Phhysics2 Revision Check List

Topic	Tick	Tick	Tick
1. Radioactive Emissions			
a) I know that radioactive emissions happen because unstable nuclei disintegrate			
b) I know that the nucleus is unstable because of the imbalance between the number of protons and neutrons on in the nucleus, that is, the protons are trying to repel each other but the neutrons prevent the nucleus being pushed apart (and there have to be enough of them to do this!)			
c) I know the various sources of background radioactivity, which are natural (food, rocks, cosmic rays) and which are not (medical, industrial, nuclear explosions from the 1960s)			
d) I know about the dangers of building homes on rocks that leak radon gas and how homes can be protected from the build up of this gas			
e) I know how to investigate the penetrating powers of alpha (α) particles, beta particles (β) and gamma rays (γ)			
f) I know that alpha particles are absorbed (and so stopped) by paper or a few cm of air, betas are absorbed by a few mm of metal like aluminium, and gammas by several cm of lead or several m of concrete			
g) I know that it is easy to shield against alpha and beta (stopped by paper and aluminium respectively) but gamma can never be completely stopped some will always be able to penetrate concrete or lead			
h) I know that if the source is inside you alpha will be absorbed by the cells and cause damage to the cells that can lead to cancer, that beta is also absorbed but will pass deeper into the tissue and gamma will pass straight through with very little being absorbed			
i) I know that alpha is positively charged (2+) and so very ionising, causing lots of			

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cell damage, that beta is negatively charged (1-) and is less ionising than alpha, and that gamma have no charge and are the least ionising			
j) I know that handling radioactive materials carries a risk of cancer and know the precautions taken by workers (face masks, tongs, limited use, protective clothing, film badges to monitor exposure)			
k) I know that treating cancers with gamma rays can make the patient ill as healthy cells are also killed and risk new cancers forming, I know how the treatment limits this risk			
2. Half Life of Radioactive Materials			
a) I know that the half life of a material is the time it takes for the samples activity to fall to a half of the original value, or it is the time taken for half the radioactive nuclei to decay			
b) I know how a graph of activity against time looks and can use the graph to read off the half life,			
c) I can perform calculations to find the time taken to reach a particular activity			
3. Uses and Dangers of Radioactivity			
a) I know how radioactive samples are used in radioactive tracers, thickness monitoring and cancer treatment etc., and how the type of emission and half life make it useful			
b) I know about the scientific and ethical issues to do with the disposal of radioactive waste, and am aware of the uncertainty of the safety of containers and the materials over thousands of years			

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4. Simple Electrical Circuits			
a) I know that ammeters are used to measure current, they are connected in series and the unit is the amp or A			
b) I know that voltmeters are used to measure voltage, they are connected in parallel and the unit is the volt or V			
c) I know that as the voltage is increased the current will increase and that when the resistance of a material is high the current is low, and that a larger voltage is needed to produce the same current as in a lower resistance material			
d) I can select and use the equation **resistance (Ω) =** $\frac{\textbf{voltage (V)}}{\textbf{Current (A)}}$			
e) I can use the equation to find **voltage** and **current**			
f) I know how to investigate how the current changes with voltage for a resistor, wire, filament lamp and diode			
g) I know how a graph of current against voltage will look for a resistor or wire, a filament lamp and a diode			
5. Safety Features Used In Mains Circuits			
a) I know which wire is the neutral (blue), live (brown) and earth (green and yellow) and why they are covered in plastic			
b) I know that when a fault occurs and the casing becomes live the current travels to earth through the earth wire and that this causes the fuse to heat and blow breaking the circuit, this prevents fires and shocks			
c) I can select and use the equation **current (A) =** $\frac{\textbf{power of appliance (W)}}{\textbf{voltage (V)}}$ and use the answer to select the correct fuse to use			

d) I can use the equation to find **power of appliance or voltage**			
e) I know that miniature circuit breakers (mcb) and fuses both break the circuit when the current is too large, that the advantage of mcbs is that they are quick, can be reset and are sensitive – only require a slight increase of current			
f) I know that residual current devices (rcd) work by comparing the current in the live and neutral wires, if there is a slight difference then the rcd will breakl the circuit, the advantage if these compared to mcbs is that they are even quicker and so protect from fatal shocks			
g) I know that different countries use different voltages because higher voltages are more dangerous (eg., 110V instead of our 230V) but that it would be costly for us to change to a lower voltage			
6. Distance, Speed and Acceleration			
a) I can identify steady speed, acceleration, deceleration and stopped on distance-time and speed-time graphs			
b) I can select and use the equation **speed(m/s)=** $\frac{\textbf{distance(m)}}{\textbf{time(s)}}$ to find speed			
c) I can use the equation to find **distance** and **time**			
d) I can select and use the equation **acceleration(m/s^2)=** $\frac{\textbf{change in speed (m/s)}}{\textbf{time(s)}}$			
e) I can use the equation to find **change in speed** and **time**			
7. Effects of Forces			
a) I know the effect of balanced (it stays still or moves with a steady speed) and unbalanced (it accelerates or decelerates)forces on the motion of objects			

b) I know that the greater the resultant force (the difference between 2 unbalanced forces) the greater the acceleration or deceleration			
c) I can select and use the equation **force (N) = mass (kg) x acceleration (m/s^2)**			
d) I can use the equation to find **mass** and **acceleration**			
e) I know the difference between mass and weight and I know that the weight of an object of mass of 1 kg is approximately 1N			
f) I know that when a parachutist speeds up its air resistance increases until it is the same size as the weight, at this point it no longer accelerates (resultant force is now zero) and falls with a steady speed called terminal speed			
g) I know that vehicles and rain drops have terminal speeds			
8. Interactions Between Objects			
a) I know that when a gun fires the gun pushes the bullet forward and the bullet pushes the gun backwards (recoils), and that the 2 forces are equal in size and act in opposite directions (and on different objects; one acts on the bullet and the other on the bullet), and that this is called action and reaction and happens in rockets and jet engines			
b) I know that when a force acts on a moving object that energy has been transferred to the object			
c) I can select and use the equation **work (J) = force (N) x distance (m)**			
d) I can use the equation to find **force** and **distance**			
e) I know that work is equal to the energy transferred (eg kinetic and potential)			
f) I can select and use the equation **kinetic energy (J)=** $\frac{\textbf{mass (kg) x speed}^2\textbf{(m/s)}}{\textbf{2}}$			
g) I can use the equation to find **speed**			

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h) I can select and use the equation **Change in potential energy (J) = mass (kg) x gravitational field x change in Strength (10N/kg) height (m)**			
i) I can use the equation to find **change in height**			
j) I know that the stopping distance for a car is the thinking distance plus the braking distance			
k) I know that the thinking distance is how far the car travels in metres while the driver is reacting, that if the speed doubles the thinking distance doubles, and that tiredness, drugs, distraction and illness (as well as speed) can make the thinking distance longer			
l) I know that the braking distance is how far the car travels while the brakes are applied, that if the speed doubles the braking distance becomes 4x longer, that worn tyres, brakes, wet/icy/loose surfaces (as well as speed) can make the braking distance longer			
m) I know that cars are designed with crumples zones and air bags to minimise the effects of a collision			
n) I know that crumple zones and air bags make the deceleration smaller and so from **force=mass x acceleration** the force acting on the person will be less so causing less serious injury (since the change in speed now happens over a longer time this makes acceleration less)			
o) I know that speed is restricted in built up areas and housing estates, and speed cameras used, because a small increase in speed results in a much greater increase in the kinetic energy of the car, this then means the car travels much further when braking			
p) I know that the reason the car travels further is that the kinetic energy is			

greater, that this energy is transferred to the brakes, so from work = force x distance, if the work is greater and the force of the brakes the same, that distance will be longer			