

## STOMATA • GUARD CELLS • XYLEM • PHLOEM

1. Stomata are mainly present in the:

- A) Root epidermis      B) Leaf epidermis      C) Xylem      D) Phloem

2. The singular form of stomata is:

- A) Stoma      B) Stomatum      C) Stomatic      D) Stomate

3. The main function of stomata is:

- A) Food storage      B) Gas exchange and transpiration      C) Mineral absorption      D) Seed formation

4. The pore of a stoma is surrounded by:

- A) Companion cells      B) Guard cells      C) Sieve cells      D) Tracheids

5. Guard cells regulate the opening and closing of:

- A) Lenticels      B) Stomata      C) Veins      D) Root hairs

6. In most dicot leaves, stomata are more numerous on the:

- A) Upper surface      B) Lower surface      C) Midrib      D) Petiole

7. The opening between two guard cells is called the:

- A) Stomatal pore      B) Sieve plate      C) Lumen      D) Pit

8. Guard cells usually contain:

- A) Chloroplasts      B) Sieve plates      C) Vessel elements      D) No cytoplasm

9. When guard cells become turgid, the stomatal pore generally:

- A) Opens      B) Closes      C) Disappears      D) Becomes a lenticel

10. Loss of water from guard cells generally causes stomata to:

- A) Open      B) Close      C) Divide      D) Form xylem

11. Which ion plays an important role in guard-cell osmotic regulation?

- A) Potassium      B) Iron      C) Aluminium      D) Silver

12. Absciscic acid generally causes:

- A) Stomatal opening      B) Stomatal closure      C) Xylem dissolution      D) Phloem formation

13. Stomata allow carbon dioxide to enter the leaf for:

- A) Respiration      B) Photosynthesis      C) Translocation      D) Germination

14. Water vapour mainly leaves leaves through stomata during:

- A) Transpiration      B) Pollination      C) Fertilization      D) Germination

15. Stomatal density refers to the number of stomata per unit:

- A) Leaf area      B) Root length      C) Stem mass      D) Seed volume

16. Stomatal opening is associated with increased guard-cell:

- A) Turgor      B) Lignin      C) Suberin      D) Cellulose

17. The uneven thickness of guard-cell walls helps in:

- A) Stomatal movement      B) Food storage      C) Root pressure      D) Seed dispersal

18. In many monocot leaves, stomata occur:

- A) Only on roots      B) On both leaf surfaces      C) Only on lower surface      D) Only on upper surface

19. Which structure directly controls stomatal aperture?  
A) Guard cells                      B) Companion cells                      C) Tracheids                      D) Sieve plates
20. Stomata are generally absent from:  
A) Leaf epidermis                      B) Roots                      C) Green leaves                      D) Green stems
21. The tissue that transports water and minerals is:  
A) Phloem                      B) Xylem                      C) Epidermis                      D) Cortex
22. Xylem mainly transports:  
A) Organic food                      B) Water and mineral salts                      C) Oxygen only                      D) Proteins only
23. Which xylem element is dead at maturity and conducts water?  
A) Vessel element                      B) Companion cell                      C) Sieve tube                      D) Guard cell
24. Tracheids belong to:  
A) Phloem                      B) Xylem                      C) Epidermis                      D) Mesophyll
25. Vessels are especially characteristic of:  
A) Angiosperms                      B) Algae                      C) Fungi                      D) Bryophytes
26. Xylem conducting walls are commonly strengthened by:  
A) Lignin                      B) Starch                      C) Glycogen                      D) Protein
27. Which xylem component remains living at maturity?  
A) Vessel element                      B) Tracheid                      C) Xylem parenchyma                      D) Xylem fibre
28. Xylem fibres mainly provide:  
A) Mechanical support                      B) Sugar transport                      C) Gas exchange                      D) Photosynthesis
29. The main driving force for upward water movement is:  
A) Transpiration pull                      B) Phloem loading                      C) Root hair pressure                      D) Seed pressure
30. Root pressure contributes to movement of water through:  
A) Xylem                      B) Phloem                      C) Epidermis                      D) Stomatal pore
31. A tracheid differs from a vessel element because it generally lacks:  
A) Cell wall                      B) Perforation plates                      C) Lignin                      D) Cytoplasm
32. The upward movement of water and minerals through xylem is called:  
A) Translocation                      B) Ascent of sap                      C) Diffusion                      D) Osmosis
33. Which xylem element is specialized mainly for conduction and is tube-like?  
A) Vessel element                      B) Xylem fibre                      C) Xylem parenchyma                      D) Companion cell
34. Secondary xylem is commonly called:  
A) Bark                      B) Wood                      C) Cork                      D) Pith
35. The vascular cambium produces secondary:  
A) Xylem and phloem                      B) Stomata and guard cells                      C) Root hairs                      D) Mesophyll
36. The tissue that mainly transports organic food is:  
A) Xylem                      B) Phloem                      C) Epidermis                      D) Endodermis
37. The principal sugar transported in most plant phloem is:

- A) Glucose                      B) Sucrose                      C) Lactose                      D) Ribose
38. Sieve tube elements are components of:
- A) Xylem                      B) Phloem                      C) Epidermis                      D) Cambium
39. Sieve tube elements are closely associated with:
- A) Companion cells                      B) Guard cells                      C) Tracheids                      D) Fibres only
40. A mature sieve tube element generally lacks a:
- A) Cell wall                      B) Nucleus                      C) Plasma membrane                      D) Cytoplasm
41. The end walls between sieve tube elements contain:
- A) Sieve plates                      B) Stomatal pores                      C) Casparian strips                      D) Lenticels
42. Phloem transport of organic substances is called:
- A) Translocation                      B) Transpiration                      C) Ascent of sap                      D) Imbibition
43. A photosynthesizing mature leaf is usually a:
- A) Sink                      B) Source                      C) Vessel                      D) Stoma
44. A growing root tip receiving sugars is usually a:
- A) Source                      B) Sink                      C) Guard cell                      D) Vessel
45. Phloem transport can occur:
- A) Only upward                      B) Only downward
- C) From source to sink in different directions                      D) Only in roots
46. Secondary phloem is generally located:
- A) Outside the vascular cambium                      B) Inside primary xylem                      C) Inside pith                      D) Inside guard cells
47. Which cell is metabolically active and supports sieve tube elements?
- A) Companion cell                      B) Vessel element                      C) Tracheid                      D) Xylem fibre
48. Phloem mainly transports substances from:
- A) Source to sink                      B) Root to leaf only                      C) Leaf to root only                      D) Xylem to stomata only
49. Which pair is correctly matched?
- A) Xylem—food transport                      B) Phloem—organic food transport
- C) Stomata—mineral absorption                      D) Guard cells—water conduction
50. The two major vascular tissues of higher plants are:
- A) Cortex and epidermis                      B) Xylem and phloem                      C) Pith and cortex                      D) Stomata and guard cells

## Photosynthesis

51. The process by which green plants prepare food is called:
- A) Respiration                      B) Photosynthesis                      C) Transpiration                      D) Germination
52. The main site of photosynthesis in a plant cell is the:
- A) Nucleus                      B) Mitochondrion                      C) Chloroplast                      D) Ribosome
53. The green pigment essential for photosynthesis is:

- A) Carotene                      B) Chlorophyll                      C) Xanthophyll                      D) Anthocyanin
54. The raw material absorbed from the air for photosynthesis is:
- A) Oxygen                      B) Nitrogen                      C) Carbon dioxide                      D) Hydrogen
55. Water required for photosynthesis is mainly absorbed by the:
- A) Leaves                      B) Flowers                      C) Roots                      D) Stem
56. The oxygen released during photosynthesis comes mainly from:
- A) Carbon dioxide                      B) Water                      C) Glucose                      D) Chlorophyll
57. The food initially produced during photosynthesis is commonly represented as:
- A) Glucose                      B) Protein                      C) Fat                      D) Vitamin
58. The light-dependent reactions of photosynthesis occur mainly in the:
- A) Stroma                      B) Thylakoid membranes                      C) Nucleus                      D) Cytoplasm
59. The Calvin cycle takes place in the:
- A) Stroma                      B) Grana                      C) Thylakoid lumen                      D) Nucleus
60. The stacks of thylakoids inside chloroplasts are called:
- A) Grana                      B) Cristae                      C) Ribosomes                      D) Vacuoles
61. The fluid-filled region surrounding grana is called the:
- A) Stroma                      B) Matrix                      C) Cytosol                      D) Nucleoplasm
62. Which gas is released as a by-product of photosynthesis?
- A) Carbon dioxide                      B) Nitrogen                      C) Oxygen                      D) Hydrogen
63. The energy for photosynthesis ultimately comes from:
- A) Soil minerals                      B) Sunlight                      C) Oxygen                      D) Glucose
64. The primary photosynthetic pigment in plants is:
- A) Chlorophyll a                      B) Chlorophyll b                      C) Carotene                      D) Xanthophyll
65. The splitting of water molecules during the light reactions is called:
- A) Photolysis                      B) Hydrolysis                      C) Glycolysis                      D) Fermentation
66. Which molecules carry energy produced in the light reactions to the Calvin cycle?
- A) ATP and NADPH                      B) DNA and RNA                      C) ADP and NADP<sup>+</sup>                      D) Glucose and oxygen
67. The main function of stomata in photosynthesis is to:
- A) Absorb minerals                      B) Exchange gases                      C) Produce chlorophyll                      D) Store starch
68. Stomata are usually found mainly in the:
- A) Roots                      B) Leaves                      C) Seeds                      D) Flowers
69. The opening and closing of stomata are controlled by:
- A) Guard cells                      B) Root hairs                      C) Xylem cells                      D) Palisade cells
70. Which wavelength region is generally most effective for photosynthesis?
- A) Green                      B) Red and blue                      C) Yellow only                      D) Infrared only
71. Plants appear green mainly because chlorophyll:

- A) Absorbs green light strongly  
B) Reflects/transmits much green light
- C) Produces green oxygen  
D) Uses green light exclusively
72. Which factor can directly affect the rate of photosynthesis?
- A) Light intensity      B) Sound intensity      C) Soil color      D) Wind direction only
73. Increasing carbon dioxide concentration can increase photosynthesis until:
- A) All water disappears      B) Another factor becomes limiting  
C) Chlorophyll is destroyed immediately      D) Oxygen reaches zero
74. The law stating that the rate of a process is limited by the factor in shortest supply is related to:
- A) Law of independent assortment      B) Law of limiting factors      C) Boyle's law      D) Ohm's law
75. At very high light intensity, the rate of photosynthesis may stop increasing because:
- A) Light is always irrelevant      B) Another factor becomes limiting or photoinhibition occurs  
C) Plants stop needing carbon dioxide      D) Water becomes oxygen
76. Which leaf tissue contains many chloroplasts and is highly active in photosynthesis?
- A) Palisade mesophyll      B) Epidermis      C) Xylem      D) Phloem
77. The Calvin cycle is also known as the:
- A) C<sub>3</sub> cycle      B) Krebs cycle      C) Urea cycle      D) Glyoxylate cycle
78. The first stable product of the Calvin cycle in C<sub>3</sub> plants is:
- A) Pyruvate      B) 3-phosphoglycerate      C) Acetyl-CoA      D) Lactic acid
79. The enzyme that fixes carbon dioxide in the Calvin cycle is:
- A) Amylase      B) Rubisco      C) Pepsin      D) Catalase
80. Rubisco combines carbon dioxide with:
- A) RuBP      B) ATP      C) NADPH      D) nGlucose
81. RuBP stands for:
- A) Ribulose bisphosphate      B) Ribose uridine bisphosphate  
C) Reduced uranium binding protein      D) Ribosomal unit binding peptide
82. C<sub>4</sub> plants are adapted especially well to:
- A) Cold and dark conditions      B) Hot, bright conditions  
C) Waterlogged roots only      D) Salt-free environments only
83. An example of a C<sub>4</sub> plant is:
- A) Maize      B) Wheat      C) Rice      D) Pea
84. An example of a CAM plant is:
- A) Cactus      B) Wheat      C) Potato      D) Mango
85. CAM plants generally open their stomata mainly:
- A) During the day      B) At night      C) Only at noon      D) Never
86. The first stage of photosynthesis that requires light is called:
- A) Light-dependent reaction      B) Calvin cycle      C) Dark respiration      D) Fermentation
87. ATP synthase in chloroplasts helps produce:

- A) ATP                      B) DNA                      C) Glucose directly                      D) Oxygen directly
88. The movement of electrons through the photosynthetic electron transport chain helps establish a:
- A) Proton gradient                      B) Sugar gradient                      C) Nitrogen gradient                      D) Protein gradient
89. Photosystem II is associated with the splitting of:
- A) Glucose                      B) Water                      C) Carbon dioxide                      D) Oxygen
90. Photosystem I is important in the production of:
- A) NADPH                      B) Pyruvate                      C) Lactic acid                      D) Urea
91. The two major photosystems are called:
- A) I and II                      B) A and B                      C) X and Y                      D) C and D
92. Which molecule accepts electrons at the end of the linear electron flow?
- A) NADP<sup>+</sup>                      B) O<sub>2</sub>                      C) CO<sub>2</sub>                      D) ATP
93. The overall process of photosynthesis converts light energy mainly into:
- A) Chemical energy                      B) Sound energy                      C) Nuclear energy                      D) Mechanical energy
94. Photosynthesis helps maintain atmospheric oxygen by:
- A) Consuming oxygen                      B) Releasing oxygen
- C) Converting oxygen to nitrogen                      D) Removing all gases
95. Which substance is commonly stored as a product of photosynthesis in plants?
- A) Starch                      B) Urea                      C) Hemoglobin                      D) Glycogen
96. The iodine test for starch gives a blue-black color when:
- A) Starch is present                      B) Protein is present                      C) Fat is present                      D) Water is present
97. Before testing a leaf for starch, a plant is often destarched by keeping it:
- A) In darkness                      B) In bright sunlight                      C) Under water                      D) In carbon dioxide only
98. Destarching is done mainly to:
- A) Remove chlorophyll                      B) Use up stored starch                      C) Increase oxygen                      D) Kill the plant
99. Which experiment demonstrates that chlorophyll is necessary for photosynthesis?
- A) Testing a variegated leaf for starch                      B) Measuring root length
- C) Testing blood pressure                      D) Measuring seed weight
100. A variegated leaf is useful for studying the role of:
- A) Chlorophyll                      B) Nitrogen gas                      C) Xylem pressure                      D) Root hairs

#### ANSWER KEY

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|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1. B  | 2. A  | 3. B  | 4. B  | 5. B  | 6. B  | 7. A  | 8. A  | 9. A  | 10. B |
| 11. A | 12. B | 13. B | 14. A | 15. A | 16. A | 17. A | 18. B | 19. A | 20. B |
| 21. B | 22. B | 23. A | 24. B | 25. A | 26. A | 27. C | 28. A | 29. A | 30. A |
| 31. B | 32. B | 33. A | 34. B | 35. A | 36. B | 37. B | 38. B | 39. A | 40. B |
| 41. A | 42. A | 43. B | 44. B | 45. C | 46. A | 47. A | 48. A | 49. B | 50. B |