Name: _____

The Physics Q1-Q4 Equation Sheet

DO NOT LOSE THIS!
DO NOT WRITE ON THIS!

Misc. Information

1 kg = 2.2 lbs.
1 inch = 2.54 cm
1 mile = 1.609 km = 1609 m
1 horsepower = 746 Watts

acceleration due to gravity on earth's surface: -9.8 m/s^2

mass of the earth : 5.98×10^{24} kg
radius of the earth: 6.37×10^{6} m
mass of the moon: 7.35×10^{22} kg
radius of the moon: 1.738×10^{6} m
mass of the sun = 2.0×10^{30} kg
radius of the sun = 6.955×10^{8} m

Unit I) Introductory Unit *(Chapter 1)*

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $a^2 + b^2 = c^2$ $\sin\Theta = \frac{\text{opposite}}{\text{hypotenuse}}$ $\cos\Theta = \frac{\text{adjacent}}{\text{hypotenuse}}$ $\tan\Theta = \frac{\text{opposite}}{\text{adjacent}}$

Unit II) Motion in One Dimension *(Chapter 2)*

$*v = \Delta x/\Delta t$ $a = \frac{v_f - v_i}{\Delta t}$ $\Delta y = v_i\Delta t + \frac{1}{2} a\Delta t^2$ *(or Δx)* $v_f^2 = v_i^2 + 2a\Delta x$ *(or Δy)*

Unit III) Vectors *(Chapter 3, 1st half)*

$a^2 + b^2 = c^2$ $c^2 = a^2 + b^2 - 2ab\cos C$ $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

Unit IV) Projectile Motion *(Chapter 3, 2nd half)*

$v_x = \Delta x/\Delta t$ $a_y = \frac{v_{fy} - v_{iy}}{\Delta t}$ $\Delta y = v_{iY}\Delta t + 1/2 a_Y \Delta t^2$ $v^2 = v_x^2 + v_{iy}^2$

Unit V) Newton's Laws and Forces *(Chapter 4)*

$F = ma$ $F = m(-9.8\ m/s^2 + a)$ # of g's = $\left|\frac{\text{total force}}{m \times g}\right|$ or $\left|\frac{\text{total force}}{w}\right|$

acceleration due to gravity on the moon = -1.63 m/s^2

Unit VI) Work and Energy *(Chapter 5)*

$W = F\,d$ $P = \frac{W}{\Delta t}$ $P = \frac{Fd}{\Delta t}$ $PE = mgh$ $KE = \frac{1}{2} mv^2$

1 hp = 746 watts

$PE_i + KE_i = PE_f + KE_f$
$mgh_i + \frac{1}{2} mv_i^2 = mgh_f + \frac{1}{2} mv_f^2$

Unit VII) Momentum and Collisions *(Chapter 6)*

$p = mv$ $I = F\Delta t$ $F\Delta t = m\Delta v$

explosions: $m_1 v_1 = m_2 v_2$
elastic collisions: $m_1 v_{1i} + m_2 v_{2i} = m_1 v_{1f} + m_2 v_{2f}$
inelastic collisions: $m_1 v_{1i} + m_2 v_{2i} = (m_1 + m_2) v_f$

Unit VIII) **Periodic Motion and Gravity** ***(part of Chapter 7, pendulums in Chapter 12))***

$v = 2\pi r/T$ $a_c = v^2/r$ $F_c = ma_c$ $F_c = \frac{mv^2}{r}$

$F_g = mg$ $F_g = \frac{Gm_1 m_2}{r^2}$, $G = 6.67 \times 10^{-11} \frac{Nm^2}{kg^2}$ $T^2 = \frac{4\pi^2 L}{g}$

$g = \frac{Gm}{r^2}$ $g = \frac{v^2}{r}$

Unit IX) **Waves and Sound** ***(Chapter 12 and Chapter 13)***

$v = \frac{\Delta x}{\Delta t}$ $v = f\lambda$ $v = 330\ m/s + 0.6 \cdot (^0C)$ $f' = f \frac{(v)}{(v \pm v_s)}$ $T = \frac{1}{f}$

$^oC = \frac{^oF - 32^oF}{1.8}$ $f_n = n \frac{v}{2L}$, $n = 1,2,3, \ldots$ $f_n = n \frac{v}{4L}$, $n = 1,3,5, \ldots$

$1\ kHz = 10^3\ Hz$ $1\ MHz = 10^6\ Hz$ $1\ nm = 10^{-9}\ m$

C = speed of light = 3.0×10^8 m/s

Unit X) **Mirrors and Lenses** ***(Chapter 14 and Chapter 15)***

$C = 2f$ $\frac{1}{f} = \frac{1}{p} + \frac{1}{q}$ $m = \frac{h_i}{h_o}$ $m = \frac{-q}{p}$ $\frac{h_i}{h_o} = -\frac{q}{p}$

$c = f\lambda$

$1\ nm = 10^{-9}\ m$ **C = speed of light = 3.0×10^8 m/s**

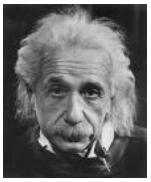
Unit XI) **Current Electricity** ***(Chapter 19 and Chapter 20)***

current cost of electricity this year = $ .101 per kWh **1 kW = 1000 W**
voltage across outlets in your home = 120 V

$\Delta V = I R$ $P = \frac{W}{\Delta t}$ $P = I \Delta V$

$R_{eq} = R_1 + R_2 + R_3 + \ldots$ $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \ldots$

Unit XII) **Special Relativity** ***(not in your book)***



$t = \frac{t_0}{\sqrt{1 - \frac{v^2}{c^2}}}$ $L = L_0\sqrt{1 - \frac{v^2}{c^2}}$ $m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}}$ $E = mc^2$

And finally, some applications of Units I-XII

Band color	Digit	Multiplier	Tolerane
Black	0	1	
Brown	1	10	
Red	2	100	
Orange	3	1,000	
Yellow	4	10,000	
Green	5	100,000	
Blue	6	1,000,000	
Violet	7	10,000,000	
Gray	8	100,000,000	
White	9	1000,000,000	
Gold		0.1	±5%
Silver		0.001	± 10%

Resistor Decoding