

| Types of cell | |
|-------------------|--|
| 1. Prokaryotes | Cells without nuclei |
| 2. Eukaryotes | Cells with nuclei |
| 3. Archaea | Early prokaryotic cells suited for extreme conditions |
| 4. Gametes | Cells used for sexual reproduction; have half the number of chromosomes |
| 5. Somatic | Cells that have a full set of chromosomes, cells that aren't gametes |
| Specialised cells | |
| 6. Sperm cell | Has tail, mitochondria and a pointed head to be able to swim to the egg |
| 7. Neuron | Cells are long, with special receptors to carry impulses |
| 8. Muscle | Cells interconnect to allow contraction of muscle |
| 9. Root hair cell | Large surface area to volume ratio for uptake of substance from soil |
| 10.. Xylem | Dead hollow cells with strong cell walls to transport water up the plant |
| 11. Phloem | Have lots of mitochondria for active transport. |
| Mitosis | |
| 12. Mitosis | Cells split to make two identical daughter cells, used for growth and repair Cells duplicate organelles and chromosomes Doubled chromosomes split in nucleus leaving half in each side Nucleus splits Cytoplasm splits leaving two identical cells |

| Parts of cells | | | | |
|-------------------------|---|--------|---------|----------|
| Organelle | Function | Plants | Animals | Bacteria |
| 13. Cell membrane | Controls entry and exit | Y | Y | Y |
| 14. Cell wall | Made from cellulose, strengthens cell | Y | | Y |
| 15. Nucleus | Stores DNA | Y | Y | |
| 16. Plasmid | Loop of DNA | | | Y |
| 17. Mitochondria | Respiration | Y | Y | Y |
| 18. Chloroplast | Photosynthesis | Y | | |
| 19. Ribosomes | Synthesise proteins | Y | Y | Y |
| 20. Cytoplasm | Chemical reactions | Y | Y | Y |
| 21. Vacuole | Stores cell sap | Y | | |
| Microscopes | | | | |
| 22. Magnification | how many times larger something appears. | | | |
| 23. Resolution | Resolution: how much detail can be seen | | | |
| 24. Light Microscope | Normal classroom microscope uses light to work | | | |
| 25. Electron Microscope | Uses a beam of electrons to generate images; gives higher magnification and resolution. | | | |

| Cell differentiation | |
|----------------------|--|
| 26. Differentiation | The process of a cell becoming specialised |
| 27. Stem cell | A cell that can specialise |
| 28. Meristem | Cells in plants that are unspecialised |
| 29. Bone marrow | Cells in humans that are partially unspecialised |
| 30. Embryo cells | Cells from humans that are fully unspecialised |

| Human stem cell therapy | |
|------------------------------|--|
| 31. S. C. T | Using stem cells to treat illnesses including diabetes and paralysis |
| 32. Diabetes | Stem cells with functioning insulin genes inserted into the pancreas to create insulin treating diabetic patients |
| 33. Paralysis | Stem cells with functioning nerve / muscle genes inserted into required area treating patient |
| 34. Bone marrow therapy | Limited in number of cell types that can be made, can be a painful operation for the donor, risks rejection by patient, risk of viral transfer |
| 35. Embryo stem cell therapy | Patient DNA is used to create an embryo so no chance of rejection, some ethical and religious objections, any type of cell can be made |

| Plant stem cell uses | |
|----------------------|---------------------------------------|
| 36. Rare species | Used to preserve rare species |
| 37. Crops | Disease resistant crops can be cloned |

| Cell transport | |
|----------------------|---|
| 38. Diffusion | Movement of substances from high to low concentration |
| 39. Osmosis | Movement of water from high to low purity, through a cell membrane |
| 40. Active transport | Movement of substances from low to high concentration requires energy |

| Rate of cell transport | |
|------------------------|---|
| 41. Increased rate | Bigger difference in concentrations, smaller distance, high temperature, higher surface area |
| 42. Surface area | Fish gills, plant roots, small intestine and increased have increased surface area to increase rates of diffusion |

| Examples active transport | |
|---------------------------|---|
| 43. Ions in soil | Ions in soil taken up by plant roots via active transport |
| 44. Sugar molecules | Taken up from gut to blood via active transport |

| Measurements | |
|---------------------|---------------------------|
| 45. Nanometre (nm)) | 1×10^{-9} metres |
| 46. Micrometre (µm) | 1×10^{-6} metres |
| 47. Millimetre (mm) | 1×10^{-3} metres |
| 48. Centimetre (cm) | 1×10^{-1} metres |

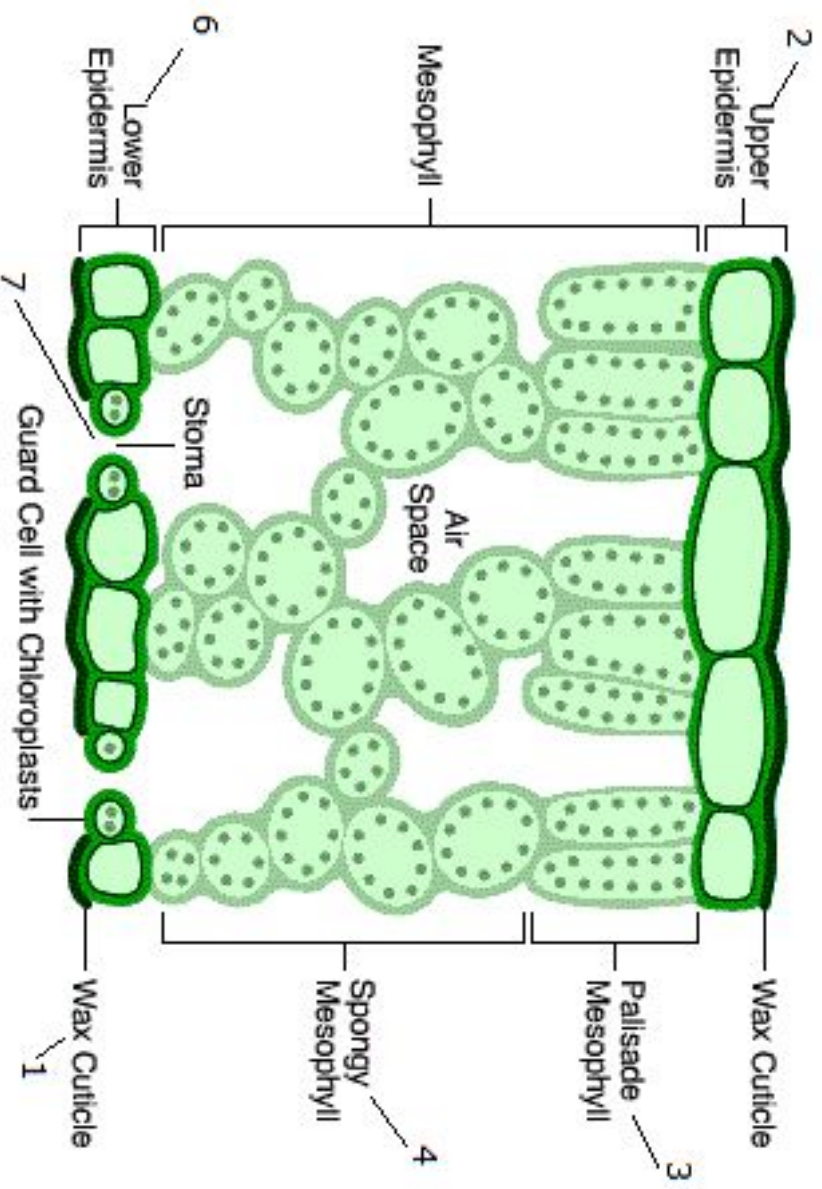
| Principles of organisation | |
|----------------------------|---|
| 1. Organelles | Small specialised components that make up cells |
| 2. Cells | A group of organelles that work together |
| 3. Tissue | A group of identical cells work together as a tissue |
| 4. Organs | A group of different tissues working together is called an organ |
| 5. Organ system | A group of different organs is called an organ system |
| 6. Organism | A living thing is called an organism |
| Digestive system organs | |
| 7. Mouth | Site of physical and chemical digestion; saliva, tongue and teeth |
| 8. Stomach | Acidic sack of muscle churns food |
| 9. Small intestine | Large surface area to absorb nutrients into the bloodstream |
| 10.. Large intestine | Absorbs water from the food into the blood |
| 11. Rectum | Stores feces before it leaves the body |

| Rate of digestion | |
|-----------------------------------|--|
| 17. Metabolism | Chemical reactions inside of the body |
| 18. Metabolic rate | Rate of reactions in the body |
| 19. Denature | The changing shape of an enzymes active site meaning it no longer works |
| 20. pH and temperature on enzymes | Increase the rate of reaction up to an optimum value before the enzyme is denatured. |
| 21. Lock and key hypothesis | Enzymes have specific shaped active sites that bind to individual substrates. These active sites can change shape causing the enzyme to longer work. |

| Food tests | |
|-------------------------|---|
| 22. Benedict's solution | Blue solution turns brick red when heated with glucose |
| 23. Biuret solution | Pale blue solution turns purple when mixed with protein |
| 24. Iodine | Orange brown liquid turns black in presence of starch (complex carbohydrate) |
| 25. Ethanol | When added to lipids with distilled water turns milky white. |

| Enzymes: biological catalysts | | Produced in... | Used in... | Gastric Juices | |
|-------------------------------|---|--|--------------------------|------------------|---|
| 12. Amylase | Breaks down starch into sugar | salivary glands, pancreas, small intestine | Mouth, small intestine | 15. Bile | Alkaline substance made by the liver and neutralises the food in the small intestine, and emulsify fats |
| 13. Lipase | Breaks down fat into glycerol and fatty acids | pancreas, small intestine | small intestine | 16. Stomach Acid | |
| 14. Protease | Breaks down proteins into amino acids | Stomach, pancreas, small intestine | Stomach, small intestine | | Produced in the stomach to kill bacteria |

| Plant organisation | |
|---------------------------|---|
| 20. Epidermal tissue | Tissue that surrounds other tissues in plants |
| 21. Mesophyll tissue | 2 types: spongy - allows gas exchange, palisade allows photosynthesis |
| 22. Xylem | Moves water and minerals up the plant by transpiration from roots to leaves where it is lost through the stoma |
| 23. Phloem | Move glucose from where it is made in the leaf to the rest of the plant this movement is called translocation ,made of elongated tubes with pores at the end to allow movement of cell sap. |
| Transpiration | |
| 20. Transpiration | The movement of water from the roots to the leaves caused by water being lost through the stoma in the leaves through the xylem. |
| 21. Rate of transpiration | Increases with more light, at higher temperatures and more wind Decreases with more humidity |
| Translocation | |
| 20. Translocation | The movement of sugar from where it is made in the leaves down the phloem to the rest of the plant. |



| Heart structures | |
|----------------------|---|
| 1. Aorta | Oxygenated blood goes away from the heart to the rest of the body |
| 2. Vena Cava | Deoxygenated blood enters the heart here from the body |
| 3. Pulmonary artery | Vessel which blood travels away from the heart to become oxygenated in the lungs |
| 4. Pulmonary vein | Vessels which carry oxygenated from the lungs back to the heart |
| 5. Coronary arteries | Arteries that supply oxygenated blood to the heart tissue |
| 6. Right atrium | The first chamber where blood enters the heart. The heart's pacemaker is here. |
| 7. Left ventricle | Thick muscled part of the heart that pumps blood to the rest of the body |
| 8. Valves | Prevent the backflow of blood |
| 9. Pacemaker | Either natural or artificial part of the heart that controls how fast the heart beats |
| 10. Arteries | Carry blood away from the heart, muscular tubes, high pressure |
| 11. Veins | Carry blood back towards the heart, a low pressure |
| 12. Capillaries | Thin vessels, only one cell thick to allow fast diffusion |
| Lung structures | |
| 13. Trachea | The main tube entering the lungs |
| 14. Bronchi | The part of the trachea that splits in two |
| 15. Alveoli | Sacks of air in the lungs surrounded by capillaries for gas exchanges |

| Components of blood | |
|------------------------|--|
| 16. Red blood cells | Specialised cells, without a nucleus, contain haemoglobin that carries oxygen around the body |
| 17. White blood cells | Defends the body from pathogens |
| 18. Plasma | Carries dissolved substances including glucose, CO ₂ and amino acids |
| 19. Platelets | Enable blood clotting |
| Coronary Heart Disease | |
| 20. Cause | Layers of fatty material build up in the coronary arteries making less oxygen available to keep the heart muscle beating |
| 21. Stents | Surgical procedure involving putting small stents in the arteries to hold them open to allow blood flow. (immediate impact, risk of surgery) |
| 22. Statins | Drugs used to break down fatty material (cholesterol), (risks of side effects, pills need to be taken daily) |
| 23. Valve problems | Non-functional heart valves can be replaced with biological (pig) or mechanical valves. |
| 24. Heart failure | When the heart stops beating it can be replaced with a heart from a different person in a heart transplant |

| Health | |
|-----------|---|
| 1. Health | State of being physically and mentally well |

| Disease interactions | |
|---|--|
| 2. Immune defects | Defects in your immune system increase risk of diseases |
| 3. Virus -> cancer | Some viruses increase risk of cancer (HPV) |
| 4. Immune reaction -> allergies | Immune system reactions can cause allergies and asthma |
| 5. Physical illnesses -> mental illness | Physical illnesses can lead to mental illness such as depression |

Impacts of lifestyle on non-communicable diseases

| | |
|-------------------|---|
| 6. Risk factor | Something that increases the chance of getting a disease |
| 7. CVD | Cardiovascular disease is increased by diet, smoking and lack of exercise |
| 8. Diabetes | Obesity is a risk factor |
| 9. Alcohol | Is a risk factor for brain and liver function |
| 10. Smoking | Is a risk factor for lung cancer and lung disease |
| 11. Unborn babies | Smoking and alcohol are risk factors for damaging the foetus |
| 12. Carcinogens | Anything that is a risk factor for cancer is a carcinogen; including ionising radiation |
| 13. Genetics | Risk factor for some cancers |

| Cancer | |
|-----------------------|--|
| 14. Mutation | A change in DNA |
| 15. Cancer | Mutations in the DNA causing uncontrolled growth and division. |
| 16. Tumour | A mass of tissue formed from uncontrolled growth and division of cells |
| 17. Benign tumours | Tumours that are contained in one part of the body |
| 18. Malignant tumours | Cancers that invade other tissues at secondary sites in the body |

| Pathogens | | Bacterial diseases | |
|-----------------------------------|--|---|--|
| 1. Pathogens | Microorganisms that cause infectious diseases | 12. Salmonella | Bacterial infection causes food poisoning caused by unhygienic cooking conditions or out of date food being ingested. Fever, vomiting and diarrhoea are a reaction to toxins released by bacteria. |
| 2. Bacteria | Unicellular prokaryotes release toxins in the body making people feel ill | 13. Gonorrhoea | STD caused by bacteria, passed on through unsafe sexual practices, symptoms include thick yellow or green discharge from the vagina or penis and pain on urination. |
| 3. Virus | Unicellular prokaryotes, exist inside host cells where they reproduce, this causes damage to host cells | 14. Antibiotics | Used to treat bacterial infections. |
| 4. Funghi | Can be uni or multicellular. | Fungal diseases | |
| 5. Protists | A type of eukaryotic organisms | 15. Rose black spot | Black spots on leaves causing leaves to eventually turn yellow and fall off affecting the rate of photosynthesis. |
| Spreading pathogens- transmission | | 16. Fungicides | Used to treat fungal infections |
| 6. Air | Some pathogens can be spread through the air such as flu or cold, these are hard to prevent getting | Protist diseases | |
| 7. Direct contact | Spread through direct contact with something / one who has the illness these can be avoided through good hygiene (salmonella) | 17. Malaria | The malarial protist has a life cycle that includes the mosquito. Malaria causes recurrent episodes of fever and can be fatal. Prevention using nets and insecticide. |
| 8. Water | Some pathogens are spread through water sources, only drinking clean / boiled water avoids this (cholera) | Human protection from communicable diseases | |
| Viral diseases | | 18. Nonspecific defence systems | Parts of the body that provide defence against all pathogens: skin, nose, trachea and bronchi, stomach. |
| 9. HIV | Human immunodeficiency - a virus that is transferred through direct contact of sexual fluids or blood. Virus replicates inside of the white blood cells of the host destroying the body's immune system. Develops into AIDS. | 19. White blood cell defence | White blood cells protect the body using phagocytosis (ingesting pathogens), antibody production (attaching and neutralising pathogens), antitoxin production (reducing the symptoms) |
| 10. TMV | Tobacco mosaic virus - a condition that infects plants causes discolored spots on leaves caused by destroying chlorophyll preventing photosynthesis in those parts | | |
| 11. Measels | Causes red rashes, can be fatal if complications occur; spread through airborne droplets from sneezes or coughs. | | |

| Vaccinations | |
|------------------------|---|
| 1. Vaccination | Inserting a inactive version of a virus into a person to stimulate white blood cells and develop antibodies to allow future quick responses to specific pathogen and prevent future infection |
| 2. Herd immunity | When a large enough proportion of a group of people are vaccinated against an illness even those not vaccinated are less likely to get the illness as there's less exposure |
| 3. Limitations | Not everyone can be vaccinated: old people, very young, already sick, people with AIDS, people on chemotherapy |
| Drugs | |
| 4. Antibiotics | Drugs used to treat bacterial infections e.g. penicillin <i>see antibiotic resistance</i> |
| 5. Fungicides | Drugs used to treat fungal infections |
| 6. Anti-viral | Drugs used to treat viruses |
| 7. Painkillers | Do not cure illness but just reduce pain associated with illness |
| Antibiotic resistance | |
| 8. Bacterial evolution | Populations of bacteria exposed to antibiotics, weakest die first, fittest survive. If full course of antibiotics not taken the fittest survive and multiply. As they can not be as easily destroyed by antibiotics they are said to be resistant to antibiotics. |
| 9. New antibiotics | To deal with this new antibiotics need to be developed but this expensive and takes a long time |
| 10. Future | More and more diseases are becoming resistant to antibiotics making common illnesses harder to cure. |

| Drug development from plants | |
|------------------------------|--|
| 11. Aspirin | A pain killer that came fame from the willow tree |
| 12. Digitalis | A drug used for heart issues came from fox gloves |
| 13. Penicillin | Antibiotic produced discovered in mold by Alexander Fleming |
| Drug testing | |
| 14. Efficacy | Testing for efficacy means testing to see if the drug treats the condition |
| 15. Toxicity | Testing for toxicity means to test if there are any unwanted side effects |
| 16. Dose | Testing to see what dose is appropriate to treat the condition |
| 17. Preclinical trials | Tests are completed on cells, tissue samples, and live animals prior to human trials |
| 18. Clinical trials | Tests are done on healthy people to test for toxicity and then people with the condition to test for efficacy and dose |
| 19. Double blind trials | Some patients are given a placebo instead of the real drug to test its true efficacy |
| 20. Placebo | An ineffective treatment (water) to use as a control to compare the results to in a double blind trial |

| Photosynthesis | | Respiration | |
|------------------------------|--|------------------------------------|---|
| 1. Photosynthesis | Endothermic reaction utilising sunlight within the chloroplasts of plants as the energy source to convert CO ₂ and H ₂ O into C ₆ H ₁₂ O ₆ and O ₂ | 13. Aerobic Respiration | Exothermic reaction used by the body to release energy from sugar and oxygen in the mitochondria/ |
| 2. Balanced equation | $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ | 14. Balanced equation | $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$ |
| 3. Limitations | Not everyone can be vaccinated: old people, very young, already sick, people with AIDs, people on chemotherapy | 15. Anaerobic respiration | Less exothermic reaction used to release energy from glucose when there isn't any oxygen. Lactic acid is produced as a bi-product. |
| 4. Rate | Photosynthetic rate is affected by: light intensity, amount of CO ₂ , temperature, amount of chlorophyll in plant | 16. Equation | glucose → lactic acid |
| 5. Limiting factor | If one of the above is in a small amount then this will limit the amount of photosynthesis that can occur. | 17. Uses of respiration | Energy is used for chemical reactions to build larger molecules, movement, keeping warm. |
| 6. Inverse square law | The further away the light source the greater the area covered by that light source therefore the less intense the light. For every doubling distance the area covered increases 4x. | 18. Anaerobic respiration in yeast | This reaction produces alcohol and carbon dioxide and is used in brewing and baking industries. glucose ethanol + carbon dioxide |
| 7. Experimental proof | Pondweed is used to measure the rate of photosynthesis either using volume of gas given off or reductions in the acidity of the water. | Response to exercise | |
| 8. Uses of glucose in plants | Energy source, stored as starch, converted into oils for storage, converted into amino acids to build proteins, converted into cellulose to make cell walls | 19. Breath volume | The amount of air taken in with each breath increases during exercise |
| Metabolism | | 20. Breathing rate | The amount of breaths per minute increases during exercise |
| 9. Metabolism | The sum of all chemical reactions that occur inside the body. | 21. Heart rate | The number of heartbeats per minute increases during exercise |
| 10. Synthes | Some metabolic reactions build molecules such as proteins | 22. Oxygen debt | When the body runs out of oxygen in the muscle tissue the muscles do anaerobic respiration creating lactic acid - this lactic acid is broken down with more oxygen - the amount of oxygen needed for this is called the oxygen debt. The conversion of lactic acid back to glucose occurs in the liver. |
| 11. Breakdown | Some metabolic reaction break down large molecules i.e. digestion | | |
| 12. Excess protein | Excess protein is removed in urine in the form of urea | | |