

APPENDIX
PRE-TEST QUESTIONNAIRE (MAI)

Name (Optional): _____

School: _____

Class: _____ **Sec:** _____

Gender: Male ____ Female ____ Other ____

INSTRUCTIONS:

This questionnaire is a part of a research study titled *"A Study on the Effect of Metacognitive Instructional Strategies in Promoting Problem-Solving Skills among Secondary Stage Students."* Your responses will be used strictly for academic and research purposes only.

There are no right or wrong answers. The purpose of this tool is to understand your natural way of thinking and solving problems while learning science concepts. Read each item carefully and select the option that best represents your thoughts or behaviours.

Please keep the following points in mind:

1. **Answer honestly** – Respond according to what you actually think or do, not what you believe is the “right” answer.
2. Read each statement carefully. If you feel the statement applies to you, mark **Yes**. If not, mark **No**.
3. **Do not leave any item unanswered**. If you are unsure, make a thoughtful choice.
4. **All responses will remain confidential** and will be used only for the purpose of this academic study.
5. Try not to overthink your answers. **Go with your first instinct** or the option that feels most natural.

Your cooperation is highly appreciated.

S.NO.	Question	Yes	No
Section A: Knowledge of Cognition			
1.	I am aware of how I learn best.		
2.	I know when I do not understand something.		
3.	I can identify the learning techniques that work for me.		
4.	I understand the goals of my learning tasks.		
5.	I can evaluate how well I have learned something after studying.		
6.	I know which subjects or topics I find easy or difficult.		
7.	I can estimate how much effort I need to learn something new.		
Section B: Regulation of Cognition			
8.	I plan what I will do before starting a learning task.		
9.	I try to focus on what's important while studying.		
10.	I change the way I study if I am not understanding the content.		
11.	I keep checking to see if I am learning correctly while studying.		
12.	I try to understand why I made a mistake in an assignment or test.		
13.	I go back and review things I don't understand.		
14.	I test myself to see if I remember the information.		
15.	I think about how I could do better after completing a task.		
16.	I organize my time before I begin studying.		
17.	I try to link what I am learning with what I already know.		
18.	I think about my learning process while I study.		
19.	I ask myself questions to make sure I understand.		
20.	I try to explain things I have learned in my own words.		

Section C: Problem-Solving Awareness			
21.	When I get stuck on a problem, I try to figure out what went wrong.		
22.	I use different ways to try and solve a problem if the first one doesn't work.		
23.	I think about the steps I should take before I try to solve a science problem.		
24.	I try to understand the meaning of a question before answering it.		
25.	I check my work to see if my answer makes sense.		
Section D: Strategy Awareness and Use			
26.	I choose study methods that help me understand the topic better.		
27.	I try to use examples or diagrams to understand tough concepts.		
28.	I take notes in a way that helps me remember things better.		
29.	I change my strategy when I find something difficult to understand.		
30.	I try to solve questions in steps, not all at once.		

Biology Pre-Test Questionnaire

Name (Optional): _____

School: _____

Class: _____ Sec: _____

Gender: Male ____ Female ____ Other ____

Instructions: This questionnaire is a part of a research study titled: “A Study on the Effect of Metacognitive Instructional Strategies in Promoting Problem-Solving Skills among Secondary Stage Students.”

Your responses will be used strictly for academic and research purposes only. The goal is to understand your current knowledge and thought process related to the biology topic *Life Processes – Photosynthesis and Respiration*.

Please read the following instructions carefully before beginning the questionnaire:

1. There are a total of **15 questions**, each carrying **2 marks**.
2. The **total marks** for the questionnaire are **30**.
3. **There is no negative marking.**
4. Read each question carefully and select the best possible answer from the options provided.
5. Attempt **all questions**. If you are unsure, choose the answer that seems most appropriate to you.
6. Your responses will be kept **confidential** and will be used only for **research and educational improvement**.
7. Do not overthink your answers—go with your **first instinct**.
8. Take your time and think **critically** about each question. The purpose is to assess not only what you know but also how you apply your understanding to solve problems in science.
9. Your **honest participation** is highly valuable and appreciated.

Thank you for your cooperation.

1. Which gas is essential for photosynthesis?
A) Nitrogen B) Oxygen C) Carbon dioxide D) Hydrogen
2. The green pigment that captures sunlight in plants is:
A) Haemoglobin B) Chlorophyll C) Melanin D) Xanthophyll
3. During respiration, energy is released in the form of:
A) DNA B) ATP C) Protein D) Glucose
4. Which of the following is a product of photosynthesis?
A) Carbon dioxide B) Oxygen C) Water D) Lactic acid
5. What is the main function of stomata?
A) Transport water B) Photosynthesis C) Exchange of gases D) Absorb sunlight
6. Which part of the cell is called the powerhouse?
A) Nucleus B) Ribosome C) Mitochondria D) Chloroplast
7. Which process occurs in green plants during daytime?
A) Respiration only B) Photosynthesis only C) Both D) Neither
8. Glucose is broken down in the cell to release energy during:
A) Photosynthesis B) Germination C) Respiration D) Reproduction
9. Which organelle is involved in photosynthesis?
A) Chloroplast B) Mitochondria C) Ribosome D) Golgi body
10. Anaerobic respiration in muscles produces:
A) Alcohol B) Oxygen C) Lactic acid D) Glucose
11. What is the role of xylem in plants?
A) Transport of water B) Transport of food C) Transport of oxygen D) Storage of starch
12. Which process helps plants make food using sunlight?
A) Digestion B) Photosynthesis C) Transpiration D) Germination
13. Which gas is used during aerobic respiration?
A) Nitrogen B) Oxygen C) Carbon dioxide D) Methane
14. The end product of glucose breakdown in the absence of oxygen is:
A) Water B) Oxygen C) Lactic acid D) Carbon dioxide
15. Which substance is tested using iodine solution in leaves?
A) Sugar B) Protein C) Fat D) Starch

POST-TEST QUESTIONNAIRE (MAI)

Name: _____

School: _____

Class: _____ Sec: _____

Gender: Male ____ Female ____ Other ____

INSTRUCTIONS:

This questionnaire is a part of a research study titled "*A Study on the Effect of Metacognitive Instructional Strategies in Promoting Problem-Solving Skills among Secondary Stage Students.*" Your responses will be used strictly for academic and research purposes only.

There are no right or wrong answers. The purpose of this tool is to understand your natural way of thinking and solving problems while learning science concepts. Read each item carefully and select the option that best represents your thoughts or behaviours.

Please keep the following points in mind:

1. **Answer honestly** – Respond according to what you actually think or do, not what you believe is the “right” answer.
2. Read each statement carefully. If you feel the statement applies to you, mark **Yes**. If not, mark **No**.
3. **Do not leave any item unanswered**. If you are unsure, make a thoughtful choice.
4. **All responses will remain confidential** and will be used only for the purpose of this academic study.
5. Try not to overthink your answers. **Go with your first instinct** or the option that feels most natural.

Your cooperation is highly appreciated.

S.NO.	Question	Yes	No
Section A: Knowledge of Cognition			
1.	I understand which learning strategies help me the most.		
2.	I can recognize when I am not learning effectively.		
3.	I know how to approach new topics based on my strengths.		
4.	I can clearly identify what I need to learn in a given task.		
5.	I can judge how well I understood something after completing a task.		
6.	I know which types of questions or problems are challenging for me.		
7.	I am aware of how much effort is needed for me to succeed in learning.		
Section B: Regulation of Cognition			
8.	Before starting a task, I decide what methods or tools to use.		
9.	I stay focused on my learning objectives while working.		
10.	If one method doesn't work, I try another way of learning.		
11.	I monitor my progress during learning activities.		
12.	I analyze what went wrong when I make mistakes.		
13.	I revisit difficult material until I understand it better.		
14.	I quiz myself to make sure I remember what I've learned.		
15.	I think about how I handled a learning task and what I could improve.		
16.	I try to connect new topics to what I already know.		
17.	I think about the steps I'm taking during learning.		
18.	I check my understanding by asking myself questions.		

19.	I can explain a concept in different ways to make sure I understand it.		
20.	I try to connect new topics to what I already know.		
Section C: Problem-Solving Awareness			
21.	I think about the problem before jumping to an answer.		
22.	I use trial and error if I am unsure how to solve a question.		
23.	I reflect on the process I used after solving a science problem.		
24.	I try to identify keywords in the question to understand what is being asked.		
25.	I double-check my steps when solving complex questions.		
Section D: Strategy Awareness and Use			
26.	I use learning tools (like mind maps, tables) to organize science information.		
27.	I summarize science topics in a way that helps me remember.		
28.	I highlight or underline important points while learning.		
29.	I change my note-taking style if it's not helping me understand.		
30.	I solve examples or questions step-by-step to avoid confusion.		

Biology Post-Test Questionnaire

Name (Optional): _____

School: _____

Class: _____ Sec: _____

Gender: Male ____ Female ____ Other ____

Instructions: This questionnaire is a part of a research study titled: “**A Study on the Effect of Metacognitive Instructional Strategies in Promoting Problem-Solving Skills among Secondary Stage Students.**”

Your responses will be used strictly for academic and research purposes only. The goal is to understand your current knowledge and thought process related to the biology topic ***Life Processes – Photosynthesis and Respiration.***

Please read the following instructions carefully before beginning the questionnaire:

10. There are a total of **15 questions**, each carrying **2 marks**.
11. The **total marks** for the questionnaire are **30**.
12. **There is no negative marking.**
13. Read each question carefully and select the best possible answer from the options provided.
14. Attempt **all questions**. If you are unsure, choose the answer that seems most appropriate to you.
15. Your responses will be kept **confidential** and will be used only for **research and educational improvement**.
16. Do not overthink your answers—go with your **first instinct**.
17. Take your time and think **critically** about each question. The purpose is to assess not only what you know but also how you apply your understanding to solve problems in science.
18. Your **honest participation** is highly valuable and appreciated.

Thank you for your cooperation.

1. Which factor affects the rate of photosynthesis?
A) Leaf size B) Light intensity C) Wind speed D) Soil colour
2. Which part of a leaf helps in exchange of gases?
A) Midrib B) Veins C) Guard cells D) Epidermis
3. In which form is energy stored in cells?
A) DNA B) RNA C) ATP D) Protein
4. Which component of air is necessary for respiration?
A) Oxygen B) Carbon dioxide C) Nitrogen D) Hydrogen
5. What happens to the glucose produced in photosynthesis?
A) Exhaled B) Stored as starch C) Evaporates D) Used to make proteins
6. Which gas is given out during respiration?
A) Oxygen B) Carbon dioxide C) Hydrogen D) Methane
7. What is common between mitochondria and chloroplasts?
A) Found only in animals B) Energy transformation C) Store DNA D) Involved in respiration
8. Where does anaerobic respiration occur in the body?
A) Brain B) Liver C) Muscles during heavy exercise D) Skin
9. What is the colour change seen in iodine test for starch?
A) Blue-black B) Red C) Yellow D) Green
10. The food prepared by plants is mainly:
A) Protein B) Starch C) Cellulose D) Fat
11. What do stomata do during photosynthesis?
A) Transport food B) Absorb sunlight C) Release oxygen D) Make glucose
12. During aerobic respiration, how many ATP molecules are generated from one glucose molecule?
A) 2 B) 4 C) 36-38 D) 1
13. Which gas is absorbed by leaves from air for photosynthesis?
A) Oxygen B) Carbon dioxide C) Nitrogen D) Argon
14. Why is sunlight important for plants?
A) For respiration B) For growth C) For photosynthesis D) For reproduction
15. Which cell organelle is responsible for energy release?
A) Mitochondria B) Nucleus C) Vacuole D) Endoplasmic reticulum