

## Golden Knowledge Multiple Choice Question sheet: Topic 4: Bioenergetics and Plants (TRILOGY COURSE)

Use the table below to help you identify which questions are for each lesson / section of learning within this topic:

Lesson Ref	Specification ref (Trilogy)	Lesson content	Question numbers
B4.6	2.3.1	Tissues and organs in plants	1-7
B4.7	2.3.2	Transport systems in plants	8-13
B4.8	2.3.2	Evaporation and transpiration	14-21
B4.9	2.3.2	Factors affecting transpiration	22-28
<del>B5.10</del>	<del>3.3.1</del>	<del>More about plant diseases</del>	<del>29-36</del>
<del>B5.11</del>	<del>3.3.2</del>	<del>Plant defence responses</del>	<del>37-41</del>
B8.1	4.1.1	Photosynthesis	42-43
B8.2	4.1.2	The rate of photosynthesis	44-48
RP6		Required practical 6 - Rate of photosynthesis	49-54
B8.3	4.1.3	How plants use glucose	55-57
B8.4	4.1.2	Making the most of photosynthesis (H)	58-60
B9.1	4.2.1	Aerobic respiration	61-64
B9.2	4.2.2	The response to exercise	65-68
B9.3	4.2.1	Anaerobic respiration	69-74
B9.4	4.2.3	Metabolism and the liver	75-79

- Which of the following best describes the function of stomata in plants?
  - Stomata store water for the plant.
  - Stomata produce energy through photosynthesis.
  - Stomata regulate the exchange of gases, such as carbon dioxide and oxygen.
  - Stomata transport nutrients from the roots to the leaves.
- What is the primary function of the xylem in a plant?
  - Transporting sugars and nutrients
  - Transporting water and minerals from roots to leaves
  - Carrying out photosynthesis
  - Providing support to the plant
- What is the main role of phloem in a plant?
  - Transporting water and minerals
  - Transporting organic nutrients, like sugars, throughout the plant
  - Anchoring the plant to the soil
  - Protecting the plant from pathogens
- Which part of the plant is typically involved in reproduction and producing seeds?
  - Stem
  - Xylem
  - Flowers
  - Leaves
- What is the primary function of roots in a plant?
  - Photosynthesis
  - Anchoring the plant and absorbing water and minerals
  - Transporting nutrients from the leaves to the rest of the plant
  - Producing flowers for reproduction

6. Which part of the plant is responsible for the process of transpiration?
  - a) Stem
  - b) Xylem
  - c) Leaves
  - d) Flowers
  
7. Which plant part is typically involved in capturing sunlight and performing photosynthesis?
  - a) Stem
  - b) Xylem
  - c) Leaves
  - d) Phloem
  
8. What is the primary plant organ system responsible for transporting water and minerals from roots to leaves?
  - a) Stems
  - b) Leaves
  - c) Flowers
  - d) Roots
  
9. Which process involves the loss of water vapour from the leaves to the atmosphere through small openings called stomata?
  - a) Photosynthesis
  - b) Osmosis
  - c) Transpiration
  - d) Translocation
  
10. What is the term used to describe the movement of sugars and other organic nutrients throughout a plant from sources to sinks?
  - a) Transpiration
  - b) Active transport
  - c) Translocation
  - d) Photosynthesis
  
11. Which process allows plants to take up essential minerals from the soil through root cells against a concentration gradient?
  - a) Passive transport
  - b) Transpiration
  - c) Osmosis
  - d) Active transport
  
12. Which plant tissue is primarily responsible for transporting water and minerals from roots to leaves?
  - a) Phloem
  - b) Epidermis
  - c) Xylem
  - d) Cambium
  
13. What is the primary function of phloem tissue in a plant?
  - a) Transporting water and minerals
  - b) Providing structural support
  - c) Transporting organic nutrients, like sugars, throughout the plant
  - d) Absorbing light energy for photosynthesis
  
14. Which of the following environmental factors affects the rate of transpiration in plants?
  - a) Soil pH
  - b) Light intensity
  - c) Root hair density
  - d) Leaf colour

15. What is the primary plant organ system responsible for transporting water and minerals from roots to leaves?
- Stems
  - Leaves
  - Flowers
  - Roots
16. In the process of transpiration, water is primarily lost from which part of a plant?
- Roots
  - Stems
  - Leaves
  - Flowers
17. Which plant structures regulate the exchange of gases and the loss of water vapour in transpiration?
- Chloroplasts
  - Xylem vessels
  - Stomata
  - Epidermal cells
18. How do root hair cells primarily absorb water and minerals from the soil?
- Through passive diffusion
  - Via active transport and osmosis
  - Through the process of photosynthesis
  - By simple diffusion
19. The primary function of xylem tissue in a plant is:
- Transporting organic nutrients
  - Providing structural support
  - Transporting water and minerals
  - Performing photosynthesis
20. Osmosis, a process involving the movement of water, primarily occurs in which part of a plant?
- Leaves
  - Stems
  - Roots
  - Flowers
21. What is the primary role of active transport in root hair cells?
- To release excess water
  - To transport minerals into the cell against a concentration gradient
  - To facilitate transpiration
  - To synthesize sugars through photosynthesis
22. Which of the following environmental factors directly affects the rate of transpiration in plants?
- Soil pH
  - Air temperature
  - Flower colour
  - Leaf shape
23. What is the primary plant organ system responsible for transporting sugars produced during photosynthesis?
- Stems
  - Leaves
  - Flowers
  - Roots

24. In the process of transpiration, what is the main substance that is lost from plant leaves?
- Oxygen
  - Carbon dioxide
  - Water vapour
  - Sugar
25. What is the function of stomata in plant leaves?
- Storage of excess water
  - Regulating the exchange of gases and water vapour
  - Absorbing sunlight for photosynthesis
  - Anchoring the plant in the soil
26. How do root hair cells primarily absorb water and minerals from the soil?
- Through passive diffusion
  - Via active transport and osmosis
  - Through photosynthesis
  - By transpiration
27. The primary function of xylem tissue in a plant is:
- Transporting organic nutrients
  - Providing structural support
  - Transporting water and minerals
  - Facilitating translocation
28. Osmosis, a process involving the movement of water, primarily occurs in which part of a plant?
- Leaves
  - Stems
  - Roots
  - Flowers
42. What is the equation for photosynthesis, representing the process in plants?
- Carbon dioxide + Water → Glucose + Oxygen
  - Breathing + Sunlight → Sugar + Air
  - Photosynthesis + Glucose → Carbon dioxide + Oxygen
  - Respiration + Light → Starch + Hydrogen
43. How would you define an endothermic reaction?
- A reaction that releases energy to the surroundings
  - A reaction that occurs in living organisms
  - A reaction that absorbs energy from the surroundings
  - A reaction that takes place in photosynthesis
44. What factors affect the rate of photosynthesis in plants?
- Temperature, light intensity, and carbon dioxide concentration
  - Soil quality, humidity, and wind speed
  - Fertilizer type, pot size, and pH level
  - Leaf colour, root length, and watering frequency
45. How can photosynthesis be optimized in a greenhouse environment?
- Increasing humidity and reducing temperature
  - Reducing light intensity and decreasing carbon dioxide levels
  - Adjusting temperature, light intensity, and carbon dioxide concentration
  - Leaving the greenhouse completely open to natural conditions

46. Which of the following is a limiting factor for photosynthesis?
- High light intensity
  - Low carbon dioxide concentration
  - Optimal temperature
  - Abundant water supply
47. In the context of photosynthesis, what is the importance of limiting factors?
- To prevent photosynthesis from occurring
  - To ensure plants always produce glucose
  - To balance the growth of leaves and roots
  - To understand the factors that affect the rate of photosynthesis
48. How does knowledge of limiting factors contribute to the economics of greenhouse conditions?
- It has no impact on greenhouse economics
  - It helps greenhouse owners save money by reducing plant growth
  - It enables optimal control of factors to maximize plant growth efficiently
  - It increases the cost of greenhouse operation
49. What is the purpose of investigating the effect of light intensity on the rate of photosynthesis using an aquatic organism like pondweed?
- To determine the impact of water quality on photosynthesis
  - To study the effect of temperature on photosynthesis
  - To understand how aquatic organisms photosynthesize underwater
  - To measure how light intensity influences the rate of photosynthesis
50. In the experiment with pondweed, if light intensity is the independent variable, what should be the dependent variable?
- The type of pondweed used
  - The colour of the pondweed
  - The rate of photosynthesis
  - The size of the pondweed leaves
51. How can light intensity be controlled in the experiment?
- By adjusting the concentration of carbon dioxide
  - By changing the water temperature
  - By varying the distance between the light source and the pondweed
  - By altering the pH of the water
52. What effect does an increase in light intensity typically have on the rate of photosynthesis in aquatic plants?
- It decreases photosynthesis rates
  - It has no effect on photosynthesis
  - It increases photosynthesis rates
  - It changes the colour of the pondweed
53. What piece of equipment would be essential for measuring the rate of photosynthesis in this experiment?
- A thermometer
  - A ruler
  - A pH meter
  - A gas syringe
54. In summary, what does this experiment aim to discover about the relationship between light intensity and photosynthesis in pondweed?
- Whether pondweed can photosynthesize in the dark
  - How light intensity affects the colour of pondweed
  - The effect of temperature on aquatic organisms
  - How varying light intensity influences the rate of photosynthesis

55. After photosynthesis, glucose in plants is primarily used for:
- Providing structural support
  - Reproduction
  - Energy storage and providing energy for plant growth
  - Water absorption
56. Which of the following processes does glucose play a key role in after photosynthesis?
- Photosynthesis
  - Transpiration
  - Respiration
  - Osmosis
57. What happens to excess glucose in plants after photosynthesis when the immediate energy needs are met?
- It is converted into glycogen for cell walls
  - It is released into the atmosphere as oxygen
  - It is stored as starch
  - It is used to maintain turgidity
58. In the process of photosynthesis, what is the primary source of carbon dioxide (CO<sub>2</sub>)?  
(HIGHER)
- Soil
  - Air
  - Water
  - Sunlight
59. Which of the following environmental factors is most likely to limit the rate of photosynthesis?  
(HIGHER)
- High light intensity
  - Low carbon dioxide concentration
  - Adequate water supply
  - Warm temperature
60. When the rate of photosynthesis is limited due to insufficient light, what is the immediate effect on the plant? (HIGHER)
- The plant continues to photosynthesize normally
  - The plant's growth is enhanced
  - The plant relies more on respiration
  - The plant's growth is slowed due to lack of glucose for respiration
61. Cellular respiration is best described as:
- An endothermic reaction
  - An exothermic reaction
  - A chemical reaction in plants only
  - An energy-absorbing reaction
62. During cellular respiration, energy is released from:
- Glucose and oxygen
  - Water and carbon dioxide
  - Light and chlorophyll
  - Nitrogen and carbon
63. What does an exothermic reaction like cellular respiration produce?
- Heat and light energy
  - Water and oxygen
  - Glucose and carbon dioxide
  - Starch and nutrients

64. Why do organisms need energy?
- To produce oxygen
  - To maintain body temperature
  - To increase body weight
  - To store excess glucose
65. When engaging in vigorous exercise, what happens to the demand for oxygen and glucose?
- The demand decreases
  - The demand remains the same
  - The demand increases
  - The demand for energy is eliminated
66. How are investigations into the effects of exercise on the body typically conducted?
- Only in laboratory settings
  - By studying mathematical equations
  - Through experiments on plant tissues
  - Through physical and physiological measurements
67. When muscles lack oxygen during strenuous exercise, what is likely to occur?
- Increased strength and energy
  - Muscle cramps and fatigue
  - Improved muscle flexibility
  - Enhanced muscle growth
68. How is lactic acid typically removed from muscles and transported to the liver?
- Through the respiratory system
  - Via the bloodstream
  - Through the digestive system
  - By the urinary system
69. Cellular respiration is best described as:
- An endothermic reaction
  - An exothermic reaction
  - A chemical reaction in plants only
  - An energy-absorbing reaction
70. During cellular respiration, energy is released from:
- Glucose and oxygen
  - Water and carbon dioxide
  - Light and chlorophyll
  - Nitrogen and carbon
71. What does the exothermic reaction of aerobic cellular respiration release?
- Heat energy
  - Water and oxygen
  - Glucose and carbon dioxide
  - Starch and nutrients
72. Which of the following is a key difference between aerobic and anaerobic respiration?
- Aerobic respiration occurs in the absence of oxygen, while anaerobic respiration requires oxygen.
  - Aerobic respiration releases more energy than anaerobic respiration.
  - Anaerobic respiration takes place in the mitochondria, while aerobic respiration occurs in the cytoplasm.
  - Aerobic respiration produces lactic acid, while anaerobic respiration does not.

73. In aerobic respiration, which gas is required?
- Oxygen
  - Carbon dioxide
  - Lactic acid
  - Ethanol
74. What is the primary role of fermentation in yeast cells?
- Production of energy in the form of ATP
  - Formation of glucose for energy storage
  - Conversion of lactic acid into pyruvate
  - Generation of carbon dioxide and ethanol in the absence of oxygen
75. During exercise, why is there an increased need for oxygen and glucose in the body?
- To slow down metabolism
  - To support muscle contraction
  - To reduce energy production
  - To promote rest and recovery
76. What do investigations into the effects of exercise on the body typically involve?
- Studying the effects of video games
  - Measuring heart rate and oxygen levels
  - analysing TV-watching habits
  - Observing sleep patterns
77. When muscles experience a lack of oxygen during intense exercise, what is the primary consequence?
- Muscles relax and recover quickly
  - Muscles become fatigued and painful
  - Muscles double in size
  - Muscles become stronger
78. What is the primary method by which the body removes lactic acid generated during exercise?
- Lactic acid is expelled through sweat
  - Lactic acid is converted into more energy
  - Lactic acid is directly eliminated by the muscles
  - Lactic acid is transported to the liver for processing
79. In terms of lactic acid removal, which organ primarily plays a role in processing it?
- The brain
  - The kidneys
  - The muscles
  - The liver



**Marksheet – Fill in your answers using this grid:**

Qn	Answer	Correct	Check
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			

Qn	Answer	Correct	Check
23			
24			
25			
26			
27			
28			
42			
43			
44			
45			
46			
47			
48			
49			
50			
51			
52			
53			
54			
55			
56			
57			

Qn	Answer	Correct	Check
58			
59			
60			
61			
62			
63			
64			
65			
66			
67			
68			
69			
70			
71			
72			
73			
74			
75			
76			
77			
78			
79			
Total			/66

## **Feedback and Review**

*Reviewing and providing feedback on your GCSE biology questions is an important part of the learning process. Here's a list of tasks to help you effectively review and learn from the content you didn't know:*

**Identify Weak Areas:** Go through the questions you answered and identify the specific topics or concepts you struggled with.

**Revisit the Questions:** Re-read the questions you answered incorrectly to understand the context and what was expected in your response.

**Consult Textbooks and Notes:** Refer to your GCSE biology textbooks, revision guides and class work to find information related to the topics you found challenging.

**Online Resources:** Use online resources and educational websites, videos, or articles to gain a deeper understanding of the topics you struggled with. Ask if you are unsure which to use.

**Create a Summary:** Summarize the key points for each topic or concept in your own words. This will help reinforce your understanding.

**Practice Problems:** Look for additional practice questions or worksheets related to the weak areas you identified and attempt them.

**Flashcards:** Create flashcards for important terms, definitions, and concepts. Use them for quick and effective review.

**Mind Maps:** Create visual mind maps or concept maps to connect related ideas and concepts. This can help you see the bigger picture.

**Teach Someone Else:** Explaining what you've learned to a friend or family member can be an effective way to reinforce your understanding.

*Use the summary box below to annotate the ideas and information that you must use to provide your own feedback on what you are going to do next to develop and enhance your learning of this content:*

**Golden Knowledge Multiple Choice Question sheet: Topic 4: Bioenergetics and Plants (TRILOGY COURSE)**

**Answers**

1	c) Stomata regulate the exchange of gases, such as carbon dioxide and oxygen.
2	b) Transporting water and minerals from roots to leaves
3	b) Transporting organic nutrients, like sugars, throughout the plant
4	c) Flowers
5	b) Anchoring the plant and absorbing water and minerals
6	c) Leaves
7	c) Leaves
8	a) Stems
9	c) Transpiration
10	c) Translocation
11	d) Active transport
12	c) Xylem
13	c) Transporting organic nutrients, like sugars, throughout the plant
14	b) Light intensity
15	a) Stems
16	c) Leaves
17	c) Stomata
18	b) Via active transport and osmosis
19	c) Transporting water and minerals
20	c) Roots
21	b) To transport minerals into the cell against a concentration gradient
22	b) Air temperature
23	a) Stems
24	c) Water vapour
25	b) Regulating the exchange of gases and water vapour
26	b) Via active transport and osmosis
27	c) Transporting water and minerals
28	c) Roots
42	a) Carbon dioxide + Water → Glucose + Oxygen
43	c) A reaction that absorbs energy from the surroundings
44	a) Temperature, light intensity, and carbon dioxide concentration
45	c) Adjusting temperature, light intensity, and carbon dioxide concentration
46	b) Low carbon dioxide concentration
47	d) To understand the factors that affect the rate of photosynthesis
48	c) It enables optimal control of factors to maximize plant growth efficiently
49	d) To measure how light intensity influences the rate of photosynthesis
50	c) The rate of photosynthesis
51	c) By varying the distance between the light source and the pondweed
52	c) It increases photosynthesis rates
53	d) A gas syringe
54	d) How varying light intensity influences the rate of photosynthesis
55	c) Energy storage and providing energy for plant growth
56	c) Respiration
57	c) It is stored as starch
58	b) Air

59	b) Low carbon dioxide concentration
60	d) The plant's growth is slowed due to lack of glucose for respiration
61	b) An exothermic reaction
62	a) Glucose and oxygen
63	a) Heat and light energy
64	b) To maintain body temperature
65	c) The demand increases
66	d) Through physical and physiological measurements
67	b) Muscle cramps and fatigue
68	b) Via the bloodstream
69	b) An exothermic reaction
70	a) Glucose and oxygen
71	a) Heat energy
72	b) Aerobic respiration releases more energy than anaerobic respiration.
73	a) Oxygen
74	d) Generation of carbon dioxide and ethanol in the absence of oxygen
75	b) To support muscle contraction
76	b) Measuring heart rate and oxygen levels
77	b) Muscles become fatigued and painful
78	d) Lactic acid is transported to the liver for processing
79	d) The liver