Physics 12

Resource Material

2002

NOVA SCOTIA
Department of Education
Testing and Evaluation

Nova Scotia Examinations Physics 12
Formula Sheet

KINEMATICS

$$\vec{v}_{ave} = \frac{\Delta\vec{d}}{t} \qquad \Delta\vec{d} = \left(\frac{\vec{v}_f + \vec{v}_i}{2}\right)t$$

$$a = \frac{\vec{v}_f - \vec{v}_i}{t} \qquad \Delta\vec{d} = \vec{v}_i t + \frac{1}{2}\vec{a}t^2$$

$$v_f^{\,2} = v_i^{\,2} + 2ad$$

$$v_c = \frac{2\pi r}{T} \qquad a_c = \frac{v_c^{\,2}}{r}$$

DYNAMICS

$$\vec{F} = m\vec{a} \qquad \vec{F}_g = m\vec{g} \qquad F_f = \mu F_N$$

$$\vec{F}_s = -k\vec{x} \qquad F_c = \frac{mv^2}{r} \qquad F_c = \frac{4\pi^2 mr}{T^2}$$

$$F_g = \frac{Gm_1m_2}{d^2} \qquad g = \frac{Gm_1}{d^2} \qquad k = \frac{r^3}{T^2}$$

$$T = 2\pi\sqrt{\frac{\ell}{g}} \qquad T = 2\pi\sqrt{\frac{m}{k}}$$

torque = length of torque arm × applied force

ELECTRICITY AND MAGNETISM

$$F_e = k\frac{q_1q_2}{r^2} \qquad V = IR$$

$$E = \frac{kq_1}{r^2} \qquad P = IV$$

$$F_m = B_\perp I\ell \qquad F_m = qvB_\perp$$

$$\vec{E} = \frac{\vec{F}_e}{q} \qquad I = \frac{q}{t}$$

$$V = \frac{\Delta E}{q} \qquad \frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\text{etc}$$

$$V = \ell vB_\perp \qquad R_T = R_1 + R_2 + R_3\text{etc}$$

$$\frac{N_p}{N_s} = \frac{V_p}{V_s} = \frac{I_s}{I_p}$$

MOMENTUM AND ENERGY		QUANTUM AND NUCLEAR PHYSICS	
$\vec{p} = m\vec{v}$	$\vec{F}\Delta t = m\Delta\vec{v}$	$E_k = hf - hf_o$	$E = mc^2$
$W = Fd\cos\theta$	$E_k = \frac{1}{2}mv^2$	$E_n = \frac{-13.6}{n^2}eV$	$c = f\lambda$
$E_p = mgh$	$E_p = \frac{1}{2}kx^2$	$E_{photon} = E_f - E_i$	$p = \frac{h}{\lambda} = \frac{hf}{c}$
		$E_{photon} = hf = \frac{hc}{\lambda}$	$E_{photon} = pc$
		$\lambda = \frac{h}{mv}$	

Some Useful Information

acceleration due to gravity at the Earth's surface.....**g** = 9.80 m/s^2
universal gravitation constant.....**G** = 6.67 x 10^{-11} Nm^2/kg^2
Coulomb's law constant.....**k** = 9.0 x 10^9 Nm^2/C^2
magnitude of the charge on an electron.....1.60 x 10^{-19} C
Planck's constant.....**h** = 6.626 x 10^{-34} J/Hz or J•s
radius of Earth.....6.37 x 10^6 m
radius of Earth orbit.....1.4957 x 10^{11} m
mass of Earth.....5.98 x 10^{24} kg
speed of light in vacuum.....**c** = 3.00 x 10^8 m/s
mass of an electron.....9.11 x 10^{-31} kg
mass of a proton.....1.6735 x 10^{-27} kg
atomic mass unit.....**u** = 1.6605 x 10^{-27} kg
rest mass of neutron.....1.008665 u = 1.6749 x 10^{-27} kg
rest mass of proton.....1.007823 u = 1.6735 x 10^{-27} kg
1 electron volt.....**eV** = 1.6 x 10^{-19} J

Periodic Table

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 H Hydrogen 1.01																	2 He Helium 4.00
2	3 Li Lithium 6.94	4 Be Beryllium 9.01											5 B Boron 10.81	6 C Carbon 12.01	7 N Nitrogen 14.01	8 O Oxygen 15.99	9 F Fluorine 18.99	10 Ne Neon 20.18
3	11 Na Sodium 22.99	12 Mg Magnesium 24.31											13 Al Aluminum 26.98	14 Si Silicon 28.09	15 P Phosphorus 30.97	16 S Sulphur 32.07	17 Cl Chlorine 35.45	18 Ar Argon 39.95
4	19 K Potassium 39.10	20 Ca Calcium 40.08	21 Sc Scandium 44.96	22 Ti Titanium 47.88	23 V Vanadium 50.94	24 Cr Chromium 51.99	25 Mn Manganese 54.94	26 Fe Iron 55.85	27 Co Cobalt 58.93	28 Ni Nickel 58.69	29 Cu Copper 63.55	30 Zn Zinc 65.39	31 Ga Gallium 69.72	32 Ge Germanium 72.61	33 As Arsenic 74.92	34 Se Selenium 78.96	35 Br Bromine 79.90	36 Kr Krypton 83.80
5	37 Rb Rubidium 85.47	38 Sr Strontium 87.62	39 Y Yttrium 88.91	40 Zr Zirconium 91.22	41 Nb Niobium 92.91	42 Mo Molybdenum 95.94	43 Tc Technetium (97.91)	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.91	46 Pd Palladium 106.42	47 Ag Silver 107.87	48 Cd Cadmium 112.41	49 In Indium 114.82	50 Sn Tin 118.71	51 Sb Antimony 121.76	52 Te Tellurium 127.60	53 I Iodine 126.90	54 Xe Xenon 131.29
6	55 Cs Cesium 132.91	56 Ba Barium 137.33	57 * La Lanthanum 138.91	72 Hf Hafnium 178.49	73 Ta Tantalum 180.95	74 W Tungsten 183.85	75 Re Rhenium 186.21	76 Os Osmium 190.2	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.97	80 Hg Mercury 200.59	81 Tl Thallium 204.38	82 Pb Lead 207.2	83 Bi Bismuth 208.98	84 Po Polonium (208.98)	85 At Astatine (209.98)	86 Rn Radon (222.02)
7	87 Fr Francium (223.01)	88 Ra Radium (226.03)	89 ** Ac Actinium (227.03)	104 Rf Rutherfordium (261.11)	105 Db Dubnium (262.11)	106 Sg Seaborgium (263.12)	107 Bh Bohrium (262.12)	108 Hs Hassium (265)	109 Mt Meitnerium (266)	110 Uun Ununnilium (269)	111 Uuu Unununium (272)	112 Uub Ununbium (277)						

*	58 Ce Cerium 140.12	59 Pr Praseodymium 140.91	60 Nd Neodymium 144.24	61 Pm Promethium (144.91)	62 Sm Samarium 150.36	63 Eu Europium 151.97	64 Gd Gadolinium 157.25	65 Tb Terbium 158.93	66 Dy Dysprosium 162.50	67 Ho Holmium 164.93	68 Er Erbium 167.26	69 Tm Thulium 168.93	70 Yb Ytterbium 173.04	71 Lu Lutetium 174.97
**	90 Th Thorium (232.04)	91 Pa Protactinium (231.04)	92 U Uranium 238.03	93 Np Neptunium (237.05)	94 Pu Plutonium (244.06)	95 Am Americium (243.06)	96 Cm Curium (247.07)	97 Bk Berkelium (247.07)	98 Cf Californium (251.08)	99 Es Einsteinium (252.08)	100 Fm Fermium (257.09)	101 Md Mendelevium (258.10)	102 No Nobelium (259.10)	103 Lr Lawrencium (262.11)