Name: _____

A Level Physics
Topic 1 Physical Quantities and Units

- Physical quantity
- Magnitude
- Number
- Unit
- Reasonable estimates
- SI units
  - Kilograms
  - Meters
  - Seconds
  - Amperes
  - Kelvin
- Derived units
- Metric prefixes
  - pico
  - nano
  - micro
  - milli
  - centi
  - deci
  - kilo
  - Mega
  - Giga
  - Tera
- Systematic errors
- Random errors
- Precision
- Accuracy
- Absolute uncertainties
- Percentage uncertainties
- Scalar
- Vector
- Adding and subtracting vectors
- SOH-CAH-TOA
- Pythagorean theorem

Name: _____

A Level Physics
Topic 2 Kinematics

- Distance
- Displacement
- Speed
- Velocity
- Acceleration
- Understand graphs of
  - *distance vs. time*
  - *displacement vs. time*
  - *speed vs. time*
  - *velocity vs. time*
  - *acceleration vs. time*
- The area under a *velocity vs. time* graph tells us the change in displacement
- The area under an *acceleration vs. time* graph tells us the change in velocity
- The gradient/slope on a line/curve on a *displacement vs. time* graph tells us the instantaneous velocity
- The gradient/slope on a line/curve on a *velocity vs. time* graph tells us the instantaneous acceleration
- Applying suvat equations to horizontal motion
- Applying suvat equations to vertical motion

Name: _____

A Level Physics
Topic 3 Dynamics

- Mass
- Force
- Linear momentum
- Newton's first law of motion
- Newton's second law of motion
- Newton's third law of motion
- Force is the rate of change of momentum
- Acceleration of free fall
- Force of gravity
- Weight
- Force of friction (air and surface)
- Drag/viscous force
- Relationship between speed and air resistance
- Terminal speed/velocity
- Law of conservation of momentum in one dimension
- Law of conservation of momentum in two dimensions
- Elastic collisions
- Inelastic collisions
-

Name: _____

A Level Physics
Topic 4 Forces, Density, and Pressure

- Centre of gravity
- Moment of a force
- Couple
- Apply torque to a couple
- Principle of moments
- Equilibrium
- Vector triangle and coplanar forces
- Density
- Pressure
- Hydrostatic pressure
- Upthrust (buoyant force) of an object in a fluid
- Archimedes' principle

Name: _____

A Level Physics
Topic 5 Work, Energy, and Power

- Work
- Law of conservation of energy
- Efficiency
- Power
- Gravitational potential energy
- Kinetic energy

Name: _____

A Level Physics
Topic 6 Deformation of Solids

- Deformation
- Tensile forces
- Compressive forces
- Load
- Extension
- Compression
- Limit of proportionality
- Hooke's law
- Relationship between force on a spring and extension of spring
- Stress
- Strain
- Young's modulus
- Elastic deformation
- Plastic deformation
- Elastic limit
- The area under a *force vs. extension* graph tells us the work done
- Elastic potential energy

Name: _____

A Level Physics
Topic 7 Waves

- Colour
- Progressive wave
- Wave motion in a rope, ripple tank, and spring
- Displacement
- Amplitude
- Phase difference
- Period
- Frequency
- Wavelength
- Speed
- The use of the time-base and y-gain of a cathode ray oscilloscope CRO to determine frequency and amplitude
- Derive and apply the wave equation $v = \frac{\lambda}{T} = \lambda f$
- A progressive wave transfers energy
- Intensity of a progressive wave
- Transverse wave
- Longitudinal wave
- Doppler effect
- Electromagnetic spectrum
- Speed of light in free space
- Range of wavelengths in free space of electromagnetic waves from radio waves to gamma rays
- Polarizing filter
- Polarization
- Malus's law

Name: _____

A Level Physics
Topic 8 Superposition

- Principle of superposition
- Stationary waves
- Identifying nodes and antinodes
- Wavelength of a stationary wave
- Diffraction
- Relationship between gap width, wavelength, and amount of diffraction
- Interference
- Coherence
- Two source interference
- Conditions of two source interference
- Double slit interference of light and the use of $\lambda = ax/D$
- Diffraction grating and the equation $d \sin\theta = n\lambda$

Name: _____

A Level Physics
Topic 9 Electricity

- Electric current
- Charge
- Quantization of charge
- Drift speed $I = Anvq$
- Potential difference
- Power
- Resistance
- Graph of *current vs. voltage* of a
  - metallic conductor at a constant temperature
  - semiconductor diode
  - filament lamp
- Relationship between current, temperature, and resistance on a filament lamp
- Resistivity
- Ohm's law
- Relationship between light intensity and resistance of a light dependent resistor
- Relationship between temperature and resistance of a thermistor

Name: _____

A Level Physics
Topic 10 DC Circuits

- Circuit symbols
- Circuit diagrams
- Electromotive force
- Difference between emf and potential difference
- Internal resistance
- Kirchoff's junction rule
- Kirchoff's loop rule
- Resistors in parallel
- Resistors in series
- Potential divider
- Potentiometer
- Galvanometer in null methods
- Use of thermistors and light dependent resistors in potential dividers

Name: _____

A Level Physics
Topic 11 Particle Physics

- Conclusion of the gold leaf and alpha particle scattering experiment
- Model of the atom (dense nucleus with neutrons and protons with orbiting electrons)
- Proton number is the atomic number
- Nucleon number is the atomic mass
- Isotope
- Nuclide
- Conservation of nucleon number and charge in nuclear processes
- Alpha decay
- Beta minus decay
- Beta plus decay
- Gamma decay
- Antiparticles
- Antineutrinos
- Neutrinos
- Discrete energies of alpha particles in alpha decay
- Continuous energies of beta particles in beta decay
- Atomic mass unit
- Quarks: up, down, strange, charm, top, bottom
- Antiquarks have opposite charge of quarks
- Quark composition of the neutron and proton
- Hadron: baryon or meson
- Leptons

Name: _____

A Level Physics
Topic 12 Motion in a Circle

- Angular displacement in degrees and radians
- Angular speed in radians per second
- Direction of centripetal force
- Direction of centripetal acceleration

Name: _____

A Level Physics
Topic 13 Gravitational Fields

- Gravitational field strength has units of Newtons per kilogram (or meters per second squared)
- Gravitational field lines
- Approximate a sphere with mass as a point mass
- Newton's law of gravitation
- Circular orbits
- Gravitational potential

Name: _____

A Level Physics
Topic 14 Temperature

- Thermal equilibrium
- Transfer of thermal energy from regions of higher temperature to lower temperature
- Conversion between degree Celsius and Kelvin
- Absolute zero
- Specific heat capacity
- Specific latent heat of fusion
- Specific latent heat of vaporization

Name: _____

A Level Physics
Topic 15 Ideal Gases

- Mole
- Avogadro constant N_A
- Boltzmann constant
- Use of the equation $PV = nRT$
- Assumptions of kinetic theory of gases
- Root mean square speed
- Average translational kinetic energy of a molecule

Name: _____

A Level Physics
Topic 16 Thermodynamics

- Energy
- Internal energy
- First law of thermodynamics

Name: _____

A Level Physics
Topic 17 Oscillations

- Simple harmonic oscillations
- Displacement
- Amplitude
- Period
- Frequency
- Angular frequency
- Phase difference
- Analyze graphs of
  - *displacement vs. time*
  - *velocity vs. time*
  - *acceleration vs. time*
  - *velocity vs. displacement*
  - *acceleration vs. displacement*
  - *kinetic energy vs. displacement*
  - *potential energy vs. displacement*
  - *total energy vs. displacement*
- Damping
  - Light
  - Critical
  - Heavy
- Resonance
- Natural frequency

Name: _____

A Level Physics
Topic 18 Electric Fields

- Electric field is a field of force
- Electric field lines
- electric field lines between charged parallel plates
- Effect of electric field on charged particles
- Coulomb's law
- Electric field strength
- $E = -dV/dx$
- Electric potential
- electric potential energy

Name: _____

A Level Physics
Topic 19 Capacitance

- Capacitance
- Simplifying capacitors in parallel
- Simplifying capacitors in series
- Area under a *potential vs. charge* graph tells us the electric potential energy stored in a capacitor
- Graphs of discharging a capacitor
  - *Potential difference vs. time*
  - *Charge vs. time*
  - *Current vs. time*
- Time constant

Name: _____

A Level Physics
Topic 20 Magnetic Fields

- Magnetic fields are created by
  - Moving charge or
  - Permanent magnets.
- Magnetic field lines
- Magnetic force on a current carrying wire from an external magnetic field
- Fleming's left hand rule
- Magnetic flux density
- Force on a charged object moving in a magnetic field
- Hall voltage
- Hall probe
- Sketch magnetic field lines
- Effects of a ferrous core in a solenoid
- Magnetic flux
- Magnetic flux density
- Magnetic flux linkage
- Faraday's law
- Lenz's law

Name: _____

A Level Physics
Topic 21 Alternating Currents

- Period applied to alternating current and voltage
- Frequency applied to alternating current and voltage
- Peak value applied to alternating current and voltage
- Sinusoidally alternating current
- Sinusoidally alternating voltage
- Mean power
- Root mean square value for current and voltage
- Peak value for current and voltage
- Half wave rectification
- Full wave rectification
- Diode
- Bridge rectifier
- Use of a capacitor and bridge rectifier

Name: _____

A Level Physics
Topic 22 Quantum Physics

- Electromagnetic radiation behaves as both particles and waves (wave-particle duality)
- Photon
- Electron-volt
- Photoelectric effect
- Threshold frequency
- Threshold wavelength
- Photoelectric emission
- Work function
- Electron diffraction
- De Broglie wavelength
- Discrete energy levels for electrons orbiting in an atom
- Photon absorption spectra
- Photon emission spectra

Name: _____

A Level Physics
Topic 23 Nuclear Physics

- Relationship between energy and mass
- Mass defect
- Binding energy
- Graph of *binding energy per nucleon vs. nucleon number*
- Nuclear fission
- Nuclear fusion
- Calculate energy released in nuclear reactions
- Count rate
- Radioactive decay
- Activity
- Decay constant
- Half-life

Name: _____

A Level Physics
Topic 24 Medical Physics

- Piezo-electric crystal
- Piezoelectric transducer
- Reflection of pulses of ultrasound
- Specific acoustic impedance of a medium
- Intensity reflection coefficient of a boundary
- Attenuation of ultrasound in matter
- Use of x-rays in imaging
- Contrast in x-ray imaging
- Attenuation of x-rays in matter
- Computed tomography scanning
- Tracer
- Positron emission tomography
- Particle-antiparticle annihilation

Name: _____

A Level Physics
Topic 25 Astronomy and Cosmology

- Luminosity
- Radiant flux intensity
- Standard candle
- Determine distance to galaxies from standard candles
- Wien's displacement law
- Stefan-Boltzmann law
- Redshift
- Expanding universe
- Hubble's law
- Big bang theory