Yr 11 Combined Science Topic: ANIMAL COORDINATION & CONTROL

Duration: 6 LESSONS

Composite: Unit test

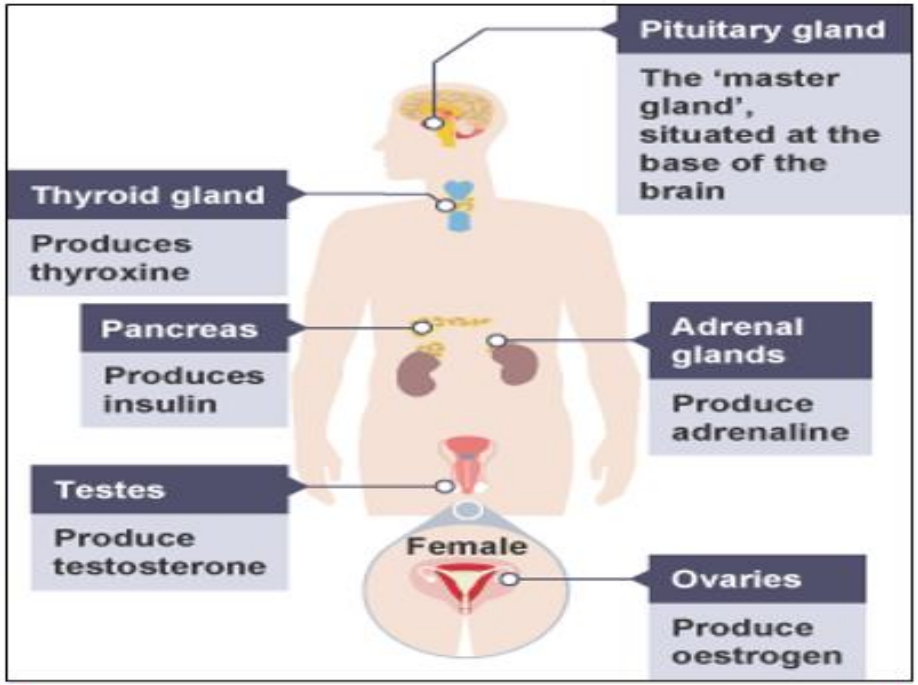
Key vocabulary:	Core knowledge Components	Powerful knowledge components crucial to commit to long term memory	Links to previous and future topics
Hormone Messenger Gland Tissue Cell Receptor Effector Negative feedback mechanism Positive feedback mechanism Secrete Pregnancy Metabolism Control Ovary Uterus Endometrium Testes Pituitary Thyroid Adrenal Pancreas Stimulus Nervous	**1.** What is the role of pituitary, thyroid, pancreas, adrenal, ovaries and testes? **2.** How does hormonal action compare to nervous responses? **3.** How does adrenalin act to support the need for cellular respiration? **4.** How will thyroxine affect basal metabolic rate? **5.** How is thyroxine control an example of negative feedback? **6.** How does the pituitary gland initiate the menstrual cycle? **7.** Explain the roles of the other hormones: oestrogen, progesterone, FSH and LH. **8.** What is the corpus luteum and what is its role? **9.** How do hormones change during pregnancy? **10.** Which hormone is maintained during pregnancy? **11.** When is clomiphene therapy used and how does it work? **12.** Explain the steps involved in IVF treatment **13.** Give examples of hormonal contraception. **14.** Explain the difference between hormonal and barrier methods. **15.** Contrast the two methods. **16.** Which hormones control blood glucose levels? **17.** What are the two types of diabetes and how are they caused?	• What kind of substances are hormones? • How are hormones transported around the body? • How are hormones different from nerves? • Why is adrenalin called the "fight or flight" hormone? • What is basal metabolic rate? • Which hormone(s) control blood sugar? • What is type 1 diabetes? • What is type 2 diabetes?	KS3: Cells Reproduction Moving & Breathing KS4: Key concepts, Exchange & Transport

Impressive reading	Impressive speaking	Impressive writing	Resilience	Numeracy/graph skills	Employability via:
Article on the FOF response	Read aloud to group the Dr's letters	Doctor's letter for diabetes patient	To understand the multiple hormones involved in control of the menstrual cycle	Calculation of BMI from formula.	Doctor, nurse, paramedic, athlete, physiotherapist, sport therapist, family planning adviser

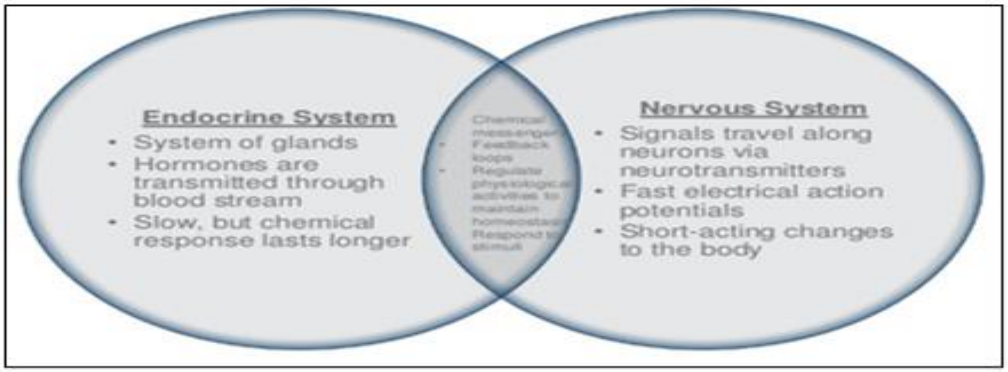
Culture capital:

- How flight or flight is a primitive response, and the health problems it can lead to when stimulated too often in stressful situations nowadays
- Foundation: clomiphene & IVF
- HRT

SEND			
Communication & Interaction • Unambiguous terms and clear language used is presentations/handouts • Unambiguous terms and clear language used by teacher • ADHD pupils are given instructions directly by use of their names • Use of post-it plans to help pupils work through a task	**Cognition & Learning** • Chunking of activities into manageable portions, so as not to lead to cognitive overload • Use of low stakes/high gains activities for knowledge recall • Topics are mapped out visually for pupils to see • Links to previous learning established	**SEMH** • Consideration to seating positions • Awareness of specific pupil triggers • Communication channels kept open	**Physical/Sensory** • Consideration to seating positions • Clear access for physically compromised pupils • Opportunities for different sensory learning activities threaded into topics



Hormones are chemical messengers secreted by the glands of the endocrine system. They are carried around the body in the blood and act upon specific targets cells or tissues, which possess receptors for the hormone.



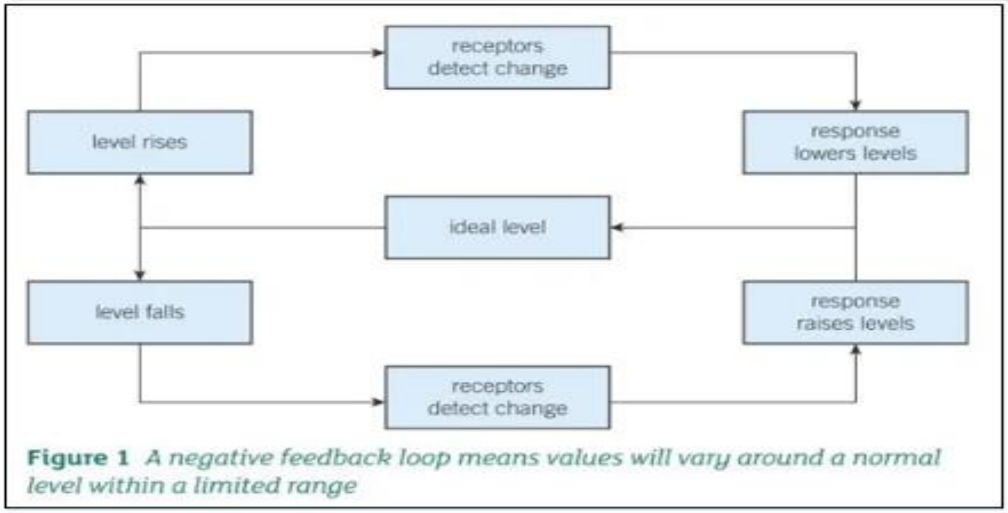
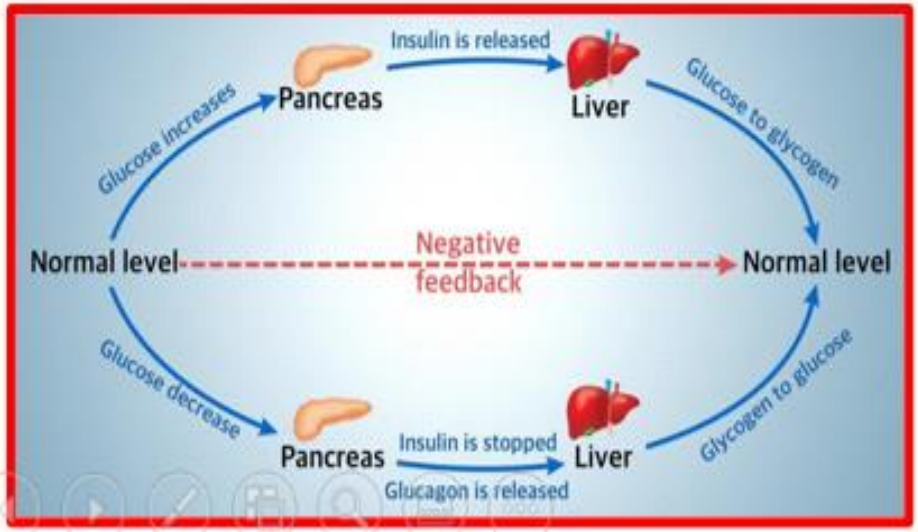
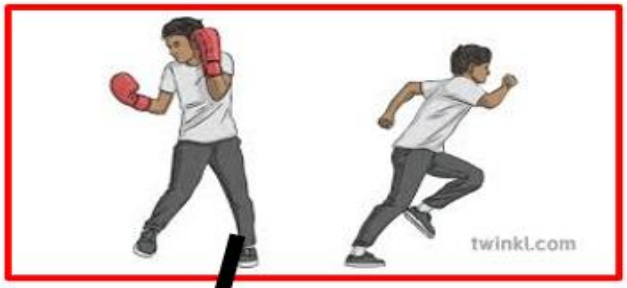


Figure 1 *A negative feedback loop means values will vary around a normal level within a limited range*



Type I Insulin-Dependent Diabetes Mellitus (IDDM)	Type II Non Insulin Dependent Diabetes Mellitus (NIDDM)
Usually occurs during childhood (early onset)	Usually occurs during adulthood (late onset)
Body does not *produce* sufficient insulin	Body does not *respond* to insulin production
Caused by the destruction of β-cells (autoimmune)	Caused by the down-regulation of insulin receptors
Requires insulin injections to regulate blood glucose	Controlled by managing diet and lifestyle

Adrenalin: Fight or flight response

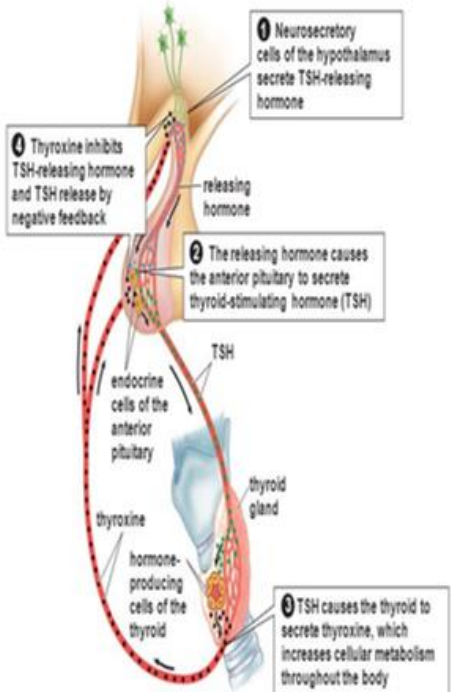


PHYSIOLOGICAL CHANGE	REASON
Increased heart rate	To increase blood flow to organs and increase the movement of adrenaline around the body.
Increased breathing rate	To increase oxygen intake.
Pupil dilation	To increase light entry into the eye and enhance vision (especially in the dark).
Sweat production	To regulate temperature.
Reduction of non-essential functions (e.g. digestive system, urination, salivation)	To increase energy for other essential functions.

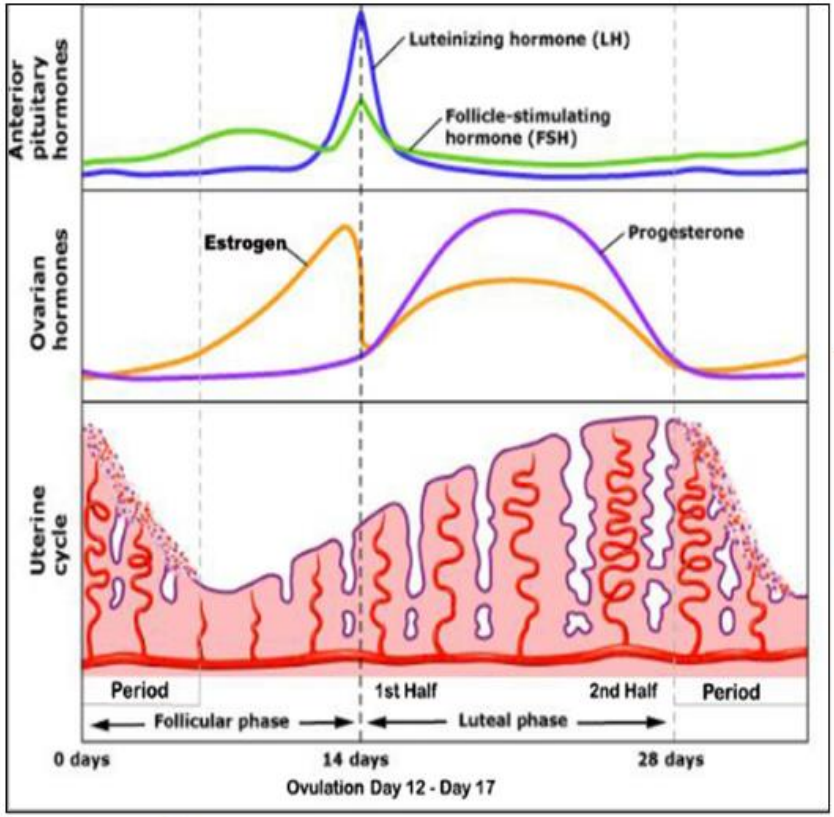
Definition – Basal Metabolic Rates

- Amount of energy required by the body to carry on its vital body processes at rest.
- Body processes: respiration, circulation, glandular activity, cellular activity, and maintenance of body temperature.

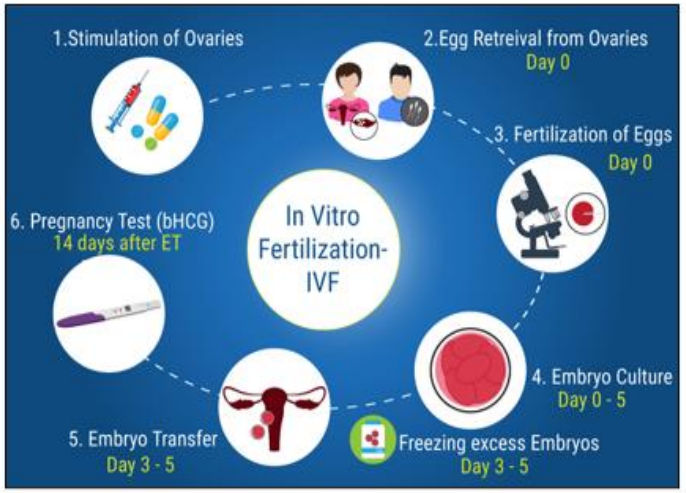
Negative Feedback in Thyroid Gland Function



HORMONAL CONTROL OF THE MENSTRUAL CYCLE

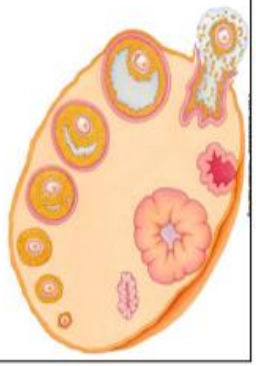


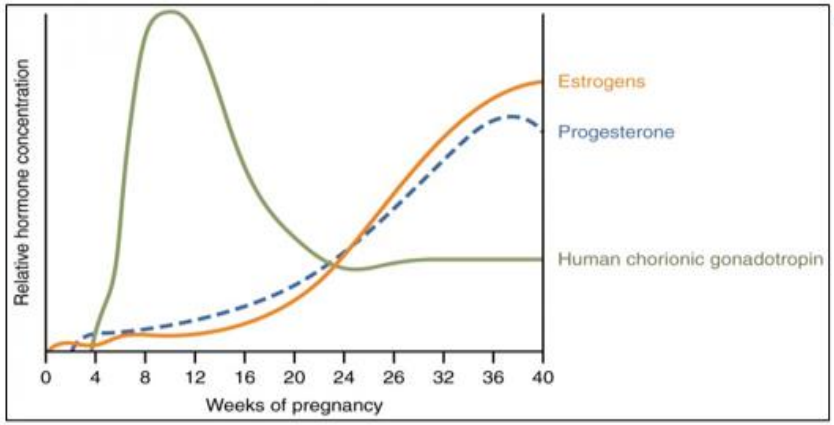
Clomifene Therapy:
Some women have difficulty becoming pregnant because they do not ovulate (release eggs). Clomifene is a drug used as a fertility drug to stimulate ovulation, the release of eggs. It works by blocking the action of oestrogen's negative feedback on LH. Therefore more LH is released in a surge. This mimics the LH surge which occurs just before ovulation.



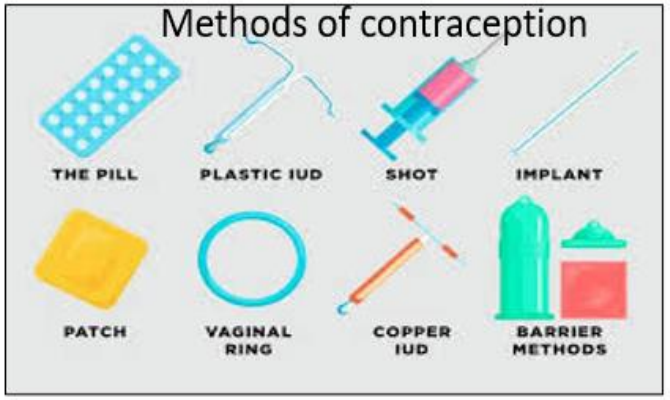
Development of the Corpus Luteum

- After ovulation, the granulosa cells in the ruptured follicle come together to form a structure called the corpus luteum.
- The corpus luteum's function is to secretes progesterone.
- Progesterone keeps the uterine lining in place for implantaiton of the egg.





Methods of contraception



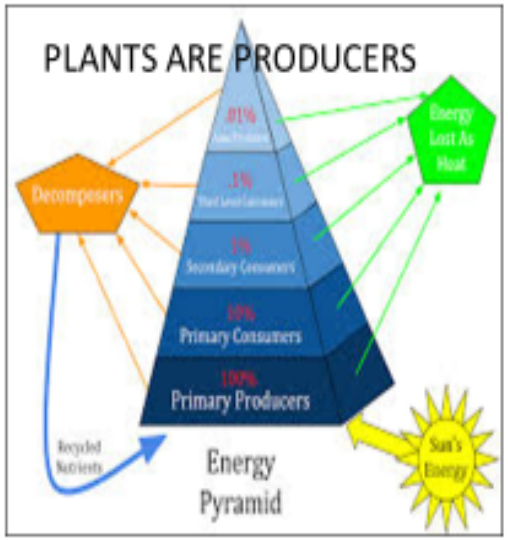
STUDENT TOPIC OVERVIEW Combined Science Year 10 Topic: Plants Structures and their Functions		Duration: 6 lessons	Composite: end of unit test
Key vocabulary: Chloroplasts Chlorophyll Chemosynthetic Biomass Palisade cell Guard cell Stoma Stomata Starch Sucrose Concentration Factor Temperature Intensity Proportion Diffusion Osmosis Translocation Active transport Root hair Xylem Phloem Transpiration Cohesion Capillary action Evaporation Potometer Inverse Proportional	**Core knowledge Components** Know that glucose made via photosynthesis is the basis for all other increases in biomass in organisms. Name and label the main structures in a leaf, and explain how they maximise photosynthesis and/or transpiration Recognise the structural components of stomata Explain from graphical data how limiting factors are affecting the rate of photosynthesis. Explain how rate of photosynthesis is directly proportional to light intensity Know how water enters a plant and is moved around. Describe the specialised structures and function of the root hair cells Explain how plants absorb minerals against a concentration gradient. Describe the route water molecules take to get from root to the leaf Explain what factors affect the rate of transpiration Describe how the products of photosynthesis move around the plant	**Powerful knowledge components crucial to commit to long term memory** **State the chemical equation for photosynthesis** **Identify the cells in the leaf where most photosynthesis occurs.** **State the function of stomata** **State how stomata are involved in transpiration** **Name 3 limiting factors that could reduce the rate of photosynthesis.** **Know that the rate of photosynthesis can be measured by pH change** **Name the processes which occur when water & minerals enter a root hair cell.** **Give one adaptation of a root hair cell.** **Know what is carried in the phloem** **Know that this process is called translocation** **Know 1 structural adaptation of phloem vessels** **Know what is carried in the xylem** **Know that this process is called transpiration** **Know that rate of transpiration can be measured using a potometer** **Know 1 structural adaptation of xylem vessels**	**Links to previous and future topics** **Yr7 Cells, Ecology** **Yr8 Plants** **Yr10 key concepts** **Yr9 Photosynthesis**

Impressive reading	Impressive speaking	Impressive writing	Resilience	Employability and Careers via:
• Culture capital articles	• Able to verbalise during questioning using key words.	• Writing clear conclusions and evaluations from practical.	Interpreting abstract concepts and evaluating data from graphs.	**Employability**: Collaboration, using data, following instructions. **Careers**: Gardener, farmer, agricultural scientist, florist. All need to know how to make plants grow well and survive.
Culture Capital: Uses of essential oils Resurrection plants				

SEND			
Communication & Interaction	**Cognition & Learning**	**SEMH**	**Physical/Sensory**
• Unambiguous terms and clear language used is presentations/handouts • Unambiguous terms and clear language used by teacher • ADHD pupils are given instructions directly by use of their names • Use of post-it plans to help pupils work through a task	• Chunking of activities into manageable portions, so as not to lead to cognitive overload • Use of low stakes/high gains activities for knowledge recall • Topics are mapped out visually for pupils to see • Links to previous learning established	• Consideration to seating positions • Awareness of specific pupil triggers • Communication channels kept open	• Consideration to seating positions • Clear access for physically compromised pupils • Opportunities for different sensory learning activities threaded into topics

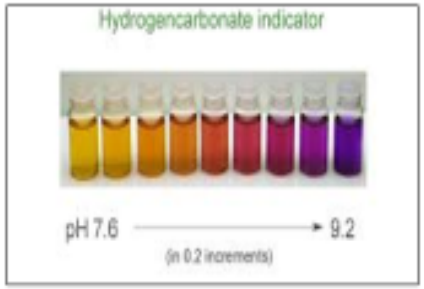
Yr10 Combined science
Plants Function Structure
KNOWLEDGE ORGANISER

PLANTS ARE PRODUCERS



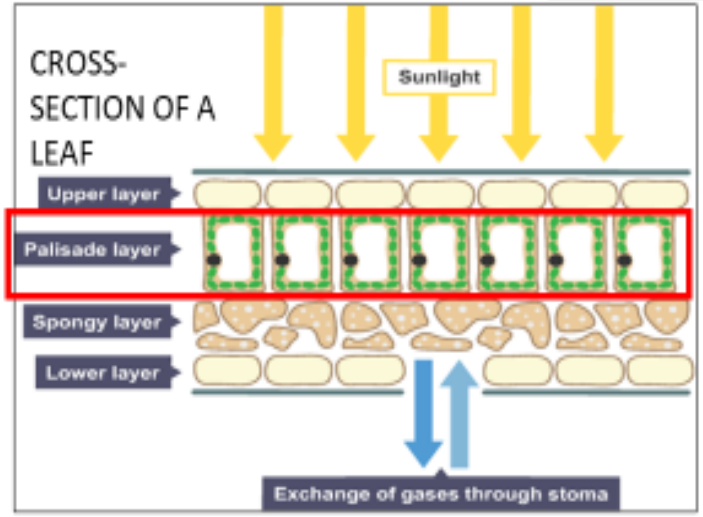
Plants, animals & selected other photosynthetic organisms are known as producers as they are ***autotrophic***. Making their own food using energy from the sun, they pass this energy on up the food chain's trophic levels.

Photosynthesis	*Plants make use of light energy from the environment (ENDOTHERMIC) to make food (glucose)*	Carbon dioxide + Water → Oxygen + Glucose $CO_2 + H_2O \rightarrow O_2 + C_6H_{12}O_6$



CORE PRACTICAL: algal balls are placed in hydrogen carbonate indicator, which indicates rate of photosynthesis due to a fall in pH (as CO2 is acidic in solution). The more photosynthesis that occurs, the lower the pH.

CROSS-SECTION OF A LEAF



Light intensity is varied with changing distance to a lamp.

The inverse square law

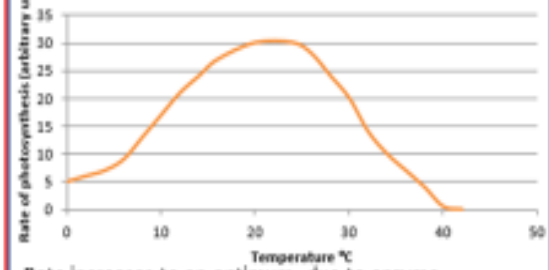
This is the 'proportional to' symbol.

$$\text{light intensity} \propto \frac{1}{\text{distance (d)}^2}$$

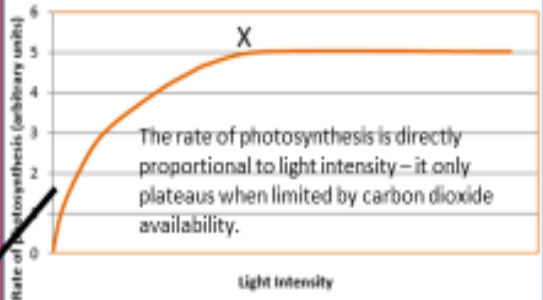
Putting one over the distance shows the inverse

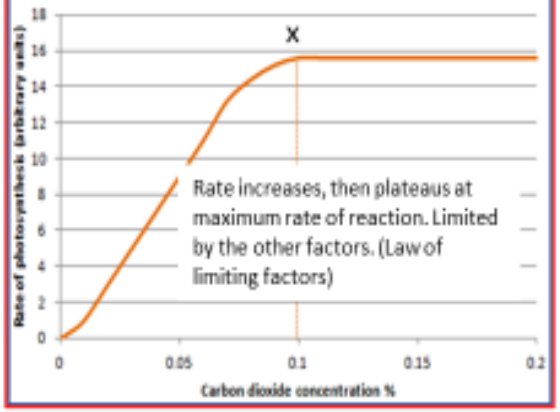
The distance is squared.

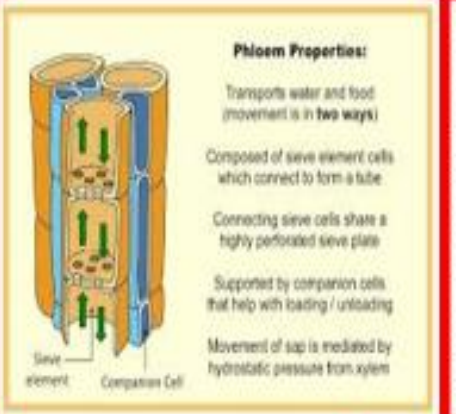
THE 3 LIMITING FACTORS OF PHOTOSYNTHESIS



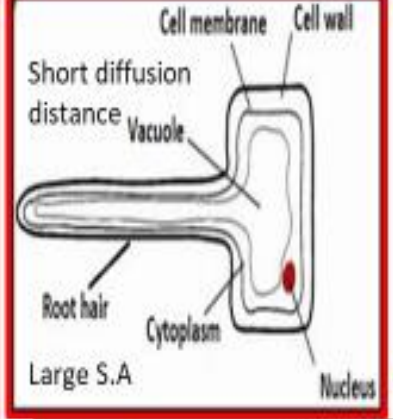
Rate increases to an optimum, due to enzyme reactions. Decreases if temperature is too high, due to denaturation.



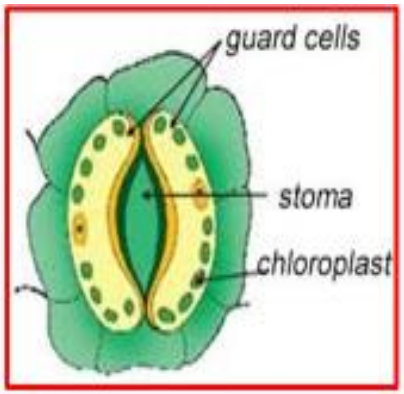




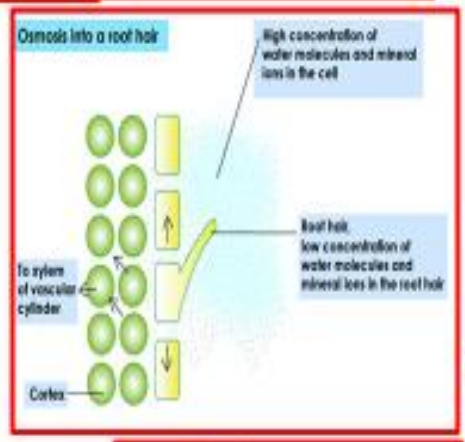
GETTING WATER IN AT THE ROOT:
The specially adapted root hair cells actively transport mineral ions in, which causes water to follow by osmosis. The water molecules move across the root and enter the xylem.

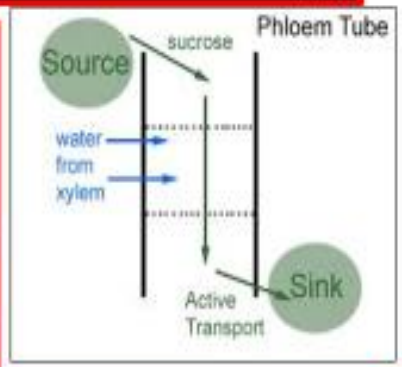


Stomata open to allow gas exchange (CO_2 in, O_2 out) for photosynthesis. Also water vapour to exit to mobilise the transpiration stream. Guard cells swell and open the pore.

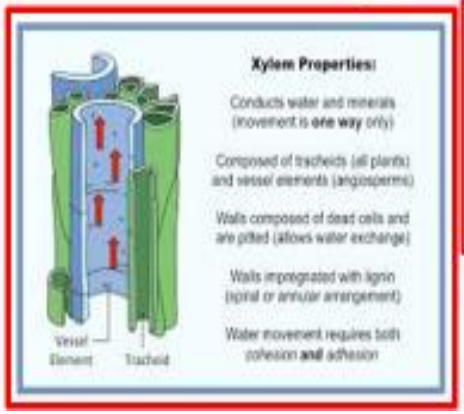


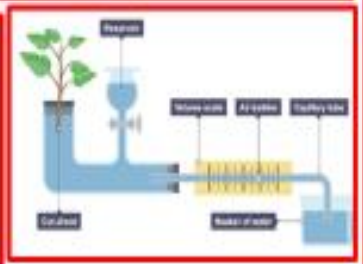
TRANSPORT IN PLANTS:
Plants have 2 separate systems of tubes inside for transport. Xylem is used to transport water & minerals in the direction from roots → leaves. Phloem is a separate system, used to transport sugars made in photosynthesis all around the plant.





The cohesive properties of water allow for the transpiration stream to be pulled through the plant by evaporation from the stomata, and osmosis through the leaves. It is pushed in to the bottom by root pressure. Factors affecting transpiration include wind, humidity and temperature.

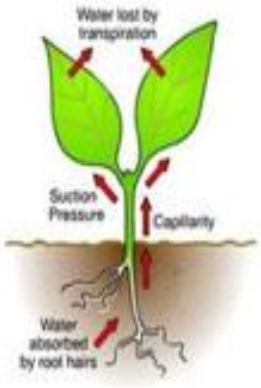




Rate of transpiration is measured using a potometer

Sugars are transported around the plant in the phloem, in any direction, via a process known as translocation. We talk about them being transported from where they are made (SOURCE) to where they are needed (SINK). Glucose is the product of photosynthesis, but it is stored as starch, and transported as sucrose.

Transpiration



2. Water is constantly lost through evaporation from the leaves through tiny holes in the bottom of the leaf called stomata.