**Suggested Study Plan Higher Physics**

You must always write something down when you are studying. Use sharp pencils, rulers, a good calculator and clean paper. TURN YOUR PHONE OFF.

Make mind maps, bullet point, make flash cards, do past paper questions and check model answers, write out symbols, units, formula and rearrange.

| **Week** | **What to Study** | **Relationships** | | | **Things you need to get help with** |
| --- | --- | --- | --- | --- | --- |
| 1 | **Motion:**  Equations of motion – knowledge and calculations.  Motion-time graphs for velocity, displacement and acceleration.  **Forces, Energy and Power:**  Vector addition and calculations involving force.  Knowledge of friction, terminal velocity, tension and Newton’s Laws.  Weight down a slope.  Conservation of energy. | d = vt  s = vt  v = u + at  s = ut + ½at2  v2 = u2 + 2as  s = ½ (u + v) t | F = ma  W = mg  Ew = Fd  Ep = mgh  Ek = ½ mv2  P = E/t | |  |
| 2 | **Collisions, Explosions and Impulse:**  Conservation of momentum – knowledge and calculations.  Inelastic and elastic collisions  Force-time graphs.  **Gravitation:**  Projectiles – knowledge and calculations.  Newton’s Law of Universal Gravitation | p = mv  Ek = ½ mv2  Ft = mv - mu | d = vt  s = vt  v = u + at  s = ut + ½at2  v2 = u2 + 2as  s = ½ (u + v) t  F = G m1m2/r2 | |  |
| 3 | **Special Relativity:**  Time dilation and length contraction.  **The Expanding Universe:**  Doppler effect and redshift – knowledge and calculations.  Hubble’s Law – knowledge and calculations.  Dark matter, dark energy and stellar temperatures.  Evidence for the Big Bang. | t’ = t / √(1 – (v/c)2)  l’ = l √(1 – (v/c)2) | | | fo = fs (v / v ± vs)  z = λobs – λrest / λrest  z = v / c  v = Hod |
| 4 | **The Standard Model:**  Knowledge of all fundamental particles.  **Forces on Charged Particles:**  Charges in electric and magnetic fields.  Particle accelerators. |  | | W = QV  Ek = ½ mv2 |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Week** | **What to Study** | **Relationships** | |  | **Things you need to get help with** |
| 5 | **Nuclear Reactions:**  Nuclear equations for radioactive decay, fission and fusion.  **Inverse Square Law:**  Irradiance – knowledge and calculations.  Inverse square law – knowledge and calculations. | E = mc2 | | I = P/A  I = k/d2  I1d12 = I2d22 |  |
| 6 | **Wave-Particle Duality:**  Photoelectric effect and photoemission – knowledge and calculations.  **Interference:**  Constructive and destructive interference.  Path difference – knowledge and calculations. | E = hf  Ek = hf - hfo  Ek = ½ mv2  V = fλ | | path diff. = mλ  or  path diff. = (m+½)λ  dsinθ = mλ |  |
| 7 | **Spectra:**  Bohr model of the atom.  Continuous, line and absorption spectra.  **Refraction of Light:**  Refractive index – knowledge and calculations.  Critical angle – knowledge and calculations. | E2 – E1 = hf  E = hf | | n = sinθ1 / sinθ2  sinθ1 / sinθ2 =λ1 / λ2 = v1 / v2  v = fλ  sinθc = 1/n |  |
| 8 | **Monitoring and Measuring AC:**  Definition of AC.  Peak and r.m.s. voltage – definition and calculations.  Frequency of a.c. signal – calculations.  **Current, Potential difference, Power, and Resistance:**  Electrical circuits – knowledge and calculations.  Voltage dividers – knowledge and calculations. | Vrms = Vpeak / √2  Irms = Ipeak / √2  T = 1 / f | | V = IR  P = IV = I2R = V2/R  RT = R1 + R2 + …  1/Rt = 1/R1 + 1/R2 + …  V1 = (R1 / R1 + R2) Vs  V1 / V2 = R2 / R2 |  |
| 9 | **Electrical Sources and Internal Resistance:**  Electromotive force (EMF), internal resistance, lost volts, terminal potential difference (t.p.d.), ideal supplies, short circuit and open circuit – knowledge and calculations.  Determination of EMF, internal resistance and short circuit current using graphical analysis.  **Capacitors:**  Capacitance – knowledge and calculations.  Capacitor charging and discharging graphs including effect of resistance and capacitance. | E = V + Ir  V = IR | | C = Q / V  Q = It  E = ½ QV  E = ½ CV2  E = ½ Q2/C |  |
| 10 | **Semiconductors and p-n Junctions:**  Band theory for conductors, semiconductors and insulators.  Doping.  LEDs and Solar Cells |  |  | |  |