PENANG SANGAM HIGH SCHOOL
P.O.BOX 44, RAKIRAKI
LESSON NOTES

Year/Level: 12C/D **Subject:** Biology

Strand	1 structure & life processes
Sub Strand	1.4 comparative form and function in plants and animals
Content Learning Outcome	Study the storage and utilization of food in plants.

Nutrition in Plants

Food manufacture

- The food manufacturing (making) process in plants is called Photosynthesis.

Ingredients used:

- Plants need several inorganic materials in order to make food as shown below:

Ingredients	Adaptation
Sunlight for energy	Pigments in the thylakoid membranes of the chloroplast absorb light (solar energy) from the sun. Leaves are broad for maximum surface area for absorption of light. Leaves are small to allow light to filter to the leaves on the lower branches. Palisade layer, with the highest density of chloroplasts in its cells, is close to the top surface of the leaf in order to absorb more sunlight. Irregular-shaped cells in spongy tissues enhance scattering of light, increasing the path length of light travelling through a leaf, thus increasing the probability of absorption. Path lengthening is important for the weakly absorbed wavelengths of light.
Carbon dioxide	Carbon dioxide (for carbon and oxygen atoms) Stomata on the bottom surface of the leaf are open to allow for diffusion of CO2 from the air into the leaf. The spongy mesophyll leaf has plenty of air spaces so the gas can diffuse more easily to the palisade layer. Leaves are usually very thin to allow faster diffusion.
Water	Water (for electrons, hydrogen ions, co-enzymes and minerals) Root hair increases the root surface area for absorption. The network of veins in the leaves helps transport water and carbohydrates. Roots show geotropism and hydrotropism.

Exercise

Give at least two adaptations in plants that allows them to obtain maximum:

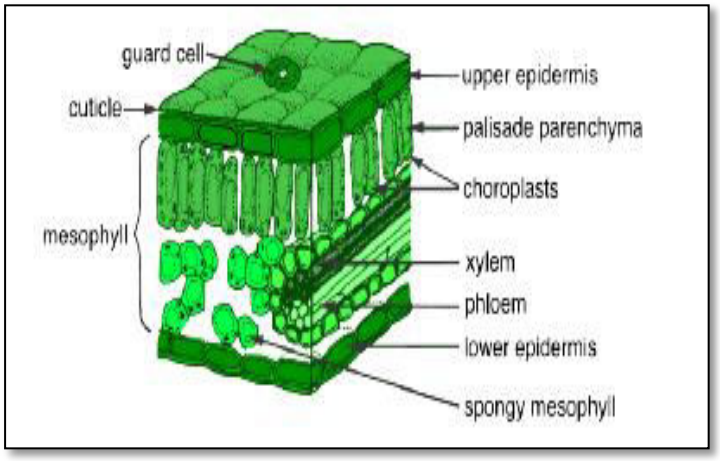
(i) Sunlight_____
_____
_____

(ii) CO_2
_____
_____
_____

(iii) Water

_____
_____
_____

Cross-section of a Leaf



Leaf Structure	Adaptation for photosynthesis
Cuticle	Prevents loss of water from leaves
Epidermis	Transparent protective layer. Protects leaf without inhibiting photosynthesis.
Palisade layer	Palisade cells are filled with chloroplasts to absorb maximum light for photosynthesis. Palisade cells are long and thin so light has to pass through as many chloroplasts as possible.
Mesophyll layer	Have plenty of air spaces that increase the surface area inside the leaf to maximize.
Stoma	Allow exchange of CO_2 and O_2
Guard Cells	Allow the stoma to open and close to regulate loss of water from the leaves
Xylem	Conducts water in plants
Phloem	Conducts food in plants