



education

**MPUMALANGA PROVINCE
REPUBLIC OF SOUTH AFRICA**

EHLANZENI DISTRICT

PHYSICAL SCIENCES

GRADE 12

PHYSICS & CHEMISTRY (P1 & P2)

MARCH CONTROL TEST (MARKING GUIDELINES)

2025

MARKS: 100

This marking guidelines consists of 10 pages

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Please turn over

QUESTION 1

- 1.1 B ✓✓ (2)
- 1.2 A ✓✓ (2)
- 1.3 D ✓✓ (2)
- 1.4 C ✓✓ (2)
- [08]**

QUESTION 2

- 2.1 A body will remain in its state of rest or motion at constant velocity unless a non-zero resultant/net force acts on it ✓✓

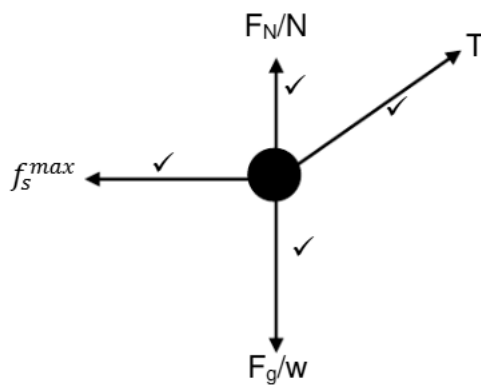
'n Liggaam sal in sy toestand van rus of beweging teen konstante snelheid beweeg tensy 'n nie-zero resultante/netto krag op dit inwerk. ✓✓

(2)

- 2.2.1 Zero/0 ✓ (1)

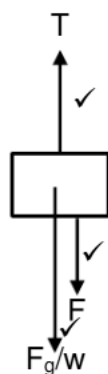
- 2.2.2 EAST ✓ (1)

2.3



(4)

2.4



(3)

Marking criteria / Merkgiglyne

- **Note:** If F_g/w does not start from the centre deduct 1 mark.
Nota: Indien F_g/w nie vanaf die middelpunt begin nie, trek 1 punt af.

2.5.1

Upwards as positive <i>Opwaarts as positief</i>	Upwards as negative <i>Opwaarts as negatief</i>
$F_{\text{net}} = ma \checkmark$ $T + (-F_g) + (-F) = ma$ $T + (5)(-9,8) + (-21) = 5(0) \checkmark$ $T = 70 \text{ N} \checkmark$	$F_{\text{net}} = ma \checkmark$ $-T + F_g + F = ma$ $-T + (5)(9,8) + (21) = 5(0) \checkmark$ $T = 70 \text{ N} \checkmark$

(3)

2.5.2

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

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

$$70\cos 60^\circ + (-0,25(9,8\text{m} - 70\sin 60^\circ)) \checkmark = 0 \checkmark$$

$$m = 20,472 \text{ kg} \checkmark$$

(3)

2.6 INCREASES✓

- The net force acting on the object will increase ✓

TOENEEM✓

- Die netto krag wat op die voorwerp inwerk sal verhoog.✓

(2)
[19]

QUESTION 3

3.1 Motion during which the only force acting on an object is the gravitational force ✓✓

Beweging waartydens die enigste krag wat op die voorwerp inwerk, gravitasie krag is. ✓✓

(2)

3.2.1 80 m ✓

(1)

3.2.2 $9,8 \text{ m}\cdot\text{s}^{-2}$ ✓ downwards / afwaarts ✓

(2)

3.3.1

Option 1	
Upwards as positive <i>Opwaarts as positief</i>	Upwards as negative <i>Opwaarts as negatief</i>
$v_f = v_i + a\Delta t$ ✓ $0 = v_i + (-9,8)(0,6)$ ✓ $v_i = \underline{5,88 \text{ m}\cdot\text{s}^{-1} \text{ upwards / opwaarts}}$ ✓	$v_f = v_i + a\Delta t$ ✓ $0 = v_i + (9,8)(0,6)$ ✓ $v_i = -5,88 \text{ m}\cdot\text{s}^{-1}$ $\therefore v_i = \underline{5,88 \text{ m}\cdot\text{s}^{-1} \text{ upwards / opwaarts}}$ ✓
Option 2	
Upwards as positive <i>Opwaarts as positief</i>	Upwards as negative <i>Opwaarts as negatief</i>
$\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$ ✓ $0 = v_i(1,2) + \frac{1}{2}(-9,8)(1,2)^2$ ✓ $v_i = \underline{5,88 \text{ m}\cdot\text{s}^{-1} \text{ upwards / opwaarts}}$ ✓	$\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$ ✓ $0 = v_i(1,2) + \frac{1}{2}(9,8)(1,2)^2$ ✓ $v_i = -5,88 \text{ m}\cdot\text{s}^{-1}$ $\therefore v_i = \underline{5,88 \text{ m}\cdot\text{s}^{-1} \text{ upwards/opwaarts}}$ ✓

(3)

3.3.2

Option 1	Option 2
$h = 80 - 55$ ✓ $h = 25 \text{ m}$ ✓	$h = -55 + 80$ ✓ $h = 25 \text{ m}$ ✓

(2)

3.3.3

Upwards as positive <i>Opwaarts as positief</i>	Upwards as negative <i>Opwaarts as negatief</i>
$v_f^2 = v_i^2 + 2a\Delta y$ ✓ $(0)^2 = v_i^2 + 2(-9,8)(60)$ ✓ $v_i = \underline{34,293 \text{ m}\cdot\text{s}^{-1} \text{ upwards / opwaarts}}$ ✓	$v_f^2 = v_i^2 + 2a\Delta y$ ✓ $(0)^2 = v_i^2 + 2(9,8)(-60)$ ✓ $v_i = \underline{34,293 \text{ m}\cdot\text{s}^{-1} \text{ upwards/opwaarts}}$ ✓

(3)

3.3.4

Upwards as positive <i>Opwaarts as positief</i>	Upwards as negative <i>Opwaarts as negatief</i>
$v_f^2 = v_i^2 + 2a\Delta y$ $v_f^2 = (5,88)^2 + 2(-9,8)(-80) \checkmark$ $v_f = 40,032 \text{ m}\cdot\text{s}^{-1} \text{ downwards}$ $v_f = v_i + a\Delta t \checkmark$ $-40,032 = 5,88 + (-9,8)\Delta t \checkmark$ $\Delta t = 4,685 \text{ s}$ $v_f = v_i + a\Delta t$ $0 = 34,293 + (-9,8)\Delta t \checkmark$ $\Delta t = 3,499 \text{ s}$ $\therefore t = 4,685 + 3,499 = 8,184 \text{ (s)} \checkmark$	$v_f^2 = v_i^2 + 2a\Delta y$ $v_f^2 = (-5,88)^2 + 2(9,8)(80) \checkmark$ $v_f = 40,032 \text{ m}\cdot\text{s}^{-1} \text{ downwards}$ $v_f = v_i + a\Delta t \checkmark$ $40,032 = -5,88 + (9,8)\Delta t \checkmark$ $\Delta t = 4,685 \text{ s}$ $v_f = v_i + a\Delta t$ $0 = -34,293 + (9,8) \Delta t \checkmark$ $\Delta t = 3,499 \text{ s}$ $\therefore t = 4,685 + 3,499 = 8,184 \text{ (s)} \checkmark$

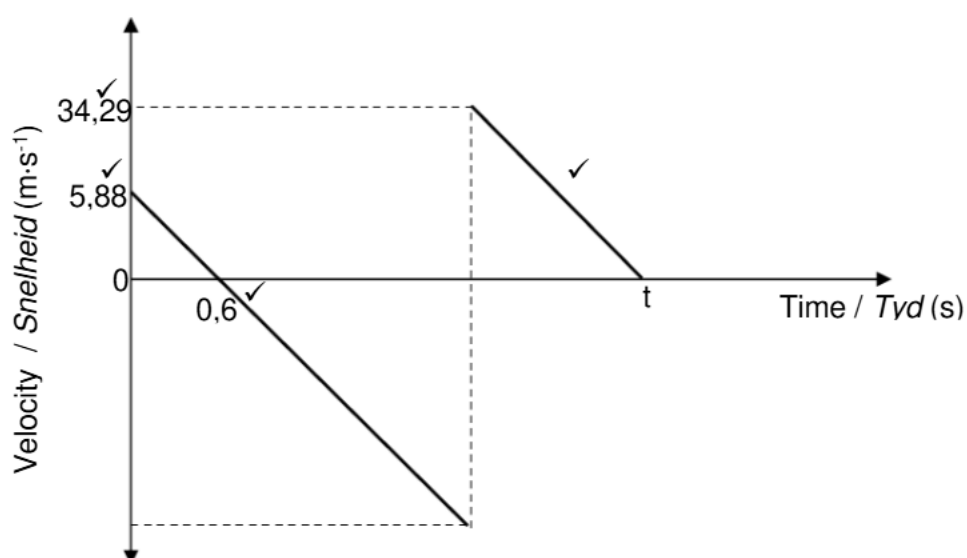
(5)

3.4

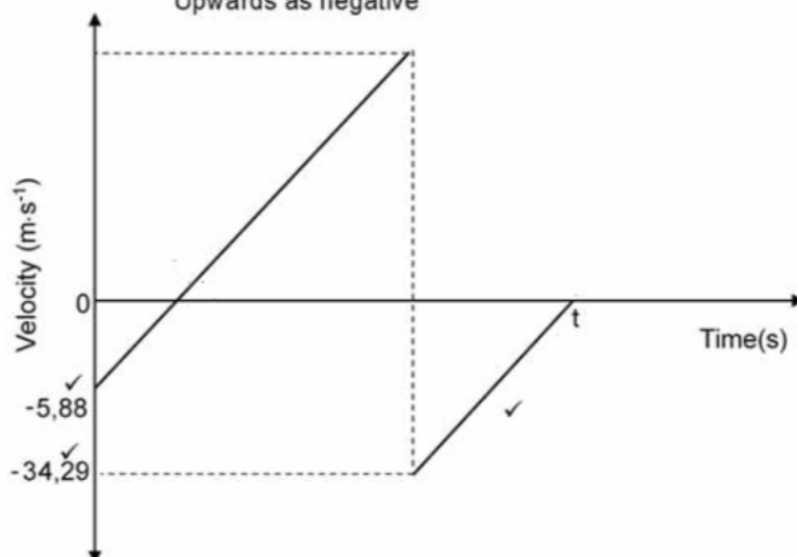
Marking criteria / Merkgiglyne

- Correct shape and ends at time, t . ✓ / Korrekte vorm en eindig by tyd t ✓
- Initial velocity ✓ / Aanvanklike snelheid ✓
- Velocity at which it leaves the ground after the first bounce. ✓ / Snelheid waarteen dit die grond verlaat na die eerste bons ✓
- Time taken to reach maximum height for the first time. ✓ / Tyd wat dit neem om die maksimum hoogte vir die eerste keer te bereik. ✓

Upwards as positive / Opwaarts as positief



Upwards as negative



(4)

QUESTION 4

- 4.1 Is a system on which the net external force is zero ✓✓ (2 or 0)
Is 'n sisteem waarvan die netto eksterne kragte zero is ✓✓ 2 of 0)

(2)

4.2.1

$$\sum E_{ki} = \frac{1}{2}mv^2 + \frac{1}{2}mv^2$$

$$38,5 = \frac{1}{2}(2)(4)^2 + \frac{1}{2}m(3)^2 \checkmark$$

$$m = 5 \text{ kg } \checkmark$$

(2)

4.2.2

Note: if direction is specified in the final answer, deduct 1 mark.**Nota:** Indien rigting gespesifiseer word in die finale antwoord, trek 1 punt af

East as positive / Oos as positief	East as negative / Oos as negatief
$\Delta p = m(v_f - v_i) \checkmark$	$\Delta p = m(v_f - v_i) \checkmark$
$-12,5 = 2(v_f - 4) \checkmark$	$12,5 = 2(v_f - (-4)) \checkmark$
$v_f = -2,25 \text{ m}\cdot\text{s}^{-1}$	$v_f = 2,25 \text{ m}\cdot\text{s}^{-1} \checkmark$
$\therefore v_f = 2,25 \text{ m}\cdot\text{s}^{-1} \checkmark$	

(3)

4.2.3

Option 1 / Opsie 1	
East as positive / Oos as positief	East as negative / Oos as negatief
$\sum p_i = \sum p_i \checkmark$	$\sum p_i = \sum p_i \checkmark$
$(2)(4) + (5)(-3) = (2)(-2,25) + 5v_2 \checkmark$	$(2)(-4) + (5)(3) = (2)(2,25) + 5v_2 \checkmark$
$v_2 = -0,5 \text{ m}\cdot\text{s}^{-1}$	$v_2 = 0,5 \text{ m}\cdot\text{s}^{-1} \text{ west / wes } \checkmark$
$\therefore v_2 = 0,5 \text{ m}\cdot\text{s}^{-1} \text{ west / wes } \checkmark$	
Option 2 / Opsie 2	
East as positive / Oos as positief	East as negative / Oos as negatief
$\Delta p = m(v_f - v_i) \checkmark$	$\Delta p = m(v_f - v_i) \checkmark$
$12,5 = 5(v_f - (-3)) \checkmark$	$-12,5 = 5(v_f - 3) \checkmark$
$v_f = -0,5 \text{ m}\cdot\text{s}^{-1}$	$v_f = 0,5 \text{ m}\cdot\text{s}^{-1} \text{ west } \checkmark$
$\therefore v_f = 0,5 \text{ m}\cdot\text{s}^{-1} \text{ west } \checkmark$	

(3)

4.3 EQUAL TO ✓

The trolleys exert forces of equal magnitude on each other and the time of contact during the collision is the same ✓ (**Accept:** the trolleys have equal magnitude of change in momentum).

GELYK AAN ✓

Die trollies oefen kragte uit op mekaar met gelyke grootte en die kontaktyd gedurende die botsing is dieselfde. ✓ (**Aanvaar:** die trollies het gelyke grootte van verandering in momentum).

(2)
[12]

QUESTION 5

5.1 A bond or an atom or a group of atoms that determine(s) the physical and chemical properties of a group of organic compounds ✓✓

'n Binding of 'n atom of 'n groep van atome wat die fisiese en chemiese eienskappe van 'n groep organiese verbindings bepaal ✓✓

(2)

5.2.1 $\text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3)\text{CHO}$ ✓✓

Marking criteria / Merk riglyne

- Ending with CHO ✓ / *Eindig met CHO* ✓
- Whole structure correct and CH_3 in brackets ✓ / *Hele struktuur korrek en CH_3 in hakies* ✓

(2)

5.2.2 3-methylbutanal ✓

Marking criteria / Merk riglyne

- 3-methyl / *3-metiel* ✓
- butanal / *butanaal* ✓

(2)

5.3.1 SECONDARY (HALO-ALKANE) ✓

The carbon atom with the halogen atom or the functional group is bonded to two other carbon atoms ✓

SEKONDÊRE (HALO-ALKAAN) ✓

Die koolstofatoom met die halogen atoom of die funksionele groep is gebind aan twee ander koolstofatome ✓

(2)



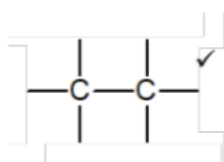
5.3.2 4-bromo-2,2-dimethylpentane / 4-bromo-2,2-dimetielpentaaan✓✓✓

Marking criteria

- Correct stem i.e. pentane.✓ / *Correct stam, pentaan* ✓
- All substituents (bromo and dimethyl) correctly identified.✓ / *Alle substituentte (bromo en dimetiel) is korrek geïdentifiseer.* ✓
- IUPAC name completely correct including numbering, sequence, hyphens and commas. ✓ / *IUPAC naam volledig korrek, insluitden nommering, volgende, koppelpunte en kommas* ✓

(3)

5.4.1



(1)

5.4.2 $2\text{C}_4\text{H}_{10} + 13\text{O}_2 \rightarrow 8\text{CO}_2 + 10\text{H}_2\text{O}$ **Marking criteria/ Merkriglyne**

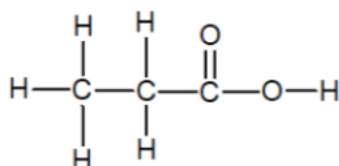
- Correct reactants (C_4H_{10} and O_2) ✓ / *Korrekte reaktante (C_4H_{10} and O_2)* ✓
- Correct products (CO_2 and H_2O) ✓ / *Korrekte produkte (CO_2 and H_2O)* ✓
- Correct balancing without multiples and fractions ✓ / *Korrekte balansering sonder veelvoude en breuke* ✓
- Marking rule 6.3.10 is applied / *Merkreël 6.3.10 is toegepas*

(3)

5.5.1 Carboxyl (group) ✓ / *Karboksiel (groep)* ✓

(1)

5.5.2

**Marking criteria / Merkriglyne**

- Functional group correct ✓ / *Funksionele groep is korrek* ✓
- Whole structure correct ✓ / *Hele struktuur is korrek.* ✓

(2)

[18]

QUESTION 6

6.1

Marking criteria / Merkriglyne

If any one of the underlined key words/phrases in the correct context (temperature) is omitted, deduct 1 mark.

Indien enige van die onderstreepte sleutelwoorde/ frases in die korrekte konteks (temperatuur) uitgelaat word, trek 1 punt af.

The temperature at which the vapour pressure of a substance equals atmospheric pressure ✓✓

Die temperatuur waarby die dampdruk van 'n stof gelyk is aan atmosferiese druk. ✓✓ (2)

6.2.1 London forces / induced dipole forces / dispersion forces ✓

London kragte / geïnduseerde dipoolkragte / dispersie kragte ✓ (1)

6.2.2 **S** ✓

Has a higher boiling point than **R** ✓ (or **R** has a lower boiling point than **S**)

S ✓

*Het 'n hoër kookpunt as **R** ✓ (of **R** het 'n laer kookpunt as **S**)* (2)



6.3

Marking criteria / Merkriglyne

- **Q** (2-bromobutane) ✓ / **Q** (2-bromobutaan) ✓
- State London forces in **P** ✓ / Noem Londonkragte in **P** ✓
- State dipole-dipole forces in **Q** ✓ / Noem dipool-dipool kragte in **Q** ✓
- Compare strengths of IMFs/compare energies required ✓ / Vergelyk sterkte van IMK / vergelyk energie benodig ✓

- **Q** (2-bromobutane) ✓ / **Q** (2-bromobutaan) ✓
- Compound **P** has London forces✓ and compound **Q** has dipole-dipole forces✓
- Compound **Q** has stronger intermolecular forces than **P**/Compound **P** has weaker intermolecular forces than **Q** ✓

OR

- More energy is required to overcome the intermolecular forces in compound **Q**/Less energy is required to overcome the intermolecular forces in compound **P**✓

- **Q** (2-bromobutaan) ✓
- Verbinding **P** het Londonkragte ✓ en verbinding **Q** het dipool-dipool kragte ✓
- Verbinding **Q** het sterker intermolekulêre kragte as **P**/Verbinding **P** het swakker intermolekulêre kragte as **Q** ✓

OF

Meer energie word benodig om die intermolekulêre kragte te oorkom in verbinding **Q**/Minder energie word benodig om die intermolekulêre kragte te oorkom in verbinding **P**✓

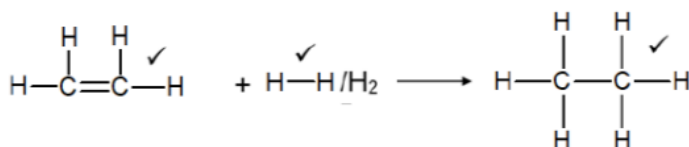
(4)
[09]

QUESTION 77.1.1 Addition ✓ (**accept:** hydrogenation) / *Addisie* ✓ (**aanvaar:** hidrogenasie) (1)7.1.2 Use Pt/Ni/Pd as a catalyst ✓ / *Gebruik Pt/Ni/Pd as katalis* ✓ (1)

7.1.3

Marking criteria / Merkriglyne

- Correct structural formula of ethene ✓ / *Korrekte struktuurformule van eteen* ✓
- H – H or/of H₂ ✓ /
- Correct structural formula of ethane ✓ / *Korrekte struktuurformule van etaan* ✓



(3)

7.2.1 Substitution ✓ (**Accept:** Halogenation) / *Vervanging* ✓ (**Aanvaar:** halogenering) (1)7.2.2 Halo-alkanes/Alkyl halides ✓ / *Halo-alkane / alkielhaliedes* ✓ (1)7.2.3 Hydrogen chloride ✓ (**do not accept:** HCl) / *Waterstofchloried* ✓ | **Moenie** HCl **aanvaar nie** (1)7.3.1 Hydrohalogenation / *Hidrohalogenering* ✓ (1)7.3.2 1-chloroethane / 1-chloroetaan ✓✓ (Accept: chloroethane / *aanvaar: chloroetaan*) (2)7.4 Elimination / *Eliminasie* ✓ (1)
[12]**GRAND TOTAL: 100**