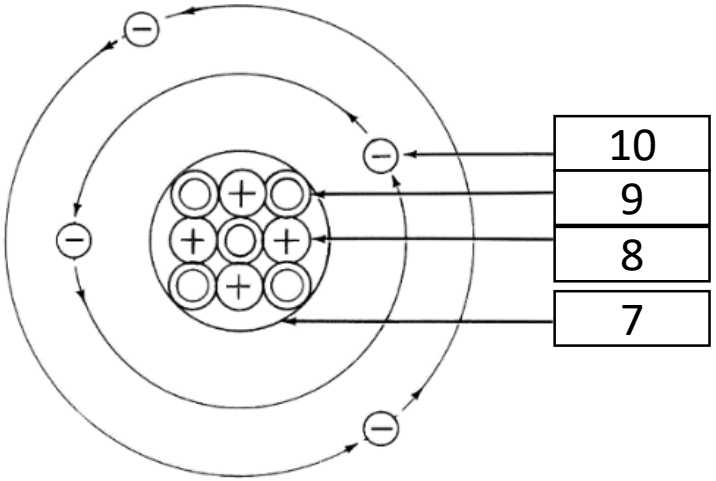
Physics topic 4: Atomic structure

1. Keywords	
1. Atom	The smallest possible piece of an element. Has a radius of 0.1nm (or $1x10^{-10}$m).
2. Element	A substance in which all the atoms have the same atomic number.
3. Isotope	Atoms with the same number of protons but different numbers of neutrons.
4. Molecule	Two or more atoms bonded together
5. Compound	Two or more <u>different</u> atoms bonded together
6. Mixture	At least two different elements or compounds together. Can be separated easily.
7. Nucleus	The centre of an atom. Contains protons and neutrons
8. Proton	A positively charged particle found in the nucleus
9. Neutron	A neutral particle found in the nucleus. Has no charge
10. Electron	A negatively charged particle found in energy levels (shells) around the nucleus



2. Properties of sub-atomic particles			
Particle	Relative mass	Relative charge	Location
Proton	1	+1	Nucleus
Neutron	1	0	Nucleus
Electron	0	-1	Shells

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

1
H
hydrogen
1

3. Using the periodic table		
Number of..	Is the…	Found by..
Protons	Atomic (proton) number	Smaller number on periodic table
Electrons	Atomic (proton) number	Smaller number on periodic table
Neutrons	Difference between the atomic mass and atomic number	Big number – small number

4. History of the atom			
Discovery	By	Model	Diagram
Solid particle called atom	John Dalton	Particle: solid spheres	1
The electron	JJ Thompson	Plum pudding: positive 'cake' with negative 'plums'	2
Nucleus	Rutherford	Nuclear: Positive nucleus surrounded by electrons	3
Neutron	James Chadwick	Nuclear: Now with protons and neutrons in nucleus	3
Energy levels (shells)	Niels Bohr	Planetary: Electrons now 'orbit' in different shells	4

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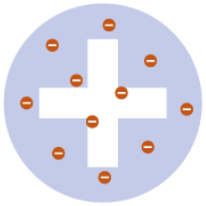
2. 

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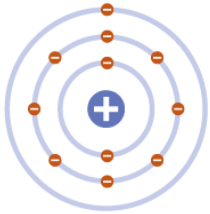
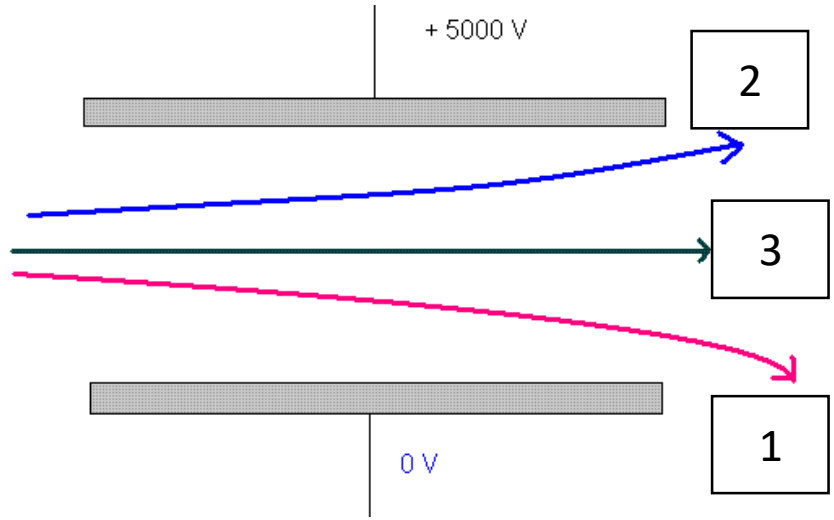
4. 

5. Radioactive decay keywords	
Unstable	The ability for a nucleus to decay
Radioactive decay	The RANDOM process of radiation being released by a nucleus. A different element in formed
Nuclear radiation	The energy and particles released when an unstable nucleus decays
Activity	How quickly a radioactive sample decays
Becquerel	The unit of activity
Geiger-Muller tube	A device to measure the count rate of a radioactive source
Count rate	The number of radioactive decays per second
Ionising power	How well it knocks off electrons and damages cells
Half life	The time it takes half of a group of radioactive nuclei to decay
Radioactive contamination	Unwanted hazardous materials containing radioactive atoms
Peer review	When the findings of one expert are double checked by another expert to make sure they are correct



6. Ionising radiation							
	Name	Symbol	Made of	Charge	Range in air	Penetration	Ionising power
1	Alpha	α	Helium nucleus $^{4}_{2}He$	**+2**	5 cm	Blocked by paper and skin	High
2	Beta	β	Fast moving electron $^{0}_{-1}e$	**-1**	15 cm	Blocked by thick aluminium	Medium
3	Gamma	γ	Electromagnetic wave	N/A	Very long	Blocked by thick lead	Low