

Mechanics Formulas:

TNEOM: $V_f = V_i + a\Delta t$
 $\Delta x = V_i\Delta t + \frac{1}{2}a\Delta t^2$
 $V_f^2 = V_i^2 + 2a\Delta x$

Weight: $F_{\text{gravity}} = mg$

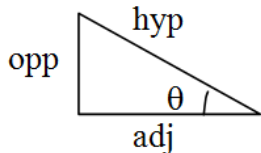
Gravitation: $F_g = \frac{G m_1 m_2}{r^2}$

Gravitation constant: $G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$
(just G's units) ↑

Force: $F = ma$

Friction: $f = \mu N$

Trig formulas: $\tan\theta = \text{opp} / \text{adj}$
 $\sin\theta = \text{opp} / \text{hyp}$
 $\cos\theta = \text{adj} / \text{hyp}$



Pythagorean Theorem: $a^2 + b^2 = c^2$

Kinetic energy: $KE = \frac{1}{2} m v^2$

Potential energy: $PE = mgh$

Work energy: $W = Fd \cos\theta$

spring energy: $E_{\text{sp}} = \frac{1}{2} kx^2$

efficiency = $W_{\text{out}} / W_{\text{in}} \times 100\%$

power: $P = \frac{W}{\Delta t} = F v$

momentum: $p = mv$

impulse: $I = F\Delta t = m\Delta v$

circular motion:

centripetal velocity: $v = \frac{2\pi r}{t}$

centripetal acceleration: $a_c = \frac{v^2}{r}$

E&M Formulas:

Coulomb's Law: $F = \frac{k Q_{\text{source}} Q_{\text{test}}}{r^2}$

Coulomb's constant: $k = 9.00 \times 10^9 \text{ Nm}^2/\text{C}^2$
(just k's units) ↑

Electron charge: $e = -1.60 \times 10^{-19} \text{ C}$

Electron mass: $9.11 \times 10^{-31} \text{ kg}$

Proton mass: $1.67 \times 10^{-27} \text{ kg}$

Electric Field: $E = \frac{F}{Q_{\text{test}}}$

(E for point source) $E = \frac{k Q_{\text{source}}}{r^2}$

Potential: $V = \frac{PE}{Q_{\text{test}}}$

(V for point source) $V = \frac{k Q_{\text{source}}}{r}$

(V for parallel plates) $V = E d$

Potential Energy (for Point sources): $PE = \frac{k Q_{\text{source}} Q_{\text{test}}}{r}$

Ohm's Law: $V = I R$

Power: $P = I V$

Series: $R_{\text{tot}} = R_1 + R_2 + \dots$

Parallel: $1/R_{\text{tot}} = 1/R_1 + 1/R_2 + \dots$

Magnetic force:

(for moving charge) $F = qv \times B$

(for current in wire) $F = IL \times B$

Induced voltage/emf $\varepsilon = -\frac{N(\Delta AB)}{\Delta t}$

Unit 09 – Vocabulary and Equations – Current Electricity & Circuits

Vocabulary:

previous vocabulary
 electric current, ampere, amp (A), Coulomb (C)
 electrical potential, voltage (V), electromotive force (emf)
 potential difference
 resistor, resistance (Ω), equivalent resistance, load
 power (W)
 Ohm's law, ohmic
 conventional current, drift velocity, drift speed
 cross sectional area
 circuit breaker, fuse, potentiometer
 direct current (DC), alternating current (AC)
 kilowatt-hour
 electric circuit, series circuit, parallel circuit
 resistors in series, resistors in parallel
 closed circuit, open circuit, short-circuit
 switch
 multimeter, COM port, conductivity tester
 wire, conductor, insulator
 circuit diagram, schematic, schematic symbols
 battery, positive terminal, negative terminal

Symbols:

V, ΔV , i, ΔQ , Δt , R, A, Ω , W, P

Equations & constants:

$$i = \Delta Q / \Delta t \quad \Delta V = i R$$

Equivalent resistance:

Series $R_e = R_1 + R_2$

Parallel $1/R_e = 1/R_1 + 1/R_2$

$$P = E/t \quad P = iV \quad P = V^2/R$$

Cost = rate x energy

Resistor codes (use these, don't memorize them)

Number	Color	Number	Color
0	Black	5	Green
1	Brown	6	Blue
2	Red	7	Violet
3	Orange	8	Gray
4	Yellow	9	White

NOT provided on test: 1st digit/2nd digit/# of zeros

Unit Objectives - Williams

1. Basic electricity properties: V,I,R and Ohm's laws
2. Power
3. Schematics
4. Series and Parallel circuits

DuPage ROE Objectives

601. I can apply Ohm's Law.
602. I can recognize and analyze series and parallel circuits.
603. I can identify how to measure voltage and current with an appropriate meter.
604. I can calculate the power used by an electronic device.