

## 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      | $g$    | $9,8 \text{ m}\cdot\text{s}^{-2}$                                  |
| Universal gravitational constant | $G$    | $6,67 \times 10^{-11} \text{ N}\cdot\text{m}^2\cdot\text{kg}^{-2}$ |
| Speed of light in a vacuum       | $c$    | $3,0 \times 10^8 \text{ m}\cdot\text{s}^{-1}$                      |
| Planck's constant                | $h$    | $6,63 \times 10^{-34} \text{ J}\cdot\text{s}$                      |
| Coulomb's constant               | $k$    | $9,0 \times 10^9 \text{ N}\cdot\text{m}^2\cdot\text{C}^{-2}$       |
| Charge on electron               | $e$    | $-1,6 \times 10^{-19} \text{ C}$                                   |
| Electron mass                    | $m_e$  | $9,11 \times 10^{-31} \text{ kg}$                                  |
| Mass of the Earth                | $M$    | $5,98 \times 10^{24} \text{ kg}$                                   |
| Radius of the Earth              | $R_E$  | $6,38 \times 10^6 \text{ m}$                                       |

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

## FORCE

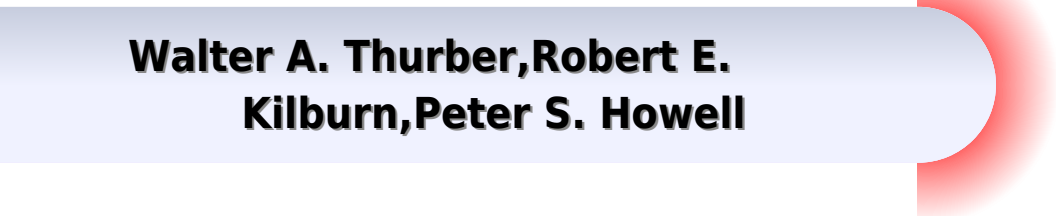
|                                                                 |                                              |
|-----------------------------------------------------------------|----------------------------------------------|
| $F_{\text{net}} = ma$                                           | $p = mv$                                     |
| $F_{\text{fr}}^{\text{max}} = \mu_k N$                          | $F_{\text{fr}} = \mu_k N$                    |
| $F_{\text{net}}\Delta t = \Delta p$<br>$\Delta p = mv_f - mv_i$ | $w = mg$                                     |
| $F = \frac{Gm_1m_2}{d^2}$ OR $F = \frac{Gm_1m_2}{r^2}$          | $g = \frac{GM}{d^2}$ 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 $E_k = \frac{1}{2}mv^2$                                     | $W_{\text{net}} = \Delta K$ OR $W_{\text{net}} = \Delta E_k$<br>$\Delta K = K_f - K_i$ OR $\Delta E_k = E_{kf} - E_{ki}$ |
| $W_{\text{net}} = \Delta K + \Delta U$ OR $W_{\text{net}} = \Delta E_k + \Delta E_p$ | $P = \frac{W}{\Delta t}$                                                                                                 |
| $P_{\text{net}} = Fv_{\text{net}}$                                                   |                                                                                                                          |

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