Edrolo

PHYSICS

Practice written examination

FORMULA BOOK AND ANSWER SHEET

Instructions

This formula book is provided for your reference.

A question and answer book is provided with this formula book.

At the end of the examination

Place the answer sheet for multiple-choice questions inside the front cover of your question book.

You may keep the formula book.

Edrolo

Physics Units 3&4

Practice written examination

FORMULA SHEET

Physics formulas provided in the examination.

Motion and related energy transformations

velocity; acceleration	$v = \frac{\Delta s}{\Delta t}; \quad a = \frac{\Delta v}{\Delta t}$
equations for constant acceleration	$v = u + at$ $s = ut + \frac{1}{2}at^2$ $s = vt - \frac{1}{2}at^2$ $v^2 = u^2 + 2as$ $s = \frac{1}{2}(v + u)t$
Newton's second law	$\Sigma F = ma$
circular motion	$a = \frac{v^2}{r} = \frac{4\pi^2 r}{T^2}$
Hooke's law	$F = -k\Delta x$
elastic potential energy	$\frac{1}{2}k(\Delta x)^2$
gravitational potential energy near the surface of Earth	$mg\Delta h$
kinetic energy	$\frac{1}{2}mv^2$
Newton's law of universal gravitation	$F = G\frac{M_1 M_2}{r^2}$
gravitational field	$g = G\frac{M}{r^2}$
impulse	$F\Delta t$
momentum	mv
Lorentz factor	$\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$
time dilation	$t = t_0\gamma$
length contraction	$L = \frac{L_0}{\gamma}$
rest energy	$E_{rest} = mc^2$
relativistic total energy	$E_{total} = \gamma mc^2$
relativistic kinetic energy	$E_k = (\gamma - 1)mc^2$

Fields and application of field concepts

electric field between charged plates	$E = \frac{V}{d}$
energy transformations of charges in an electric field	$\frac{1}{2}mv^2 = qV$
field of a point charge	$E = \frac{kq}{r^2}$
force on an electric charge	$F = qE$
Coulomb's law	$F = \frac{kq_1q_2}{r^2}$
magnetic force on a moving charge	$F = qvB$
magnetic force on a current carrying conductor	$F = nIlB$
radius of a charged particle in a magnetic field	$r = \frac{mv}{qB}$

Generation and transmission of electricity

voltage; power	$V = RI; \quad P = VI = I^2R$
resistors in series	$R_T = R_1 + R_2$
resistors in parallel	$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$
ideal transformer action	$\frac{V_1}{V_2} = \frac{N_1}{N_2} = \frac{I_2}{I_1}$
AC voltage and current	$V_{RMS} = \frac{1}{\sqrt{2}}V_{peak} \quad I_{RMS} = \frac{1}{\sqrt{2}}I_{peak}$
electromagnetic induction	EMF: $\varepsilon = -N\frac{\Delta \Phi_B}{\Delta t}$ flux: $\Phi_B = B_\perp A$
transmission losses	$V_{drop} = I_{line}R_{line} \quad P_{loss} = I_{line}^2R_{line}$

Wave concepts

wave equation	$v = f\lambda$
constructive interference	path difference = $n\lambda$
destructive interference	path difference = $\left(n - \frac{1}{2}\right)\lambda$
fringe spacing	$\Delta x = \frac{\lambda L}{d}$

The nature of light and matter

photoelectric effect	$E_{k\,max} = hf - \phi$
photon energy	$E = hf$
photon momentum	$p = \frac{h}{\lambda}$
de Broglie wavelength	$\lambda = \frac{h}{p}$

Data

acceleration due to gravity at Earth's surface	$g = 9.8\ m\ s^{-2}$
mass of the electron	$m_e = 9.1 \times 10^{-31}\ kg$
magnitude of the charge of the electron	$e = 1.6 \times 10^{-19}\ C$
Planck's constant	$h = 6.63 \times 10^{-34}\ J\ s$ $\quad h = 4.14 \times 10^{-15}\ eV\ s$
speed of light in a vacuum	$c = 3.0 \times 10^{8}\ m\ s^{-1}$
gravitational constant	$G = 6.67 \times 10^{-11}\ N\ m^2\ kg^{-2}$
mass of Earth	$M_E = 5.98 \times 10^{24}\ kg$
radius of Earth	$R_E = 6.37 \times 10^{6}\ m$
Coulomb constant	$k = 8.99 \times 10^{9}\ N\ m^2\ C^{-2}$

Prefixes/Units

p = pico= 10^{-12}	n = nano = 10^{-9}	μ = micro = 10^{-6}	m = milli = 10^{-3}
k = kilo = 10^{3}	M = mega = 10^{6}	G = giga = 10^{9}	t = tonne = 10^{3} kg

Physics Units 3&4

Practice written examination

MULTIPLE-CHOICE ANSWER SHEET

DATE: _____

STUDENT NAME: _____

TEACHER NAME: _____

Instructions

Use a **pencil** for **all** entries. For each question, shade the box which indicates your answer.

Marks will **not** be deducted for incorrect answers.

No mark will be given if more than **one** answer is completed for any question.

If you make a mistake, **erase** the incorrect answer - **do not** cross it out.

All answers must be completed like this example: A [B] C D

One answer per line		One answer per line	
1	A B C D	11	A B C D
2	A B C D	12	A B C D
3	A B C D	13	A B C D
4	A B C D	14	A B C D
5	A B C D	15	A B C D
6	A B C D	16	A B C D
7	A B C D	17	A B C D
8	A B C D	18	A B C D
9	A B C D	19	A B C D
10	A B C D	20	A B C D