



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

**GRADE 12
GRAAD 12**

SEPTEMBER 2010

**PHYSICAL SCIENCES – PAPER 1/
FISIESE WETENSKAPPE – VRAESTEL 1**

DATA / GEGEWENS

This data consists of 3 pages.
Hierdie gegewens bestaan uit 3 bladsye.

DATA/GEGEWENS

TABLE 1: PHYSICAL CONSTANTS/TABEL 1: FISIESE KONSTANTES

NAME/NAAM	SYMBOL/SIMBOOL	VALUE/WAARDE
Acceleration due to gravity <i>Swaartekrag versnelling</i>	g	$9,8 \text{ m}\cdot\text{s}^{-2}$
Speed of light in a vacuum <i>Spoed van lig in 'n vakuum</i>	c	$3,0 \times 10^8 \text{ m}\cdot\text{s}^{-1}$
Planck's constant <i>Planck se konstante</i>	h	$6,63 \times 10^{-34} \text{ J}\cdot\text{s}$
Coulomb's constant <i>Coulomb se konstante</i>	k	$9,0 \times 10^9 \text{ N}\cdot\text{m}^2\cdot\text{C}^{-2}$
Charge on electron <i>Lading op elektron</i>	e	$-1,6 \times 10^{-19} \text{ C}$
Electron mass <i>Elektronmassa</i>	m_e	$9,11 \times 10^{-31} \text{ kg}$
Permittivity of free space <i>Permittiwiteit van vry ruimte</i>	ϵ_0	$8,85 \times 10^{-12} \text{ F}\cdot\text{m}^{-1}$

TABLE 2: FORMULAE / TABEL 2: FORMULES

MOTION/BEWEGING

$v_f = v_i + a \Delta t$	$\Delta x = v_i \Delta t + \frac{1}{2} a \Delta t^2$ or/of $\Delta y = v_i \Delta t + \frac{1}{2} a \Delta t^2$
$v_f^2 = v_i^2 + 2a\Delta x$ or/of $v_f^2 = v_i^2 + 2a\Delta y$	$\Delta x = \left(\frac{v_f + v_i}{2} \right) \Delta t$ or/of $\Delta y = \left(\frac{v_f + v_i}{2} \right) \Delta t$

FORCE/KRAG

$F_{\text{net}} = ma$	$p = mv$
$F\Delta t = \Delta p = mv_f - mv_i$	$F_g = mg$

WORK, ENERGY AND POWER/ ARBEID, ENERGIE EN DRYWING

$W = F\Delta x \cos \theta$	$U = E_p = mgh$
$K = E_k = \frac{1}{2} mv^2$	$W = \Delta K = \Delta E_k = E_{kf} - E_{ki}$
$P = \frac{W}{\Delta t}$	$P = Fv$

WAVES, SOUND AND LIGHT/GOLWE, KLANK EN LIG

$v = f \lambda$ or/of $v = \nu \lambda$	$T = \frac{1}{f}$ or/of $T = \frac{1}{\nu}$
$f_L = \frac{v \pm v_L}{v \pm v_s} f_s$	$E = hf$ or/of $E = h\nu$ or/of $E = h \frac{c}{\lambda}$
$\sin \theta = \frac{m\lambda}{a}$	$hf = W_0 + \frac{1}{2} mv^2 = hf_0 + \frac{1}{2} mv^2$

ELECTROSTATICS / ELEKTROSTATIKA

$F = \frac{kQ_1Q_2}{r^2}$	$E = \frac{kQ}{r^2}$
$E = \frac{V}{d}$	$E = \frac{F}{q}$
$U = \frac{kQ_1Q_2}{r}$	$V = \frac{W}{q}$
$C = \frac{Q}{V}$	$C = \frac{\epsilon_0 A}{d}$

ELECTRIC CIRCUITS / ELEKTRIESE STROOMBANE

$R = \frac{V}{I}$	$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$
$R_s = R_1 + R_2 + \dots$	$\text{emf/emk}(\epsilon) = I(R + r)$
$q = I\Delta t$	$W = Vq = VI\Delta t = I^2 R \Delta t = \frac{V^2 \Delta t}{R}$
$P = \frac{W}{\Delta t} = VI = I^2 R = \frac{V^2}{R}$	

ALTERNATING CURRENT / WISSELSTROOM

$I_{\text{rms}} = \frac{I_{\text{max}}}{\sqrt{2}} / I_{\text{wgk}} = \frac{I_{\text{maks}}}{\sqrt{2}}$	$P_{\text{average}} = V_{\text{rms}} I_{\text{rms}} = I_{\text{rms}}^2 R = \frac{V_{\text{rms}}^2}{R}$
$V_{\text{rms}} = \frac{V_{\text{max}}}{\sqrt{2}} / V_{\text{wgk}} = \frac{V_{\text{maks}}}{\sqrt{2}}$	$P_{\text{gemiddeld}} = V_{\text{wgk}} I_{\text{wgk}} = I_{\text{wgk}}^2 R = \frac{V_{\text{wgk}}^2}{R}$