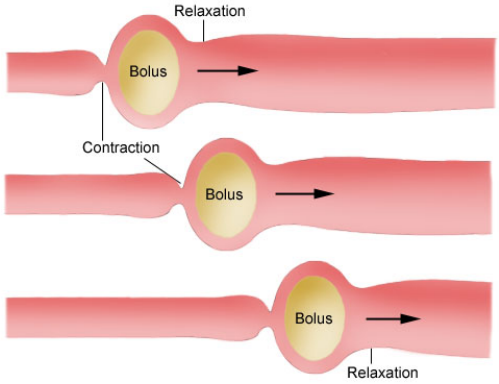
Egestion: The digestive system eliminates the undigested molecules via the anus.

Digestion- chewing, saliva, amylase ready for peristalsis.

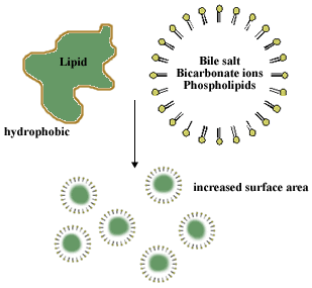


Food is moved the digestive system by a process known as peristalsis. This is the contractions of two sets of muscles in the walls of the gut. One set runs along the gut, while the other set circles it. Their wave-like contractions create a squeezing action, moving down the gut.

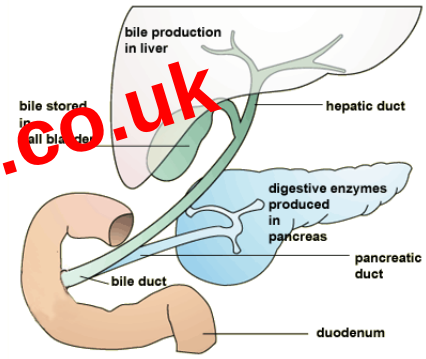
- Amylase and maltase catalyse the breakdown of starch into glucose (sugars) in the mouth and small intestine. Starch ➔ glucose

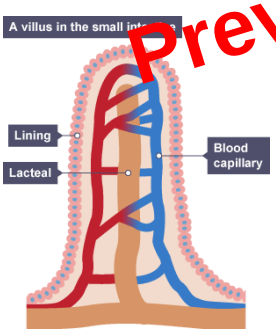
- Proteases catalyse the breakdown of proteins into amino acids in the stomach and small intestine. Proteins ➔ amino acids

- Lipases catalyse the breakdown lipids into fatty acids and glycerol in the small intestine. Lipids ➔ fatty acids + glycerol



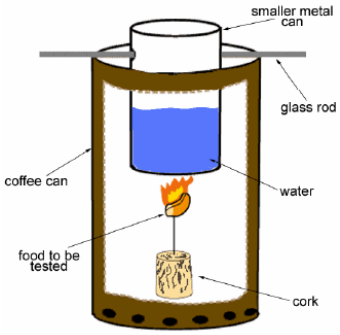
Bile:
After the stomach, food travels to the small intestine. The enzymes in the small intestine work best in alkaline conditions, but the food is acidic after being in the stomach. Bile is an alkaline substance produced by the liver and stored in the gall bladder. It is secreted into the small intestine, where it emulsifies fats by breaking into small globules. This is important, because it provides a larger surface area in which the lipases can work.





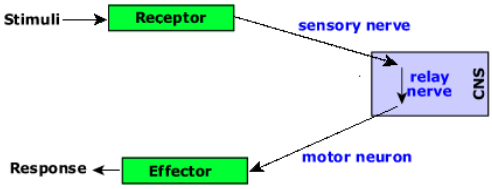
Produced by liver.
Stored in gall bladder.

Villus: The Lining of the small intestine is covered in villi, which are adapted for effective diffusion.



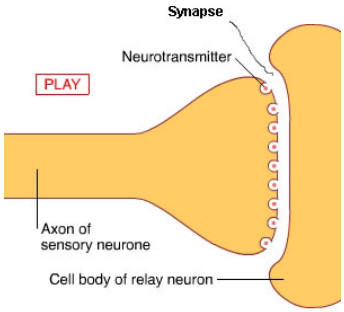
You can determine energy content of a food sample by burning it and using it to heat a measured sample of water. This is a simple calorimeter.
(Weigh crisp, set on fire, heat water.Take temp of water before and after, fixed volume of water.) Q=(mcΔT) ÷ mass of food (g). Measured in kilojoules/gram (KJ/gram)

Adaptation in Small Intestine	Explanation
Large Surface Area caused by Villi	Tiny projections in the lining increasing surface area so more nutrients can be absorbed and pass into blood. Villus (singular), Villi (plural)
Really long	Up to 7 meters long! Increases surface area so more nutriets can be absorbed + maximized time food spends being broken down by enzymes.
Villi have good blood supply	Food can be easily/quickly absorbed.

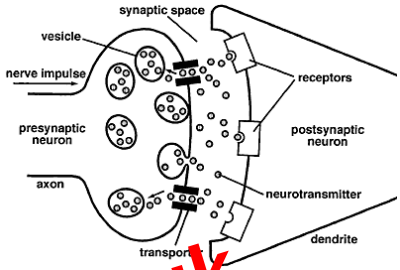


- Complex reflex- this involves a message to the brain, follows a reflex arc, in brain the message is sorted out. It is under conscious control and is voluntary. E.g. talking, walking

A nerve is a structure, which carries messages from CNS to organs.
A neuron is a nerve cell, which carries an impulse within the nerve.



Synapse is the gam between two nerve cells. Chemicals are able to cross the gap and travel through the neuron. This chemical is called a neurotransmitter. Can be found between sensory neurons and relay neurons, or motor neurons and relay neurons.
Having a gap between neurons allows the body to control the impulses. Also, synapses allow the output of one neuron to be the result of integration of information from many other cells.

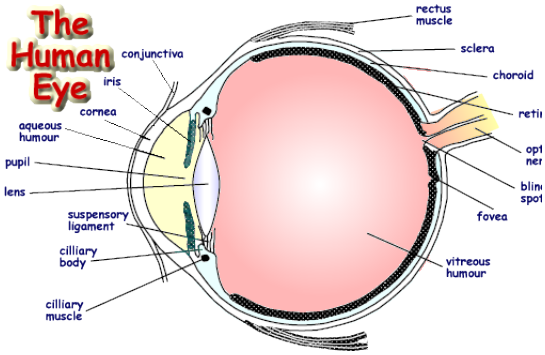


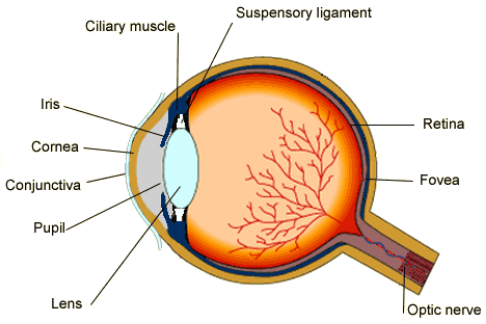
Electrical ➔Chemical ➔Electrical

1. Electrical impulse arrives at synapse
2. Is converted into neurotransmitter, a chemical
3. Neurotransmitter is broken down in second neuron, energy is converted to electrical energy (electrical impulse is generated)

There are also electrical synapses- the gap is so small that electrical impulses can travel straight across.

The Eye





Choroid- layer of cells with dark pigment to stop light being refracted inside the eye
Retina- light sensitive area with photoreceptor cells- rods and cones
Fovea- central part of retina where cones are mainly concentrated
Blind Spot- Where the optic nerve leaves the eye- no rods or cones
Optic nerve- sensory neurons pass impulses from rods and cones to the brain
Ciliary Muscles- Changes the thickness of the lens by contracting to make it thicker in order to see distant objects
Conjuctiva- thin, protective layer in front of the cornea

Insect Pollinated	Wind Pollinated
large, brightly coloured petals - to attract insects	small petals, often brown or dull green - no need to attract insects
often sweetly scented - to attract insects	no scent - no need to attract insects
usually contain nectar - to attract insects	no nectar - no need to attract insects
moderate quantity of pollen - less wastage than with wind pollination	pollen produced in great quantities - because most does not reach another flower
pollen often sticky or spiky - to stick to insects	pollen very light and smooth - so it can be blown in the wind and stops it clumping together
anthers firm and inside flower - to brush against insects	anthers loosely attached and dangle out - to release pollen into the wind
stigma inside the flower - so that the insect brushes against it	stigma hangs outside the flower - to catch the drifting pollen
stigma has sticky coating - pollen sticks to it	stigma feathery or net like - to catch the drifting pollen

Controls blood water level by triggering uptake of

ovaries

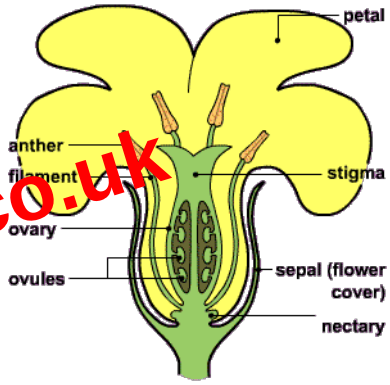
Controls puberty in males

Sexual reproduction allows some of the genetic information from each parent to mix, producing offspring that resemble their parents, but are not identical to them. In this way, sexual reproduction leads to variety in the offspring. Animals and plants can reproduce using sexual reproduction. Pollen is transferred from one flower to another.

The pollen grain land on the stigma and a pollen tube is grown down through the style towards the ovary.

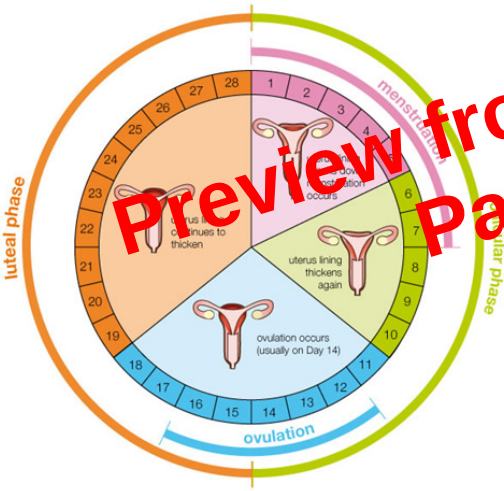
The nucleus of the pollen grain then passes down the tube to fertilize the egg cell inside the ovule.

The fertilized egg cell develops into an embryo, the ovule becomes the seed and the ovary forms the fruit.



Cross pollination- transfer of pollen from an anther of a flower to the stigma of a different flower

Self-pollination- transfer of pollen from the anther of a plant, to its stigma- no genetic variation. Can be done using a brush.



Structure	Function
Sepals	protect the unopened flower bud
Petals	may be brightly coloured to attract insects
Stamens	the male parts of the flower consisting of the anther held up on the filament
Anthers	produce male sex cells (pollen grains).
Stigma	the top of the female part of the flower which collects pollen grains
Ovary	produces the female sex cells (ovules)
Nectaries	produce sugary nectar which attracts insects

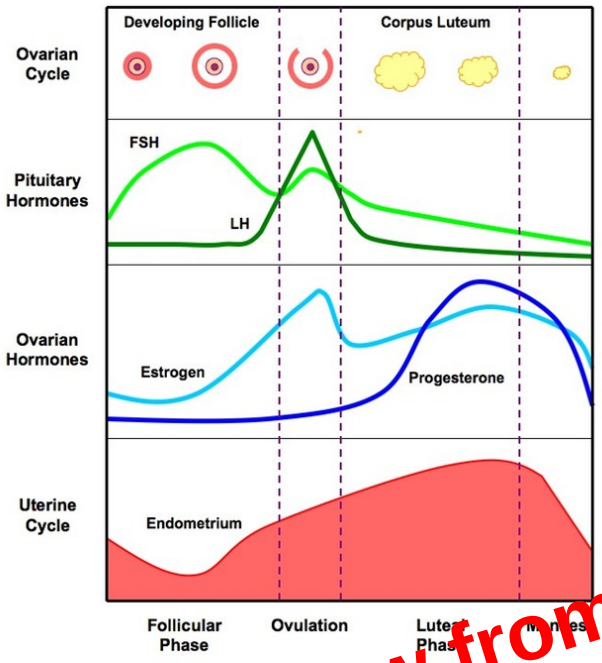
Seeds need warmth, water and oxygen to germinate, NOT sunlight. Seeds use their stored food as they germinate until new leaves open and photosynthesize.

Plants can reproduce asexually articially(by mitosis), by cuttings: A branch from the parent plant is

cervix is a ring of muscle at the lower end of the uterus. It keeps the baby in place while the woman is pregnant.

Vagina and urethra: The vagina is a muscular tube that leads from the cervix to the outside of the woman's body. A man's penis goes into the woman's vagina during sexual intercourse. The opening to the vagina has folds of skin called labia that meet to form a vulva.

The urethra also opens into the vulva, but it is separate from the vagina. It passes urine out of the body from the bladder.



Oestrogen stimulates the lining of the uterus to build up. It also reduces levels of FSH produced by pituitary and increases levels of LH

Progesterone stimulates growth of blood vessels in the lining of the uterus getting ready for pregnancy. If a fertilized ovum arrives in the uterus, progesterone helps to keep pregnancy going.

Follicle Stimulating Hormone (FSH) stimulates ova in the follicles of the ovary to develop. It also stimulates ovary to make oestrogen.

Luteinizing hormone (LH) stimulates the release of a mature egg from ovary. Also stimulates ovary to make progesterone.

If sperm fertilizes an ovum and forms a zygote in the Fallopian tube a pregnancy begins. As embryo develops, the placenta forms- a special organ that passes food and oxygen from the mother to the developing fetus. It also takes urea and carbon dioxide from fetus into the mother's blood and secretes the hormone progesterone which maintains the pregnancy.

The fetus will be surrounded by amniotic fluid with cushions and protects the fetus.

Changes occur at puberty because of **hormones**:

testosterone - produced by the testes - controls the development of male **secondary sexual characteristics**

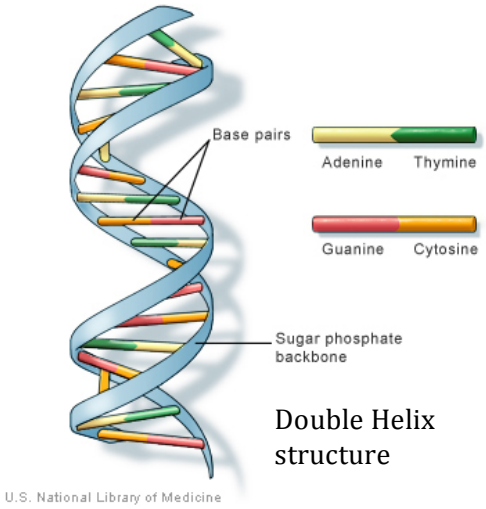
oestrogen - produced by the ovaries - controls the development of female secondary sexual characteristics

Changes during puberty

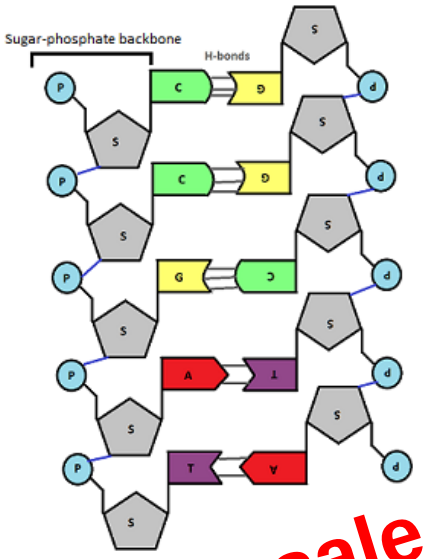
Boys only	Boys and girls	Girls only
Voice breaks	Pubic hair grows	Voice deepens gradually
Hair grows on face and body	Underarm hair grows	Hips get wider
Body becomes more muscular	Sexual organs grow and develop	Breasts develop
Testes start to produce sperm cells		Ovaries start to release egg cells - menstruation starts

Inheritance

- Nucleus of a cell contains chromosomes. The genes are located in the chromosomes
- A gene is a section of a DNA molecule that controls the development of certain characteristics and codes for a specific protein
- Genes exist in alternative forms called alleles, which all differences in the inherited characteristics
- In humans cells, the diploid number of cells is 46, and the haploid is 23



Double Helix structure



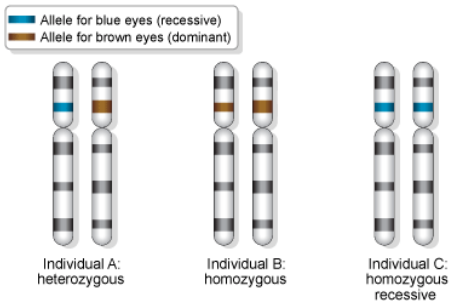
S= sugar
P= phosphate
A= adenine
T= thymine
G= guanine
C= cytosine

A+ T are complimentary
G+ C are complimentary

Dominant: a dominant allele is the one that will be made
Recessive: a recessive allele will be masked by a dominant one and not visible
Homozygous: if you have two of the same alleles for a gene in one persons DNA
Heterozygous: if you have two different alleles for a gene in in someones DNA
Phenotype: what allele is expressed as a protein
Genotype: what alleles you have in your DNA for a gene
Codominance: when two alleles have equal dominance (they will both be expressed)

A monohybrid cross is a mating between individuals who have different alleles at one genetic locus of interest.

Different forms of the same gene are called *alleles* (pronounced al-eels). The gene for eye colour has an allele for blue eye colour and an allele for brown eye colour.



Alleles are *dominant* or *recessive*:

- the characteristic controlled by a dominant allele develops if the allele is present on one or both chromosomes in a pair
- the characteristic controlled by a recessive allele develops only if the allele is present on both chromosomes in a pair

For example, the allele for brown eyes is dominant, while the allele for blue eyes is recessive. An individual who inherits one or two alleles for brown eyes will have brown eyes. An individual will only have blue eyes if they inherit two copies of the allele for blue eyes.