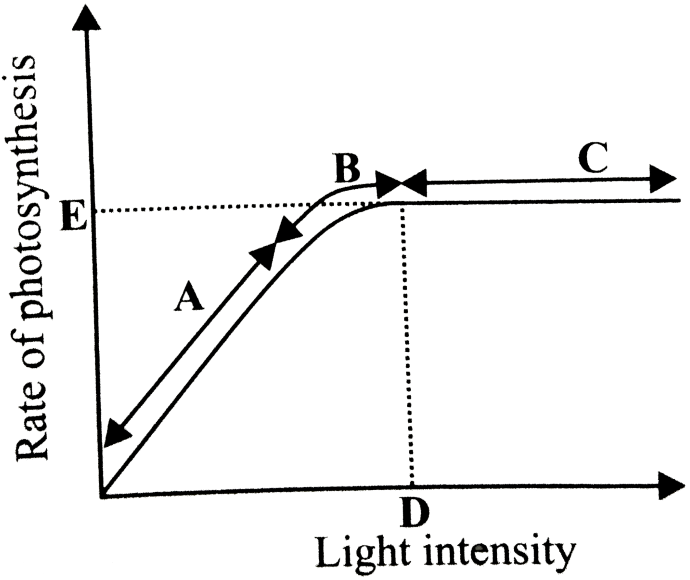
91. Study the given graph showing the efect of light intensity on the rate of photosynthesis. Which of the following statemetns regarding this is correct?



A. Light is a limiting factor in the region a.

B. Region C represents that rate of photosynthesis is because some other factor became limiting.

C. point D rrepresents the intensity of light at which some other factor became limiting

D. All of these

Answer: D

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92. Quality of light refers to

A. (a) Intensity of light

B. (b) Frequency of light

C. (c) Wavelength of light

D. (d) Duration of light

Answer: C

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93. Given table shows the CO_2 compensation point and optimum CO_2 concentration for photosynthesis for C_3 and C_4 plants.

	C_3 Plants	C_4 Plants
CO_2 compensation point	25 – 100ppm	A
Optimum Co_2 cocentration	B	360 ppm

Select the correct values for A and B.

A. A 0.50ppm B 300ppm

B. A $0 - 10\text{ppm}$ B 450ppm

C. A $100 - 150\text{ppm}$ B 250ppm

D. A $100 - 110\text{ppm}$ B 290ppm

Answer: B

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94. A point at which illuminated plant parts stop absorbing CO_2 from their enviroment, is known as

A. (a) CO_2 compensation point

B. (b) CO_2 saturation point

C. (c) CO_2 optimum point

D. (d) CO_2 limiting point.

Answer: A

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95. When temperature is increased from minimum to optimum, rate of photosynthesis doubles for every ____ rise in temperature.

A. (a) $1^\circ C$

B. (b) $10^\circ C$

C. (c) $20^\circ C$

D. (d) $30^\circ C$

Answer: B

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96. Tropical plants have a ___ temperature optimum than the plants adapted to temperate climates.

A. lower

B. equal

C. higher

D. None of these

Answer: C

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97. Warbung effect refers to

A. decreased photosynthetic rate at very high O_2 concentration

B. increased photosynthetic rate at very high O_2 concentration

C. decreased photosynthetic rate at very low O_2 concentration

D. increased photosynthetic rate at very low O_2 concentration

Answer: A

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98. Which of the following factors, besides being one of the reactants in the process of photosynthesis, indirectly affects its rate?

A. Oxygen

B. Carbon dioxide

C. Water

D. Chlorophyll

Answer: C

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99. Which of the following is not an external factor influencing photosynthesis?

A. CO_2 concentration

B. O_2 concentration

C. Availability of water

D. Chlorophyll concentration

Answer: D

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100. The factor which is not limiting in normal conditions for photosynthesis is

A. water

B. chlorophyll b

C. light

D. carbon dioxide.

Answer: B

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101. Consider the following statements regarding synthesis of starch and sucrose during daytime and select the correct ones.

(i) Triose phosphate is confined to chloroplast and is utilized for the synthesis of starch only.

(ii) Triose phosphate is translocated to cytosol from chloroplast.

(iii) Triose phosphate is utilized for the synthesis of both starch and sucrose.

(iv) Triose phosphate is translocated from cytosol to chloroplast.

A. (a) i and iii

B. (b) ii and iii

C. (c) ii and iv

D. (d) iii and iv

Answer: B

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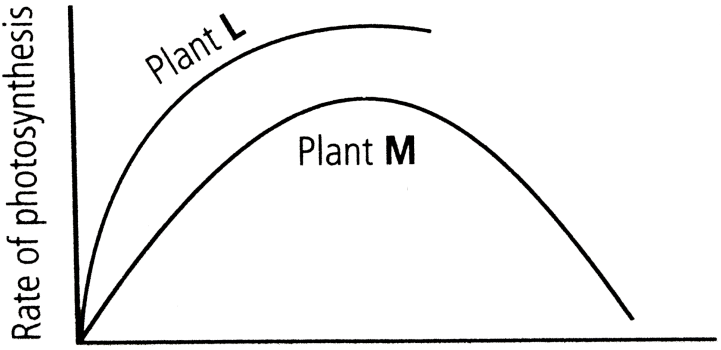
102. When two plants L and M were exposed to different light intensities and temperature they showed changes in their rates of photosynthesis. Which have been represented in the following graph.



The graph indicates that

A. Plant L is a C_3 plant for which the light saturation point is 100% of full sunlight

B. Plant M is a C_4 plant for which the optimum temperature s around $20^\circ C$

C. Plant M is a C_3 plant which is more affected at higher temperature and higher light intensity as compared to palnt L

D. plant L is a C_4 plant and cannot function at light intensities above the saturation point.

Answer: C

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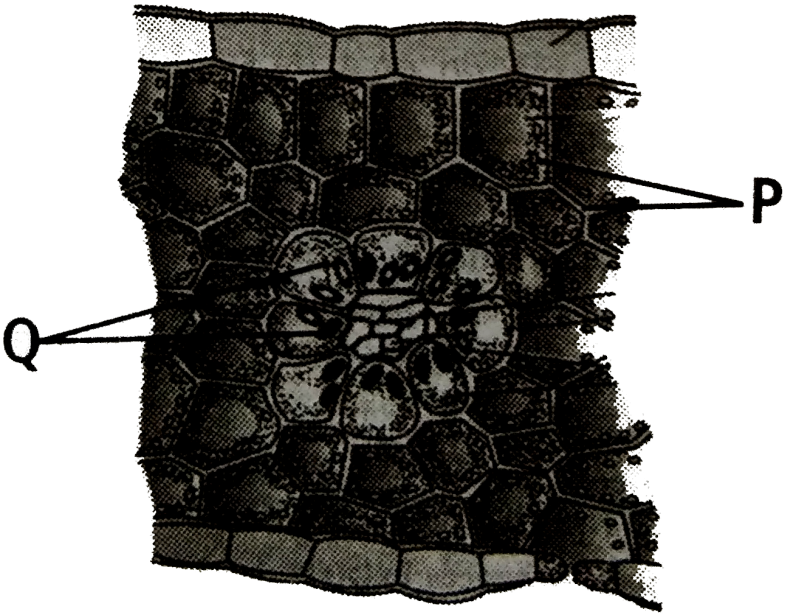
103. Refer to the given cross section of a C_4 leaf and select the incorrect option.



A. P are the chloroplasts in which thyiakoids are stacked together to form grans.

B. P are the chloroplasts which can perform light reaction, evolve molecular O_2 and produce assimilatory power.

C. Q are the chloroplasts in which thylakoids occur as stroma lamellae.

D. Q are the chloroplasts in which CO_2 is fixed by phosphoenol pyruvic acid to form oxaloacetic acid.

Answer: D

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104. When wheat and sugarcane leaves are fed with radioactive $.^{14}CO_2$. In which molecule would the radioactivity appear first in these plants?

A. 3-Phosphoglycerate Oxalocacetate

B. 3-Phosphoglycerate 3-Phosphoglycerate

C. Oxalocaetate Oxaloacetate

D. Malate 3-Phosphoglycerate

Answer: A

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105. Which of the following equations holds true for acidification reactions of CAM pathway?

A. $PEP + CO_2 + H_2O \xrightarrow{\text{PEPCase}} OAA + H_3PO_4$

B. $OAA + NADH \xrightarrow{\text{Dehydrogenase}} \text{Malic acid} + NAD^+$

C. $\text{Malic acid} + NADP^+ \xrightarrow[\text{enzyme}]{\text{Malic}} \text{Pyruvic acid} + CO + NADPH$

D.

Answer: D

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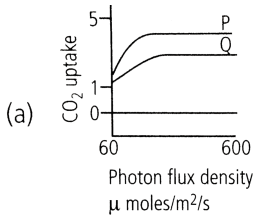
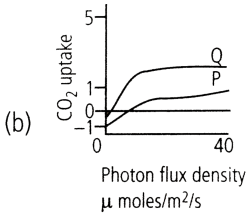
106. Which of the following graphs correctly depicts the rate of photosynthesis of sun plant (P) and shade plant (Q)?

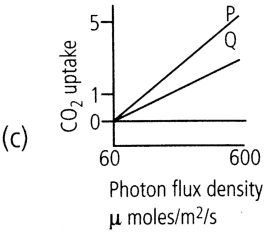
A.



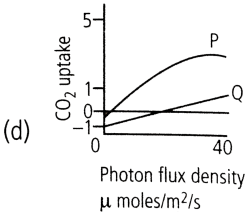
B.



C.



D.



Answer: D

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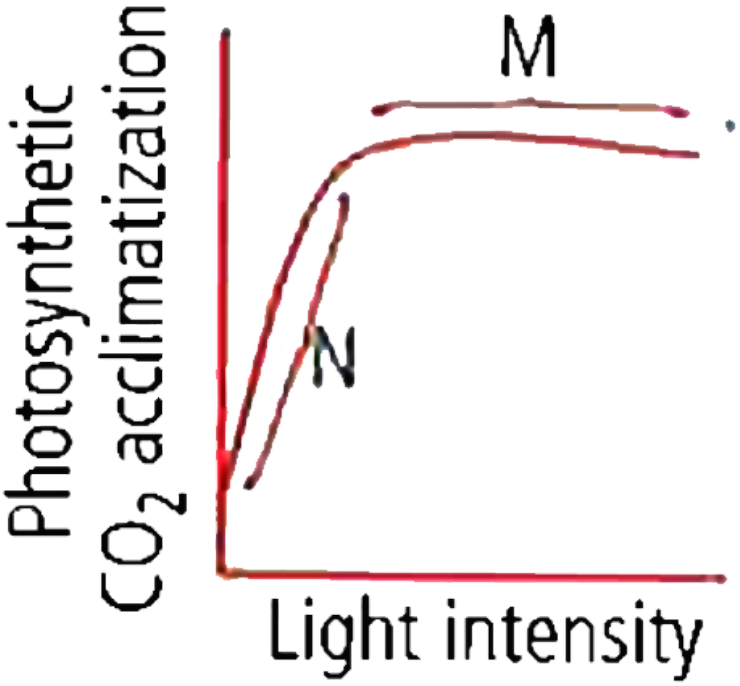
107. A typical light response curve of photosynthesis is shown. The limiting factos/s for photosynthesis at M and N is/are



A. temperature and CO_2 respectively

B. CO_2 and light respectively

C. only CO_2

D. light and CO_2 respectively.

Answer: B

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108. Which metal ion is a constituent of chlorophyll?

A. Iron

B. Copper

C. Manesium

D. Zinc

Answer: C

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109. Which pigment acts directly to convert light energy to chemical energy?

A. Chlorophyll a

B. Chlorophyll b

C. Xanthophyll

D. Carotenoid

Answer: A

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110. Which range of wavelenght (in nm) is called photosyntehtically active radiation (PAR)?

A. 100-390

B. 390-430

C. 400-700

D. 760-10,000

Answer: C

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111. Which light range is least effective in phosynthesis?

A. blue and green

B. Green

C. red and green

D. Violet

Answer: B

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112. Chemosynthetic bacteria obtain energy from

A. Sunlight

B. infra red rays

C. organic substances

D. inorganic chemicals.

Answer: D

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113. Energy required for ATP synthesis in PSII comes from

A. proton gradient

B. electron gradient

C. reduction of glucose

D. oxidation of glucose

Answer: A

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114. During light reaction in photosynthesis the following are formed.

A. ATP and sugar

B. hydrogen, O_2 and sugar

C. ATP, hydrogen donor and O_2

D. ATP, hydrogen and O_2 donor

Answer: C

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115. Dark reaction in photosynthesis is called so because

A. it can occur in dark also

B. it does not directly depend on light energy

C. it cannot occur during day light

D. it occurs more rapidly at night.

Answer: B

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116. PEP is primary CO_2 acceptor in

A. C_4 plants

B. C_3 plants

C. C_2 plants

D. both C_3 and C_4 plants.

Answer: A

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117. Splitting of water is associated with

A. photosystem I

B. lumen of thylakoid

C. both photosystem I and II

D. inner surface of thylakoid membrane

Answer: D

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118. The correct sequency of flow of electons in the light reaction is

A. PSII, plastoquinone, cytochromes, PSI, ferredoxin

B. PSI, plastoquinone, cytochromes, PSII, ferredoxin

C. PSI, ferredoxin, PSII

D. PSI,plastoquinone, cytochromes, PSII, ferredoxin.

Answer: A

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119. The enzyme that is not found in a C_3 plant is

A. RuBP carboxylase

B. PEP carboxylase

C. NADP reductase

D. ATP synthase.

Answer: B

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120. The reaction that is responsible for the primary fixation of CO_2 is catalysed by

A. RuBP carboxylase

B. PEP carboxylase

C. RuBP carboxylase and PEP carboxylase

D. PGA synthase.

Answer: C

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121. When CO_2 is added to PEP. The first stabel product synthesised is

A. Pyruvate

B. glyceradehyde-3-phosphate

C. phosphoglycerate

D. oxalocetate.

Answer: D

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122. Assertion : Chloroplasta occur inside the leaves mostly in mesophyll cells along their walls.

Reason: The membrane system of chloroplast is responsible for trapping the light energy and also for the synthesis of ATP and NADPH.

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123. Assertion: The color of the leaf is due to the presence of four pigments-chlorophyll a, chlorophyll b, xanthopylls and carotenoids.

Reason: Chlorophyll b is the chief pigment associated with phosynthesis

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124. Assertion: The splitting of water is associated with PS II.

Reason: Water is split into H^+, O_2 and electrons.

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125. Assertion: The stoma lamellae have both PS I and PS II.

Reason: The grana lamellae lack PS II and well as NADP reductase enzyme.

Photosynthesis in Higher Plants

A If both assertion and reason are true and reason is the correct explanation of assertion

B If both assertion and reason are true but reason is not the correct explanation of assertion

C If assertion is true but reason is false

D If both assertion and reason are false

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126. Assertion: The proton gradient is broken down due to the movement of protons across the membrane to stroma through the transmembrane channerl of the F_0 of the ATPase.

Reason: The breakdonw of proton gradient leads to release of energy.

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127. Dark reactions are called biosynthetic phase of photosynthesis.

Reason: Dark reactions do not directly depend on the presence of light but are dependent on the products of the light reaction, i.e., ATP and NADPH.

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128. Assertion: The first product of CO_2 fixation in C_3 pathway is OA A.

Reason: The first product of CO_2 fixation in C_4 pathway is PGA.

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129. Assertion: The C_4 plants have a speical type of leaf anatomy called kranz anatomy.

Reason: Chloroplasts of bundle sheath cells have well developed grana and starch grains.

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130. Assertion : The primary CO_2 acceptor in C_4 pathway is 3-carbon molecule phosphoenol pyruvate (PEP).

Reason: The enzyme responsible for this fixation is PEP carboxylase or PEPcase.

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131. Assertion: In C_4 plants, the bundle sheath cells are rich in an enzyme phosphoate carboxylase-oxygenase (PEP case). Reason: In C_4,the mesophyll cells are rich in an enzyme ribulose carboxylase-oxygenase(RuBisCo)

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132. Assertion: In C_4 plants, photorespiration does not occurs.

Reason: C_4 plants have a mechanism that increaes the concentration of CO_2 at the enzyme site.

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133. Assertion: Photorespiration is a wasteful process.

Reason: In photorespiratory pathway, there is not synthesis of sugars or ATP.

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134. Assertion: The external factors that affected photosynthesis are number, size age and orientation of leaves, mesophyll cells and chloroplasts and the amount of chlorophyll.

Reason: The internal factors that affect photosynthesis are availability of sunlight, temperature CO_2 concentration and water.

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135. Assertion: C_3 plants respond to increased CO_2 concentration by increaing rate of photosyntheis. ltbr. Reason: The higher productivity of some greenhouse crops such as tomatoes and bell pepper is due to increased CO_2 concentration

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136. Assertion: Tropical plants have a higher optimum temperature for photsynthesis than temperate plants

Reason: The temperature optimum for photosynthesis of different plants depends on their habitat.

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Photosynthesis In Higher Plants

1. Synthesis of complex organic substances from simple inorganic raw materials in the presence of sunlight and chlorophyll is called as ___ which is a ___ process.

A. photosynthesis, anabolic

B. photosynthesis, catabolic

C. respiration, anabolic

D. respiration, catabolic

Answer: A

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2. Which of the following correctly depicts the biochemical reaction of photosynthesis?

A. $C_6H_{12}O_6 + 6O_2 \xrightarrow{\text{Enzymes}} 6CO_2 + 6H_2O + \text{energy}$

B. $C_6H_{12}O_6 + 6O_2 + 6H_2O \rightarrow 6CO_2 + 12H_2O + \text{energy}$

C. $6CO_2 + 6H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2$

D. $6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2 + 6H_2O$

Answer: D

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3. Moll's half-leaf experiment proves that___ is essential for photosynthesis to take place

A. chlrophyll

B. CO_2

C. Light

D. H_2O

Answer: B

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4. Who demonstrated that green plansts purifty the foul air produced by breathing animals and burning candles?

A. Priestley

B. Ingenhousz

C. Sachs

D. Engelmann

Answer: A

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5. Which of the following scientists concluded by his experiments that green plant parts play a role in purifying the noxious air only in the pressure of sunlight?

A. Preistley

B. Ingenhousz

C. Sachs

D. Engelmann

Answer: B

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6. Ingenhousz in an experiment showed that in bright sunlight, small bubbles were formed around the green parts of the plant, while in the dark, they did not. He identified these bubbles to be of

A. CO_2

B. H_2O

C. O_2

D. H_2

Answer: C

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7. Who provided the evidence that glucose is formed during photosynthesis and is then stored in the form of starch?

A. Sachs

B. Engelmann

C. van Niel

D. Blackmann

Answer: A

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8. Who used prism, green alga Cladophora and aerobic bacteria and plotted the first action spectrum of photosynthesis?

A. Sachs

B. Amon

C. Arnold

D. Engelmann

Answer: D

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9. Who, after conducting experiments on purple and green sulphur bacteria, inferred that O_2 evolved during photosynthesis comes from H_2O not from CO_2?

A. Sachs

B. Engelmann

C. van Niel

D. Blackmann

Answer: C

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10. Which one of the following equation suggests that O_2 released during photosynthesis comes from water?

A. $6CO_2^{18} + 12H_2O \rightarrow 6O_2^{18} + C_6H_{12}O_6 + 6H_2O^{18}$

B. $6CO_2 + 12H_2O^{18} + \rightarrow 6O_2 + C_6H_{12}O_6 + 6H_2O^{18}$

C. $6CO_2^{18} + 12H_2O \rightarrow 6O_2^{18} + C_6H_{12}O_6 + 6H_2O$

D. $6CO_2 + 12H_2O^{!8} \rightarrow 6O_2^{18} + C_6H_{12}O_6 + 6H_2O$

Answer: D

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11. If green plant cells are incubated with O^{18}- labelled water, which of the following molecuels will become radioactive when the cells are exposed to light?

A. O_2

B. CO_2

C. H_2O

D. Sugar

Answer: A

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12. During high light intensity, the chloroplasts align themselves

A. in vertical position along lateral walls

B. along tangential walls

C. in centre and get scattered

D. perpendicular to light.

Answer: A

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13. Select the correct match.

A. Stroma-Light reactions

B. Membrane system-Trapping of light energy

C. Thylakoids $-CO_2$ fixation

D. Stromal lamellae-Synthesis of ATP

Answer: B

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14. Photosynthetic pigmetns such as chl a,chl b,xanthophyll and carotene can be separated by which of the following techniques?

A. paper chromatography

B. Gel Electophoresis

C. X-ray diffusion

D. ELISA test

Answer: A

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15. Chlorophyll a appears ___ in colour and chlorophyll b appears___ in colour in the chromatogram.

A. bluish green, yellowish green

B. yellowish green, bluish green

C. blue, blue

D. green,green

Answer: A

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16. Study the following statements regarding chl a molecule.

(i) Molecular formula of chl a is $C_{55}H_{72}O_5N_4Mg$.

(ii) It is the primary photosynthetic pigment.

(iii) In pure state, it is red in colour and thus it absorbs more blue wavelength of light than the red wavelength.

(iv) It is soluble in water as well as pertroleum ether. Which of the above statements is/are not correct

A. i and iii

B. iii and iv

C. ii only

D. iv only

Answer: B

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17. Red colour of tomatoes, carrots and chillies is due to the presence of a type of carotene pigment called as

A. lutein

B. lycopene

C. fucoxanthin

D. phycoerythrin.

Answer: B

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18. Yellowish colour of autumn foliage is due to the presence of a type of xanthophyll pigment called as

A. lutein

B. lycopene

C. fucoxanthin

D. zeaxanthin.

Answer: A

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19. Which of these is a type of phycobilin pigments?

A. Phycocyanin

B. Allophycocyanin

C. Phycoerythrin

D. All of these

Answer: D

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20. Visible part of electromagnetic spectrun consists of radiations having a wavelength in the range of

A. 400-800nm

B. 300-2600nm

C. 390-760 nm

D. 650-760nm

Answer: C

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21. Indigo and red regions of VIBGYOR, respectively fall in the range of wavelenght

A. 430-470nm and 660-760nm

B. 300-390 nm and 600-650 nm

C. 390-760 nm and 430-470nm

D. 660-760 nm and 430-470nm

Answer: A

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22. Absorption spectrum of 'chl a' shows maximum absorption in ___ and ___ regions of light

A. blue and green

B. blue and red

C. red and green

D. red and far red

Answer: B

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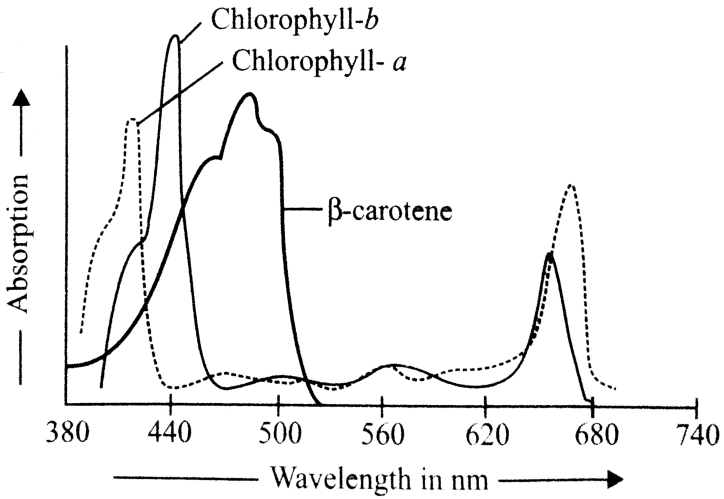
23. Given graph represents the absorption specra of three photosynthetic pigments chl a, chl b and β-carotene.



Select the correct statement regarding this.

A. The curve showing the amount of absorption of different wavelengths of light by a photosynthetic pigment is called as absorption spectrum

B. chl a and chl b absorb maximum light in blue and red wavelengths of light.

C. Rate of photosynthesis is maximum in blue and red wvelengths of light.

D. All of these

Answer: D

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24. Study the following statements.

(i) Red light falling in the ragne of wavelength 660-760nm is the most effective for photosynthesis.

(ii) Green light falling in the range of wavelength 500-580 nm is the least effective for photosynthesis.

(iii) Chl a,chl b carotenses and xanthophylls are soluble in organic solvents.

(iv) Phycobilins (phycocyanin, allophycocynin and phycoerythrin) are soluble in water

Which of the above statements is/are incorrect?

A. ii and iii

B. iii and iv

C. i only

D. None of these

Answer: D

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25. Accessory photosynthetic pigments in most green plants are

A. chlorophyll a

B. chlorophyll b

C. carotenoids and xanthophylls

D. both b and c

Answer: D

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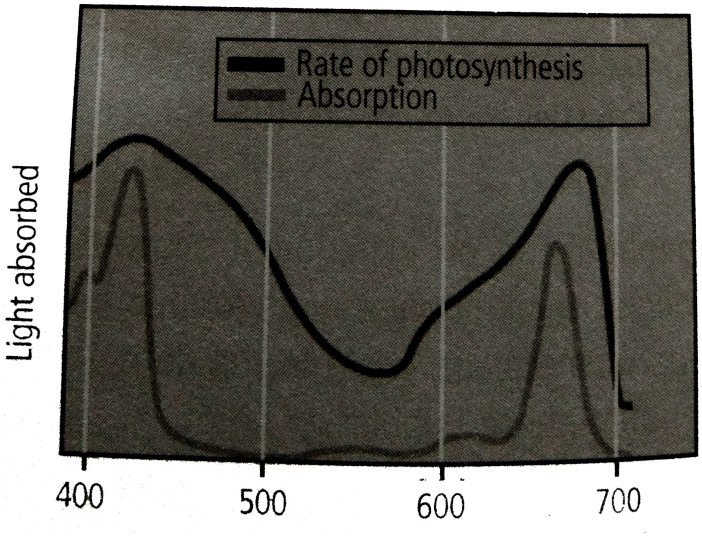
26. Consider the above given figure and select the option that can be best concluded from it.



A. The action spectrum shows a graphic representation of amount of light of different wavelenghts absorbed by a pigment.

B. Asorption spetrun shows a graphic representation of amount of light of different wavelenghts absorbed by a pigment.

C. Absorption spectrum depicts the relative rates of photsynthesis at different wavelenghts of light

D. Action spectrum corresponds closely to absorption spectra of chl a.

Answer: C

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27. Which of the following is produced during the light phase of photosynthesis?

A. ATP

B. NADPH _ (2)

C. Both ATP and $NADPH_2$

D. Carbohydrates

Answer: C

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28. Photochemical phase does not include

A. light absorpiton

B. water splitting and O_2 release

C. ATP and NADPH formation

D. CO_2 fixation.

Answer: D

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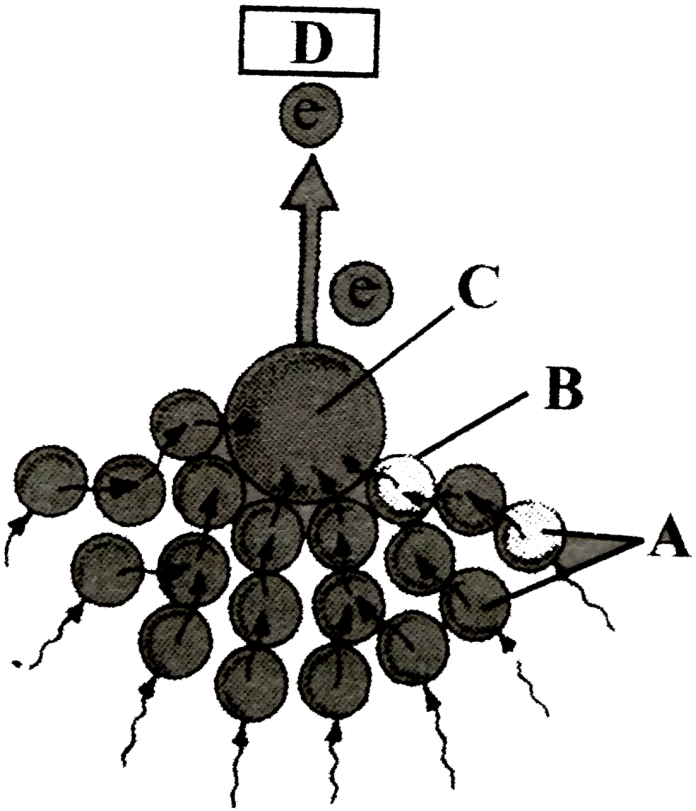
29. Given figure depicts the light harvesting comples (LHC) of photosystem I (PS I)



Select the correct identification for A,B,C and D

A. A Core molecuels B Antenna molecule C P_{680} D primary

B. A Antenna molecuels B Core C P_{700} D Primary

C. A Antenna moleculs B Core C P_{700} D Plastocyanin

D. A Core molecules B Reaction centre C P_{680} D Plastocyanin

Answer: B

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30. Reaction centre of PS I is ____ and reaction centre of PS II is___

A. P_{680}, P_{700}

B. P_{700}, P_{680}

C. P_{800}, P_{600}

D. P_{700}, P_{900}

Answer: B

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31. In PS I, the reaction centre chl a has absorption maxima at___whereas in PS II, the reaction centre Chl a has absorption maxima at ___

A. 700nm ,680nm

B. 680nm,700nm

C. 400nm,500nm

D. 700nm,800nm

Answer: A

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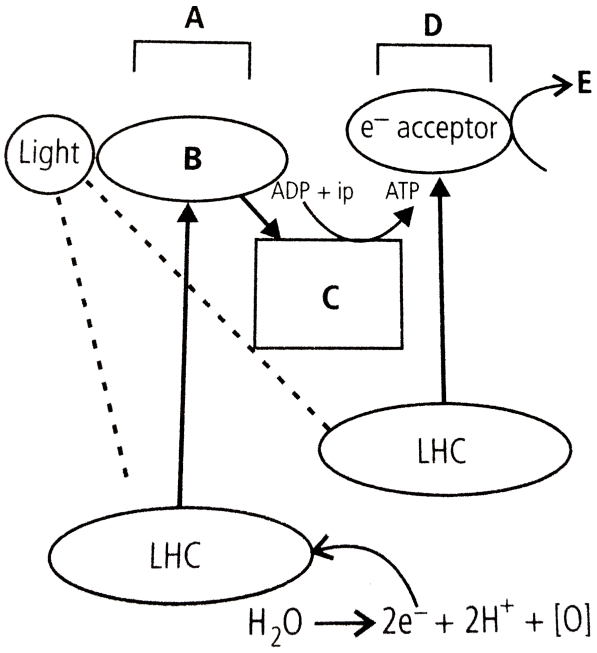
32. Identify A,B,C,D and E in the given flow chart showing Z-Scheme of light reaction.



A.

A	B	C	D	E
P_{700}	H^+ acceptor	e^- acceptor	P_{680}	$NADP^+$

B.

A	B	C	D	E
Photosystem I	e^- acceptor	e^- transport	photosystem II	NAD

C.

A	B	C	D	E
Photosystem II	H^+ acceptor	e^- acceptor	P_{700}	$NADPH$

D.

A	B	C	D
Photosystem II	e^- acceptor	$e(-)$transport system	Photosyste

Answer: D

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33. The biochemical objective of PS I is to

A. oxidise NADPH

B. hydrolyse ATP

C. phosphorylate ADP

D. reduce NADP$(+)$

Answer: D

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34. Which one is involved in Z-scheme of photosynthesis?

A. PS I

B. PS II

C. e^- carriers

D. All of these

Answer: D

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35. For NADPH + H^+ formation

A. only PS I is required

B. only PS II is required

C. both PS I and PS II are required

D. only stroma is required.

Answer: C

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36. Which of the following is/are formed during Z-scheme of photophosphorylation?

A. ATP

B. $NADPH_2$

C. O_2

D. All of these

Answer: D

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37. The Z scheme of photophosphorylation follows the following sequence.

Which of the following option is correct for A,B,C and D tranfer of electrons?

A. $\underset{\text{Uphill}}{A}$ $\underset{\text{Downhill}}{B}$ $\underset{\text{Uphill}}{C}$ $\underset{\text{Downhill}}{D}$

B. $\underset{\text{Downhill}}{A}$ $\underset{\text{Uphill}}{B}$ $\underset{\text{Downhill}}{C}$ $\underset{\text{Uphill}}{D}$

C. $\underset{\text{Downhill}}{A}$ $\underset{\text{Uphill}}{B}$ $\underset{\text{Uphill}}{C}$ $\underset{\text{Downhill}}{D}$

D. $\underset{\text{Uphill}}{A}$ $\underset{\text{Downhill}}{B}$ $\underset{\text{Downhill}}{C}$ $\underset{\text{Uphill}}{D}$

Answer: A

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38. During Z scheme, electrons excited by absorption of light if PS I are transferred to the primary acceptors, and tehrefore must bereplaced. The

replacements come directly form

A. NADP

B. ATP

C. PS II

D. Water.

Answer: C

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39. Refer to the given reaction.

$2H_2O \rightarrow 4H^+ + O_2 + 4e^-$

Where does this reaction take place in the chloroplasts of plants?

A. Outer surface of thylakoid membrane

B. inner surface of thylakoid membrane

C. in the matrix (stroma)

D. intermembrane space

Answer: B

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40. Which one of the following ions is essential for photolysis of water?

A. Mangnaese

B. Zinc

C. Copper

D. Boron

Answer: A

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41. During photocatalytic splitting of water, liberation of O_2 requires

A. Mn^{2+}

B. Cl^{-}

C. Ca^{2+}

D. all of these.

Answer: D

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42. ___ is the process of synthesis of ATP from ADP and Pi in the presence of light.

A. Phosphorylation

B. Photophosphorylation

C. Photosystem

D. Oxidative phosporylation

Answer: B

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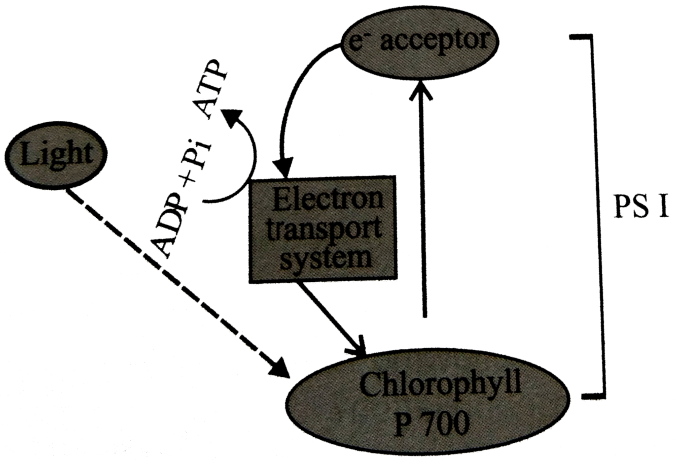
43. What does the given diagram represent with respect to the various photosynthetic process?



A. C_2 cycle

B. Cyclic photophosphorylation

C. Non-cyclic photophosphorylation

D. Z-scheme of phosphorylation

Answer: B

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44. PS II is located on

A. inner side of thylakoid, membrane

B. outer side of thylakoid membrane

C. lumen of thylakoid membrane

D. stroma lamellae.

Answer: A

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45. Read the following statements and selct the correct ones.

(i) PS I is involved in non-cyclic photophosphroylation only.

(ii) PS II is involved in both cyclic and non-cyclic photophosphorylation.

(iii) Stoma lamellae membranes possess PS I only whereas grana lamellae membranes possess both PS I and PS II.

A. i only

B. ii only

C. iii only

D. i,ii and iii

Answer: C

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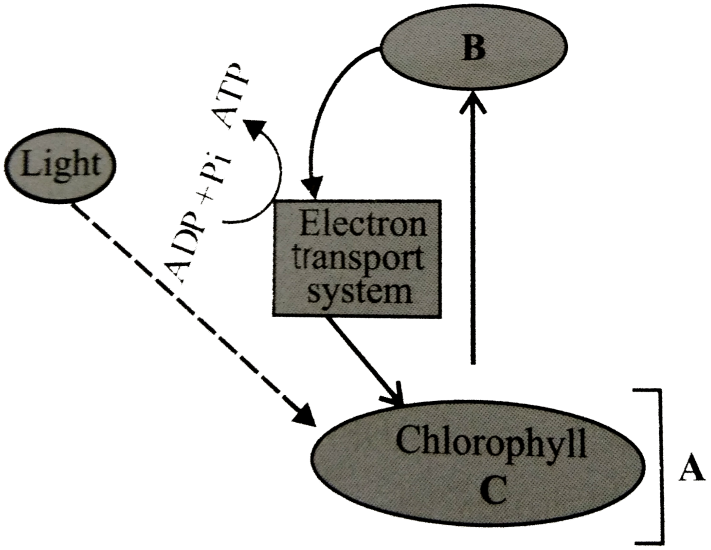
46. Study the given flow chart of cyclic photophosphorylation and selct the correct answer for A,B and C



A. $\begin{matrix} A & B & C \\ \text{PS I} & e^- \text{acceptor} & P_{680} \end{matrix}$

B. $\begin{matrix} A & B & C \\ \text{PS I} & \text{e}\hat{}(\text{-})aep \rightarrow r & P_{700} \end{matrix}$

C. $\begin{matrix} A & B & C \\ \text{PS II} & \text{Cytochrome} & P_{700} \end{matrix}$

D. $\begin{matrix} A & B & C \\ \text{PS II} & \text{Cytochrome} & P_{680} \end{matrix}$

Answer: B

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47. In cyclic photophosphorylation, the electron released by reaction centre (P_{700}) is ultimately accepted by

A. ferrdoxin

B. $NADP^+$

C. reaction centre (P_{700})

D. plastocyanin.

Answer: C

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48. During non-cyclic photophosporylation, electrons arecontinously lost from the reaction centre of PS II. Which source is used to replace these electrons?

A. Sunlight

B. O_2

C. H_2O

D. CO_2

Answer: C

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49. Read the given statements and select the correct option.

Statement 1: In photosyntheis, during ATP synthesis, protons accumulate in the lumen of thylakoid.

Statement 2: In respiration, during ATP synthesis protons accumulate in the intermembranal space of mitochondria.

A. Both statement 1 and 2 are correct.

B. Statement 1 is correct but statement 2 is incorrect.

C. Statement 1 is incorrect but statement 2 is correct

D. Both statements 1 and 2 are incorrect.

Answer: A

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50. Assume a thylakoid which is somehow punctured so that the interior of the thylakoid is no longer separated from the stroma. This damage will have the most direct effect on which of the following processes?

A. Splitting of water

B. Absorption of light energy by chlorophyll

C. Flow of electrons from photosystem II to photosystem I

D. Synthesis of ATP

Answer: D

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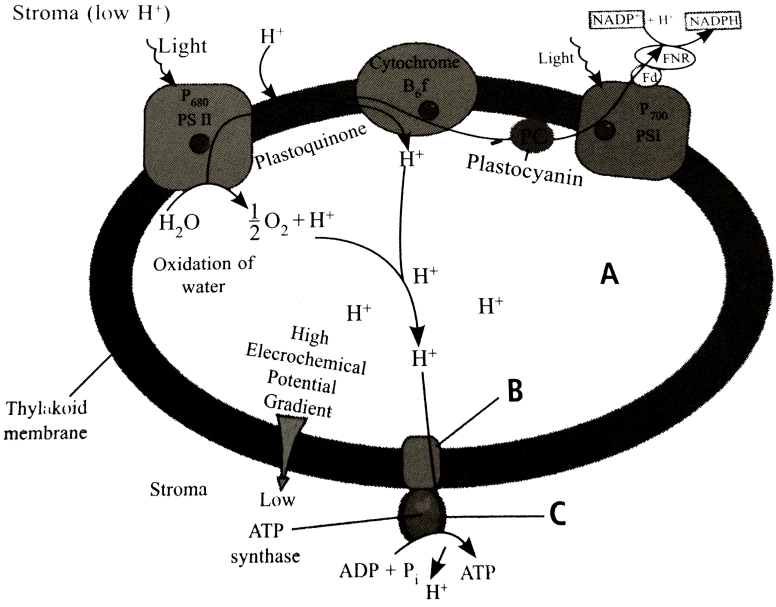
51. Identify the parts marked as A,B and C in the given figure showing ATP synthesis thorugh chemiosmosis.



A.

A	B	C
Thylakoid lumen	CF_0	CF_1

B.

A	B	C
Thylakoid lumen	CF_1	CF_0

C.

A	B	C
Chloroplast lumen	CF_0	CF_1

D.

A	B	C
Chloroplast lumen	CF_1	CF_0

Answer: A

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52. Breakdown of proton gradient developed during chemiosmosis leads to the release of

A. oxygen

B. water

C. energy

D. protons.

Answer: C

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53. During chemiosomotic synthesis of ATP, protons diffuse through CF_0 channels that activates ATPase enzyme As a result, one molecule of ATP is formed when___passes thorugh ATPase.

A. $4H^+$

B. H^+

C. $2H^+$

D. $6H^+$

Answer: C

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54. The herbicide DCMU kills the weeds because it inhibits

A. respiration

B. CO_2 fixation

C. cell division

D. NO_3^{2-} uptake

Answer: B

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55. Which of the following statements about dark reactions is correct?

A. They occur in darkness.

B. They are not light dependent.

C. They are dependent upon the products syntesised during light reactions.

D. All of these

Answer: C

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56. Following table summarises the differences between light reactions and dark reactions.

Which of the above paris of difference is/are incorrect?

A. i and iv

B. iii and iv

C. ii only

D. i only

Answer: D

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57. If green plant cells are incubated with O^{18}labelled CO_2. Which of the following molecules will become radioactive when the cells are exposed to light?

A. ATP

B. Water

C. Sugar

D. O_2

Answer: C

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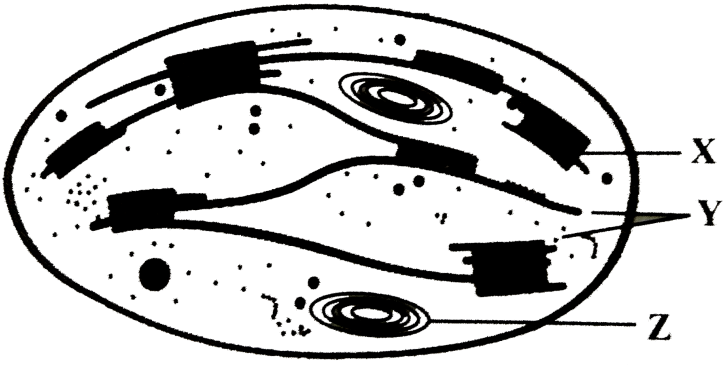
58. Refer to the given diagrammatic representation of an electron micrograph of a section of chloroplast and answer the



Select the option that correct identifes X,Y and Z.

A. X Stroma Y Grana Z Chloroplast DNA

B. X Stroma Y Grana Z Starch granule

C. X Grana Y Stroma Z Starch granule

D. X Grana Y Stroma Z Chloroplast DNA

Answer: C

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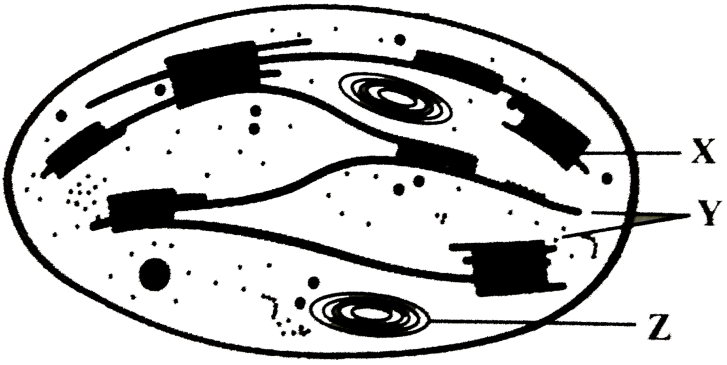
59. Refer to the given diagrammatic representation of an electron micrograph of a section of chloroplast and answer the



Select the option which correctly depicts the functions of parts X,Y and Z

A.

X	Y	Z
Dark reaction	Light reaction	Cytoplasmic inheritance

B.

X	Y	Z
Light reaction	Carbohydrate synthesis	Carbohydrate storage

C.

X	Y	Z
Light reaction	Carbohydrate storage	Carbohydrate synthesis

D.

X	Y	Z
Carbohydrate synthesis	Carboyhydrate storage	Cytoplasmic inhe

Answer: B

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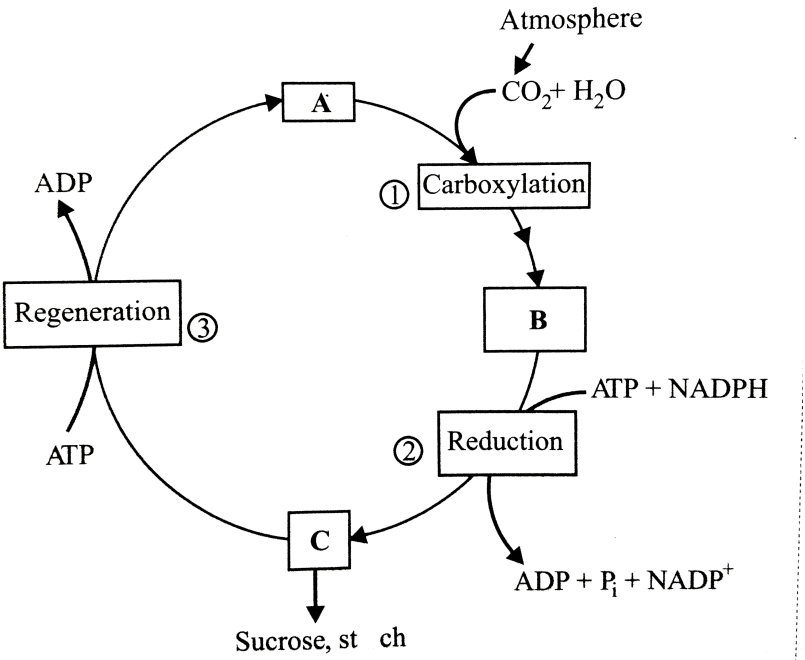
60. In the given representation of Calvin cycle, identify A, B and C and slect the correct option.



A. A B C
3PGA RuBP Triose phosphate

B. A B C
RuBP $3PGA$ Triose phosphate

C. A B C
PEP $Q\forall$ Malic acid

D. A B C
PEP $RuBP$ OAA

Answer: B

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61. Read the given statements and select the correct option.

Statement 1 : Carboxylation is the most crucial step of Calvin cycle where CO_2 is utilised for the carboxylation of RuBP.

Statement 2: Carboxylation is catalysed by the enzyme RuBis CO which results in the formation of two molecules of 3PGA.

A. Both statement 1 and 2 are correct.

B. Statement 1 is correct but statement 2 is incorrect.

C. Statement 1 is incorrect but statement 2 is correct

D. Both statements 1 and 2 are incorrect.

Answer: A

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62. Identify the correct sequence of stages of Calvin cycle.

A. Reduction $\rightarrow$ Carboxylation $\rightarrow$ Regeneration

B. Carboxylation $\rightarrow$ Regeneration $\rightarrow$ Reduction

C. Carboxylation $\rightarrow$ Reduction $\rightarrow$ Regeneration

D. Reduction $\rightarrow$ Regeneration $\rightarrow$ Carboxylation

Answer: C

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63. CO_2 combines with RuBP in the presence of enzyme RuBisCO to from 3PGA This process of Calvin cycle is included under

A. carboxylation

B. oxygenation

C. reduction

D. regeneration.

Answer: A

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64. RuBisCO is

A. RuBP carboxylase

B. RuBP oxygenase

C. RuPB carboxylase-oxygenase

D. RuBP carboxydismutase.

Answer: C

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65. Glucose synthesis occurs during which stage of C_3 cycle?

A. Carboxylation

B. Oxygenation

C. Reduction

D. regeneration.

Answer: C

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66. During fixation of one molecule of CO_2 by C_3 plants, number of ATP and NADPH_(2)` required are

A. 3ATP and $2NADPH_2$

B. 5ATP and $NADPH_2$

C. 12 ATP and $12NADPH_2$

D. 2ATP and 3 $NADPH_2$

Answer: A

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67. How many ATP and NADPH molecuels are respectively required to mae one molecule of glucose through Calvin cycle?

A. 3 and 2

B. 9 and 6

C. 18 and 12

D. 12 and 18

Answer: C

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68. How many number of CO_2 molecules are required to synthesise one molecule of glucose during C_3 cycle?

A. One

B. Three

C. Six

D. Five

Answer: C

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69. Which of the following statements is incorrect regarding the Calvin cycle of C_3 plants?

A. First stable product of Calvin cycle in C_3 plants is 3-Phosphoglyceric acid.

B. Sunflower is an example of C_3 plants.

C. Calvin cycle occurs in bundle sheath cells of C_3 plants.

D. Enzyme PEP case is absent in C_3 plants.

Answer: C

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70. Kranz anatomy is not exhibited by which of the following plants?

A. Maize

B. Sorghum

C. Sugarcane

D. Sunflower

Answer: D

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71. Select the incorrect statement as far as Kranz anatomy is concerned.

A. Undifferentiated mesophyll occurs in concentric layers around vascular bundles.

B. Centrifugal chloroplasta are present in bundle sheath cells.

C. Large sized bundle sheath cells are arranged in a wreath-like manner in one to several layers.

D. Chloroplasts of bundle sheath cells possess welldeveloped grana lamellae.

Answer: D

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72. During Hatch and stack pathway, PEP combines with CO_2 in the presence of enzyme PEPcase, to form OAA. This process of initial fixation of CO_2 occurs in

A. mesophyll cells

B. bundle sheath cells

C. both a and b

D. None of these

Answer: A

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73. Consider following statements with respect to the C4 pathway and select the correct ones.

(i) Mesophyll cells possess both RuBisCO and PEPcase enzymes.

(ii) Initial CO_2 fixation occurs in mesophyll cells.

(iii) Final CO_2 fixation occurs in bundle sheath cells.

A. i and iii

B. ii and iii

C. i and iii

D. i,ii,and iii

Answer: B

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74. In C_4 plants, Calvin cycle enzymes are present in

A. chloroplasts of mesophyl cells

B. chloroplasts of bundle sheath cells

C. cytoplasm of guard cells

D. cytolasm of epidermal cells.

Answer: B

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75. Select the correct statement regarding the first stable product formed in Hatch and slack pathway in C_4 plants.

A. Oxaloacetate is formed by carboxylation of phosphoenol pyruvate (PEP) in the mesophyll cells.

B. Oxaloacelate is formed by carboxylation of phosphoenol pyruvate (PEP) in the mesophyll cells.

C. Phosphoglyceric acid is formed in the mesophyll cells.

D. Phosphoglyceric acid is formed in the bundle sheath cells.

Answer: B

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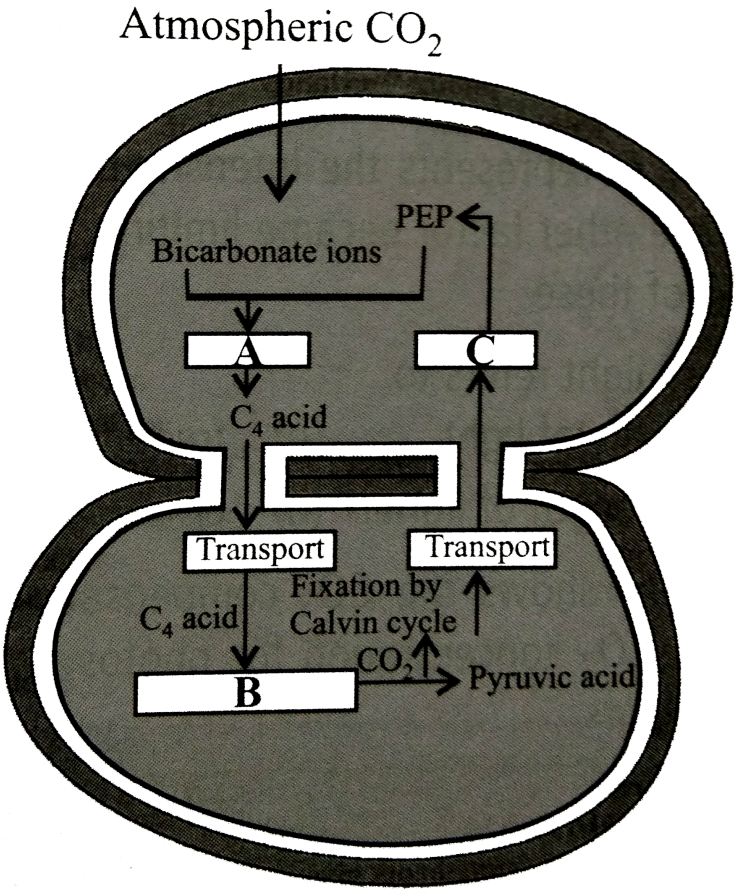
76. Given figure represents C_4 pathway. Select the suitable options for A,B and C.



A. A Decarboxylation B Reduction C Regeneration

B. A Fixation B Transamination C Regeneration

C. A Carboxylation B Decarboxylation C Reduction

D. A Fixation B Decarboxylation C Regeneration

Answer: D

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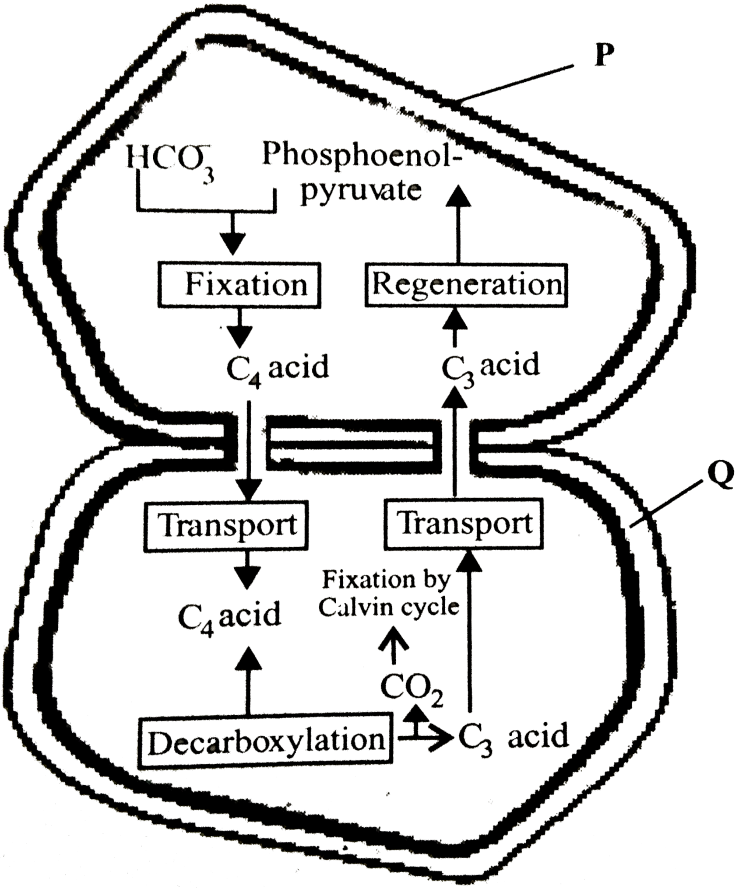
77. Which kind of cells are represented by letter P and Q in the given figure showing C_4 pathway?



A. *P* Palisade parenchyma *Q* Spongy parenchyma

B. *P* Spongy parenchyma *Q* Palisade parenchyma

C. *P* Mesophyll cell *Q* Bundle sheath cell

D. *P* Bundle sheath cell *Q* Mesophyll cell

Answer: C

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78. In an experiment in which photosynthesis is perforemd during the day. You provide a plant with radioactive carbon dioxide $\left(.^{14}CO_2\right)$ as a metabolic tracer. The $.^{14}C$ is incorporated first into oxaloacetic acid. The plant is best characterised as a

A. C_4 plant

B. C_3 plant

C. CAM plant

D. Insectivorous plant.

Answer: A

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79. Select the incorrect pair.

A. 2-carbon compound-Aspartic acid

B. 3-carbon compound-PGA

C. 4-carbon compound-Malic acid

D. 5-carbon compound-RuBP

Answer: A

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80. Optimum temperature conditions for photosynthesis in C_3 and C_4 plants are respectively

A. $10^\circ C - 25^\circ C$ and $30^\circ 45^\circ C$

B. $30^\circ C - 45^\circ C$ and $10^\circ C - 25^\circ C$

C. $0^\circ C - 10^\circ C$ and $10^\circ C - 30^\circ C$

D. $25^\circ C - 30^\circ C$ and $40^\circ C - 50^\circ C$.

Answer: A

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81. Read the given statements and select the correct option.

Statement 1: Crassulacean acid metabolism occurs in succulent plants which grow in xeric conditions.

Statement 2: Stomata are generally sunken in succulent plants.

A. Both statement 1 and 2 are correct.

B. Statement 1 is correct but statement 2 is incorrect.

C. Statement 1 is incorrect but statement 2 is correct

D. Both statements 1 and 2 are incorrect.

Answer: A

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82. Mathc column I with column II and selct the correct option from the given codes.

Column I	Column II
C_3Plants	(i)Kalanchoe,Opuntia
C_4plants	(ii)Maize,sugarcane
C_4plants	(iii)Maize,sugarcane

A. ii,iii,i

B. i,ii,iii

C. iii,ii,i

D. i,iii,ii

Answer: C

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83. Mathc column I with column II and select the correct option from the given codes.

column I	column II
C_4plants	(i)Succulents
Chlorophyll b	(ii)Accessory photosynthetic pigment
PS II	(iii)Photoxidation ofH_2O
CAM	(iv)Kranz anatomy

A. iv,ii,iii,i

B. iii,ii,iv,i

C. i,iii,ii,iv

D. i,ii,iii,iv

Answer: A

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84. The enzyme RuBisCO has

A. more affinity for CO_2 than for O_2

B. more affinity for O_2. Than for O_2

C. equal affinity for both

D. more affinity for sugars, than for CO_2

Answer: A

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85. Refer to the given reaction.

$$RuBP + O_2 \xrightarrow[\text{oxygenase}]{\text{RuBP}} \text{Phosphoglyceric acid} + \text{Phosphoglycolic acid}$$

It is the first reaction of

A. C_3 pathway

B. C_4 pathway

C. C_2 pathway

D. glycolysis.

Answer: C

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86. Read the given statements and selct the correct option.

Statement 1: Photorespiration interferes with the successful functioning of Calvin cycle.

Statement 2: Photorespiration oxidises ribulose-1,5 biphosphate which is an acceptor of CO_2 in Calvin cycle.

A. Both statement 1 and 2 are correct.

B. Statement 1 is correct but statement 2 is incorrect.

C. Statement 1 is incorrect but statement 2 is correct

D. Both statements 1 and 2 are incorrect.

Answer: A

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87. How many ATP and $NADPH_2$ are produced respectively in the process of photorespiration?

A. 2 and 4

B. 1 and 2

C. 4 and 6

D. 0 and 0

Answer: D

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88. During C_2 cycle, there occurs

A. synthesis of sugars

B. utilisation of ATP

C. synthesis of ATP

D. synthesis of NADPH

Answer: B

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89. Which organelle out of these does not participate in photorespiration?

A. Peroxisomes

B. Mitochondria

C. Chloroplasts

D. Golgi bodies

Answer: D

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90. The law of limiting factors was given by ___ in the year___

A. Blackman, 1905

B. Blackman, 1804

C. Engelemann, 1909

D. Warburg, 1920

Answer: A

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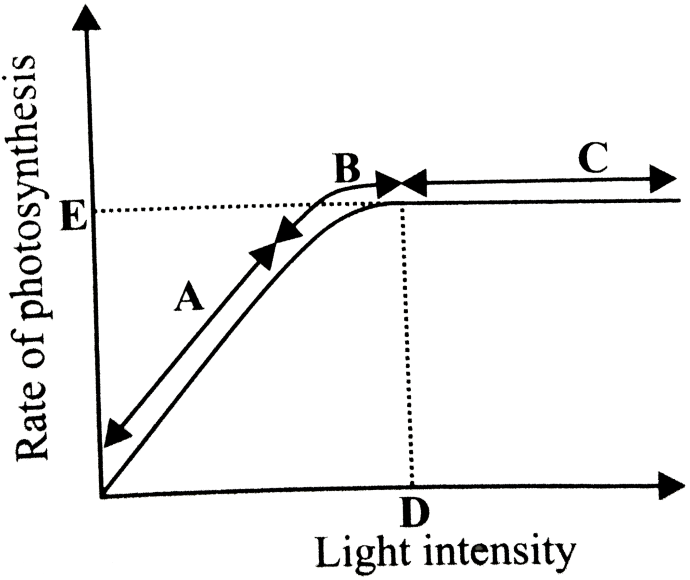
91. Study the given graph showing the efect of light intensity on the rate of photosynthesis. Which of the following statemetns regarding this is correct?



A. Light is a limiting factor in the region a.

B. Region C represents that rate of photosynthesis is because some other factor became limiting.

C. point D rrepresents the intensity of light at which some other factor became limiting

D. All of these

Answer: D

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92. Quality of light refers to

A. Intensity of light

B. frequency of light

C. wavelenght of light

D. duration of light

Answer: C

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93. Given table shows the CO_2 compensation point and optimum CO_2 concentration for photosynthesis for C_3 and C_4 plants.

	C_3 Plants	C_4 Plants
CO_2 compensation point	$25 - 100$ppm	A
Optimum Co_2 cocentration	B	360 ppm

Select the correct values for A and B.

A. A 0.50ppm B 300ppm

B. A $0 - 10$ppm B 450ppm

C. A $100 - 150$ppm B 250ppm

D. A $100 - 110$ppm B 290ppm

Answer: B

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94. A point at which illuminated plant parts stop absorbing CO_2 from their enviroment, is known as

A. CO_2 compensation point

B. CO_2 saturation point

C. CO_2 optimum point

D. CO_2 limiting point.

Answer: A

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95. When temperature is increased from minimum to optimum, rate of photosynthesis doubles for every ____ rise in temperature.

A. $1^\circ C$

B. $10^\circ C$

C. $20^\circ C$

D. $30^\circ C$

Answer: B

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96. Tropical plants have a ___ temperature optimum than the plants adapted to temperate climates.

A. lower

B. equal

C. higher

D. None of these

Answer: C

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97. Warbung effect refers to

A. decreased photosynthetic rate at very high O_2 concentration

B. increased photosynthetic rate at very high O_2 concentration

C. decreased photosynthetic rate at very low O_2 concentration

D. increased photosynthetic rate at very low O_2 concentration

Answer: A

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98. Which of the following factors, besides being one of the reactants in the process of photosynthesis, indirectly affects its rate?

A. Oxygen

B. Carbon dioxide

C. Water

D. Chlorophyll

Answer: C

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99. Which of the following is not an external factor influencing photosynthesis?

A. CO_2 concentration

B. O_2 concentration

C. Availability of water

D. Chlorophyll concentration

Answer: D

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100. The factor which is not limiting in normal conditions for photosynthesis is

A. water

B. chlorophyll b

C. light

D. carbon dioxide.

Answer: B

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101. Consider the following statements regarding synthesis of starch and sucrose during daytime and select the correct ones.

(i) Triose phosphate is confined to chloroplast and is utilized for the synthesis of starch only.

(ii) Triose phosphate is translocated to cytosol from chloroplast.

(iii) Triose phosphate is utilized for the synthesis of both starch and sucrose.

(iv) Triose phosphate is translocated from cytosol to chloroplast.

A. i and iii

B. ii and iii

C. ii and iv

D. iii and iv

Answer: B

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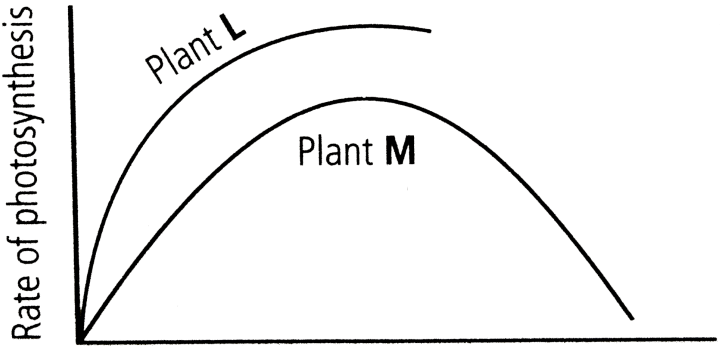
102. When two plants L and M were exposed to different light intensities and temperature they showed changes in their rates of photosynthesis. Which have been represented in the following graph.



The graph indicates that

A. Plant L is a C_3 plant for which the light saturation point is 100% of full sunlight

B. Plant M is a C_4 plant for which the optimum temperature s around $20^\circ C$

C. Plant M is a C_3 plant which is more affected at higher temperature and higher light intensity as compared to palnt L

D. plant L is a C_4 plant and cannot function at light intensities above the saturation point.

Answer: C

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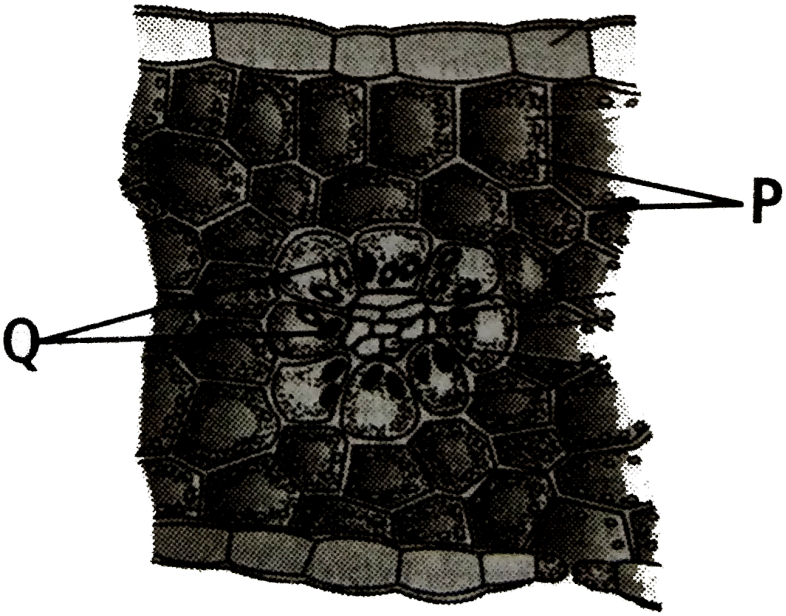
103. Refer to the given cross section of a C_4 leaf and select the incorrect option.



A. P are the chloroplasts in which thyiakoids are stacked together to form grans.

B. P are the chloroplasts which can perform light reaction, evolve molecular O_2 and produce assimilatory power.

C. Q are the chloroplasts in which thylakoids occur as stroma lamellae.

D. Q are the chloroplasts in which CO_2 is fixed by phosphoenol pyruvic acid to form oxaloacetic acid.

Answer: D

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104. When wheat and sugarcane leaves are fed with radioactive $.^{14}CO_2$. In which molecule would the radioactivity appear first in these plants?

A. 3-Phosphoglycerate Oxalocacetate

B. 3-Phosphoglycerate 3-Phosphoglycerate

C. Oxalocaetate Oxaloacetate

D. Malate 3-Phosphoglycerate

Answer: A

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105. Which of the following equations holds true for acidification reactions of CAM pathway?

A. $PEP + CO_2 + H_2O \xrightarrow{\text{PEPCase}} OAA + H_3PO_4$

B. $OAA + NADH \xrightarrow{\text{Dehydrogenase}} \text{Malic acid} + NAD^+$

C. $\text{Malic acid} + NADP^+ \xrightarrow[\text{enzyme}]{\text{Malic}} \text{Pyruvic acid} + CO + NADPH$

D.

Answer: D

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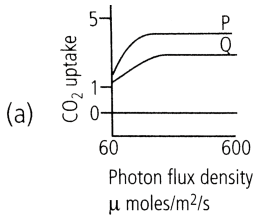
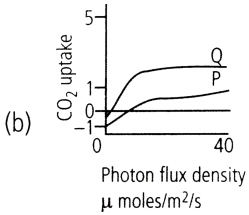
106. Which of the following graphs correctly depicts the rate of photosynthesis of sun plant (P) and shade plant (Q)?

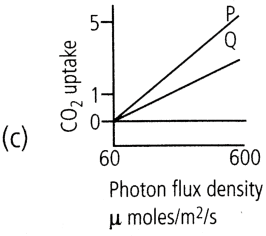
A.



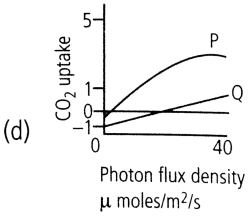
B.



C.



D.



Answer: D

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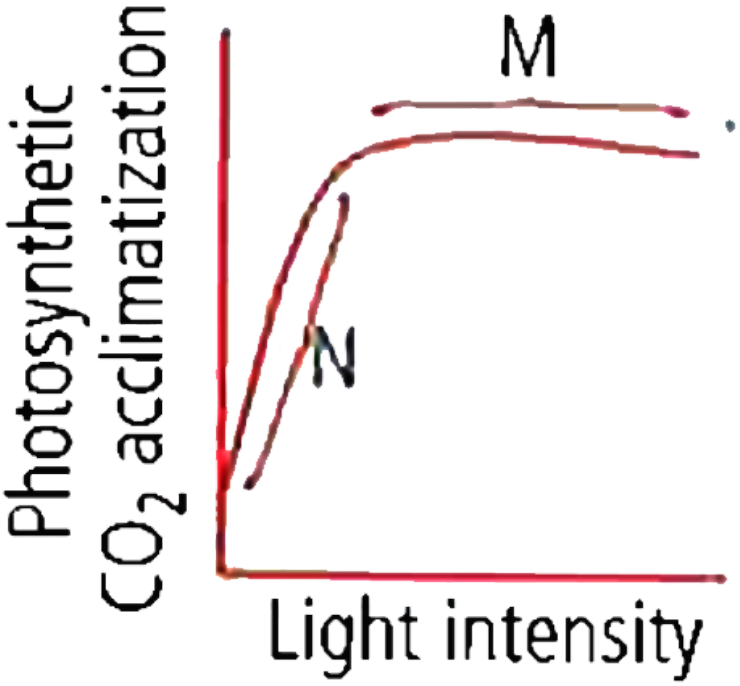
107. A typical light response curve of photosynthesis is shown. The limiting factos/s for photosynthesis at M and N is/are



A. temperature and CO_2 respectively

B. CO_2 and light respectively

C. only CO_2

D. light and CO_2 respectively.

Answer: B

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108. Which metal ion is a constituent of chlorophyll?

A. Iron

B. Copper

C. Manesium

D. Zinc

Answer: C

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109. Which pigment acts directly to convert light energy to chemical energy?

A. Chlorophyll a

B. Chlorophyll b

C. Xanthophyll

D. Carotenoid

Answer: A

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110. Which range of wavelenght (in nm) is called photosyntehtically active radiation (PAR)?

A. 100-390

B. 390-430

C. 400-700

D. 760-10,000

Answer: C

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111. Which light range is least effective in phosynthesis?

A. blue and green

B. Green

C. red and green

D. Violet

Answer: B

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112. Chemosynthetic bacteria obtain energy from

A. Sunlight

B. infra red rays

C. organic substances

D. inorganic chemicals.

Answer: D

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113. Energy required for ATP synthesis in PSII comes from

A. proton gradient

B. electron gradient

C. reduction of glucose

D. oxidation of glucose

Answer: A

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114. During light reaction in photosynthesis the following are formed.

A. ATP and sugar

B. hydrogen, O_2 and sugar

C. ATP, hydrogen donor and O_2

D. ATP, hydrogen and O_2 donor

Answer: C

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115. Dark reaction in photosynthesis is called so because

A. it can occur in dark also

B. it does not directly depend on light energy

C. it cannot occur during day light

D. it occurs more rapidly at night.

Answer: B

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116. PEP is primary CO_2 acceptor in

A. C_4 plants

B. C_3 plants

C. C_2 plants

D. both C_3 and C_4 plants.

Answer: A

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117. Splitting of water is associated with

A. photosystem I

B. lumen of thylakoid

C. both photosystem I and II

D. inner surface of thylakoid membrane

Answer: D

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118. The correct sequency of flow of electons in the light reaction is

A. PSII, plastoquinone, cytochromes, PSI, ferredoxin

B. PSI, plastoquinone, cytochromes, PSII, ferredoxin

C. PSI, ferredoxin, PSII

D. PSI,plastoquinone, cytochromes, PSII, ferredoxin.

Answer: A

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119. The enzyme that is not found in a C_3 plant is

A. RuBP carboxylase

B. PEP carboxylase

C. NADP reductase

D. ATP synthase.

Answer: B

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120. The reaction that is responsible for the primary fixation of CO_2 is catalysed by

A. RuBP carboxylase

B. PEP carboxylase

C. RuBP carboxylase and PEP carboxylase

D. PGA synthase.

Answer: C

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121. When CO_2 is added to PEP. The first stabel product synthesised is

A. Pyruvate

B. glyceradehyde-3-phosphate

C. phosphoglycerate

D. oxalocetate.

Answer: D

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122. Assertion : Chloroplasta occur inside the leaves mostly in mesophyll cells along their walls.

Reason: The membrane system of chloroplast is responsible for trapping the light energy and also for the synthesis of ATP and NADPH.

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123. Assertion: The color of the leaf is due to the presence of four pigments-chlorophyll a, chlorophyll b, xanthopylls and carotenoids.

Reason: Chlorophyll b is the chief pigment associated with phosynthesis

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124. Assertion: The splitting of water is associated with PS II.

Reason: Water is split into H^+, O_2 and electrons.

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125. Assertion: The stoma lamellae have both PS I and PS II.

Reason: The grana lamellae lack PS II and well as NADP reductase enzyme.

Photosynthesis in Higher Plants

A If both assertion and reason are true and reason is the correct explanation of assertion

B If both assertion and reason are true but reason is not the correct explanation of assertion

C If assertion is true but reason is false

D If both assertion and reason are false

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126. Assertion: The proton gradient is broken down due to the movement of protons across the membrane to stroma through the transmembrane channerl of the F_0 of the ATPase.

Reason: The breakdonw of proton gradient leads to release of energy.

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127. Dark reactions are called biosynthetic phase of photosynthesis.

Reason: Dark reactions do not directly depend on the presence of light but are dependent on the products of the light reaction, i.e., ATP and NADPH.

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128. Assertion: The first product of CO_2 fixation in C_3 pathway is OA A.

Reason: The first product of CO_2 fixation in C_4 pathway is PGA.

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129. Assertion: The C_4 plants have a speical type of leaf anatomy called kranz anatomy.

Reason: Chloroplasts of bundle sheath cells have well developed grana and starch grains.

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130. Assertion : The primary CO_2 acceptor in C_4 pathway is 3-carbon molecule phosphoenol pyruvate (PEP).

Reason: The enzyme responsible for this fixation is PEP carboxylase or PEPcase.

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131. Assertion: In C_4 plants, the bundle sheath cells are rich in an enzyme phosphoate carboxylase-oxygenase (PEP case). Reason: In C_4,the mesophyll cells are rich in an enzyme ribulose carboxylase-oxygenase(RuBisCo)

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132. Assertion: In C_4 plants, photorespiration does not occurs.

Reason: C_4 plants have a mechanism that increaes the concentration of CO_2 at the enzyme site.

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133. Assertion: Photorespiration is a wasteful process.

Reason: In photorespiratory pathway, there is not synthesis of sugars or ATP.

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134. Assertion: The external factors that affected photosynthesis are number, size age and orientation of leaves, mesophyll cells and chloroplasts and the amount of chlorophyll.

Reason: The internal factors that affect photosynthesis are availability of sunlight, temperature CO_2 concentration and water.

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135. Assertion: C_3 plants respond to increased CO_2 concentration by increaing rate of photosyntheis. ltbr. Reason: The higher productivity of some greenhouse crops such as tomatoes and bell pepper is due to increased CO_2 concentration

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136. Assertion: Tropical plants have a higher optimum temperature for photsynthesis than temperate plants

Reason: The temperature optimum for photosynthesis of different plants depends on their habitat.

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