

GCSE & A-Level Physics

Essential Formulas, Diagrams & Exam Tips | StudyVolt

■ Forces & Motion

Quantity	Formula	Units
Resultant force	$F = ma$	N
Weight	$W = mg$	N
Momentum	$p = mv$	kg m/s
Impulse	$F \times t = mv - mu$	N s
Kinetic energy	$KE = (1/2) m v^2$	J
Gravitational PE	$GPE = m \times g \times h$	J
Power	$P = W/t = F \times v$	W

Forces on a Moving Car — Resultant Force



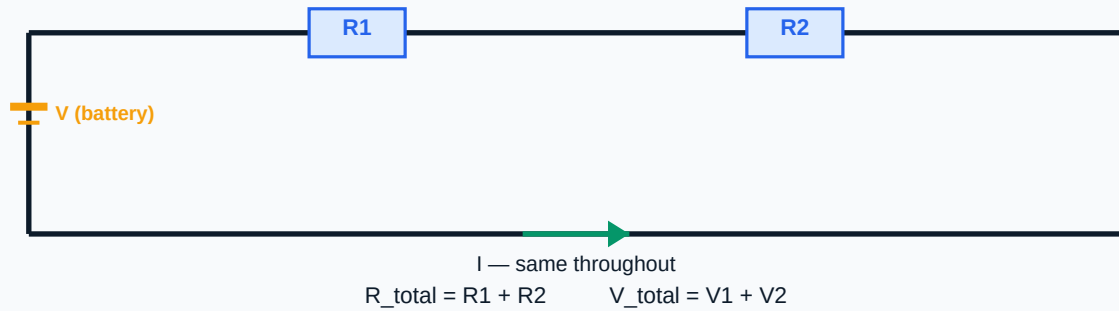
$$\text{Resultant } F = F_e - F_f \quad a = F_{\text{resultant}} \div m \quad (F=ma \text{ uses RESULTANT force})$$

Exam tip: $F=ma$ ALWAYS uses the RESULTANT (net) force. Draw a force diagram first, find net force, then substitute.

■ Electricity

Quantity	Formula	Units
Ohm's Law	$V = I \times R$	V, A, Ω
Power	$P = IV = I^2 R = V^2/R$	W
Energy	$E = P \times t = Q \times V$	J
Charge	$Q = I \times t$	C
Series resistance	$R_{\text{total}} = R_1 + R_2$	Ω
Parallel resistance	$1/R_{\text{T}} = 1/R_1 + 1/R_2$	Ω

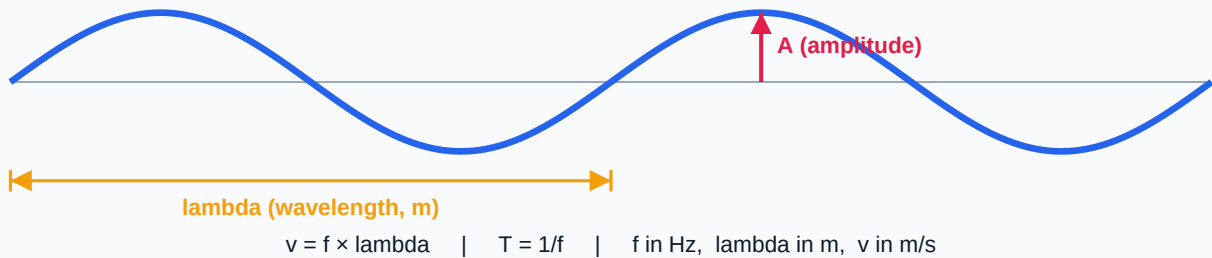
Series Circuit



Exam tip: Series: same current throughout, voltages add. Parallel: same voltage across each branch, currents add.

Waves

Wave Properties



Quantity	Formula	Units
Wave speed	$v = f \times \text{lambda}$	m/s
Period	$T = 1/f$	s
Refractive index	$n = c/v = \sin(i)/\sin(r)$	(none)

Nuclear & Atomic (A-Level)

Quantity	Formula	Units
Photon energy	$E = h \times f = hc/\text{lambda}$	J
de Broglie	$\text{lambda} = h / (m \times v)$	m
Activity	$A = \text{lambda} \times N$	Bq
Half-life	$T(1/2) = \ln 2 / \text{lambda}$	s
Mass-energy	$E = m \times c^2$	J

Exam tip: A-Level 6-mark questions: State → Explain → Conclude. Use exact specification keywords throughout.