education

Lefapha la Thuto la Bokone Bophirima
Noordwes Departement van Onderwys
North West Department of Education
NORTH WEST PROVINCE

PROVINCIAL ASSESSMENT

PROVINSIALE ASSESSERING

GRADE/*GRAAD* 12

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PHYSICAL SCIENCES/*FISIESE WETENSKAP*

MARCH/*MAART* 2025

CONTROL TEST/*KONTROLE TOETS*

MARKING GUIDELINE/*NASIENRIGLYNE*

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MARKS/*PUNTE*: **100**

TIME/*TYD*: **2 hours/*uur***

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QUESTION 1/*VRAAG 1*

1.1 C ✓✓ (2)

1.2 D ✓✓ (2)

1.3 B ✓✓ (2)

1.4 B ✓✓ (2)

1.5 C ✓✓ (2)

1.6 A ✓✓ (2)

[12]

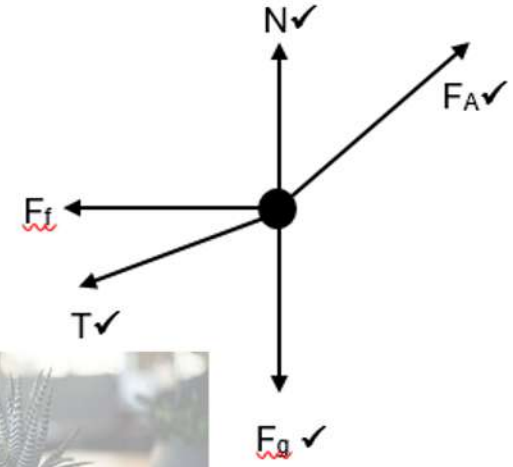
QUESTION 2/ *VRAAG 2*

2.1 When a net force acts on an object of mass, the object will accelerate in the direction of the net force with an <u>acceleration that is directly proportional to the net force</u>✓ and <u>inversely proportional to the mass of the object</u>.✓

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

Marking criteria/*Nasienkriteria*
If any of the underlined key words or phrases in the correct context is omitted, deduct 1 mark./*Indien enige van die onderstreepte sleutelwoorde of frases in die korrekte konteks uitgelaat word, trek 1 punt af.* (2)

2.2



Accepted labels/*Aanvaarde benoemings* :	
Tension force /T/F_T/*Spankrag*	✓
Weight/W/Gravitational force/Fg/*Gewig*/*Gravitasiekrag*	✓
Normal force/F_N/Normal/N/*Normaalkrag*/*Normaal*	✓
Force applied/Fa/*Toegepaste krag*/F_T	✓
Frictional force/f/F_f/F_k/*Wrywingskrag*	✓

NOTE/*NOTA*:

- Mark is awarded for **label** and **arrow**. If no arrows 4/5 /*Punte word toegeken vir die **benoeming** en die **pyle**. Indien geen pylpunt 4/5.*
- Do not penalise for length of arrows./*Moet nie penaliseer vir die lengte van die pyle nie.*
- If incorrect angles (directions) of the applied force and/or Tension force - 4/5 / *Indien die verkeerde hoeke (rigtings) van die toegepaste krag en/of die spankrag – 4/5.*
- Any other additional forces - 4/5 /*Enige addisionele kragte – 4/5.*
- If components of applied force or tension force are drawn – 4/5 /*As komponente van toegepaste krag of spankrag geteken word – 4/5.*
- If any arrow does not touch the dot - 4/5 /*Indien enige pyl nie die kol raak nie – 4/5.*

(5)

2.3

OPTION 1/*OPSIE 1*

4kg toy car / *4kg speelgoedkar*

Fnet =ma ✓

$-f + T_x = ma$

$-10 + T_x$ ✓$= 4a$

$T_x = 4a + 10$.....(1)

✓ **(any 1/*enige 1*)**

6kg toy car / *6kg speelgoedkar*

$-T_x - f + F_{ax} = ma$

$-T_x - 15 + 50\cos 30°$ ✓$= 6a$.....(2)

Sub (1) into (2) / *Vervang (1) in (2)*

$-(4a + 10) - 15 + 50\cos 30° = 6a$

$-(4a + 10) + 28{,}30127 = 6a$✓

$-10 + 28{,}30127 = 10a$

a= 1,83 m.s^{-2} to the right ✓ *Ina regs*

OPTION 2/ *OPSIE 1*

4kg toy car/ *4kg speelgoedkar*

Fnet =ma ✓

$-f + T_x = ma$

$-10 + T\cos 25°$ ✓$= 4a$

$a = \frac{T\ COS\ 25}{4} - \frac{10}{4}$.....(1)

✓ **(any 1/*enige 1*)**

6kg toy/ *5kg speelgoedkar*

$-T_x - f + F_{ax} = ma$

$-T\ COS\ 25° - 15 + 50\cos 30°$ ✓$= 6a$.....(2)

Sub (1) into (2) / *Vervang (1) in (2)*

$-T\ COS\ 25° - 15 + 50\cos 30° = 6\left(\frac{T\ COS\ 25}{4} - \frac{10}{4}\right)$

$T = 19.11$ N

Sub T into (1) or (2) / *Vervang T in (1) of (2)*

$a = \frac{19.11\ COS\ 25}{4} - \frac{10}{4}$ ✓

a= 1,83 m.s^{-2} to the right ✓

(6)

2.4 **Positive marking from 2.3/*Positiewe nasien van 2.3***

$T_x = 4(1{,}83) + 10$

$= 17{,}3204$ N

$T_x = T\cos 25°$

$T = 17{,}3204 \div \cos 25°$✓

$= 19{,}11$ N✓

Note: two marks for answer if calculated in 2.3 above./ ***Nota:***
twee punte vir die antwoord indien dit bereken is in 2.3 hierbo. (2)

[15]

QUESTION 3/ *VRAAG 3*

3.1 A motion of an object during which the only force acting on it is the gravitational force. ✓✓
Die beweging van 'n voorwerp waarop die enigste krag wat daarop inwerk, die gravitasiekrag is. **(2 or/*of* 0)** (2)

3.2

3.2.1 90 m✓ (1)

3.2.2 9,8 $m \cdot s^{-2}$ downwards✓/*afwaarts* (1)

3.3 **TAKING UPWARD AS POSITIVE/*NEEM OPWAARTS AS POSITIEF***

3.3.1

Option 1/*Opsie 1*	**Option 2/*Opsie 2***
$V_f = V_i + a\Delta t$ ✓ $0 = V_i + (-9,8)$ (3) ✓ $V_i = 29,4\ m.s^{-1}$ upwards✓/*opwaarts*	$V_f = V_i + a\Delta t$ ✓ $-V_i = V_i + (-9,8)(6)$ ✓ $V_i = 29,4\ m.s^{-1}$ upwards✓/*opwaarts*
Option 3/*Opsie 3*	**Option 4/*Opsie 4***
$\Delta y = V_i \Delta t + \frac{1}{2} a\Delta t^2$ ✓ $-90 = V_i \times 8,2 + \frac{1}{2}(-9.8)(8.2)^2$ ✓ $V_i = 29,4\ m.s^{-1}$ upwards✓/*opwaarts*	$V_f^2 = V_i^2 + 2a\Delta y$ $= 0 + 2(-9.8)(-134)$ $V_f = 51.23\ m.s^{-1}$ $V_f^2 = V_i^2 + 2a\Delta y$ ✓ $51.23^2 = V_i^2 + 2(-9.8)(-90)$ ✓ $V_i = 29,34\ m.s^{-1}$ upwards ✓/*opwaarts*

Range/*Gebied* *(29,33-29,41)*
Note: Accept downwards as positive.
***Nota**: Neem afwaarts as positief.* (3)

3.3.2 **Positive marking from 3.3.1/*Positiewe nasien van 3.3.1***
$V_f^2 = V_i^2 + 2a\Delta y$✓
$= \underline{(29,4)^2 + 2(-9,8)(-90)}$ ✓
$= -51,27\ m.s^{-1}$
$= 51,27\ m.s^{-1}$ downwards✓/*afwaarts* (3)

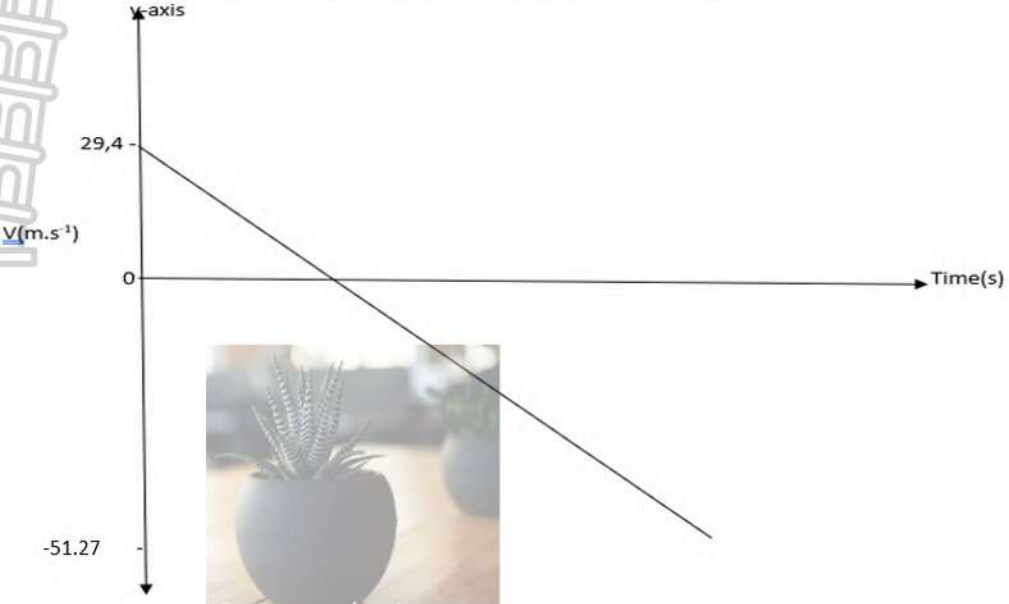
3.3.3 **Positive marking from 3.3.2/*Positiewe nasien van 3.3.2***

Option 1 /*Opsie 1* (upwards as positive/*opwaarts as positief*)	**Option 2/*Opsie 2*** (upwards as negative/*Opwaarts as negatief*)
$F_{net} = \frac{\Delta P}{\Delta t}$✓ $F_{net} = \frac{m(Vf-Vi)}{\Delta t}$ 130✓ $= \frac{1,2(16,5-(-51,27))}{\Delta t}$✓ $\Delta t = 0,63s$✓	$F_{net} = \frac{\Delta P}{\Delta t}$✓ $F_{net} = \frac{m(Vf-Vi)}{\Delta t}$ -130✓ $= \frac{1,2(-16,5-(51,27))}{\Delta t}$✓ $\Delta t = 0,63s$✓

(4)

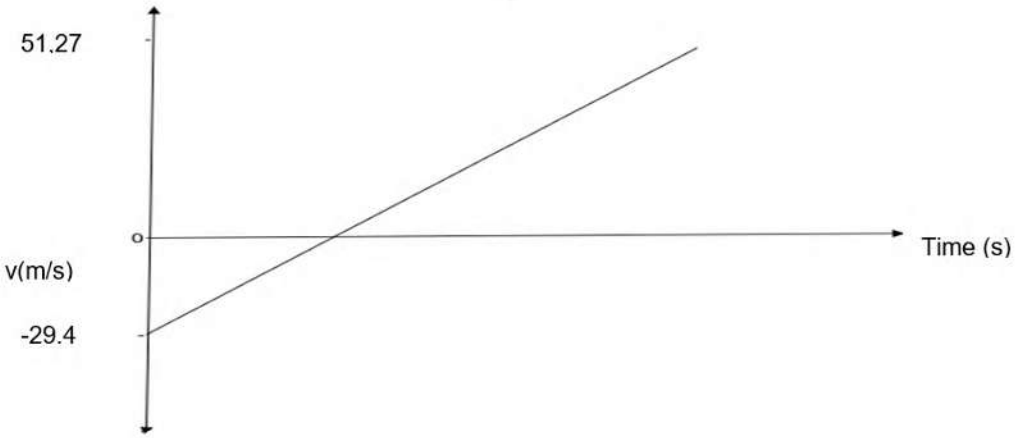
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3.4 Upwards as positive/*Opwaarts as positief*



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Downwards as positive / *Afwaarts as positief*



Criteria /*Kriteria*	**Mark allocation/ *Punte toekenning***
Graph starts at 29,4 m.s^{-1} / *Grafiek begin by 29,4 m.s^{-1}*	✓
Graph stops at 51,27 m.s^{-1}/ *Grafiek stop by 51,27 m.s^{-1}*	✓
Shape (straight line) with a negative/positive gradient / *Vorm (reguit lyn) met 'n negatiewe/positiewe gradiënt*	✓

(3)
[17]

QUESTION 4/ *VRAAG 4*

4.1 Net force/ *Netto krag* (1)

4.2
$$\sum p_i = \sum p_f \checkmark$$
$$m_A v_{iA} + m_B v_{iB} = (m_A + m_B) v_f$$
$$(2)(1,5) + (5)(0) \checkmark = (2+5)\, v_f \checkmark$$
$$v_f = 0,43 \text{ m.s}^{-1} \checkmark$$ (4)

4.3
$$\sum p_i = \sum p_f$$
$$m_A v_{iA} + m_B v_{iB} = (m_A + m_B) v_f$$
$$(2)(2) + (5)(0) = (2+5)\, v_f \checkmark$$
$$v_f = 0,571 \text{ m.s}^{-1}.$$

$$F_{net} = \frac{\Delta P}{\Delta t} \checkmark$$
$$= \frac{m(v_f - v_i)}{\Delta t}$$
$$= \frac{5(0,571-0)\checkmark}{(0,25)\checkmark}$$

= 11, 42 N east/right. ✓ /*oos/regs* (5)

4.4 No ✓/ *Nee*

- the change in velocity/change in momentum/contact time is not the same for the two trails. ✓/ *die verandering in snelheid/die verandering in momentum/kontaktyd is nie dieselfde vir die twee toetslopies nie*. (2)

[12]

QUESTION 5/*VRAAG 5*

5.1

5.1.1 D✓ (1)

5.1.2 B✓ (1)

5.2

5.2.1 4-ethyl-2,2-dimethylhexane /*4-etiel-2,2-dimetielheksaan*

Marking Criteria / *Nasienkriteria*	**Allocation/ *toekenning***
Parent name (**Hexane**) / *Stamnaam (**Heksaan**)*	✓
Two substituents (**ethyl and methyl**)/*Twee substituente (**etiel en metiel**)*	✓
The whole name correct./*Die hele naam korrek.*	✓

(3)

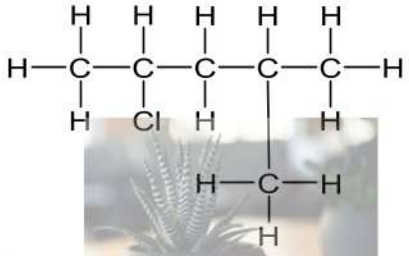
5.2.2 C_nH_{2n+2}✓ (1)

5.2.3 Butanal ✓✓

Marking Criteria/*Nasienkriteria*	**Allocation/ *toekenning***
Parent chain	✓
functional group/name ending with -al	✓

(2)

5.2.4



Marking Criteria/*Nasienkriteria*	**Allocation/ *toekenning***
Chlorine on the second carbon/*Chloor op die tweede koolstof*	✓
Methyl on the fourth carbon/*Metiel op die vierde koolstof*	✓
The whole structure correct./*Die hele struktuur korrek.*	✓

(3)

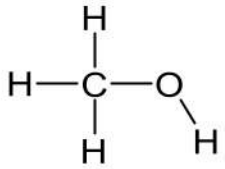
5.3.1 *Structural isomers*- organic compounds with the same molecular formula but different structural formula.
✓✓/*Struktuur isomere - organiese verbindings met dieselfde molekulêre formule maar verskillende struktuur formules.* (2)

5.3.2 Functional ✓ (isomers) /*Funksionele (isomere)* (1)

5.4

5.4.1 Methyl propanoate✓✓ /*Metielpropanoaat* (2)

5.4.2



Marking Criteria/*Nasienkriteria*	**Allocation/ *toekenning***
Hydroxyl group present/*Hidroksielgroep teenwoordig*	✓
The whole structure correct./*Die hele naam korrek*	✓

(2)

5.4.3 Water / H_2O✓ (1)

[19]

QUESTION 6/ *VRAAG 6*

6.1 The pressure exerted by a vapour in equilibrium with its liquid in a closed system. ✓✓ / *Die druk uitgeoefen deur 'n damp in ewewig met sy vloeistof in 'n geslote sisteem.* (2 or/*of* 0) (2)

6.2 Compound B✓/*Verbinding B*

- Both compounds A and B have London forces / dispersion forces / Induced dipole forces ✓ /*Beide verbinding A en B het Londonkragte / dispersie kragte / geÏnduseerde dipoolkragte*
- Compound A has a smaller surface area/ shorter chain length/ more branches than compound B.✓/*Verbinding A het 'n kleiner kontakoppervlakte/ korter kettinglengte/ meer vertakkings as verbinding B*
- Compound A has weak intermolecular forces than compound B.✓/*Verbinding A het swakker intermolekulêre kragte as verbinding B*

OR/*OF*

- Both compounds A and B have London Forces/ dispersion forces / Induced dipole forces. ✓/*Beide verbindings A en B het London kragte / geÏnduseerde dipoolkragte*
- Compound B has a larger surface area/ longer chain length/ less branches than compound A. ✓/*Verbinding B het 'n groter kontakoppervlakte / langer kettinglengte / minder sykettings as verbinding A*
- Compound B has stronger intermolecular forces than compound A. ✓/*Verbinding B het sterker intermolekulêre kragte as verbinding A.*

(4)

6.3

- Both compounds C and D have Hydrogen bonds (in addition to London forces and dipole-dipole) ✓/*Beide verbindings C en D het waterstofbindings (addisioneel tot die London kragte en dipool-dipool)*
- Compound C /propan-1-ol has one site for hydrogen bonding while compound D/ Ethanoic acid has two sites for hydrogen bonding. ✓ / *Verbinding C/propan-1-ol het een plek vir waterstofbindings terwyl verbinding D/etanoësuur twee plekke het vir waterstofbindings*
- The intermolecular forces of compound D are stronger than the intermolecular forces of compound C. ✓/*Intermolekulêre kragte van verbinding D is sterker as die intermolekulêre kragte van verbinding C.*
- More energy will be required to overcome the intermolecular f
- orces of compound D/ Ethanoic acid than that of compound C/ propan-1-ol. ✓ /*Meer energie sal benodig word om die intermolekulêre kragte te oorkom van verbinding D/ etanoësuur as die van verbinding C/propan-1-ol.*

(4)
[10]

QUESTION 7/ *VRAAG 7*

7.1

7.1.1 Elimination/ Dehydrohalogenation/ Dehydrobromination. ✓ /*Eliminasie/Dehidrohalogenering/Dehidrobromering* (1)

7.1.2 But-2-ene ✓✓ /*Butan-2-een* (2)

7.2

7.2.1 Substitution/ Hydrolysis✓/*Substitusie / Hidrolise* (1)

7.2.2



Marking Criteria/*Nasienkriteria*	**Allocation/ *toekenning***
Hydroxyl group present/*Hidroksielgroep teenwoordig*	✓
The whole name correct/*Die hele naam korrek*	✓

(2)

7.2.3 Dilute strong base/NaOH/KOH/LiOH✓ and Mild heat ✓ / *Verdunde sterk basis/ NaOH/KOH/LiOH en matige hitte.* (2)

7.3

7.3.1 Carboxylic acid✓/*Karboksielsuur* (1)

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7.3.2

$n=\frac{m}{Mr}$ ✓
$=\frac{6,66}{1}$
= 6,66 mol

$n=\frac{m}{Mr}$
$=\frac{40}{12}$
= 3,33 mol
$n=\frac{m}{Mr}$
$=\frac{53,33}{16}$
= 3,33

2: 1: 1 ✓
CH_2O
Molar mass empirical / *Empiriese molêre massa* = 30 g·mol^{-1}✓

$\frac{molar\ mass}{molar\ mass\ emperical} = \frac{150}{30}$
= 5 ✓
Molecular formula / *Molekulêre formule* = $C_5H_{10}O_5$ ✓ (6)

[15]
TOTAL/*TOTAAL* 100

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