



**THE DUBLIN
ACADEMY OF
EDUCATION**

ONLINE GRINDS PROGRAMME

SAMPLE NOTES

6TH YEAR BIOLOGY

LEAVING CERT (HIGHER LEVEL)

PHOTOSYNTHESIS

DAVID LEWIS



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ONLINE GRINDS PROGRAMME

Our Online Grinds programmes offer students the opportunity to be taught by our incredible teachers every single week from the comfort of their own homes. We have designed these online programmes based on extensive student feedback regarding how to best deliver online tuition.

These programmes run for 29x academic weeks and contain a blend of pre-recorded and live lessons. Each week, students will receive a new 75-minute pre-recorded video lesson. These pre-recorded video lessons are very beneficial for students as they can pause, rewind and rewatch any of the content they're not sure of. Another benefit to the pre-recorded lessons are that students can watch (and rewatch) them at their convenience rather than being constrained to a timetable. Students will also have access to a full archive of all delivered video lessons which they can rewatch right up until the State Examinations. The pre-recorded video lessons are then supported by additional live online Q & A tutorial sessions with our teachers which facilitate all student queries ensuring they are following the material.

Key information:

- A total of 29x video lessons which are delivered weekly to students via our moodle platform (each weekly video is 75-minutes in duration)
- Students can watch their video lessons, wherever and whenever suits them, they are not constrained to a timetable.
- Students can pause, rewind and rewatch video lessons.
- In addition to the 29x videos, students will have access to regular live online Q & A tutorial sessions with our teachers
- Access to a 5-hour live workshop with our teachers in May 2021
- Hundreds of pages of our study notes which will be delivered in hard copy format to students' homes free of charge
- Regardless of any school closures, all Online Grinds programmes will proceed as scheduled. This is made possible as we have spent the entire Summer pre-recording all the video lessons to ensure these can be delivered whether schools are open or closed.

ON-DEMAND CLASSES

6th Year			
SUBJECT	LEVEL	LOCATION	DATE
Applied Maths	H	Online	Monday 7th September Onwards
Biology	H	Online	Monday 7th September Onwards
Business	H	Online	Monday 7th September Onwards
Chemistry	H	Online	Monday 7th September Onwards
Economics	H	Online	Monday 7th September Onwards
English	H	Online	Monday 7th September Onwards
French	H	Online	Monday 7th September Onwards
Geography	H	Online	Monday 7th September Onwards
Irish	H	Online	Monday 7th September Onwards
Maths	H	Online	Monday 7th September Onwards
Physics	H	Online	Monday 7th September Onwards
Spanish	H	Online	Monday 7th September Onwards

5th Year			
SUBJECT	LEVEL	LOCATION	DATE
English	H	Online	Monday 7th September Onwards
Irish	H	Online	Monday 7th September Onwards
Maths	H	Online	Monday 7th September Onwards

3rd Year			
SUBJECT	LEVEL	LOCATION	DATE
Maths	H	Online	Monday 7th September Onwards

FEES

OPTION 1: IN FULL			
	PRICE	TOTAL	SAVINGS
1 subject	€895	€895	-
2 subjects	€495	€1,390	€400
3 subjects	€495	€1,885	€800
4 subjects	€495	€2,380	€1,200
5 subjects	€495	€2,875	€1,600

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The Teacher



As the Dublin Academy's study skills strategist, David does more than just present course material in maths and biology. With more than 7 years' experience teaching at the highest level, he is fascinated with innovating new ways of creating effective, personalised exam strategies that are extraordinarily useful and proven to achieve results.

No matter which teaching hat he is wearing, David's motivation is simple - to give students tools and methods that drive confidence and empower them to produce a successful leaving cert. This motivation has transferred into his private life as he has helped to build schools for underprivileged children in India with EDUCO. He also hosts the Academy podcast, co teaches the schools personal development club and in 2020 David authored his first book.

Throughout his career, David has modeled himself on the saying:

'work hard, work smart, have fun'

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Ref: 6/bio/h/dl/freecourse2020

The Biology Course

Unit 1	Unit 2	Unit 3
Scientific Method	Cell Structure	Monera
Food	Cell Diversity	Fungi
Ecology	Enzymes	Viruses
	Photosynthesis	Protista
	Respiration	Plant Structure
	Enzymes	Plant Transport
	Osmosis + Diffusion	Plant Responses
	DNA + RNA	Plant Reproduction
	Cell Division	Vegetative Propagation
	Genetic Crosses	Breathing System
	Variation + Evolution	Circulatory System
	Genetic Engineering	Digestive System
		Endocrine System
		Lymphatic System
		Nervous System
		Excretion + Homeostasis
		Human Reproduction
		Human Defence
		Senses
		Skeletal System

Experiments

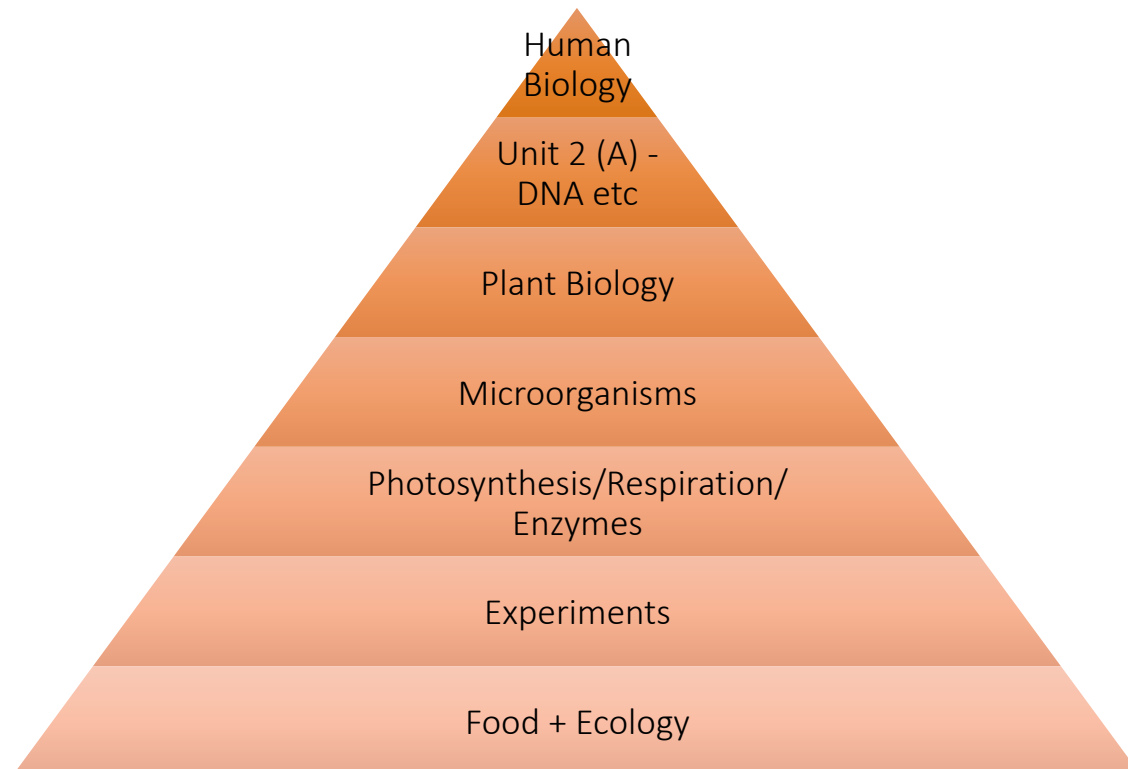
Unit 1	Unit 2	Unit 3
<ol style="list-style-type: none"> 1. Use a light Microscope 2. Food Tests: <ul style="list-style-type: none"> – Test for Starch – Test for Fats – Test for Reducing Sugar – Test for Protein 3. Identify 5 Animals 4. Identify 5 Plants 5. Use equipment to collect Animals and Plants 6. Quantitative survey of plants 7. Quantitative survey of Animals (capture-recapture) 8. Investigate 3 Abiotic factors 	<ol style="list-style-type: none"> 9. Prepare a Plant Cell 10. Prepare an Animal Cell 11. Effect of pH on Enzymes 12. Effect of Temp on Enzymes 13. Effect of Heat denaturation on Enzymes 14. Prepare and Examine an immobilised Enzyme 15. Light intensity effect on Photosynthesis 16. Production of alcohol using yeast 17. Demonstrate osmosis 	<ol style="list-style-type: none"> 18. Isolate DNA from a Plant 19. Investigate growth of leaf yeast. 20. Prepare TS of a Dicot Stem 21. Effect of IAA on plant tissue 22. Digestive activity during Germination 23. Effect of H₂O, O₂ and Temperature on Germination 24. Heart Dissection 25. Effect of exercise on pulse rate

EXAM FOCUS

The Leaving Cert Biology Exam is broken into 3 sections for a total of 400m

<u>Section A 25%</u>	<u>Section B 15%</u>	<u>Section C 60%</u>
Answer 5/6 Qs (20 m)	Answer 2/3 Qs (30 m)	Answer 4/6 Qs* (60 m)
Unit 1 : 2 Qs	<u>23 Experiments</u>	Unit 1 : 1 Q
Unit 2 : 2 Qs		Unit 2 : 2 Qs
Unit 3 : 2 Qs		Unit 3 : 3 Qs
100m	60m	240m

The Study Plan



UNIT 2

How does it appear?

Section A	Section B	Section C
2 Qs (2 x 20 marks)	Experiments 6-14 (30 marks)	2 Question* (2 x 60 marks)
		*may contain experiment

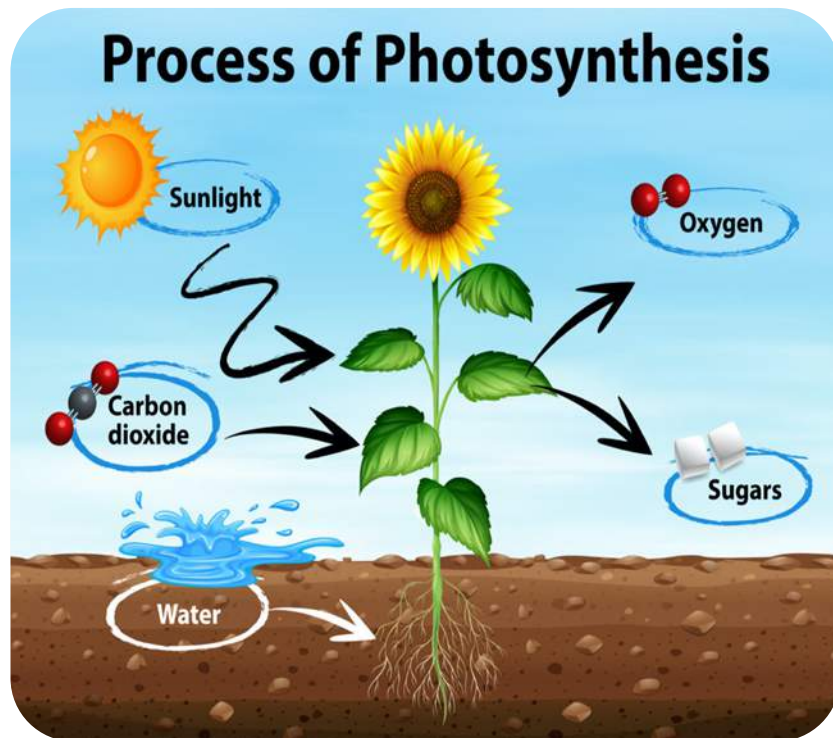
HISTORY OF TOPIC	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05
The Cell	X	6m	20m	6m	X	30m	6m	9m	12m	3m	X	X	X	30m	X
Cell Diversity	20m	X	X	30m	X	X	X	20m	X	20m	X	X	X	X	X
Osmosis + Diffusion	6m	X	36m	30m	20m	X	26m	3m	30m	30m	X	18m	X	X	80m
Enzymes	36m	24m	30m	6m	9m	60m	30m	30m	30m	30m	30m	30m	54m	20m	30m
Respiration	X	42m	20m	36m	24m	44m	60m	24m	20m	X	36m	20m	36m	20m	60m
Photosynthesis	24m	30m	36m	27m	36m	X	36m	27m	30m	36m	24m	30m	30m	60m	20m

Photosynthesis

Questions		Headings:	
How often does it appear?	14/15 Years	- Role	- Experiment
How much is it worth?	24m – 60m	- General Overview	
When did it last appear?	2019 (24m)	- Detailed Study	

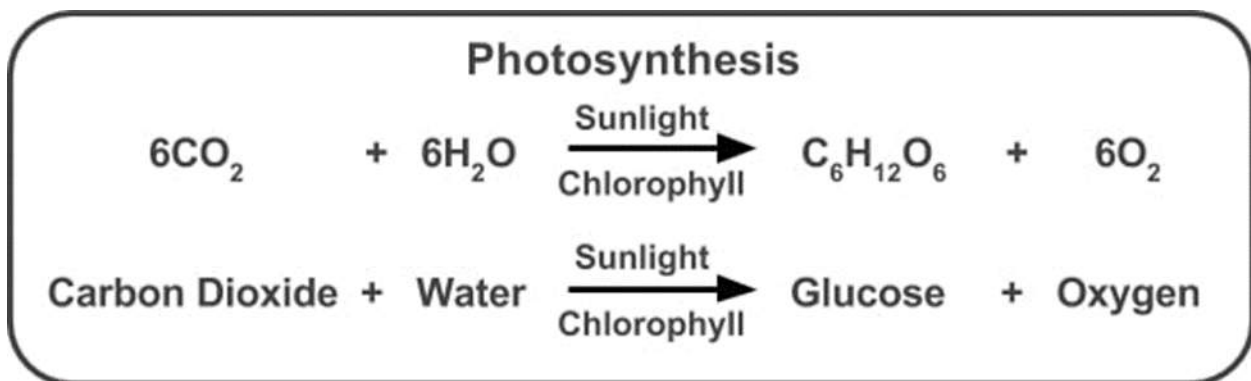


Photosynthesis: production of food from inorganic materials using light energy trapped by chlorophyll. (Eg. Plants, Algae, some Bacteria)



Role of Photosynthesis:

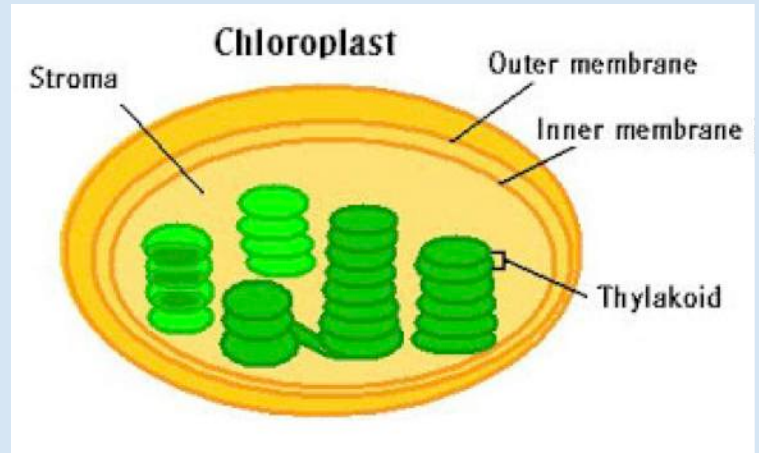
1. Provide plants with food.
2. Provide oxygen for aerobic respiration.
3. Provide animals with food



Photosynthesis

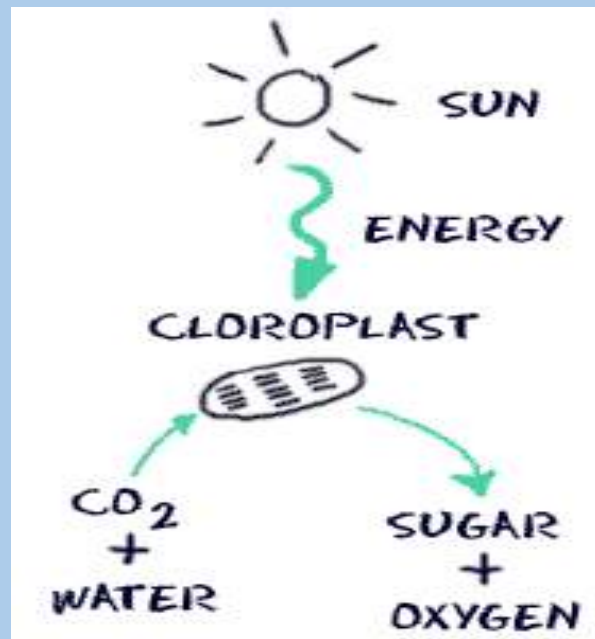
Where :

Photosynthesis takes place in the chloroplasts of cells



1) General Overview

- Chlorophyll absorbs light.
- Photolysis (splitting of water) produces 4 protons, 4 electrons and an oxygen molecule.
- Sunlight energises the electrons.
- Plant absorbs carbon dioxide.
- The energy combines protons, electrons and carbon dioxide to form glucose.



Notes:

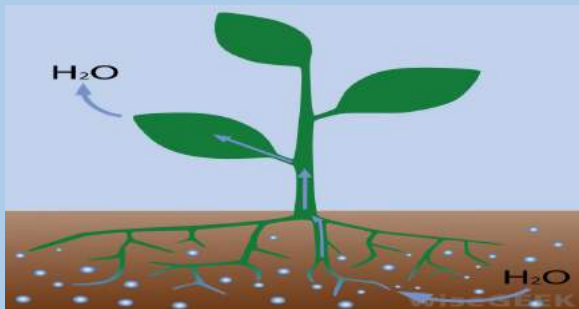
Oxygen

1. Released into atmosphere.
2. Stored for aerobic respiration in plant.



Water

- **absorbed from soil**

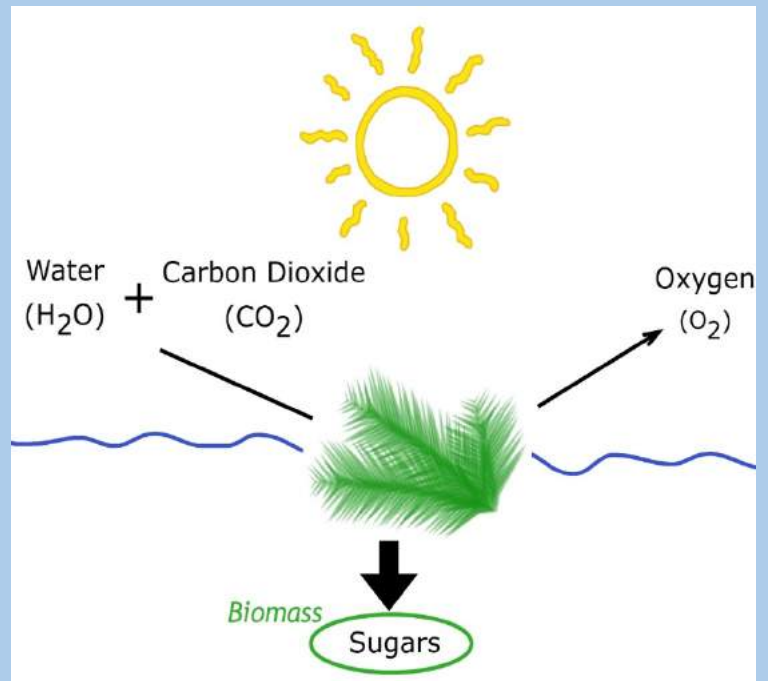


Carbon Dioxide

1. Internal: from respiration
2. External: atmosphere, burning of fossil fuels



Summary:



Detailed Study

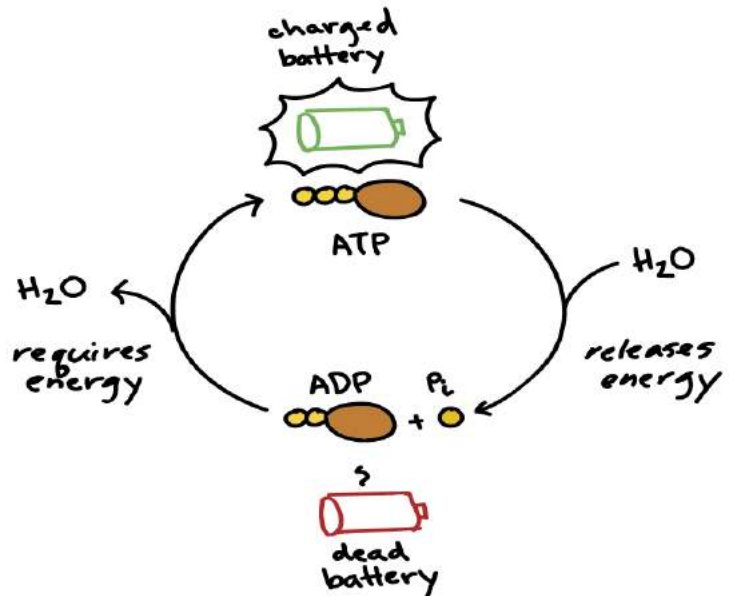
Energy Carriers:

1) ADP/ATP

Adenosine DiPhosphate

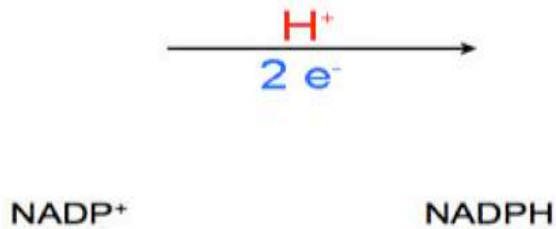
Adenosine TriPhosphate

(Phosphorylation: adding a phosphate)



2) NADP+ / NADPH

Nicotinamide Adenine Dinucleotide Phosphate



Light Stage (light dependent)

1) Light is absorbed

- chlorophyll - photolysis

2) Pathways

Pathway 1 (Cyclic)

- electrons absorb the light energy
- high energy electrons transferred along electron acceptors and back to chlorophyll
- as it moves excess energy is released which is used to make ATP from ADP

Pathway 2 (Non Cyclic)

- Electrons (2) absorb the light energy
- high energy electrons do not return to chlorophyll
- as it moves excess energy is released which is used to make ATP from ADP
- the electrons combine with NADP+ and a proton to form NADPH

3) Products

ATP: gives energy to dark stage reactions

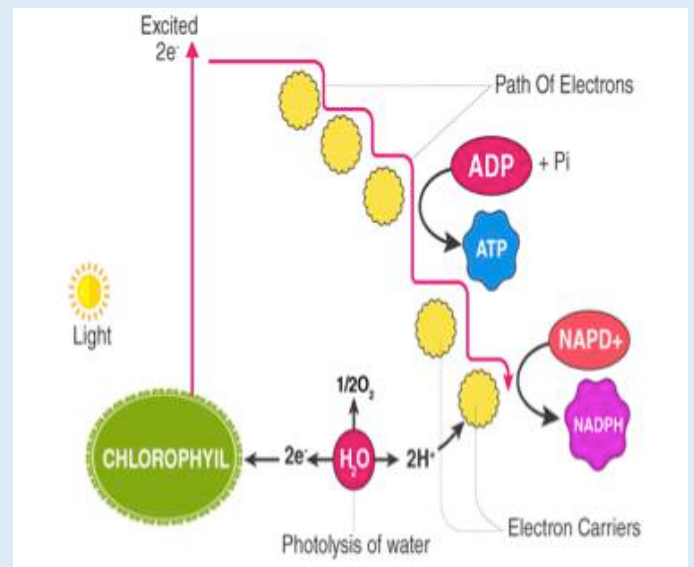
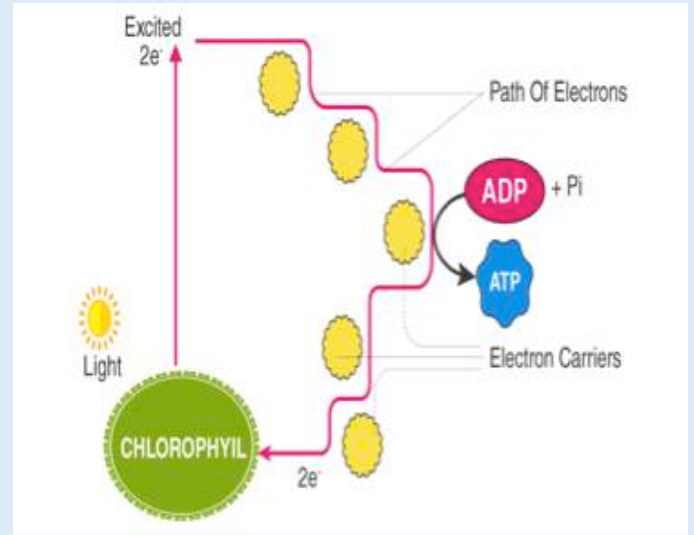
NADPH: supplies protons and energised electrons for dark stage reactions

O₂ : respiration/released to atmosphere

*grana of chloroplasts

Ingredients

1. Water
2. Light
3. Chlorophyll

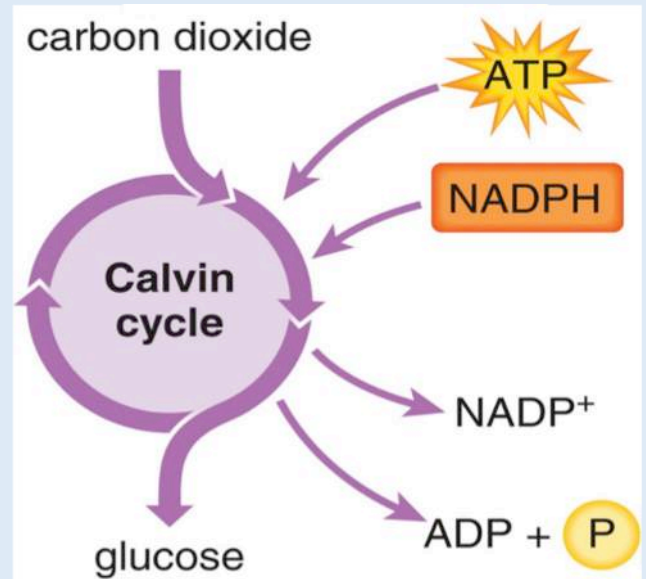


Dark Stage (light independent)

***stroma of chloroplasts**

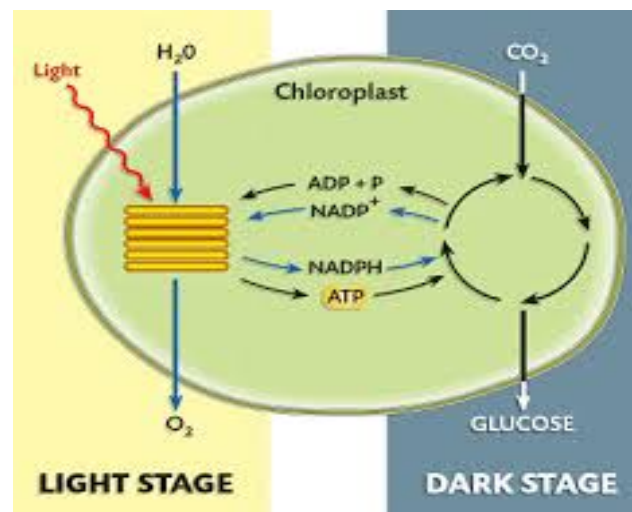
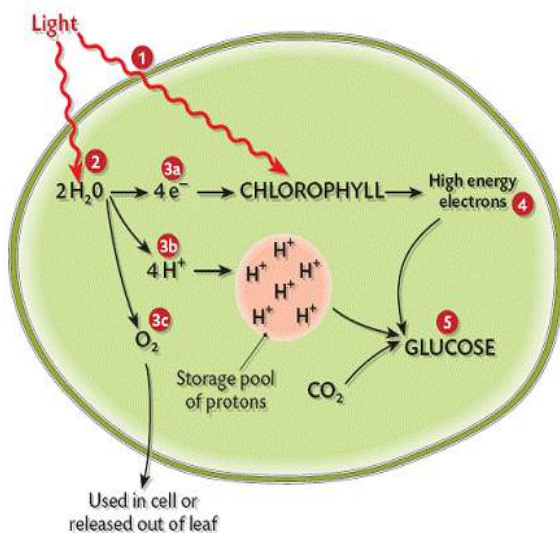
*Controlled by enzymes

- 1) Carbon dioxide diffuses into the stroma
- 2) CO₂ is reduced to C₆ H₁₂ O₆ (glucose) using products of NADPH and energy supplied by ATP
-
- 3) NADPH returns to NADP+, ATP returns to ADP + P
- 4) Products are recycled back to the light stage



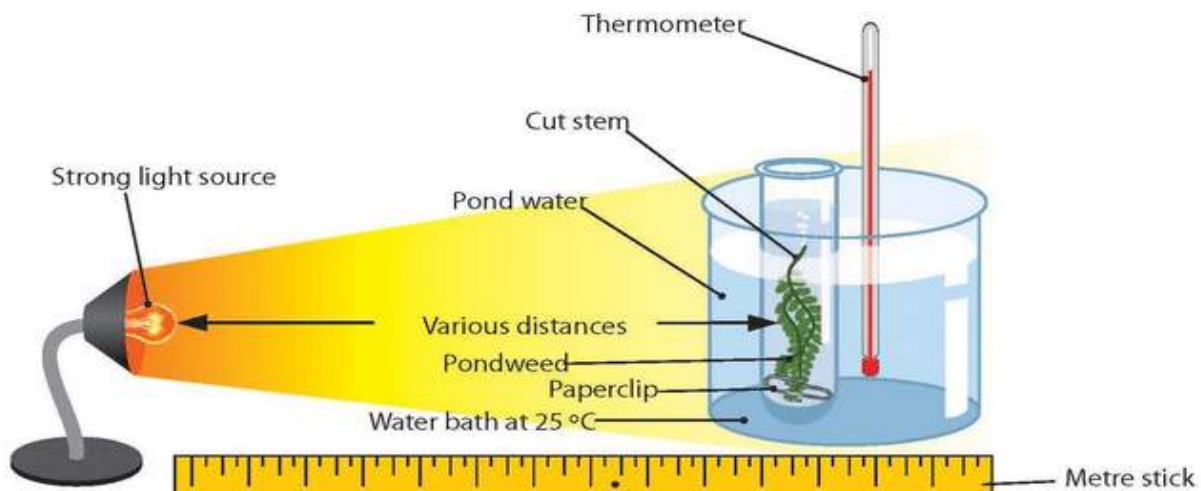
(Note: Also known as Calvin Cycle)

Summary



Mandatory Experiment:

To investigate the effect of light intensity on the rate of photosynthesis



Method:

- Obtain fresh pondweed.
- Cut a small section using the backed blade and crush the cut end slightly between your fingers.
- Place pondweed in a test tube with pond water.
- Ensure the cut end is facing upwards and weigh the pondweed down by attaching a paperclip.
- Shine the strong fluorescent light source on the pondweed for 5 minutes to allow the pondweed to adjust.
- Move the light source various distances from the pondweed.
- Allow the pondweed to adjust to each new light intensity for 5 minutes before counting the number of bubbles per minute.
- Count the number of bubbles per minute at each distance.

Result: As the light source is moved further away from the pondweed, the rate of bubbles per minute decreases.

Conclusion: The rate of photosynthesis increases with light intensity

