



# education

DEPARTMENT: EDUCATION  
MPUMALANGA PROVINCE

**NATIONAL  
SENIOR CERTIFICATE  
NACIONALE  
SENIOR SERTIFIKAAT**

**GRADE/GRAAD 12**

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

**SEPTEMBER 2023**

**MARKING GUIDELINES/NASIENRIGLYNE**

**MARKS/PUNTE: 150**

**These marking guideline consists of 14 pages**

***Hierdie nasienriglyne bestaan uit 14 bladsye***



# QUESTION 1 / VRAAG 1

- 1.1 C ✓✓ (2)
  - 1.2 C ✓✓ (2)
  - 1.3 A ✓✓ (2)
  - 1.4 B ✓✓ (2)
  - 1.5 D ✓✓ (2)
  - 1.6 A ✓✓ (2)
  - 1.7 B ✓✓ (2)
  - 1.8 C ✓✓ (2)
  - 1.9 B ✓✓ (2)
  - 1.10 D ✓✓ (2)
- [20]**



## QUESTION 2 / VRAAG 2

### 2.1 Marking criteria/Nasienkriteria

If any one of the underlined key words/phrases in the **correct context** is omitted, deduct 1 mark. /Indien enige van die onderstreepte sleutelwoorde/frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.

When a net force acts on an object, the object will accelerate in the direction of the force and the acceleration is directly proportional to the resultant/net force and inversely proportional to the mass of the object. ✓✓

Wanneer 'n resulterende/netto krag op 'n voorwerp inwerk, versnel die voorwerp in die rigting van die krag teen 'n versnelling direk eweredig aan die resultante/netto krag en omgekeerd eweredig aan die massa van die voorwerp.

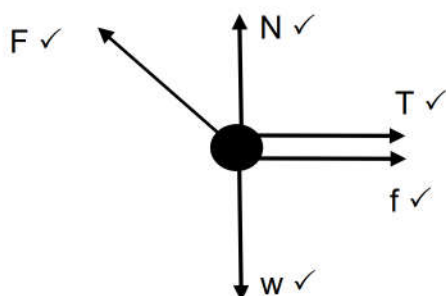
#### OR/OF

The resultant/net force acting on an object is equal to the rate of change of momentum of the object. **(2 or 0)**

Die resulterende/netto krag wat op 'n voorwerp inwerk is gelyk aan die tempo van verandering van momentum. **(2 of 0)**

(2)

### 2.2



(5)

#### Accepted labels / Aanvaarde benoemings

w	$F_g$ / $F_w$ / force of earth on block / weight / mg / gravitational force / VALUE
F	$F_{\text{applied}}$ / $F_A$ / Applied force
T	Tension in rope / $F_T$
F	$F_{\text{friction}}$ / $F_f$ / frictional force /
N	Normal force / $F_N$

#### Notes/Aantekeninge:

- Mark awarded for label and arrow.
- Any additional forces: deduct 1 mark: max  $\frac{4}{5}$
- No labels: deduct 1 mark: max  $\frac{4}{5}$
- If everything correct, but no arrows: deduct 1 mark:  $\frac{4}{5}$
- Force(s) not touching object: deduct 1 mark: max  $\frac{4}{5}$
- Ignore relative sizes of the vectors



2.3.1 **Marking criteria/Nasienkriteria:**

- Formula for block A or block B ✓
- Substitution of  $F_{\text{net}}$  for block A ✓
- Substitution of  $F_{\text{net}}$  for block B ✓
- 8a **OR** 4a ✓
- Answer ✓

For Block A:

$$F_{\text{net}} = ma$$

$$F_x + (-T) + (-f) = ma$$

$$(75)\cos 25^\circ - T - 11,76 \checkmark = 4a \checkmark$$

$$56,21 - T = 4a$$

$$T = -4a + 56,21$$

For Block B:

$$F_{\text{net}} = ma$$

$$F_g + T + (-F) = ma$$

$$78,4 + T - 96 \checkmark = 8a$$

$$T - 17,6 = 8a$$

$$T = 8a + 17,6$$

$$\therefore -4a + 56,21 = 8a + 17,6$$

$$12a = 38,61$$

$$a = 3,22 \text{ m}\cdot\text{s}^{-2} \checkmark$$

(5)

2.3.2 **POSITIVE MARKING FROM QUESTION 2.3.1**

**Marking criteria/Nasienkriteria:**

- Substitution to calculate T ✓
- Answer ✓

For Block A:

$$T = -4a + 56,21$$

$$= (-4)(3,22) + 56,21 \checkmark$$

$$= 43,33 \text{ N} \checkmark$$

For Block B:

$$T = 8a + 17,6$$

$$= (8)(3,22) + 17,6$$

$$= 43,36 \text{ N}$$

(2)

[14]

**QUESTION 3 / VRAAG 3**

- 3.1 An object which has been given an initial velocity and then it moves under the influence of the gravitational force only. ✓ ✓ **(2 or 0)**

'n Voorwerp waaraan 'n beginsnelheid gegee is en wat dan slegs onder die invloed van die gravitasiekrag beweeg. **(2 or 0)**

(2)

3.2.1

**Upwards positive/**

**Opwaarts positief:**

$$\Delta y = v_i \Delta t + \frac{1}{2} a \Delta t^2 \checkmark$$

$$-48 \checkmark = v_i(2,8) + \frac{1}{2}(-9,8)(2,8)^2 \checkmark$$

$$v_i = -3,42$$

$$v_i = 3,42 \text{ m}\cdot\text{s}^{-1} \checkmark$$

**Downwards positive/**

**Afwaarts positief:**

$$\Delta y = v_i \Delta t + \frac{1}{2} a \Delta t^2 \checkmark$$

$$48 \checkmark = v_i(2,8) + \frac{1}{2}(9,8)(2,8)^2 \checkmark$$

$$v_i = 3,42 \text{ m}\cdot\text{s}^{-1} \checkmark$$

(4)



3.2.2 **POSITIVE MARKING FROM QUESTION 3.2.1**  
**POSITIEWE NASIEN VANAF VRAAG 3.2.1**

<b>OPTION 1</b> <b>Upwards Positive/</b> <b>Opwaarts positief</b> $v_f = v_i + a \Delta t$ ✓ $v_f = -3,42 + (-9,8)(2,8)$ ✓ $v_f = -30,86 \text{ m} \cdot \text{s}^{-1}$ $v_f = 30,86 \text{ m} \cdot \text{s}^{-1}$ ✓	<b>Downwards Positive/</b> <b>Afwaarts positief</b> $v_f = v_i + a \Delta t$ ✓ $v_f = 3,42 + (9,8)(2,8)$ ✓ $v_f = 30,86 \text{ m} \cdot \text{s}^{-1}$ ✓
<b>OPTION 2</b> <b>Upwards Positive/</b> <b>Opwaarts positief</b> $v_f^2 = v_i^2 + 2a \Delta y$ ✓ $v_f^2 = (-3,42)^2 + 2(-9,8)(-48)$ ✓ $v_f = 30,86 \text{ m} \cdot \text{s}^{-1}$ ✓	<b>Downwards Positive/</b> <b>Afwaarts positief</b> $v_f^2 = v_i^2 + 2a \Delta y$ ✓ $v_f^2 = (3,42)^2 + 2(9,8)(48)$ ✓ $v_f = 30,86 \text{ m} \cdot \text{s}^{-1}$ ✓
<b>OPTION 3</b> <b>Upwards Positive/</b> <b>Opwaarts positief</b> $\Delta x = \frac{(v_f + v_i)}{2} \Delta t$ ✓ $-48 = \frac{(v_f - 3,42)}{2} 2,8$ ✓ $v_f = -30,87 \text{ m} \cdot \text{s}^{-1}$ $v_f = 30,87 \text{ m} \cdot \text{s}^{-1}$ ✓	<b>Downwards Positive/</b> <b>Afwaarts positief</b> $\frac{(v_f + v_i)}{2} \Delta t$ ✓ $48 = \frac{(v_f + 3,42)}{2} 2,8$ ✓ $v_f = 30,87 \text{ m} \cdot \text{s}^{-1}$ ✓
<b>OPTION 4</b> $(E_m)_A = (E_m)_B$ $(mgh + \frac{1}{2}mv^2)_A = (mgh + \frac{1}{2}mv^2)_B$ } Any one ✓ Enige een $\frac{m(9,8)(48) + \frac{1}{2}m(3,42)^2}{v} = 0 + \frac{1}{2}mv^2$ ✓ $v = 30,86 \text{ m} \cdot \text{s}^{-1}$ ✓	
<b>OPTION 5</b> $F_{\text{net}} \Delta t = \Delta p$ $F_{\text{net}} \Delta t = mv_f - mv_i$ $mg \Delta t = mv_f - mv_i$ $g \Delta t = v_f - v_i$ $(9,8)(2,9) = v_f - 3,42$ ✓ $v = 30,86 \text{ m} \cdot \text{s}^{-1}$ ✓                 } Any one ✓ Enige een	

(3)

3.2.3 **Upwards positive /**  
**Opwaarts positief**  
 $v_f^2 = v_i^2 + 2a \Delta y$  ✓  
 $0 = v_i^2 + 2(-9,8)(8)$  ✓  
 $v_i = 12,52 \text{ m} \cdot \text{s}^{-1}$  ✓

**Downwards positive/**  
**Afwaarts positief**  
 $v_f^2 = v_i^2 + 2a \Delta y$  ✓  
 $0 = v_i^2 + 2(9,8)(-8)$  ✓  
 $v_i = 12,52 \text{ m} \cdot \text{s}^{-1}$  ✓

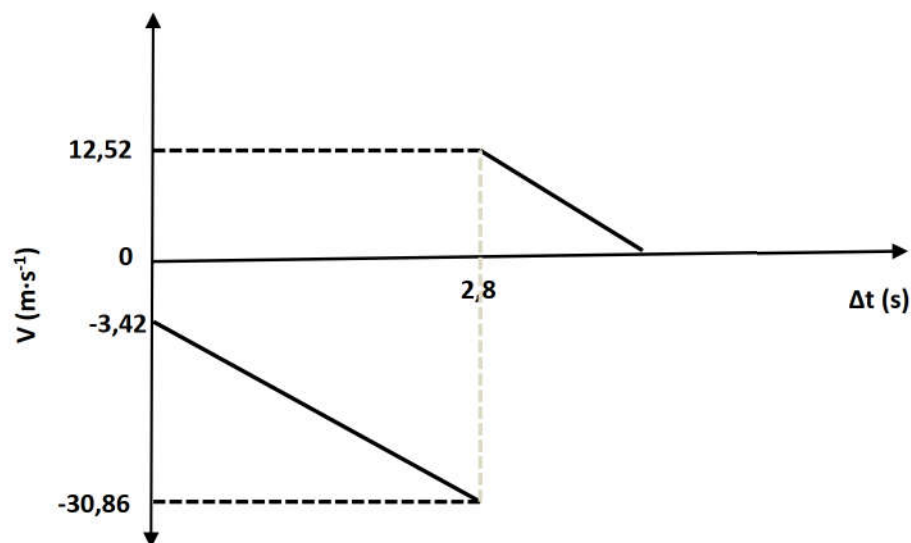
(3)

3.3

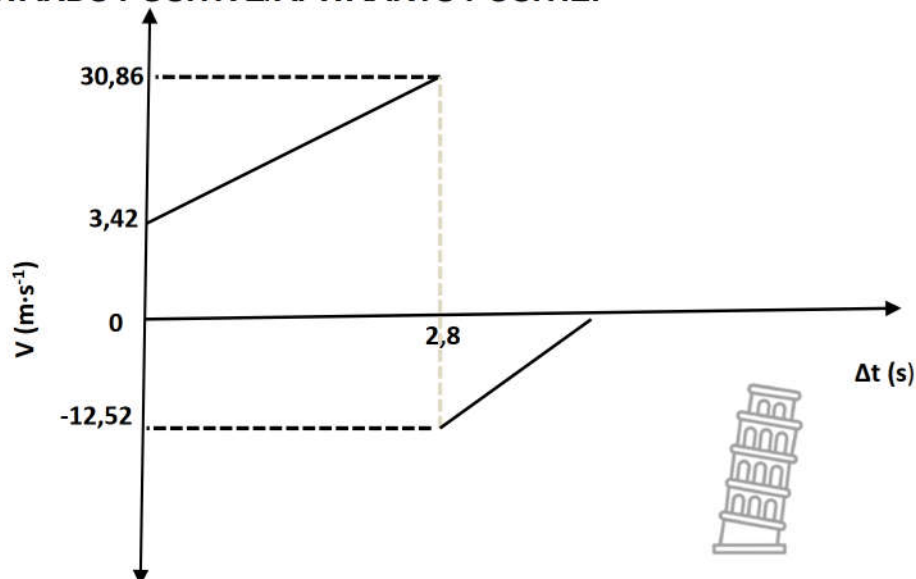
**Marking criteria/Nasienkriteria:**

- Initial velocity with which the ball was thrown (3.2.1) ✓
- Beginsnelheid waarmee bal gegooi is
- Final velocity with which the ball hit the ground (3.2.2) ✓
- Eindsnelheid waarmee die bal die grond tref
- Time taken to hit the ground (2,8 s) ✓
- Tyd om die grond te tref (2,8 s)
- The velocity with which the ball bounces off the ground – line parallel to other line (3.2.3) ✓
- Die snelheid waarmee die bal van die grond as bons – lyn parallel met ander lyn

**POSITIVE MARKING FROM/POSITIEWE MERK VANAF 3.2.1., 3.2.2 & 3.2.3  
UPWARDS POSITIVE/OPWAARTS POSITIEF**



**DOWNWARDS POSITIVE/AFWAARTS POSITIEF**



(4)  
[16]

# QUESTION 4 / VRAAG 4

4.1

## Marking criteria/Nasienkriteria

If any one of the underlined key words/phrases in the **correct context** is omitted, deduct 1 mark. /Indien enige van die onderstreepte sleutelwoorde/frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.

The total (linear) momentum of an isolated/closed system remains constant/is conserved. ✓✓

Die totale (lineêre) momentum in 'n geïsoleerde sisteem bly konstant/behoue.

(2)

4.2.1

## TAKE TO THE LEFT AS POSITIVE/NEEM LINKS AS POSITIEF

$$\begin{aligned} \Sigma p_i &= \Sigma p_f \\ (mv_i)_1 + (mv_i)_2 &= (mv_f)_1 + (mv_f)_2 \end{aligned} \quad \left. \begin{array}{l} \\ \end{array} \right\} \text{✓ Any one/enige een}$$

$$(0,015)(-45) + (8,45)(0) \quad \checkmark = (0,015)(10,60) + (8,45)(v_f) \quad \checkmark$$

$$v = -0,10 \text{ m} \cdot \text{s}^{-1}$$

$$v = 0,10 \text{ m} \cdot \text{s}^{-1} \quad \checkmark$$

## TAKE TO THE RIGHT AS POSITIVE/NEEM REGS AS POSITIEF

$$\begin{aligned} \Sigma p_i &= \Sigma p_f \\ (mv_i)_1 + (mv_i)_2 &= (mv_f)_1 + (mv_f)_2 \end{aligned} \quad \left. \begin{array}{l} \\ \end{array} \right\} \text{✓ Any one/enige een}$$

$$(0,015)(45) + (8,45)(0) \quad \checkmark = (0,015)(-10,60) + (8,45)(v_f) \quad \checkmark$$

$$v = 0,10 \text{ m} \cdot \text{s}^{-1} \quad \checkmark$$

(4)

4.2.2

## POSITIVE MARKING FROM QUESTION 4.2.1

### OPTION 1

$$v_f^2 = v_i^2 + 2a \Delta y$$

$$0^2 \quad \checkmark = (0,10)^2 + 2(a)(1,32) \quad \checkmark$$

$$a = -0,00378 \text{ m} \cdot \text{s}^{-2} \quad (a = -3,79 \times 10^{-3} \text{ m} \cdot \text{s}^{-2})$$

$$F_{\text{net}} = ma \quad \checkmark$$

$$f = (8,45)(-0,00378) \quad \checkmark$$

$$f = 0,03 \text{ N} \quad \checkmark$$

## POSITIVE MARKING FROM QUESTION 4.2.1

### OPTION 2

$$v_f^2 = v_i^2 + 2a \Delta y$$

$$0^2 = (0,10)^2 + 2(a)(1,32) \quad \checkmark$$

$$a = -0,00378 \text{ m} \cdot \text{s}^{-2} \quad (a = -3,79 \times 10^{-3} \text{ m} \cdot \text{s}^{-2})$$

$$v_f = v_i + a \Delta t$$

$$0 = 0,10 + (-0,00378) \Delta t$$

$$\Delta t = 26,39 \text{ s} \quad \checkmark$$

$$F_{\text{net}} \Delta t = mv_f - mv_i \quad \checkmark$$

$$f(26,39) = (8,45)(0) - (8,45)(0,10) \quad \checkmark$$

$$f = -0,03 \text{ N}$$

$$f = 0,03 \text{ N} \quad \checkmark$$



(5)

[11]



## QUESTION 5 / VRAAG 5

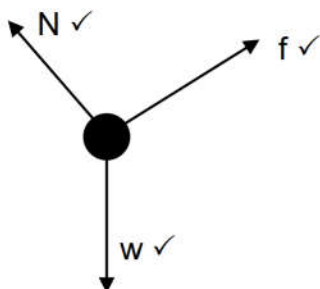
### 5.1 Marking criteria/Nasienkriteria

If any one of the underlined key words/phrases in the **correct context** is omitted, deduct 1 mark. /Indien enige van die onderstreepte sleutelwoorde/frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.

A force for which the work done in moving an object between two points depends on the path taken. ✓✓

'n Krag waarvoor die arbeid verrig om 'n voorwerp tussen twee punte te beweeg, afhanklik is van die roete wat gevolg word. (2)

5.2



(3)

### Accepted labels / Aanvaarde benoemings

w	$F_g$ / $F_w$ / force of earth on block / weight / mg / gravitational force /
f	$F_{\text{friction}}$ / $F_f$ / frictional force
N	Normal force / $F_N$

5.3

$$f_k = \mu_k N \quad N = F_{g\perp}$$

$$= (0,45)(449,81) \quad = (53)(9,8)\cos 30^\circ$$

$$= 202,42 \text{ N} \quad = 449,81 \text{ N}$$

(3)

### 5.4 Marking criteria/Nasienkriteria

If any one of the underlined key words/phrases in the **correct context** is omitted, deduct 1 mark. /Indien enige van die onderstreepte sleutelwoorde/frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.

The net work done on an object is equal to the change in kinetic energy of the object. ✓✓

Die netto arbeid verrig op 'n voorwerp is gelyk aan die verandering in kinetiese energie van die voorwerp **OF** die arbeid verrig op die voorwerp deur 'n netto krag is gelyk aan die verandering in kinetiese energie van die voorwerp. (2)

### 5.5 **POSITIVE MARKING FROM Q5.3**

#### **OPTION 1**

$$W_{\text{net}} = \Delta E_k$$

$$f\Delta x \cos \theta + N\Delta x \cos \theta + F_g\Delta x \cos \theta = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$$

$$(202,42)(35)\cos 180^\circ + 0 + (53)(9,8)(35)\cos 60^\circ = \frac{1}{2}(53)v_f^2 - 0$$

$$v_f = 8,70 \text{ m}\cdot\text{s}^{-1}$$

} Any one ✓





**OPTION 2**

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

$$f \Delta x \cos \theta = [\frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2] + [mgh_f - mgh_i]$$

$$(202,42)(35)\cos 180^\circ = [\frac{1}{2}(53)v_f^2 - 0] + [(53)(9,8)(17,5) - (53)(9,8)(35)]$$

$$v_f = 8,70 \text{ m}\cdot\text{s}^{-1}$$

} Any one ✓

(5)

[15]



**QUESTION 6 / VRAAG 6**

6.1 Doppler effect / effek ✓

(1)

6.2

$$v = f \lambda$$

$$340 = 780 \lambda$$

$$\lambda = 0,44 \text{ m}$$

(2)

6.3 Waves in front of source are more compact/ wavelength decreases ✓  
More waves per second reaches the listener ✓

Golwe voor die bron is meer kompak/ golflengte neem af  
Meer golwe per sekonde bereik die luisteraar

(2)

6.4.1

$$f_L = \frac{v \pm v_L}{v \pm v_S} f_S \quad \text{OR} \quad f_L = \frac{v}{v - v_S} f_S$$

$$850 = \left( \frac{340 + v_L}{340 + 0} \right) 780$$

$$v_L = 30,51 \text{ m}\cdot\text{s}^{-1}$$

(5)

6.4.2

$$v_f^2 = v_i^2 + 2a\Delta y$$

$$(30,51)^2 = 0^2 + 2a(83,11)$$

$$a = 5,60 \text{ m}\cdot\text{s}^{-2}$$

(3)

[13]



## QUESTION 7 / VRAAG 7

7.1

### Marking criteria/Nasienkriteria

If any one of the underlined key words/phrases in the **correct context** is omitted, deduct 1 mark. /Indien enige van die onderstreepte sleutelwoorde/frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.

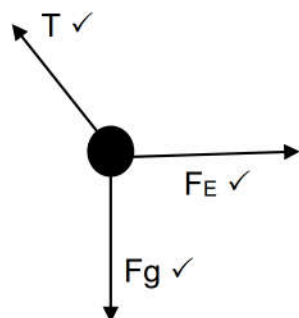
**Note:** If masses used ( 0/2 )

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 the charges ✓ and inversely proportional to the square of the distance ( $r$ ) between them ✓

Die grootte van die elektrostatiese krag wat een puntlading ( $Q_1$ ) op 'n ander puntlading ( $Q_2$ ) uitoefen, 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



### Accepted labels / Aanvaarde benoemings

W	$F_g$ / $F_w$ / force of earth on block / weight / $mg$ / gravitational force / 0,392 N
$F_E$	Electrostatic force
T	Tension in rope / $F_T$

(3)

### Notes/Aantekeninge:

- Any additional forces: deduct 1 mark: max  $2/3$
- No labels: deduct 1 mark: max  $2/3$
- No arrows: 0/3
- Force(s) not touching object: deduct 1 mark: max  $2/3$
- Ignore relative sizes of the vectors



7.3.1  $F = \frac{kQ_1Q_2}{r^2} \checkmark$   
 $= \frac{(9 \times 10^9)(30 \times 10^{-6})(20 \times 10^{-6})}{(0,8)^2} \checkmark$   
 $F = 8,44 \text{ N} \checkmark \quad (8,4375 \text{ N})$

(3)

7.3.2  $F_g = mg$   
 $= (0,09)(9,8)$   
 $= 0,882 \text{ N} \checkmark$   
 $T^2 = F_e^2 + F_g^2 \checkmark$   
 $= (8,44)^2 + (0,88)^2 \checkmark$   
 $T = 8,49 \text{ N} \checkmark$

(4)

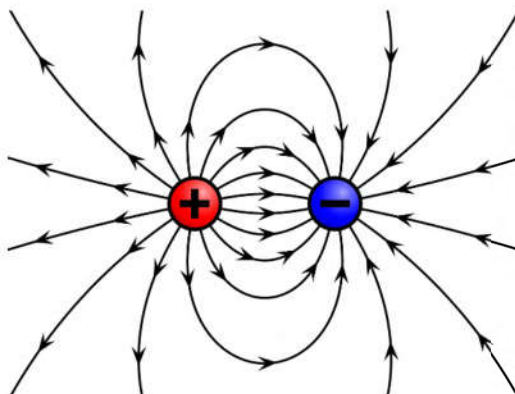
[12]

### QUESTION 8 / VRAAG 8

- 8.1 **Marking criteria/Nasienriglyne:**  
 -1 mark for each of the 3 key words omitted in the correct context.  
 -1 punt vir elk van die 3 sleutelwoorde weggelaat in die korrekte konteks.  
 The electric field is an area in space where an electric charge experiences a force.  $\checkmark \checkmark$   
 Die elektriese veld is 'n gebied in die ruimte waarin 'n elektriese lading 'n krag ondervind

(2)

8.2



Criteria for sketch/Kriteria vir skets	Marks/Punte
Correct shape as shown. Korrekte vorm soos getoon.	$\checkmark$
Direction away from positive to negative. Rigting weg van positief na negatief.	$\checkmark$
Field lines start on spheres and do not cross for correct diagram. Veldlyne begin op elke sfeer en kruis nie vir korrekte diagram.	$\checkmark$

(3)



8.3

$$E_{\text{nett}} = E_1 + E_2$$

$$E_{\text{net}} = \frac{kQ}{r^2} - \frac{kQ}{r^2} \quad \checkmark \quad (\text{Mark for/Punt vir } \frac{kQ}{r^2})$$

$$\checkmark 4\,128 = \frac{(9 \times 10^9)(5 \times 10^{-9})}{r^2} \checkmark - \checkmark \frac{(9 \times 10^9)(4 \times 10^{-9})}{(4r)^2} \checkmark$$

$$4\,128 = \frac{45}{r^2} - \frac{36}{16r^2}$$

$$r = 0,10 \text{ m} \checkmark$$

(6)  
[11]

### QUESTION 9 / VRAAG 9

9.1 24 Joule  $\checkmark$  per unit coulomb charge work done.  $\checkmark$

Arbeid van 24 Joule per eenheid coulomb lading

(2)

9.2.1

$$r_i = \frac{\text{lost V}}{I} \checkmark$$

$$I = \frac{24 - 22,3}{0,5} \checkmark$$

$$= 3,4 \text{ A} \checkmark$$

(3)

9.2.2

#### **POSITIVE MARKING FROM Q9.2.1**

$$\begin{aligned} V_{3\Omega} &= IR \\ &= 3,4(3) \checkmark \\ &= 10,2 \text{ V} \end{aligned}$$

$$\begin{aligned} V_{\parallel} &= 22,3 - 10,2 \checkmark \\ &= 12,1 \text{ V} \end{aligned}$$

$$P_{18\Omega} = \frac{V^2}{R} \checkmark$$

$$\begin{aligned} P_{18\Omega} &= \frac{(12,1)^2}{18} \checkmark \\ &= 8,314 \text{ W} \checkmark \end{aligned}$$

(5)

9.2.3

#### **POSITIVE MARKING FROM Q9.2.1 & Q9.2.2**

$$I_{6\Omega} = \frac{V}{R} \checkmark$$

$$\begin{aligned} &= \frac{12,1}{6} \checkmark \\ &= 2,02 \text{ A} \end{aligned}$$

$$I_{18\Omega} = \frac{V}{R}$$

$$\begin{aligned} &= \frac{12,1}{18} \checkmark \\ &= 0,67 \text{ A} \end{aligned}$$

$$\begin{aligned} I_R &= I_{\text{tot}} - I_{6\Omega} - I_{18\Omega} \\ &= 3,4 - 2,02 - 0,67 \\ &= 0,71 \text{ A} \checkmark \end{aligned}$$



(4)

- 9.3 Increase ✓  
 R (18Ω) remains constant,  $V_{||}$  increases ✓  
 Current in circuit decreases  
 $P = \frac{V^2}{R}$  ✓

(3)  
[17]

### QUESTION 10 / VRAAG 10

- 10.1 Kinetic/mechanical energy TO electrical energy ✓✓  
*Kinetiese/meganiese energie NA elektriese energie*

(2)

- 10.2 Slip rings (AC) and split rings (DC) ✓  
 Sleepringe (WS) en splitringe (GS)

(1)

10.3

#### OPTION 1

$$P_{ave} = I_{rms}^2 R \checkmark$$

$$100 = I_{rms}^2 (3) \checkmark$$

$$I_{rms} = 5,77A$$

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

$$5,77 = \frac{I_{max}}{\sqrt{2}} \checkmark$$

$$I_{max} = 8,16A \checkmark$$

#### OPTION 2

$$P_{ave} = I_{rms}^2 R \checkmark$$

$$100 \checkmark = \frac{I_{max}^2}{2} \checkmark (3) \checkmark$$

$$I_{max} = 8,16A \checkmark$$

(5)  
[8]

### QUESTION 11 / VRAAG 11

11.1 **Marking criteria/Nasienkriteria**

If any one of the underlined key words/phrases in the **correct context** is omitted, deduct 1 mark. /Indien enige van die onderstreepte sleutelwoorde/frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.

The minimum energy that an electron in the metal needs to be emitted from the metal surface. ✓✓

Die minimum energie benodig om 'n elektron uit die oppervlak van 'n metaal vry te stel.

(2)

- 11.2 Light source A – higher frequency than  $f_0$  ✓  
**OR** Light source B – lower frequency than  $f_0$

Ligbron A – hoër frekwensie as  $f_0$

**OF** Ligbron B – laer frekwensie as  $f_0$

Wavelength  $\propto \frac{1}{f}$  ✓

Golflengte  $\propto \frac{1}{f}$

(2)



11.3.1

$$W_0 = \frac{hc}{\lambda_0} \checkmark$$

$$= \frac{(6,63 \times 10^{-34})(3 \times 10^8)}{570 \times 10^{-9}} \checkmark$$

$$= 3,489 \times 10^{-19} \text{ J } \checkmark$$

(3)

11.3.2

**POSITIVE MARKING FROM 11.3.1**

$$E = W_0 + E_{k(\max)} \checkmark$$

$$\frac{hc}{\lambda} = W_0 + \frac{1}{2}mv^2$$

$$\frac{(6,63 \times 10^{-34})(3 \times 10^8)}{480 \times 10^{-9}} \checkmark = (3,489 \times 10^{-19}) \checkmark + \frac{1}{2}(9,11 \times 10^{-31})v^2 \checkmark$$

$$v = 3,79 \times 10^5 \text{ m} \cdot \text{s}^{-1} \checkmark$$

(5)

11.4

Green/Groen ✓

(1)

[13]

**TOTAL/TOTAAL: 150**







# education

DEPARTMENT: EDUCATION  
MPUMALANGA PROVINCE

## ERRATA PHYISCAL SCIENCES 2023 GRADE 12 TRIAL PAPER 1

Question	Correction
1.5	Answer is A
5.5	Q5.5 should not be marked; statement was in complete.

**BASED ON Q5.5 ABOVE THE TOTAL OF THE PAPER IS NOW 145 MARKS**

