

PHYS 172: Planetary & Stellar Astronomy
 Midterm test #1: Friday, February 21, 2025

Formula Sheet

$\varepsilon = \frac{d}{2a}$	$v_{escape} = \sqrt{\frac{2GM_E}{R_E}}$	$G = 6.6743 \times 10^{-11} \text{ m}^3/\text{kg}\cdot\text{s}^2$
$T^2 = a^3$		$1 \text{ eV} = 1.602 \times 10^{-19} \text{ J}$
$\frac{v_p}{v_a} = \frac{1 + \varepsilon}{1 - \varepsilon}$	$f = \frac{1}{T}$	$\sigma = 5.67 \times 10^{-8} \text{ W}/(\text{m}^2 \cdot \text{K}^4)$
$x = vt$	$\lambda f = c$	$h = 6.626 \times 10^{-34} \text{ J}\cdot\text{s}$
$v = at$	$\lambda_{max} = \frac{2.9 \times 10^6}{T}$	$\varepsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/(\text{N}\cdot\text{m}^2)$
$x = \frac{1}{2}at^2$	$L = \sigma T^4$	$c = 3.0 \times 10^8 \text{ m/s}$
$F_{A \rightarrow B} = -F_{B \rightarrow A}$	$I = \frac{1}{2}c\varepsilon_0 E^2$	$m_p = 1.67265 \times 10^{-27} \text{ kg}$
$E_k = \frac{1}{2}mv^2$	$B = E/c$	$m_n = 1.67495 \times 10^{-27} \text{ kg}$
$F_G = G \frac{M_A M_B}{r^2}$	$P = \frac{I}{c}$	$m_e = 9.11 \times 10^{-31} \text{ kg}$
$a_c = \frac{v^2}{r}$	$I(r, \theta) = \frac{\pi^2 p_0^2}{2\varepsilon_0 c^3} \cdot f^4 \cdot \frac{\sin^2 \theta}{r^2}$	$1 \text{ AU} = 149.6 \times 10^6 \text{ km}$
$F_c = \frac{mv^2}{r}$	$p_\gamma = \frac{h}{\lambda} = \frac{E_\gamma}{c}$	$M_{Earth} = 5.97 \times 10^{24} \text{ kg}$
$T^2 = \frac{4\pi^2}{G(M_1 + M_2)} a^3$	$M_\gamma = 0$	$R_{Earth} = 6371 \text{ km}$
$M_1 r_1 = M_2 r_2$	$f' = f + \Delta f$	$M_{Sun} = 1.99 \times 10^{30} \text{ kg}$
$r_2 = a \frac{M_1}{M_1 + M_2}$	$\frac{\Delta f}{f} = -\frac{\Delta \lambda}{\lambda} = \frac{v_{ }}{c}$	$R_{Sun} = 6.96 \times 10^5 \text{ km}$
$p = mv$	$v_{ } = v \cos \theta$	$M_{Moon} = 7.34 \times 10^{22} \text{ kg}$
$L = p \times r$		$R_{Moon} = 1737 \text{ km}$
$L = mvr$		
$E_{potential} = -G \frac{M_1 M_2}{r}$		
$E_{total} = E_{potential}$		
$+ E_{kinetic}$		