

## 4.2 Information sheets – Paper 1 (Physics)

DATA FOR PHYSICAL SCIENCES GRADE 12  
PAPER 1 (PHYSICS)

TABLE 1: PHYSICAL CONSTANTS

NAME	SYMBOL	VALUE
Acceleration due to gravity	g	9,8 m·s <sup>-2</sup>
Universal gravitational constant	G	6,67 x 10 <sup>-11</sup> N·m <sup>2</sup> ·kg <sup>-2</sup>
Speed of light in a vacuum	c	3,0 x 10 <sup>8</sup> m·s <sup>-1</sup>
Planck's constant	h	6,63 x 10 <sup>-34</sup> J·s
Coulomb's constant	k	9,0 x 10 <sup>9</sup> N·m <sup>2</sup> ·C <sup>-2</sup>
Charge on electron	e	-1,6 x 10 <sup>-19</sup> C
Electron mass	m <sub>e</sub>	9,11 x 10 <sup>-31</sup> kg
Mass of the Earth	M	5,98 x 10 <sup>24</sup> kg
Radius of the Earth	R <sub>E</sub>	6,38 x 10 <sup>6</sup> m

TABLE 2: FORMULAE

## MOTION

$v_f = v_i + a\Delta t$	$\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$ OR $\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$
$v_f^2 = v_i^2 + 2ax$ OR $v_f^2 = v_i^2 + 2ay$	$\Delta x = \left(\frac{v_i + v_f}{2}\right)\Delta t$ OR $\Delta y = \left(\frac{v_i + v_f}{2}\right)\Delta t$

## FORCE

$F_{net} = ma$	$p = mv$
$f_{\text{friction}} = \mu_s N$	$f_{\text{friction}} = \mu_s N$
$F_{net}\Delta t = \Delta p$ $\Delta p = mv_f - mv_i$	$w = mg$
$F = \frac{Gm_1m_2}{r^2}$ OR $F = \frac{Gm_1m_2}{r^2}$	$g = \frac{GM}{r^2}$ OR $g = \frac{GM}{r^2}$

## WORK, ENERGY AND POWER

$W = F\Delta x \cos\theta$	$U = mgh$ OR $E_p = mgh$
$K = \frac{1}{2}mv^2$ OR $E_k = \frac{1}{2}mv^2$	$W_{net} = \Delta K$ OR $W_{net} = \Delta E_k$
$W_{\text{tot}} = \Delta K + \Delta U$ OR $W_{\text{tot}} = \Delta E_k + \Delta E_p$	$\Delta K = K_f - K_i$ OR $\Delta E_k = E_{k,f} - E_{k,i}$
$P_{avg} = Fv_{avg}$	$P = \frac{W}{\Delta t}$

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**Lingjun Ying**

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