OCR GCSE 9-1 Gateway Physics Equations
You need to learn these formulae:

P1 Matter
density (kg/m^3) = mass (kg)/volume (m^3) **$\rho = m/V$**

P2 Forces
distance travelled (m) = speed (m/s) × time(s) **s = v/t**
acceleration (m/s^2) = change in velocity (m/s)/time(s) **a = (v-u)/t**
kinetic energy (J) = 0.5 × mass (kg) × (speed (m/s))^2 **KE = ½ mv^2**
force (N) = mass (kg) × acceleration (m/s^2) **F = ma**
work done (J) = force (N) × distance (m) (along the line of action of the force) **WD = F x D**
power (W) = work done (J)/time(s) **P = WD / t**
momentum (kgm/s) = mass (kg) × velocity (m/s) **p = mv**
Pressure (Pa) = Force (N) / Area (m^2) (Separate Science only)
weight = gravity force (N) = mass (kg) × gravitational field strength, g (N/kg) **F = W = mg**
(in a gravity field) potential energy (J) = mass (kg) × height (m) × gravitational field strength, g (N/kg) **GPE = mgh**
Moment of a force (Nm) = force (N) x distance (m) (normal to the direction of the force) (Separate Science only)

P3 Electricity
charge flow (C) = current (A) × time (s) **Q = It**
potential difference (V) = current (A) × resistance (Ω) **V = IR**
energy transferred (J) = charge (C) × potential difference (V) **E = QV**
power (W) = potential difference (V) × current (A) = (current (A))^2 × resistance (Ω) **P = IV = I^2R**
energy transferred (J, kWh) = power (W, kW) × time (s, h) **E = Pt**

P5 Waves
wave speed (m/s) = frequency (Hz) × wavelength (m) **$v = f\lambda$**

P7 Energy
efficiency = useful output energy transfer (J)/input energy transfer (J)

P8 Global Challenges
Stopping distance (m) = thinking distance (m) + braking distance (m)

You will be given these formulae in the exam:

P1 Matter
change in thermal energy (J) = mass (kg) × specific heat capacity (J/kg°C) × change in temperature (°C) **$E = mC\Delta T$**
thermal energy for a change in state (J) = mass (kg) × specific latent heat (J/kg) **E = mL**
for gases: pressure (Pa) x volume (m^3) = constant (for a given mass of gas and at a constant temperature) (Separate Science only)
pressure due to a column of liquid (Pa) = height of column (m) x density of liquid (kg/m^3) x g (N/kg) (Triple only) (Separate Science only)

P2 Forces
(final velocity (m/s))^2 – (initial velocity (m/s))^2 = 2 × acceleration (m/s^2) × distance (m) **$v^2 - u^2 = 2as$**
energy transferred in stretching (J) = 0.5 × spring constant (N/m) × (extension (m))^2 **E = ½ ke^2**

P4 Magnetism
force on a conductor (at right angles to a magnetic field) carrying a current (N) = magnetic field strength (T) × current (A) × length (m) (Higher only) F = BIl

Potential difference across primary coil (V) / potential difference across secondary coil (V) = Number of turns in primary coil / number of turns in secondary coil (Higher only) (Separate Science only)

$$\frac{V_p}{V_s} = \frac{N_p}{N_s}$$