



REPRODUCTION: ASEXUAL - CELL CLONED, NO GENETIC VARIATION. (MITOSIS) e.g. BACTERIA, PLANTS, FUNGI.  
 SEXUAL: GAMETES (HAPLOID: 23 CHROMOSOMES, PAIRS) JOIN, MAKE DIPLOID (23 PAIRS). MADE BY MEIOSIS: CHROMOSOMES LINE UP IN CENTRE, COPIED, SPLIT TWICE (GENES 'CROSS OVER'). → (TRIPLET)  
 \* DNA: POLYMER, HAS 4 BASES: A-T, C-G. EACH IS ASSOCIATED WITH AN AMINO ACID. DNA 'UNZIPS', RNA TAKES COPY OF CODE OUT OF NUCLEUS TO RIBOSOME IN CELL → ORDER OF BASES GIVES ORDER OF AMINO ACIDS → PROTEIN SYNTHESIS. DNA - DOUBLE HELIX.  
 \* 'GENOME' = ALL DNA IN ORGANISM.  
 \* 'GENE': PART OF DNA, CODES FOR CERTAIN PROTEIN.

**INHERITANCE, VARIATION & ADAPTATION**

ALLELES: DIFFERENT FORMS OF SAME GENE.  
 - GENOTYPE (GENE) → PHENOTYPE (CHARACTERISTIC)

PUNNETT SQUARE:  
 MUM: B: DOMINANT, b: RECESSIVE (BLUE)  
 THEREFORE 1/4 CHANCE OF CHILD HAVING BLUE EYES

	B	b
B	BB	Bb
b	Bb	bb

BB, bb: HOMOZYGOUS  
 Bb: HETEROZYGOUS  
 - SOME DISORDERS CAN BE GENETIC e.g. CYSTIC FIBROSIS.  
 - USEFUL CHARACTERISTIC FOR ENVIRONMENT? ADAPTATION e.g. THICK FUR IN COLD CLIMATE.

GENETIC ENGINEERING: CHANGING GENE IN CHROMOSOME → PUT IN BACTERIA/VIRUS → INSERTS DNA INTO EGG. e.g. GM CROPS.

VARIATION CAUSED BY GENES + ENVIRONMENT.  
 SELECTIVE BREEDING: ONLY BREED OFFSPRING WITH DESIRED TRAITS.  
 EVOLUTION: DARWINISM - RANDOM MUTATIONS → VARIATION. 'SURVIVAL OF THE FITTEST' → THESE REPRODUCE. CAN SEE WITH BACTERIAL RESISTANCE TO ANTIBIOTICS.  
 LAMARCK: ENVIRONMENT LEADS TO GENES BEING CHANGED e.g. BLIND MACKEREL.  
 TRIPLE: SHAPE OF PROTEIN DETERMINES FUNCTION.  
 CLONING: NUCLEUS FROM e.g. SKIN CELL FROM A, PUT IN EGG CELL FROM B, IMPLANTED BACK IN B. ETHICAL? CLONES DON'T LIVE LONG.

**ENDOCRINE SYSTEM: GLANDS → HORMONES, AFFECT BODILY FUNCTIONS. CAUSES OTHERS TO SECRETE**  
 - PITUITARY: 'MAIN' GLAND  
 - THYROID, PANCREAS, OVARIES, TESTES, ADRENAL  
 INSULIN: GOES TO LIVER, CONTROLS BLOOD SUGAR. TOO MUCH? GLUCOSE → GLYCOGEN OPPOSITE IF TOO LITTLE.  
 - DIABETES: WHEN PANCREAS CANNOT MAKE INSULIN (OR ENOUGH). SYMPTOMS: THIRSTY, URINATING A LOT, TIREDNESS.

**HOMEOSTASIS**  
 REGULATING BODY

**MENSTRUATION CYCLE:** → (PITUITARY GLAND)  
 FSH (FOLLICLE STIMULATING HORMONE) → UTERUS LINING THICKENS  
 OVARIES MAKE OESTROGEN → EGGS MATURE  
 - LH (LUTEINISING): INHIBITS FSH, STIMULATES EGG RELEASE.  
 - PROGESTERONE SECRETED BY EMPTY EGG FOLLICLE. INHIBITS FSH + LH.  
 - CYCLE: LINING SHEDS (5 DAYS) → OVULATION (14th), LINING THICKENS.

\* THERMOREGULATION (TEMP). IDEAL INTERNAL: 37°C.  
 OTHERWISE ENZYMES DENATURE (TOO HIGH), OR REACTION RATE TOO SLOW (TOO LOW).  
 - SWEAT EVAPORATES: COOLS. WARMES  
 - HAIRS STAND ON END (GOOSEBUMPS): TRAP AIR  
 - BLOOD VESSELS WIDEN, MOVE TO SURFACE - COOLS (VASODILATION). OPPOSITE: VASOCONSTRICTION.  
 - HYPOTHALAMUS CONTROLS THESE.  
 \* KIDNEYS CONTROL WATER LEVEL + REMOVES UREA.  
 RENAL ARTERY + VEIN  
 URETER (TO BLADDER)

**PLANT HORMONES**  
 PHOTOTROPISM: LIGHT  
 GEOTROPISM: GRAVITY - USED AS WEED KILLER, ROOTING POWDER.  
 HYDROTROPISM: WATER  
 (+ve/-ve) TOWARDS/AWAY  
 - ETHENE: RIPENS FRUIT.  
 - GIBBERELINS: PROMOTE FLOWERING, FRUIT SIZE.

**GCSE BIOLOGY PAPER 2**

\* ACCOMODATION: LENS NARROWS → FOCUS ON DISTANT OBJECT.  
 LENS WIDENS/THICKENS: CLOSE OBJECTS (INCREASES POWER)  
 \* EXTRA LENS NEEDED IF CAN'T DO THIS (GLASSES) → ('LONG-SIGHTED')

**CONTRACEPTION: PHYSICAL/HORMONAL**  
 → PILL/PATCH.  
 \* FERTILITY TREATMENTS:  
 AI (ARTIFICIAL INSEMINATION) IF LOW SPERM COUNT.  
 - IMPLANT EGG (FERTILISED), (IVF)  
 - FSH/LH THERAPY  
 - SURROGACY ETHICAL?  
 EGG IMPLANTED IN ANOTHER WOMAN.  
 - EGG/OVARY DONATION TRANSPLANT

**SHOOT**  
 LIGHT DESTROYS AUXIN, COLLECTS AT BOTTOM, GROWS TOWARDS LIGHT  
 ROOT GRAVITY: AUXIN COLLECTS AT BOTTOM, INHIBITS, GROWS DOWNWARDS

**ECOSYSTEM:**  
 INTERACTION OF ALL LIVING (BIOTIC) & NON-LIVING (ABIOTIC) PARTS OF AN ENVIRONMENT.  
 - HABITAT: AREA WHERE AN ORGANISM LIVES.  
 - COMMUNITY: MULTIPLE SPECIES IN SAME ECOSYSTEM  
 - POPULATION: NUMBER OF CERTAIN SPECIES.

**SAMPLING:** TO ESTIMATE POPULATION. ~10% OF AREA THEN USE QUADRAT TO SAMPLE RANDOMLY, MULTIPLY UP (1m<sup>2</sup>) OR WITH TRANSECT → TO OBSERVE CHANGE IN POP. DENSITY OVER DISTANCE.  
 - BIOTIC/ABIOTIC FACTORS CAN AFFECT POPULATION.

**CLASSIFICATION:**  
 LINNAEUS: USED TO MAKE BINOMIAL (LATIN) NAME  
 KINGDOM → PHYLUM → CLASS → ORDER → FAMILY → GENUS → SPECIES  
 e.g. PANTHERA TIGRIS  
 - USEFUL SO ONE KNOWS WHAT ORGANISM, REGARDLESS OF LANGUAGE

\* WOESE:  
 - ARCHAEA (PRIMITIVE BACTERIA)  
 - BACTERIA  
 - EUKARYOTA (FUNGI, PLANTS, ANIMALS etc).

**ECOLOGY**  
 CELLS - PLANT INVOLVED IN DECAY OF DEAD ORGANISMS.  
 HUMAN EFFECT ON BIODIVERSITY:  
 - FARMING  
 - BUILDING  
 - DEFORESTATION  
 - POLLUTION e.g. FERTILISER RUNOFF INTO PONDS/LAKES (EUTROPHICATION - ALGAE BLOOM BLOCKS LIGHT, PLANTS BELOW DIE, DECAY - BACTERIA USE O<sub>2</sub> → FISH DIE!)  
 - ACID RAIN (SO<sub>2</sub>, NO<sub>2</sub>)

**PREDATOR-PREY RELATIONSHIPS:** IF POPULATION OF PREY ↓, AS DOES PREDATOR SHORTLY AFTER, & V.V.

**CARBON CYCLE:**  
 - PLANTS ABSORB CO<sub>2</sub> FOR PHOTOSYNTHESIS.  
 - RESPIRATION RELEASES CO<sub>2</sub> INTO ATM - ALL ANIMAL, BACTERIA INVOLVED IN DECAY OF DEAD ORGANISMS.  
 → ALSO CARBON INTO GROUND - FOSSIL FUELS → COMBUSTION RELEASES CO<sub>2</sub> INTO ATM.

**WATER CYCLE:**  
 - EVAPORATION  
 - CONDENSATION (CLOUDS FORMED)  
 - PRECIPITATION (RAIN).