Note: Summaries are most helpful post-content review.

Gold Standard MCAT Physics Equations - Memorize

Translational motion	$x = x_o + v_o t + 1/2at^2$ | $(V_f)^2 = (V_o)^2 + 2ax$	$V_f = V_o + at$
Frictional force	$f_{max} = \mu N$	$\mu_k < \mu_s$ always
Uniform circular motion*	$F_c = ma_c = mv^2 /r$	$a_c = v^2 /r$
Momentum, Impulse*	$I = F \Delta t = \Delta M$	$M = mv$
Work, Power	$W = F d \cos\theta$	$P = \Delta W/\Delta t$
Energy (conservation)	$E_T = E_k + E_p$	$E = mc^2$
Spring Force, Work	$F = -kx$	$W = kx^2 /2$
Continuity (fluids)	$A v = \text{const.}$	$\rho Av = \text{const.}$
Current and Resistance	$I = Q/t$	$R = \rho l/A$
Resistors (series, par.)	$R_{eq} = R_1 + R_2 \ldots$ | $1/ R_{eq} = 1/ R_1 + 1/ R_2$	$R = 1 /$ conductance
Capacitors in Ser. and Par.	$1/ C_{eq} = 1/ C_1 + 1/ C_2 + 1/ C_3 \ldots$	$C_{eq} = C_1 + C_2 \ldots$
Sound	$dB = 10 \log_{10} (I/I_0)$	beats = Δf
Kirchoff's Laws	$\Sigma i = 0$ at a junction	$\Sigma \Delta V = 0$ in a loop
Thermodynamics	$Q = mc \Delta T$ (*resembles* MCAT !)	$Q = mL$
Torque forces	$L_1 = F_1 \times r_1$ (CCW + ve)	$L_2 = F_2 \times r_2$ (CW - ve)
Torque force at EQ	$\Sigma F_x = 0$ and $\Sigma F_y = 0$	$\Sigma L = 0$
Refraction	$(\sin \theta_1)/(\sin \theta_2) = v_1 /v_2 = n_2 /n_1 = \lambda_1 /\lambda_2$	$n = c/v$

*Not technically in the new MCAT Physics syllabus but since these are simple concepts that have been the source of traditional MCAT questions, we do not believe that they should be discarded from your preparation.

Gold Standard MCAT Physics Equations - Memorize As Pairs

$F = ma$	$F = qE$	Similar Form
$F = K_G (m_1 m_2 / r^2)$	$F = k (q_1 q_2 / r^2)$	
$V = IR$	$P = IV$	Paired Use
$v_{av} = \Delta d / \Delta t$	$a_{av} = \Delta v / \Delta t$	(avg vel, acc)
$v = \lambda f$	$E = hf$	$(f = 1/T)$
$E_k = 1/2 mv^2$	$E_p = mgh$	(kin, pot E)
$P = F/A$	$\Delta P = \rho g \Delta h$	(pressure P)
SG = ρ substance / ρ water	$\rho = 1 \text{ g/cm}^3 = 10^3 \text{ kg/m}^3$	(Spec Grav)
ρ = mass / volume	$F_b = V\rho g = mg$	(buoyant F)
$1/ i + 1/ o = 1/ f = 2/r$ = Power	M = magnification = $- i/o$	Optics
$\Delta G = \Delta H - T\Delta S$	Gibbs Free Energy	$\Delta G° = -RT\ln K_{eq}$

Gold Standard MCAT Physics Equations - Know How to Use - Do Not Memorize

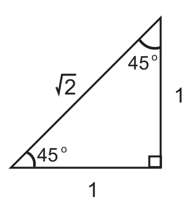
$P + \rho gh + 1/2 \rho v_2$ = constant	Bernouilli's Equation	Fluids in Motion
$f_0 = f_s (V \pm V_0)/(V \pm V_s)$	Doppler Effect: when d is decreasing use $+ V_0$ and $- V_s$	
$V = Ed$ for a parallel plate capacitor	d = the distance between the plates	
$dF = dq\, v(B \sin \alpha) = I\, dl(B \sin \alpha)$	Laplace's Law	RH rule
Potential Energy (PE) = $W = 1/2 QV$	Work in Electricity	$W = 1/2 CV^2$

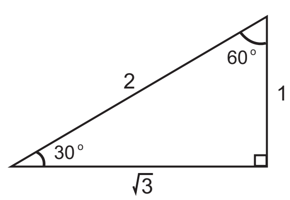
Gold Standard MCAT Physics Equations - Atomic Nucleus & Electronic Structure

1. Alpha (α) particle = ${}_2He^4$ (helium nucleus);
2. Beta (β) particle = ${}_{-1}e^0$ (an electron);
3. A positron = ${}_{+1}e^0$ (same mass as an electron but opposite charge);
4. Gamma (γ) ray = no mass, no charge, just electromagnetic energy;
5. $\Delta m / \Delta t$ = rate of decay where Δm = change in mass, Δt = change in time.
6. If the number of half-lifes n are known we can calculate the percentage of a pure radioactive sample left after undergoing decay since the fraction remaining = $(1/2)^n$.
7. $N_{electrons} = 2n^2$, where $N_{electrons}$ designates the number of electrons in shell n.
8. The state of each electron is determined by the four quantum numbers:

○ Principal quantum number = n ▪ Determines the number of shells ▪ Possible values are: 1 (K), 2 (L), 3 (M), etc...	○ Magnetic momentum quantum number = m_l ▪ Determines the orbital ▪ Possible values are: $\pm l$, ... , 0
○ Angular momentum quantum number = l ▪ Determines the subshell ▪ Possible values are: 0 (s), 1 (p), 2 (d), 3 (f), n-1, etc...	○ Spin quantum number = m_s ▪ Determines the direction of rotation of the electron ▪ Possible values are: $\pm 1/2$

Gold Standard MCAT Physics Equations - Trigonometry - The Basics





$\sin\theta = \text{opp/hyp}$ $\quad\theta = \sin^{-1} x$

$\cos\theta = \text{adj/hyp}$ $\quad\text{arcsec}\,\theta = \sec^{-1}\theta$

$\tan\theta = \text{opp/adj}$ $\quad r^2 = x^2 + y^2$

- Angle θ may be given in radians (R) where 1 revolution = $2\pi^R = 360°$
- Estimate square root 3 as 1.7 and root 2 as 1.4
- Cross-sectional area of a tube = area of a circle = πr^2 where π can be estimated as 3.14 and r is the radius of the circle; circumference = $2\pi r$

Gold Standard MCAT Physics Equations - Units to Memorize

- Both work and energy are measured in joules where 1 *joule (J)* = 1 $N \times 1\, m$. {Imperial units: the *foot-pound* , CGS units: the *dyne-centimeter* or *erg* }
- The SI unit for power is the *watt* (W) which equals one *joule per second* (J/s) = *volts* × *amperes*.
- Current is measured in *amperes* = *coulombs/sec*. The units of resistance are ohms, symbolized by Ω (omega), where 1 ohm = 1 volt/ampere.
- The SI unit for pressure is the pascal (1 Pa = 1 N/m^2). Other units are: 1.00 atm = 1.01×10^5 Pa = 1.01 bar = 760 mmHg = 760 torr.
- The SI unit for the magnetic induction vector *B* is the tesla where 1 T = 1 N/(A)(m) = 10^4 gauss.

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