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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QUESTION 1

1.1 B ✓✓ (2)

1.2 A ✓✓ (2)

1.3 D ✓✓ (2)

1.4 C ✓✓ (2)
[08]

QUESTION 2

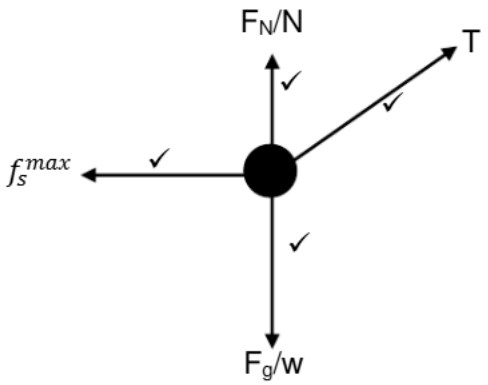
2.1 A body will remain in its state of rest or motion at constant velocity unless a non-zero resultant/net force acts on it ✓✓

'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)

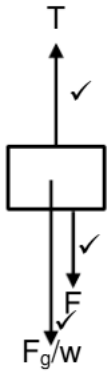
2.2.2 EAST✓ (1)

2.3



(4)

2.4



(3)

Marking criteria / *Merkriglyne*
- **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 ***Opwaarts as positief***	**Upwards as negative** ***Opwaarts as negatief***
$F_{net} = ma$ ✓ $T + (-F_g) + (-F) = ma$ $\underline{T + (5)(-9,8) + (-21) = 5(0)}$ ✓ $T = 70\ N$ ✓	$F_{net} = ma$ ✓ $-T + F_g + F = ma$ $\underline{-T + (5)(9,8) + (21) = 5(0)}$ ✓ $T = 70\ N$ ✓

(3)

2.5.2

$$F_{net} = ma$$
$$T + (-F_g) + (-F) = ma$$
$$\underline{70\cos 60° + (-0,25(9,8m - 70\sin 60°))}\ ✓ = 0\ ✓$$
$$m = 20,472\ kg\ ✓$$

(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 m·s^{-2} ✓ downwards / *afwaarts* ✓ (2)

3.3.1

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

(3)

3.3.2

Option 1	**Option 2**
h = 80 – 55 ✓ h = 25 m ✓	h = – 55 + 80 ✓ h = 25 m ✓

(2)

3.3.3

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

(3)

3.3.4

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

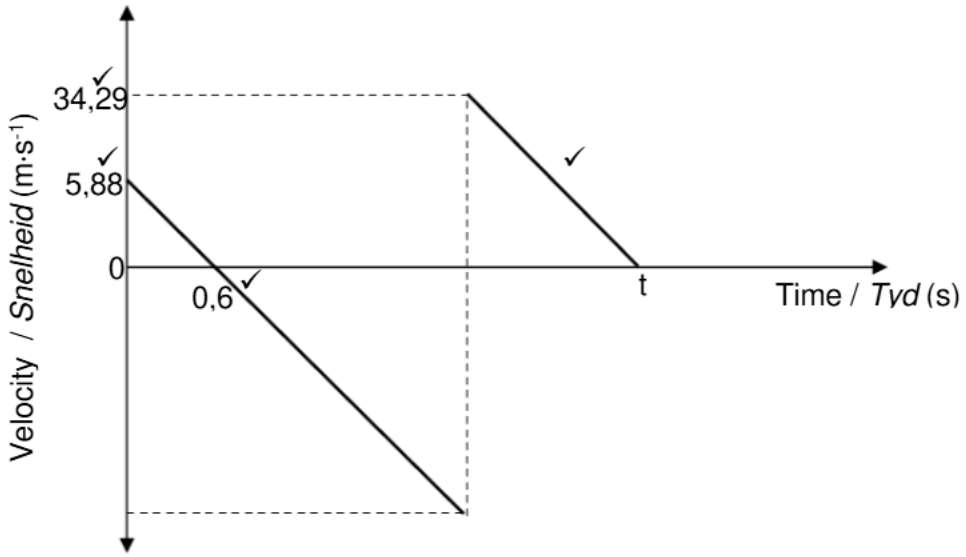
(5)

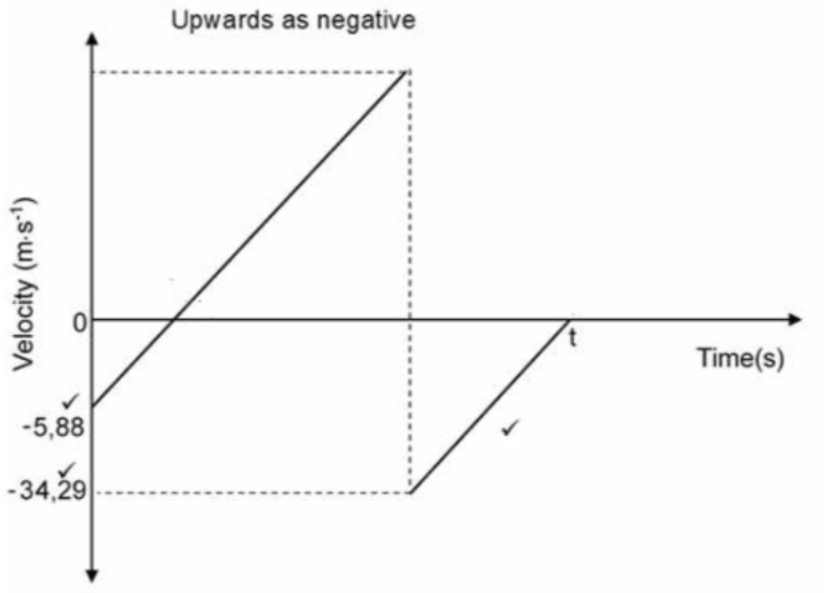
3.4

Marking criteria / *Merkriglyne*

- 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 eerst 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*





(4)

[22]

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

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

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

$m = 5\ kg$ ✓ (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***
$\Delta p = m(v_f - v_i)$ ✓	$\Delta p = m(v_f - v_i)$ ✓
$-12,5 = 2(v_f - 4)$ ✓	$12,5 = 2(v_f - (-4))$ ✓
$v_f = -2,25\ m\cdot s^{-1}$	$v_f = 2,25\ m\cdot s^{-1}$ ✓
$\therefore v_f = 2,25\ m\cdot s^{-1}$ ✓	

(3)

4.2.3

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

(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 $CH_3CH_2CH(CH_3)CHO$ ✓✓

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-methyl✓butanal ✓

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)

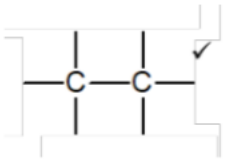
5.3.2 4-bromo-2,2-dimethylpentane / *4-bromo-2,2-dimetielpentaan*✓✓✓

Marking criteria

- Correct stem i.e. pentane.✓ / *Correct stam, pentaan* ✓
- All substituents (bromo and dimethyl) correctly identified.✓ / *Alle substituente (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 $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$

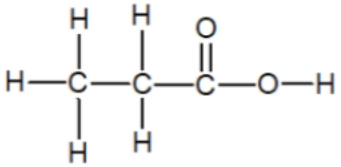
Marking criteriab/ *Merkriglyne*

- 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 then **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 7

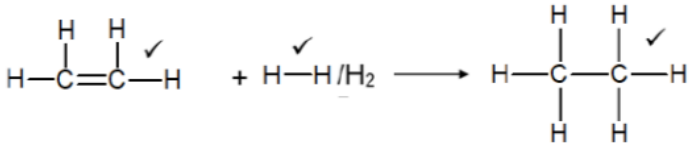
7.1.1 Addition ✓ (**accept:** hydrogenation) / *Addisie* ✓ (**aanvaar:** hidrogenasie) (1)

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 H_2 ✓/
- 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* ✓ I ***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

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