

APPROACH 1: Domain-Specific Coloring

Strategy

Each physics domain redefines color assignments.

Guarantee: No equation has repeating colors.

Trade-off:

- + Every equation is visually distinct
- + Maximum clarity per equation
- Same letter may have different colors across domains
- No global "velocity is always cyan" consistency

CH1-3: Kinematics

Color Key

d = displacement v = velocity a = acceleration t = time g = constant

Definitions:

$$v = \frac{\Delta d}{\Delta t} \quad a = \frac{\Delta v}{\Delta t}$$

Kinematic Equations:

$$v = v_0 + at$$

$$d = d_0 + v_0 t + \frac{1}{2} at^2$$

$$v^2 = v_0^2 + 2a(d - d_0)$$

CH4-6: Dynamics & Circular Motion

Color Key

F = force m = mass a = acceleration μ = friction coeff

Newton's Laws:

$$F_{\text{net}} = ma \quad W = mg \quad F_f = \mu N$$

Circular Motion:

$$a_c = \frac{v^2}{r} = r\omega^2 \quad F_c = m \frac{v^2}{r}$$

CH8: Momentum

Color Key

p = momentum m = mass v = velocity F = force t = time

Definitions:

$$p = mv$$

Impulse-Momentum:

$$\Delta p = F_{\text{net}} \Delta t$$

Conservation:

$$m_1 v_1 + m_2 v_2 = m_1 v'_1 + m_2 v'_2$$

CH9: Work, Energy, Power

Color Key

W = work KE = kinetic PE = potential P = power

Definitions:

$$W = Fd \quad KE = \frac{1}{2}mv^2 \quad P = \frac{W}{t}$$

Conservation:

$$KE_1 + PE_1 = KE_2 + PE_2$$

CH11: Thermal Physics

Color Key

Q = heat m = mass c = specific heat T = temperature

Heat Transfer:

$$Q = mc\Delta T$$

Phase Change:

$$Q = mL_f \quad Q = mL_v$$

Density:

$$\rho = \frac{m}{V}$$

CH12: Thermodynamics

Color Key

U = internal energy Q = heat W = work P = pressure

First Law:

$$\Delta U = Q - W \quad W = P\Delta V$$

Ideal Gas:

$$PV = NkT$$

Entropy & Efficiency:

$$\Delta S = \frac{Q}{T} \quad \text{Eff} = \frac{W}{Q_h}$$

CH13-14: Waves & Sound

Color Key

v = wave speed f = frequency λ = wavelength T = period

Wave Equation:

$$v = f\lambda \quad T = \frac{1}{f}$$

Intensity:

$$I = \frac{P}{A} \quad \beta = 10 \log_{10} \left(\frac{I}{I_0} \right)$$

Standing Waves:

$$f_n = n \frac{v}{2L} \text{ (open)} \quad f_n = n \frac{v}{4L} \text{ (closed)}$$

CH18: Electric Fields & Potential

Color Key

F = force q = charge E = electric field V = potential

Coulomb's Law:

$$F = k \frac{q_1 q_2}{r^2} \quad E = \frac{k|Q|}{r^2}$$

Potential:

$$V = \frac{kQ}{r} \quad U_E = \frac{kQq}{r}$$

Capacitance:

$$C = \frac{Q}{V} \quad U_E = \frac{1}{2} CV^2$$

CH19: Circuits

Color Key

I = current V = voltage R = resistance P = power

Definitions:

$$I = \frac{\Delta Q}{\Delta t} \quad V = IR$$

Power:

$$P = IV = I^2 R = \frac{V^2}{R}$$

Combinations:

$$R_{\text{series}} = R_1 + R_2 + \dots \quad \frac{1}{R_{\text{parallel}}} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$$

Approach 1 Summary

Result: Zero Color Collisions

Every equation has unique colors for each variable.

Domain Color Assignments:

- Each chapter defines its own color key
- Same letter can have different colors across domains
- Example: V = voltage (CH19) vs V = volume (CH12)

Best for:

- Formula sheets organized by chapter
- Students studying one topic at a time
- Maximum visual distinction per equation