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# **education**

**Lefapha la Thuto la Bokone Bophirima  
Noord-Wes Onderwys Departement  
North West Education Department  
NORTH WEST PROVINCE**

## **NATIONAL SENIOR CERTIFICATE/ NASIONALE SENIOR SERTIFIKAAT**

**GRADE/GRAAD 12**

**PHYSICAL SCIENCES: PHYSICS (P1)  
FISIESE WETENSKAPPE: FISIKA (V1)**

**SEPTEMBER 2022**

**MARKING GUIDELINES/NASIENRIGLYNE**

**MARKS/ PUNTE: 150**

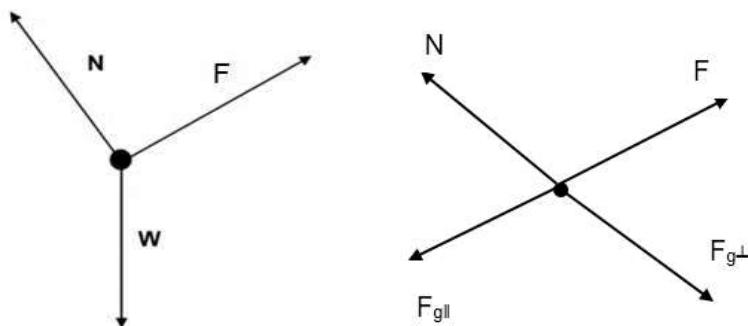
**These marking guidelines consist of 16 pages including the cognitive table/  
Hierdie nasienriglyne bestaan uit 16 bladsye wat die kognitiewe tabel insluit.**

## QUESTION 1/VRAAG 1

|             |   |    |     |
|-------------|---|----|-----|
| 1.1         | C | ✓✓ | (2) |
| 1.2         | D | ✓✓ | (2) |
| 1.3         | A | ✓✓ | (2) |
| 1.4         | D | ✓✓ | (2) |
| 1.5         | B | ✓✓ | (2) |
| 1.6         | C | ✓✓ | (2) |
| 1.7         | D | ✓✓ | (2) |
| 1.8         | A | ✓✓ | (2) |
| 1.9         | C | ✓✓ | (2) |
| 1.10        | B | ✓✓ | (2) |
| <b>[20]</b> |   |    |     |

**QUESTION 2 /VRAAG 2**

2.1

**Accept the following symbols**

|  |  |
|--|--|
| N ✓                                      | $F_N$ /Normal/Normal force<br>Normaal/Normaalkrag                        |
| F ✓                                      | $F_A$ /Applied force force/ 5000 N<br>$F_A$ /Toegepaste krag/ 5000 N     |
| w ✓ OR $F_{g\parallel}$ and $F_{g\perp}$ | $F_g$ /mg/weight/ gravitational force<br>$F_g$ /mg/gewig/ gravitasiekrag |

(3)

2.2  $F_{g\parallel} = w \sin\theta$  ✓  
 $5000 = w \sin 15^\circ$  ✓  
 $w = 19318,52 \text{ N}$   
 $M_E = \frac{(19318,52)}{9,8} - 800$  ✓  
 $= 1171,28 \text{ kg}$  ✓

(4)

2.3.1 Increases/Verhoog. ✓

(1)

2.3.2 Crate is moving at constant acceleration/*Die krat beweeg teen 'n konstante versnelling*✓

(1)

2.4.1 The force or the component of a force which a surface exerts on an object with which it is in contact, and which is perpendicular to the surface.  
*/Die krag of die komponent van die krag wat 'n voorwerp op 'n oppervlakte uitoefen waarmee dit in kontak is, en wat loodreg op die oppervlakte is.* ✓✓  
**(2 or/of 0)**

(2)

$$2.4.2 \quad F_{g\parallel} = w \sin\theta \\ = (98) (\sin\theta)$$

$$F_{g\perp} = w \cos\theta \\ = (98) (\cos\theta)$$

$$7 F_{g\parallel} = 4 F_{g\perp} \checkmark$$

$$7 (98) (\sin\theta) = 4 (98) (\cos\theta) \checkmark$$

$$\tan\theta = 0,5714$$

$$\theta = 25,53^\circ \checkmark$$

**Note: By using  $\tan\theta$  - 2/3 marks**

**Nota: Gebruik van  $\tan\theta$  - 2/3 punte**

$$\tan \theta = \frac{4}{7} \checkmark$$

$$\theta = 25,53^\circ \checkmark$$

(3)

[14]

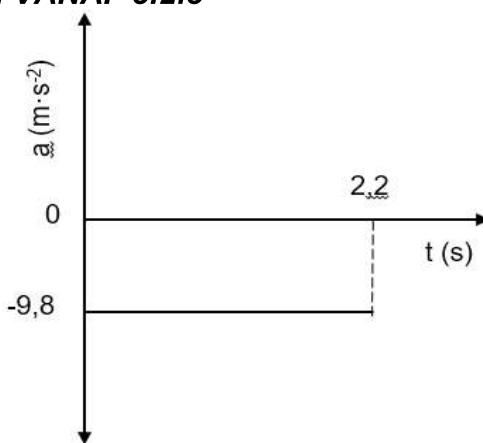
**QUESTION 3/ VRAAG 3**

- 3.1 Motion during which the only force acting on an object is the force of gravity.  
*Beweging waar die enigste krag wat op die voorwerp inwerk gravitasiekrag is.* ✓✓ (2 or/of 0) (2)
- 3.2.1  $1,4 \text{ s}$  ✓ (1)
- 3.2.2  $9,8 \text{ m}\cdot\text{s}^{-2}$  ✓ downwards ✓ / afwaarts ✓ (2)
- 3.2.3  $1,4 + 0,8 = 2,2 \text{ s}$  ✓✓ (2)
- 3.3.1  $v_f = v_i + a\Delta t$  ✓  
 $0 = v_i + (-9,8)(1,4)$  ✓  
 $v_i = 13,72 \text{ m}\cdot\text{s}^{-1}$  ✓ (3)

3.3.2 **POSITIVE MARKING FROM QUESTION 3.3.1 and 3.2.3/  
*POSITIEWE NASIEN VANAF 3.3.1 and 3.2.3***

$$\begin{aligned}\Delta y &= v_i\Delta t + \frac{1}{2} a\Delta t^2 \quad \checkmark \\ \Delta y &= (13,72)(2,2) + \frac{1}{2} (-9,8)(2,2^2) \quad \checkmark \\ &= 6,47 \text{ m} \quad \checkmark\end{aligned}\quad (3)$$

3.4 **POSITIVE MARKING FROM QUESTION 3.2.3/  
*POSITIEWE NASIEN VANAF 3.2.3***

**Marking Criteria**

- Labelling -9,8 and 2,2 on the graph ✓
- Shape and graph lies below x axis ✓

**Nasien kriteria**

- Toon -9,8 en 2,2 op die grafiek ✓
- Vorm van grafiek en grafiek lê onder die x-as ✓

(2)

- 3.5 Change in the velocity ✓  
*Verandering in die snelheid* ✓

(1)

[16]

**QUESTION 4 / VRAAG 4**

- 4.1 The net force acting on an object is equal to rate of change of momentum of the object ✓✓

*Die netto krag wat op 'n voorwerp inwerk is gelyk aan die verandering in die momentum van die voorwerp✓✓*

**(2 or/of 0)** (2)

- 4.2  $F_{\text{net}} \Delta t = \Delta P$  ✓  
 $(-1,2)(\Delta t) = (-0,24)$  ✓  
 $\Delta t = 0,2 \text{ s}$  ✓

(3)

4.3 **OPTION 1**

$$\begin{aligned} F_{\text{net}} \Delta t &= \Delta P = m(v_f - v_i) \checkmark \\ (-1,2)(0,2) &= 0,6 (v_f - 0,5) \checkmark \\ v_f &= 0,1 \text{ m}\cdot\text{s}^{-1} \text{ towards east } \checkmark \end{aligned}$$

**OPTION 2**

$$\begin{aligned} \Delta P &= m(v_f - v_i) \checkmark \\ (-0,24) &= 0,6 (v_f - 0,5) \checkmark \\ v_f &= 0,1 \text{ m}\cdot\text{s}^{-1} \text{ towards east } \checkmark \end{aligned}$$

(3)

- 4.4  $E_{k\text{before}} = E_{k\text{after}}$  } any one / enige een✓  
 $E_k = \frac{1}{2} mv^2$  }  
 $0,042 = \frac{1}{2} (0,8)(v_f)^2$  ✓  
 $v_f = 0,32 \text{ m}\cdot\text{s}^{-1}$ . ✓

(3)  
**[11]**

**QUESTION 5 / VRAAG 5**

- 5.1 The net/total work done on an object is equal to the change in the object's kinetic energy. ✓✓

/ Die netto werk verrig op 'n voorwerp is gelyk aan sy verandering in kinetiese energie.

OR

The work done on an object by a resultant/net force is equal to the change in the objects kinetic energy. ✓✓

/ Die werk verrig op 'n voorwerp deur 'n netto/resultante krag is gelyk aan sy verandering in kinetiese energie. (2)

5.2  $W_{nc} = \Delta E_K + \Delta E_p$  } any one / enige een✓

$$W_{nc} = (E_{Kf} - E_{Ki}) + (E_{pf} - E_{pi})$$

$$0 \checkmark = (E_{Kf} - 0) + (0 - (75)(9,8)(25)) \checkmark$$

$$E_{Kf} = 18375 \text{ J} \checkmark$$

(4)

**5.3 POSITIVE MARKING FROM QUESTION 5.2****POSITIEWE NASIEN VANAF 5.2**

$$W_{nc} = \Delta E_K + \Delta E_p$$

$$W_{nc} = (E_{Kf} - E_{Ki}) + (E_{pf} - E_{pi})$$

$$= (0-18375) \checkmark + (0 - (75)(9,8)(20)) \checkmark$$

$$= (-18375) + (-14700)$$

$$= -33075 \text{ J} \checkmark$$

(3)

5.4  $33075 \text{ J} \checkmark$

(1)

**5.5 POSITIVE MARKING FROM QUESTION 5.3****POSITIEWE NASIEN VANAF 5.3**

$$W_{nc} = F\Delta x \cos\theta \checkmark$$

$$-33075 \checkmark = F_T \times 20 \cos 180^\circ \checkmark$$

$$F_T = 1653,75 \text{ N} \checkmark$$

(4)

[14]

**QUESTION 6 / VRAAG 6**

- 6.1 The change in frequency (or pitch) ✓ of the sound detected by a listener because the sound source and the listener have different velocities relative to the medium of sound propagation. / Die verandering in die frekwensie (toonhoogte) van die waargenome klank deur die luisteraar agv die klankbron en die luisteraar wat verskillende snelhede relatief tot mekaar het.

**OR/OF**

An (apparent) change in (observed/detected) frequency (pitch),✓ as a result of the relative motion between a source and an observer ✓ (listener).

'n (Skynbare) verandering in(waargenome) frekwensie ✓ (toonhoogte), as gevvolg van die relatiewe beweging tussen die bron en 'n waarnemer/luisteraar. ✓

(2)

6.2

**OPTION 1**

$$f_{(\text{recorded})} = \frac{(4)}{(1 \times 10^{-4})} \quad \checkmark \\ = 40000 \text{ Hz} \\ = 40 \text{ kHz} \\ 40-38 = 2 \text{ kHz} \quad \checkmark$$

**OPTION 2**

$$f_{(\text{recorded})} = \frac{(2)}{(5 \times 10^{-5})} \quad \checkmark \\ = 40000 \text{ Hz} \\ = 40 \text{ kHz} \\ 40-38 = 2 \text{ kHz} \quad \checkmark$$

(2)

6.3

When the dolphin is moving towards the recorder, there is a compression of the wave fronts, ✓ more waves are arriving per second. ✓

*Wanneer die dolfyn na die klankopnemer beweeg vind 'n kompressie van golffronte plaas ✓ en meer golwe arriveer per sekonde ✓*

(2)

6.4

**OPTION 1 / OPSIE 1**

$$f_L = \frac{v \pm v_L}{v \pm v_s} f_s \quad \checkmark \\ 40000 \checkmark = \frac{(1500+0)}{(1500-v_s)} \checkmark 38000 \checkmark \\ v_s = 71,43 \text{ m} \cdot \text{s}^{-1} \quad \checkmark$$

(5)

6.5

The light coming from the distant planet observed from the Earth has a lower frequency and therefore a longer wavelength. ✓

Therefore it is shifted towards the red end of the spectrum. ✓

*Die lig vanaf verafgeleë planete wat observeer word van die aarde het 'n laer frekwensie en langer golflengte ✓, daarom vind 'n verskuiwing na die rooi gedeelte van die speltrum plaas ✓*

(2)

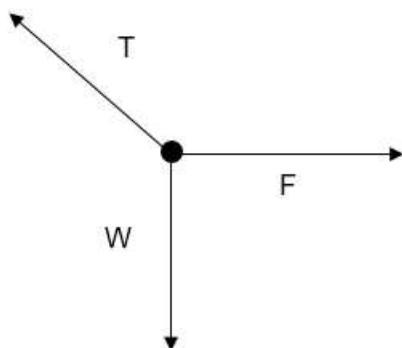
[13]

**QUESTION 7 / VRAAG 7**

- 7.1 The magnitude of the electrostatic force exerted by one point charge ( $Q_1$ ) on another point charge ( $Q_2$ ) is directly proportional to the product of the magnitudes of their charges✓ and inversely proportional to the square of the distance ( $r$ ) between them ✓  
*/ Die grootte van die elektrostasiese krag wat deur een puntlading ( $Q_1$ ) op 'n ander puntlading ( $Q_2$ ) uitgeoefen word, is direk eweredig aan die produk van die groottes van die ladings ✓ en omgekeerd eweredig aan die kwadraat van die afstand ( $r$ ) tussen hulle ✓*

(2)

7.2

**Accept the following symbols**

|     |   |
|-----|---|
| T ✓ | Tension in the spring / Spanning in die tou   |
| F✓  | Electrostatic force of repulsion / Elektrostasiese afstotingskrag   |
| w ✓ | $F_g/mg$ /weight/ $F_{\text{earth on sphere}}$ /gravitational force<br>$F_g/mg/gewig/F_{\text{aarde op sfeer}}$ /gravitasiekrag force |

(3)

- 7.3.1 Forces are in equilibrium / Kragte is in ewewig

$$\begin{aligned} w &= mg \\ &= (0,0009)(9,8) \checkmark \\ &= 0,0088 \text{ N} \\ \tan 45^\circ &= \frac{(F)}{(0,0088)} \checkmark \end{aligned}$$

$$= 0,008 \text{ N repulsion to the right. / afstotend na regs} \checkmark$$

(3)

7.3.2 **POSITIVE MARKING FROM QUESTION 7.1.3****POSITIEWE NASIEN VANAF 7.1.3**

$$F = \frac{kQ_1Q_2}{r^2} \quad \checkmark$$

$$0,0088 = \frac{(9 \times 10^9)(Q)^2}{(0,04)^2}$$

$Q = 3,8 \times 10^{-8} \text{ C}$  ✓ Accept the range  $3,8$  to  $3,9 \times 10^{-8} \text{ C}$

$Q = 3,8 \times 10^{-8} \text{ C}$  ✓ Aanvaar omvang  $3,8$  tot  $3,9 \times 10^{-8} \text{ C}$

(3)

## 7.4.1

$$F = \frac{kQ_1Q_2}{r^2}$$

'F' at 'C' due to A

$$F_{CA} = \frac{(9,0 \times 10^9)(4 \times 10^{-6})(8 \times 10^{-6})}{0,5^2} \quad \checkmark$$

=  $1,152 \text{ N}$  to the right / na regs

'F' at 'C' due to B

$$F_{CB} = \frac{(9,0 \times 10^9)(4 \times 10^{-6})(3 \times 10^{-6})}{0,2^2} \quad \checkmark$$

=  $2,7 \text{ N}$  to the left / na links

Net electrostatic force at C =  $1,152 - 2,7 = - 1,548 \text{ N}$  to the left ✓

Netto elektrostatiese krag by C =  $1,152 - 2,7 = - 1,548 \text{ N}$  na links ✓

(3)

[14]

**QUESTION 8 / VRAAG 8**

- 8.1 Internal resistance is the *resistance found inside the battery due to the movement of charges.* ✓✓

*Interne weerstand is die weestand in die batterie as gevolg van die beweging van lading*

(2)

8.2  $V_2 = 2V_3$  ✓

OR

$$V_3 = \frac{1}{2} V_2$$

(1)

8.3  $V_1 = V_2 + V_3$

$$21 = V_2 + \frac{1}{2} V_2$$

$$V_2 = 14 \text{ V}$$

$$V_3 = 7 \text{ V}$$

(2)

8.4.1  $V_{\text{lost}} = 24 - 21$

$$= 3 \text{ V}$$

$$V_{\text{lost}} = I_r$$

$$3 = 3r$$

$$r = 1 \Omega$$

(4)

8.4.2

**OPTION 1**

$$R = \frac{V}{I}$$

$$V_2 = 14 \text{ V}$$

$$14 = 3R$$

$$R = 4,67 \Omega$$

**OPTION 2**

$$R = \frac{V}{I}$$

$$V_3 = 7 \text{ V}$$

$$7 = 3R_T$$

$$7 = (3)(\frac{R}{2})$$

$$R = 4,67 \Omega$$

(3)

8.5  $P = VI$

$$60 = 12 \times I$$

$$I = 5 \text{ A}$$

$$Q = It$$

$$= 5 \times 2 \times 60$$

$$= 600 \text{ C}$$

(4)

[16]

**QUESTION 9 / VRAAG 9**

- 9.1.1 Slip rings✓ / Sleepringe (1)
- 9.1.2 Slip rings keep the armature in contact with the brushes, and thus ensure flow of current to the external circuit. ✓✓  
*Sleepringe hou die spoel in kontak met die koolstofborsels en verseker die vloei van stroom na die eksterne stroombaan* ✓✓ (2)
- 9.2 Induction of an electromotive force by the motion of conductor across a magnetic field.  
 OR  
 Whenever there is a change in the magnetic flux linkage with a conductor an emf is induced. ✓✓  
 Induksie van 'n elektromotoriese krag deur die beweging van 'n geleier oor 'n magnetiese veld.  
 OF  
*Wanneer daar 'n verandering in die magnetiese vloedkoppeling is met 'n geleier waarin 'n emk dan geïnduseer word* (2)
- 9.3 A to B / A na B✓ (1)
- 9.4 Remains the same ✓ Bly dieselfde ✓ (1)
- 9.5 Coil will be parallel to the field✓✓ / Spoel sal parallel aan die veld wees (2)
- 9.6.1  $V_{rms} = \frac{V_{max}}{\sqrt{2}}$  ✓  
 $V_{rms} = \frac{17}{\sqrt{2}}$  ✓  
 $V_{rms} = 12,02 \text{ V}$  ✓  
 $V_{wgk} = \frac{V_{max}}{\sqrt{2}}$   
 $V_{wgk} = \frac{17}{\sqrt{2}}$   
 $V_{wgk} = 12,02 \text{ V}$  (3)

### 9.6.2 POSITIVE MARKING FROM QUESTION 9.2.1

$$P_{ave} = I_{rms} \times V_{rms} \checkmark$$

$$15 = I_{rms} \times 12,02 \checkmark$$

$$I_{rms} = 1,25 \text{ A}$$

$$I_{rms} = \frac{I_{max}}{\sqrt{2}} \checkmark$$

$$1,25 = \frac{I_{max}}{\sqrt{2}} \checkmark$$

$$I_{max} = 1,77 \text{ A} \checkmark$$

### POSITIEWE NASIEN VANAF VRAAG 9.2.1

$$P_{gem} = I_{wgk} \times V_{wgk} \checkmark$$

$$15 = I_{wgk} \times 12,02 \checkmark$$

$$I_{wgk} = 1,25 \text{ A}$$

$$I_{rms} = \frac{I_{max}}{\sqrt{2}} \checkmark$$

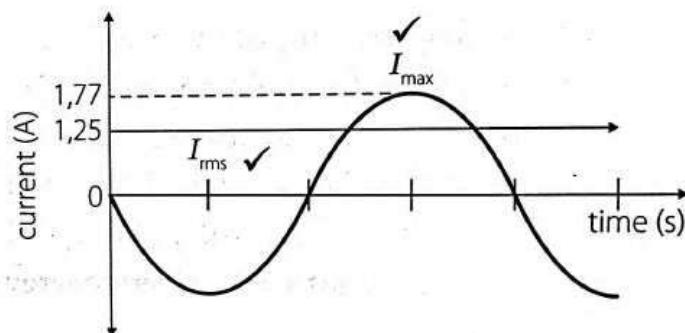
$$1,25 = \frac{I_{max}}{\sqrt{2}} \checkmark$$

$$I_{max} = 1,77 \text{ A} \checkmark$$

(5)

### 9.6.3 POSITIVE MARKING FROM QUESTION 9.2.2

#### POSITIEWE NASIEN VANAF VRAAG 9.2.2



#### Marking Criteria / Nasien kriteria

- Labelling  $I_{max}$  on the graph /  $I_{maks}$  aangedui op die grafiek✓
- Labelling  $I_{rms}$  on the graph /  $I_{wgk}$  aangedui op die grafiek✓

(2)

[19]

## QUESTION 10 / VRAAG 10

- 10.1 Threshold frequency / Drumpelfrekvensie✓ (1)
- 10.2  $E = W_0 + E_{k(\max)}$  } any one / enige een ✓  
 $E = hf_0 + \frac{1}{2}mv^2$  }  
 $(6,63 \times 10^{-34})(5 \times 10^{15}) \checkmark = (6,63 \times 10^{-34})(f_0) \checkmark + (\frac{1}{2} \times 9,1 \times 10^{-31})(5 \times 10^5)^2 \checkmark$   
 $f_0 = 4,8 \times 10^{15} \text{ Hz} \checkmark$  (5)
- 10.3.1 The work function of a metal is the minimum energy that an electron needs to be emitted from the metal surface ✓✓  
*Die werksfunksie van 'n metaal is die minimum hoeveelheid energie benodig om elektrone uit die oppervlakte van die metaal vry te stel*  
**(2 or/of 0)** (2)
- 10.3.2  $W_0 = hf_0 \checkmark$   
 $9,44 \times 10^{-19} = (6,63 \times 10^{-34})(f_0) \checkmark$   
 $f_0 = 1,42 \times 10^{15} \text{ Hz} \checkmark$  (3)
- 10.3.3 The frequency of blue light is less than that of threshold frequency of selenium,✓ and the frequency of ultraviolet light (found in day light) is greater than threshold frequency of selenium.✓  
*Die frekwensie van blou lig is laer as die drumpelfrekvensie van selenium,✓ en die frekwensie van ultraviolet lig (wat in die dag gekry word) is groter as die drumpelfrekvensie van selenium.✓* (2)  
[13]

**TOTAL/TOTAAL:** 150

| SUBJECT: PHYSICAL SCIENCES PAPER 1 |           |                  |          |          |          |                      |                                 |                                    |                               | GRADE 12       |                   |           |           |
|------------------------------------|-----------|------------------|----------|----------|----------|----------------------|---------------------------------|------------------------------------|-------------------------------|----------------|-------------------|-----------|-----------|
| ANALYSIS GRID                      |           |                  |          |          |          |                      |                                 |                                    |                               | SEPTEMBER 2022 |                   |           |           |
| QUESTION                           | Mark      | Cognitive Levels |          |          |          | Topics               |                                 |                                    |                               | TOTAL          | Difficulty Levels |           |           |
|                                    |           | 1                | 2        | 3        | 4        | Mechanics ≈ 65 Marks | Waves, Sound & Light ≈ 15 Marks | Electricity & Magnetism ≈ 55 Marks | Matter & Materials ≈ 15 Marks |                | Easy              | Moderate  | Difficult |
| 1.1                                | 2         | 2                |          |          |          | 2                    |                                 |                                    |                               | 2              | 2                 |           |           |
| 1.2                                | 2         |                  | 2        |          |          | 2                    |                                 |                                    |                               | 2              | 2                 |           |           |
| 1.3                                | 2         |                  | 2        |          |          | 2                    |                                 |                                    |                               | 2              | 2                 |           |           |
| 1.4                                | 2         |                  | 2        |          |          | 2                    |                                 |                                    |                               | 2              |                   | 2         |           |
| 1.5                                | 2         |                  | 2        |          |          | 2                    |                                 |                                    |                               | 2              | 2                 |           |           |
| 1.6                                | 2         | 2                |          |          |          |                      | 2                               |                                    |                               | 2              |                   | 2         |           |
| 1.7                                | 2         |                  | 2        |          |          |                      |                                 | 2                                  |                               | 2              |                   |           | 2         |
| 1.8                                | 2         |                  |          | 2        |          |                      |                                 | 2                                  |                               | 2              |                   |           | 2         |
| 1.9                                | 2         |                  | 2        |          |          |                      |                                 | 2                                  |                               | 2              | 2                 |           |           |
| 1.10                               | 2         | 2                |          |          |          |                      |                                 |                                    | 2                             | 2              |                   | 2         |           |
| <b>Ques 1</b>                      | <b>20</b> | <b>6</b>         | <b>4</b> | <b>8</b> | <b>2</b> | <b>10</b>            | <b>2</b>                        | <b>6</b>                           | <b>2</b>                      | <b>20</b>      | <b>10</b>         | <b>6</b>  | <b>4</b>  |
| 2.1                                | 3         |                  | 3        |          |          | 3                    |                                 |                                    |                               | 3              | 3                 |           |           |
| 2.2                                | 4         |                  |          | 4        | 4        |                      |                                 |                                    |                               | 4              |                   |           | 4         |
| 2.3.1                              | 1         |                  |          | 1        |          | 1                    |                                 |                                    |                               | 1              |                   | 1         |           |
| 2.3.2                              | 1         |                  |          | 1        |          | 1                    |                                 |                                    |                               | 1              |                   | 1         |           |
| 2.4.1                              | 2         | 2                |          |          |          | 2                    |                                 |                                    |                               | 2              | 2                 |           |           |
| 2.4.2                              | 3         |                  |          | 3        | 3        |                      |                                 |                                    |                               | 3              |                   |           | 3         |
| <b>Ques 2</b>                      | <b>14</b> | <b>2</b>         | <b>3</b> | <b>2</b> | <b>7</b> | <b>14</b>            | <b>0</b>                        | <b>0</b>                           | <b>0</b>                      | <b>14</b>      | <b>5</b>          | <b>2</b>  | <b>7</b>  |
| 3.1                                | 2         | 2                |          |          |          | 2                    |                                 |                                    |                               | 2              | 2                 |           |           |
| 3.2.1                              | 1         |                  | 1        |          |          | 1                    |                                 |                                    |                               | 1              | 1                 |           |           |
| 3.2.2.                             | 2         |                  | 2        |          |          | 2                    |                                 |                                    |                               | 2              |                   | 2         |           |
| 3.2.3                              | 2         |                  | 2        |          |          | 2                    |                                 |                                    |                               | 2              |                   |           | 2         |
| 3.3.1                              | 3         |                  | 3        |          |          | 3                    |                                 |                                    |                               | 3              |                   | 3         |           |
| 3.3.2                              | 3         |                  | 3        |          |          | 3                    |                                 |                                    |                               | 3              |                   | 3         |           |
| 3.4                                | 2         |                  | 2        |          |          | 2                    |                                 |                                    |                               | 2              |                   | 2         |           |
| 3.5                                | 1         |                  | 1        |          |          | 1                    |                                 |                                    |                               | 1              |                   |           | 1         |
| <b>Ques 3</b>                      | <b>16</b> | <b>2</b>         | <b>8</b> | <b>6</b> | <b>0</b> | <b>16</b>            | <b>0</b>                        | <b>0</b>                           | <b>0</b>                      | <b>16</b>      | <b>3</b>          | <b>10</b> | <b>3</b>  |
| 4.1                                | 2         | 2                |          |          |          | 2                    |                                 |                                    |                               | 2              | 2                 |           |           |
| 4.2                                | 3         |                  | 3        |          |          | 3                    |                                 |                                    |                               | 3              |                   | 3         |           |
| 4.3                                | 3         |                  | 3        |          |          | 3                    |                                 |                                    |                               | 3              |                   | 3         |           |
| 4.4                                | 3         |                  | 3        |          |          | 3                    |                                 |                                    |                               | 3              |                   | 3         |           |
| <b>Ques 4</b>                      | <b>11</b> | <b>2</b>         | <b>6</b> | <b>3</b> | <b>0</b> | <b>11</b>            | <b>0</b>                        | <b>0</b>                           | <b>0</b>                      | <b>11</b>      | <b>2</b>          | <b>9</b>  | <b>0</b>  |
| 5.1                                | 2         | 2                |          |          |          | 2                    |                                 |                                    |                               | 2              | 2                 |           |           |
| 5.2                                | 4         |                  | 4        |          |          | 4                    |                                 |                                    |                               | 4              |                   | 4         |           |
| 5.3                                | 3         |                  | 3        |          |          | 3                    |                                 |                                    |                               | 3              |                   |           | 3         |
| 5.4                                | 1         |                  | 1        |          |          | 1                    |                                 |                                    |                               | 1              |                   | 1         |           |
| 5.5                                | 4         |                  | 4        |          |          | 4                    |                                 |                                    |                               | 4              |                   |           | 4         |
| <b>Ques 5</b>                      | <b>14</b> | <b>2</b>         | <b>5</b> | <b>7</b> | <b>0</b> | <b>14</b>            | <b>0</b>                        | <b>0</b>                           | <b>0</b>                      | <b>14</b>      | <b>2</b>          | <b>5</b>  | <b>7</b>  |
| 6.1                                | 2         | 2                |          |          |          |                      | 2                               |                                    |                               | 2              | 2                 |           |           |
| 6.2                                | 2         |                  | 2        |          |          |                      | 2                               |                                    |                               | 2              |                   |           | 2         |
| 6.3                                | 2         |                  | 2        |          |          |                      | 2                               |                                    |                               | 2              |                   | 2         |           |
| 6.4                                | 5         |                  | 5        |          |          | 5                    |                                 |                                    |                               | 5              |                   | 5         |           |
| 6.5                                | 2         |                  | 2        |          |          | 2                    |                                 |                                    |                               | 2              | 2                 |           |           |
| <b>Ques 6</b>                      | <b>13</b> | <b>2</b>         | <b>7</b> | <b>4</b> | <b>0</b> | <b>0</b>             | <b>13</b>                       | <b>0</b>                           | <b>0</b>                      | <b>13</b>      | <b>4</b>          | <b>7</b>  | <b>2</b>  |
| 7.1                                | 2         | 2                |          |          |          |                      |                                 | 2                                  |                               | 2              | 2                 |           |           |
| 7.2                                | 3         |                  | 3        |          |          |                      |                                 | 3                                  |                               | 3              |                   | 3         |           |
| 7.3.1                              | 3         |                  | 3        |          |          |                      |                                 | 3                                  |                               | 3              |                   |           | 3         |
| 7.3.2                              | 3         |                  | 3        |          |          |                      |                                 | 3                                  |                               | 3              |                   | 3         |           |

| SUBJECT: PHYSICAL SCIENCES PAPER 1 |           |                  |          |           |          |                      |                                 |                                    |                               |           | GRADE 12          |           |           |
|------------------------------------|-----------|------------------|----------|-----------|----------|----------------------|---------------------------------|------------------------------------|-------------------------------|-----------|-------------------|-----------|-----------|
| ANALYSIS GRID                      |           |                  |          |           |          |                      |                                 |                                    |                               |           | SEPTEMBER 2022    |           |           |
| QUESTION                           | Mark      | Cognitive Levels |          |           |          | Topics               |                                 |                                    |                               | TOTAL     | Difficulty Levels |           |           |
|                                    |           | 1                | 2        | 3         | 4        | Mechanics ≈ 65 Marks | Waves, Sound & Light ≈ 15 Marks | Electricity & Magnetism ≈ 55 Marks | Matter & Materials ≈ 15 Marks |           | Easy              | Moderate  | Difficult |
| 7.4.1                              | 3         |                  |          |           | 3        |                      |                                 | 3                                  |                               | 3         |                   | 3         |           |
| <b>Ques 7</b>                      | <b>14</b> | <b>2</b>         | <b>3</b> | <b>6</b>  | <b>3</b> | <b>0</b>             | <b>0</b>                        | <b>14</b>                          | <b>0</b>                      | <b>14</b> | <b>2</b>          | <b>9</b>  | <b>3</b>  |
| 8.1                                | 2         | 2                |          |           |          |                      |                                 | 2                                  |                               | 2         | 2                 | 2         |           |
| 8.2                                | 1         |                  | 1        |           |          |                      |                                 | 1                                  |                               | 1         | 1                 |           |           |
| 8.3                                | 2         |                  | 2        |           |          |                      |                                 | 2                                  |                               | 2         | 2                 |           |           |
| 8.4.1                              | 4         |                  |          | 4         |          |                      |                                 | 4                                  |                               | 4         |                   | 4         |           |
| 8.4.2                              | 3         |                  |          | 3         |          |                      |                                 | 3                                  |                               | 3         |                   | 3         |           |
| 8.5                                | 4         |                  | 4        |           |          |                      |                                 | 4                                  |                               | 4         | 4                 |           |           |
| <b>Ques 8</b>                      | <b>16</b> | <b>2</b>         | <b>6</b> | <b>8</b>  | <b>0</b> | <b>0</b>             | <b>0</b>                        | <b>16</b>                          | <b>0</b>                      | <b>16</b> | <b>2</b>          | <b>7</b>  | <b>7</b>  |
| 9.1.1                              | 3         |                  |          | 3         |          |                      |                                 | 3                                  |                               | 3         | 3                 |           |           |
| 9.1.2                              | 1         | 1                |          |           |          |                      |                                 | 1                                  |                               | 1         | 1                 |           |           |
| 9.2                                | 2         |                  | 2        |           |          |                      |                                 | 2                                  |                               | 2         |                   | 2         |           |
| 9.3                                | 1         |                  |          | 1         |          |                      |                                 | 1                                  |                               | 1         | 1                 |           |           |
| 9.4                                | 1         |                  | 1        |           |          |                      |                                 | 1                                  |                               | 1         | 1                 |           |           |
| 9.5                                | 1         |                  |          | 1         |          |                      |                                 | 1                                  |                               | 1         |                   | 1         |           |
| 9.6.1                              | 3         |                  |          | 3         |          |                      |                                 | 3                                  |                               | 3         | 3                 |           |           |
| 9.6.2                              | 5         |                  |          | 5         |          |                      |                                 | 5                                  |                               | 5         |                   | 5         |           |
| 9.6.3                              | 2         |                  |          | 2         |          |                      |                                 | 2                                  |                               | 2         | 2                 |           |           |
| <b>Ques 9</b>                      | <b>19</b> | <b>1</b>         | <b>3</b> | <b>14</b> | <b>1</b> | <b>0</b>             | <b>0</b>                        | <b>19</b>                          | <b>0</b>                      | <b>19</b> | <b>8</b>          | <b>5</b>  | <b>6</b>  |
| 10.1                               | 1         |                  | 1        |           |          |                      |                                 |                                    | 1                             | 1         |                   | 1         |           |
| 10.2                               | 5         |                  | 5        |           |          |                      |                                 |                                    | 5                             | 5         |                   | 5         |           |
| 10.3.1                             | 2         | 2                |          |           |          |                      |                                 |                                    | 2                             | 2         | 2                 |           |           |
| 10.3.2                             | 3         |                  |          | 3         |          |                      |                                 |                                    | 3                             | 3         | 3                 |           |           |
| 10.3.3                             | 2         |                  |          |           | 2        |                      |                                 |                                    | 2                             | 2         |                   | 2         |           |
| <b>Ques 10</b>                     | <b>13</b> | <b>2</b>         | <b>6</b> | <b>3</b>  | <b>2</b> | <b>0</b>             | <b>0</b>                        | <b>0</b>                           | <b>13</b>                     | <b>13</b> | <b>5</b>          | <b>2</b>  | <b>6</b>  |
| <b>SUMMARY</b>                     |           |                  |          |           |          |                      |                                 |                                    |                               |           |                   |           |           |
| <b>QUES 1</b>                      | <b>20</b> | <b>6</b>         | <b>4</b> | <b>8</b>  | <b>2</b> | <b>10</b>            | <b>2</b>                        | <b>6</b>                           | <b>2</b>                      | <b>20</b> | <b>10</b>         | <b>6</b>  | <b>4</b>  |
| <b>QUES 2</b>                      | <b>14</b> | <b>2</b>         | <b>3</b> | <b>2</b>  | <b>7</b> | <b>14</b>            | <b>0</b>                        | <b>0</b>                           | <b>0</b>                      | <b>14</b> | <b>5</b>          | <b>2</b>  | <b>7</b>  |
| <b>QUES 3</b>                      | <b>16</b> | <b>2</b>         | <b>8</b> | <b>6</b>  | <b>0</b> | <b>16</b>            | <b>0</b>                        | <b>0</b>                           | <b>0</b>                      | <b>16</b> | <b>3</b>          | <b>10</b> | <b>3</b>  |
| <b>QUES 4</b>                      | <b>11</b> | <b>2</b>         | <b>6</b> | <b>3</b>  | <b>0</b> | <b>11</b>            | <b>0</b>                        | <b>0</b>                           | <b>0</b>                      | <b>11</b> | <b>2</b>          | <b>9</b>  | <b>0</b>  |
| <b>QUES 5</b>                      | <b>14</b> | <b>2</b>         | <b>5</b> | <b>7</b>  | <b>0</b> | <b>14</b>            | <b>0</b>                        | <b>0</b>                           | <b>0</b>                      | <b>14</b> | <b>2</b>          | <b>5</b>  | <b>7</b>  |
| <b>QUES 6</b>                      | <b>13</b> | <b>2</b>         | <b>7</b> | <b>4</b>  | <b>0</b> | <b>0</b>             | <b>13</b>                       | <b>0</b>                           | <b>0</b>                      | <b>13</b> | <b>4</b>          | <b>7</b>  | <b>2</b>  |
| <b>QUES 7</b>                      | <b>14</b> | <b>2</b>         | <b>3</b> | <b>6</b>  | <b>3</b> | <b>0</b>             | <b>0</b>                        | <b>14</b>                          | <b>0</b>                      | <b>14</b> | <b>2</b>          | <b>9</b>  | <b>3</b>  |
| <b>QUES 8</b>                      | <b>16</b> | <b>2</b>         | <b>6</b> | <b>8</b>  | <b>0</b> | <b>0</b>             | <b>0</b>                        | <b>16</b>                          | <b>0</b>                      | <b>16</b> | <b>2</b>          | <b>7</b>  | <b>7</b>  |
| <b>QUES 9</b>                      | <b>19</b> | <b>1</b>         | <b>3</b> | <b>14</b> | <b>1</b> | <b>0</b>             | <b>0</b>                        | <b>19</b>                          | <b>0</b>                      | <b>19</b> | <b>8</b>          | <b>5</b>  | <b>6</b>  |
| <b>QUES 10</b>                     | <b>13</b> | <b>2</b>         | <b>6</b> | <b>3</b>  | <b>2</b> | <b>0</b>             | <b>0</b>                        | <b>0</b>                           | <b>13</b>                     | <b>13</b> | <b>5</b>          | <b>2</b>  | <b>6</b>  |
| Total mark                         | 150       | 23               | 51       | 61        | 15       | 65                   | 15                              | 55                                 | 15                            | 150       | 43                | 62        | 45        |
| Norm mark                          | 150       | 22,5             | 52,5     | 60        | 15       | 65                   | 15                              | 55                                 | 15                            | 150       | 45                | 60        | 45        |
| Total %                            | 100       | 15               | 34       | 41        | 10       | 100                  | 100                             | 100                                | 100                           | 100       | 29                | 41        | 30        |
| Norm %                             | 100       | 15               | 35       | 40        | 10       |                      |                                 |                                    |                               | 0         | 30                | 40        | 30        |