Year 9 : Cycle 1: Science 100% sheet

Section 1: Lab Equipment	
Mass balance	Measures the mass of an object in units called grams.
Measuring cylinder	Measures the volume of a liquid in units of ml or $cm^{2.}$
Bunsen burner	A device used to heat substances by burning natural gas.
Conical flask	A cone shaped glass container that is used to hold liquids.
Tripod	A three-legged stand used to hold items safely above a Bunsen burner flame.

Section 2: Planning an Investigation	
Independent variable	The variable that is altered during a scientific experiment.
Dependent variable	The variable being tested or measured during a scientific experiment.
Control variable	A variable that is kept the same during a scientific experiment.
Method	Step by step instructions for an investigation.
Results table	Left hand column = independent variable Right hand column = dependent variable.

Section 3: Sub Cellular Structures	
Cell membrane	Controls the movement of substances into the cell (all cells).
Cytoplasm	Site of chemical reactions (all cells).
Nucleus	Contains DNA and controls the activities of the cell (P & A).
Mitochondria	Site of aerobic respiration. (p & A).
Ribosomes	Site of protein Synthesis (all cells).

Section 4: Differences in Cells	
Chloroplast	Contains chlorophyll to absorb light for photosynthesis (P).
Permanent vacuole	Contains cell sap and helps keep cells turgid (P).
Cell wall	Cellulose structure to support the cell (P & B)
Plasmid	Small ring of DNA in the cytoplasm (B).
Flagella	whip-like structure that allows a cell to move (B).

Section 5: The structure of the Atom	
Atoms	All substances are made of atoms. Radius of atom = 0.1 nm (1×10^{-10} m)
Protons	Mass = 1, charge = +1, location = nucleus.
Neutrons	Mass = 1, charge = 0, location = nucleus.
Electrons	Mass = very small, charge = -1, location = shells.
Nucleus	Most of the mass is concentrated here. Positively charged. Radius of nucleus = 1×10^{-14} m (1/10000 of radius of atom).

Section 6: History of the Atom	
Dalton's Model	Described atoms as tiny solid spheres.
Plum Pudding Model	Described atoms as a ball of positive charge with negative electrons stuck in it.
Rutherford's experiment conclusion	Nucleus is tiny and positively charged. Most of the atom is empty space. Cloud of negative electrons surround nucleus.
Bohr's Nuclear Model	Discovered that electrons orbit the nucleus in fixed shells.
Protons & Neutrons	Rutherford discovered protons. Later, Chadwick discovered neutrons.

Section 7: Microscopy	
Light microscope	Uses light, lower magnification and lower resolution.
Electron microscope	Uses electron beams. Higher magnification and resolution. Cannot be used to view live specimens, very expensive.
Stain	Chemical used to make magnified structures more visible.
Magnification equation	Image size = actual size X magnification
Converting units	1m = 1000mm, 1mm= 1000µm. (µm = micrometre).

Section 8 Atomic number, mass number and isotopes	
Atomic number	Number of **protons**. (Also gives number of electrons)
Mass number	**Total** number of **protons** and **neutrons**.
Isotopes	Atoms of the **same element** with **same** number of **protons** and **different** numbers of **neutrons**.
Relative Atomic Mass (A_r)	The **weighted average** of the masses of all of the isotopes of an element.

Section 9: Cell Cycle	
Eukaryotic cell	Complex cell with a nucleus.
Chromosomes	Molecules of DNA, 23 pairs found in a human nucleus.
Cell cycle	Three stages; growth and DNA replication, mitosis, cell division.
Growth and DNA replication	Cell grows → number of subcellular structures increase → DNA replicates → forms X -shaped chromosomes
Mitosis	A form of cell division. Two genetically identical daughter cells are produced. Used for growth and to replace damaged tissue.

Section 10: Elements, Compounds, Mixtures and Separation Processes 1	
Element	A substance made up of one type of atom.
Compound	A substance made up of two or more types of atoms chemically joined together in a consistent ratio.
Mixture	A substance made up of two or more substances mixed together but not chemically joined.
Filtration	Separates an insoluble solid from a liquid using filter paper.

Section 11: Stem Cells	
Differentiation	The process by which cells become specialised to complete a specific function.
Stem cells	Undifferentiated cells that can become different types of specialised cells.
Embryonic stem cells	Obtained from early human embryos. Can be grown in the lab. To be used in medicine or scientific research.
Adult stem cells	Can only produce certain types of cells e.g., bone marrow stem cells produce blood cells.
Plant stem cells	Found in the meristems (tissue in the tips of roots and shoots) of plants.

Section 12: Elements, Compounds, Mixtures and Separation Processes 2	
Evaporation	Heat a solution to evaporate the liquid until dry crystals are left.
Crystallisation	Heat a solution until crystals form and leave to cool. Filter out the crystals and leave to dry.
Distillation	Separates out a liquid from a mixture. Liquid evaporates then condenses. Two types – simple and fractional.
Chromatography	Separates a mixture of coloured liquids.

Section 13: Cell Transport	
Surface area: volume ratio	The larger the organism, the smaller its surface area to volume ratio. The smaller its surface area compared to its volume, the harder it is for an organism to exchange substances with its environment.
Diffusion	The net movement of particles from a higher to lower concentration, down a concentration gradient. It is a passive process (requires no additional energy).
Osmosis	The net movement of water particles across a partially permeable membrane from a dilute to a more concentrated solution, down a concentration gradient. It is a passive process.
Active transport	The movement of particles from a lower to a higher concentration against a concentration gradient. It requires energy transferred from respiration.
Factors that increase rate of cell transport	Steeper concentration gradient, larger surface area, shorter diffusion pathway, higher temperature.