Formulae for relationships between physical quantities

The relationships listed below should not be provided for AS and A level candidates.

(i) the relationship between speed, distance and time: $v = \frac{s}{t}$

(ii) the relationship between force, mass and acceleration:

force = mass x acceleration
$F = m\,a$

(iii) the relationship between density, mass and volume: $D = \frac{m}{V}$

(iv) the concept of momentum and its conservation:

momentum = mass x velocity
$p = m\,v$

(v) the relationships between force, distance, work, power and time:
work done = force x distance moved in direction of force

(vi) the relationships between mass, weight, potential energy and kinetic energy:
weight = mass x gravitational field strength
kinetic energy = $\frac{1}{2}\,m\,v^2$
change in potential energy = mass × gravitational field strength × change in height

(vii) the relationship between an applied force, the area over which it acts and the resulting pressure:
$P = \frac{F}{A}$

(viii) the Gas Law:
pressure × volume = number of moles × molar gas constant × absolute temperature
$p\,V = n\,R\,T$

(ix) the relationships between charge, current, potential difference, resistance and electrical power:
charge = current × time
$\Delta Q = I\,\Delta t$
potential difference = current × resistance
$V = I\,R$
electrical power = potential difference × current
$P = V\,I$

(x) the relationship between potential difference, energy and charge:

$$V = \frac{E}{Q}$$

(xi) the relationship between resistance and resistivity:

$$R = \frac{\rho l}{A}$$

(xii) the relationship between charge flow and energy transfer in a circuit:
energy = potential difference × current × time
$E = V I t$

(xiii) the relationship between speed, frequency and wavelength:
wave speed = frequency x wavelength
$v = f \lambda$

(xiv) the relationship between centripetal force, mass, speed and radius:

$$F = \frac{mv^2}{r}$$

(xv) the inverse square laws for force in radial electric and gravitational fields:

$$F = \frac{kQ_1Q_2}{r^2}$$

$$F = \frac{Gm_1m_2}{r^2}$$

(xvi) the relationship between capacitance, charge and potential difference:

$$C = \frac{Q}{V}$$

(xvii) the relationship between the potential difference across the coils in a transformer and the number of turns in them:

$$\frac{\text{pd across primary coil}}{\text{pd across secondary coil}} = \frac{\text{number of turns on primary coil}}{\text{number of turns on secondary coil}}$$