Homeostasis

Homeostasis is the maintenance of a constant internal environment in response to changes in internal and external environments The endocrine system and nervous system control this. Both work by **automatic control systems.**

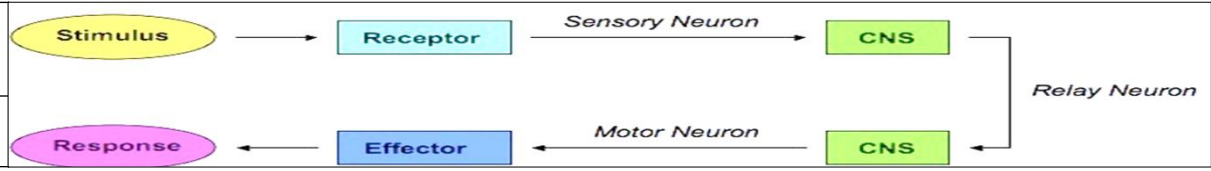
Automatic control system	Consist of receptors, coordination centres and effectors. They are 'automatic' because we don't need to think about them
Stimulus	The change in an environment
Receptor	Detect the stimulus.
Coordination centre	Process information and coordinate a response
Effector	Muscle or gland that carries out the response
Response	Brings the change in the environment back to a set level
Negative feedback	When a change occurs negative feedback automatically causes a corrective mechanism to start, which reverses the original change

The Nervous System

Nervous system	Central nervous system (CNS), sense organs and neurones
Receptor cells	Found in the ears, eyes, nose, mouth and skin
Sensory neurones	Carry information from receptors to CNS
Relay neurones	Found in CNS. Carry impulse from sensory to motor neurone
Motor neurones	Carry electrical impulses from CNS to effectors
Effectors	Muscles and glands that carry out a response
Central nervous system (CNS)	Receives information from receptors and forms a response. Made up of the brain and spinal cord
Neurones	Nerve cells
Synapses	The gap between two neurones.

Reflexes

Reflex arcs are the passage of information from the receptor to effector. They are rapid responses and completely bypass the conscious brain.

Reflexes can prevent injury.	
A reflex arc is shown here.	

The Endocrine System

Endocrine system is made up of glands that secrete chemicals called hormones into the bloodstream. Hormones regulate our internal systems in response to the environment.

Hormones	Chemical messengers that travel in the blood and activate target organs
Glands	Organs that secrete hormones

Gland	Hormone made:	Regulates:
Pituitary gland	Many hormones	Other glands and many other cells
Pancreas	Insulin	Blood glucose
Thyroid	Thyroxine	Metabolism regulation
Adrenal glands	Adrenaline	'Fight or flight' response
Ovaries (female only)	Oestrogen	Menstrual cycle
Testes (males only)	Testosterone	Puberty, sperm production

Diabetes

Diabetes is a disease where the sufferer is unable to reduce blood glucose levels

Type 1	The pancreas doesn't produce insulin. Usually develops in childhood. Treated with insulin injections, carbohydrate controlled diet and exercise.
Type 2	Sufferer becomes resistant to insulin. Obesity is a risk factor. Usually develops in later life. Treated with carbohydrate controlled diet and exercise

The menstrual cycle

Oestrogen	Causes the uterus lining to thicken
Progesterone	Maintains the uterus lining
Follicle stimulating hormone (FHS)	Causes an egg to mature in the ovaries
Luteinising hormone (LH)	Stimulates release of an egg from the ovaries

Contraceptives

Oral contraceptives, injection, skin patch, implant, condoms, diaphragms, intrauterine devices, surgical methods and natural methods

DNA

DNA	The chemical that genetic material is made up of. It forms a double helix structure
Chromosome	DNA in its tightly coiled structure
Gene	A small section of DNA which codes for an amino acid sequence
Genome	The entire set of genetic information of an organism. Scientists can use the genome to trace migration patterns and in medicine to identify inherited diseases
Homologous pairs	Every cell has 23 chromosomes from mum and 23 from dad. These form pairs with one another called homologous pairs

Sexual reproduction

The fusion of male and female gametes.

The resulting cell has the full number of chromosomes and the offspring will have a mixture of both parents genes

E.g. The egg and sperm cells in humans (23 chromosomes each), or pollen and egg cell in plants

Asexual reproduction

One parent cell splits in two to produce two daughter cells

These daughter cells are genetically identical to the parent—they are clones

E.g. Binary fission in bacterial reproduction.

Meiosis

A type of cell division which makes four gametes from one parent cell. Each gamete is genetically different to the other.

1. DNA is replicated
2. Chromosomes line up in homologous pairs at the centre of the cell
3. The pairs are pulled apart into two new cells
4. The replicated chromosomes are separated and both cells divide again to give four genetically different gametes with half the number of chromosomes as a normal cell

Genetic Inheritance

Gametes	Sex cells (egg cell and sperm cell)
Allele	Different forms of the same gene
Dominant	This allele is always expressed, only one copy needed (e..g polydactyly)
Recessive	This allele only expressed if two copies are present. (e.g. cycstic fibrosis)
Homozygous	When two alleles present are the same HH
Heterozygous	When two alleles are different Hh
Genotype	The combination of alleles you have inherited
Phenotype	Physical feature that is observable
Sex chromosomes	One homologous pair dictates whether male or female characteristics develop. Female is XX and male is XY

Variation

Genetic variation: determined by the genes inherited from your parents

Environmental variation: determined by the surroundings and things that may happen to us

Mutation: a change in an organism's DNA causing a gene to be altered

Evolution theory

All todays species have evolved from simple life forms that started to develop 3 billion years ago

Speciation: occurs when populations of a species change and can not interbreed

Extinction: when no living individuals of a species remain

Desired characteristics

Selective breeding : artificial selection of plants/animals with the best characteristics

Genetic Engineering: transfer of a gene from one organism to another for a characteristic

Fossils

The remains of organisms from many years ago. It forms a cast identical to that of the organism. They can form in three ways:

1. Gradual replacement by minerals
2. From casts and impressions
3. From preservation in places where no decay happens

Antibiotic resistant bacteria

Bacteria can develop random mutations in their DNA which can give them resistance to antibiotics—so antibiotics won't work when we get ill.

To prevent against antibiotic resistance we must:; finish the full course of antibiotics, never keep them for a later date and only take them when you really need to

Classification

Linnean system	Kingdom, Phylum, Class, Order, Family, Genus, Species
Three-domain system	1. Archaea, 2. Bacteria, 3. Eukaryota
The binomial system	Two part Latin name e.g. Homo sapiens
Evolutionary trees	These show how different species are related to one another.

Ecosystem	
Ecosystem	Interaction of a community of living organism (biotic) with non living (abiotic) parts of their environment
Biotic factors	Living factors of the environment (food, pathogens, new predators, competition)
Abiotic factors	Non living factors of the environment (temperature, light intensity, CO_2,O_2)
Community	The population of different species living in a habitat
Population	All the organisms of one species living in a habitat
Habitat	The place where an organism lives
Adaptation	
Adaptation	Features/ characteristics that allow organisms to live in their natural environment
Behavioural adaptations	The ways in which an organism behaves Example: an organism may migrate in winter to a hotter climate to avoid problems
Structural adaptations	Features of an organism's body structure (shape or colour) Example: camouflage, layers of fat, surface area to vol. ratio
Functional adaptations	The things that go on inside the organism's body that are related to processes like reproduction and metabolism
Extremophiles	Microorganisms adapted to live in extreme conditions (hot volcanic vents, salty lakes or high pressure on the sea bed)
Food chains	
Producer	Start of the food chain (plant or algae) make their own food using energy from the Sun
Consumer	Organisms which can not make their own food (primary consumers eat producers)
Herbivore	These consumers eat producers (plants, bacteria)
Carnivore	These consumers eat other consumers (animals)
Predator	Consumers that hunt and kill other animals

Quadrats	
Using quadrats and transects	Investigate population size and distribution of organisms in a particular place
Quadrat	To measure how common an organism is in two or more areas—quadrats
Line transects	To find out how organisms are distributed across an area e.g if an organism becomes more/less common moving from hedge towards the centre of a field
-	**Cycling of materials**
Water cycle	Continuous cycle of evaporation and precipitation that allows the water on Earth to be recycled and provides water to plants and animals living on land
Transpiration	Evaporation of water from plants
Carbon cycle	Shows how carbon on earth is recycled between organism and the atmosphere
Carbon taken out of air	Carbon cycle is powered by photosynthesis. Plants remove CO_2 from the atmosphere through photosynthesis to make glucose.
Carbon through food chains	Carbon becomes part of the fats and proteins in animals when they eat plants. When plants and animals die microorganisms feed on their remains
Carbon returned to the air	Carbon is returned when plants, algae, animals and microorganisms respire. It is also released when wood and fossil fuels are burnt (combustion)
Human Impact	
Biodiversity	Variety of different species of organism on Earth, or within an ecosystem.
High biodiversity	One species is less likely to rely on a single organism for resources and the physical environment that it needs. Ensures ecosystems are stable.
Low biodiversity	When some species are unable to adapt to a change in the environment and will become extinct reducing biodiversity.
Global warming	Increased levels of green house gases are causing the average temperature of the Earth to increase which is affecting biodiversity.
Deforestation	Cutting down of forests to clear land for farming and to grow crops from which biofuels are produced. Reduces biodiversity, less carbon dioxide removed from the atmosphere, causing an increase in global warming.