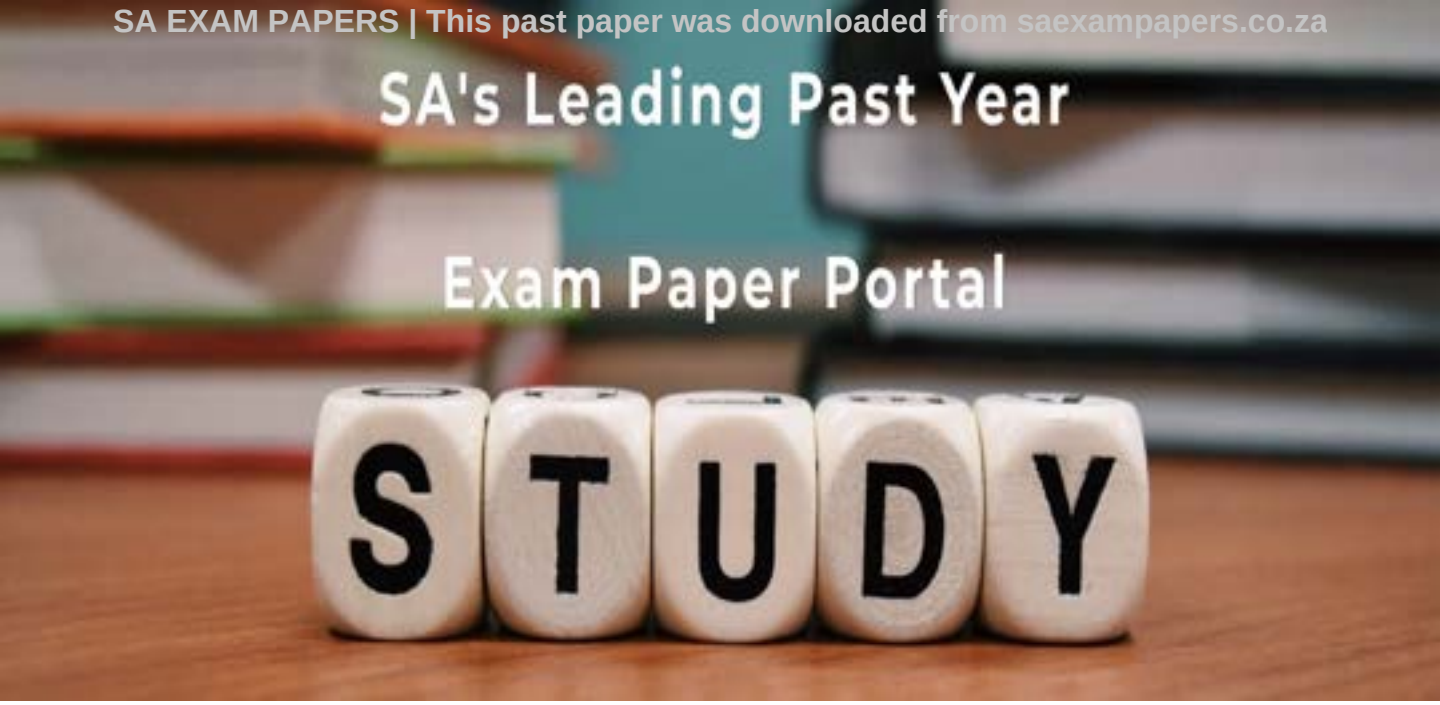

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Noordwes Departement van Onderwys
North West Department of Education
NORTH WEST PROVINCE

PROVINCIAL ASSESSMENT

PROVINSIALE ASSESSERING

GRADE/*GRAAD* 12

PHYSICAL SCIENCES

MARCH 2025

CONTROL TEST

MEMO

MARKS/*PUNTE*: 100

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

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]

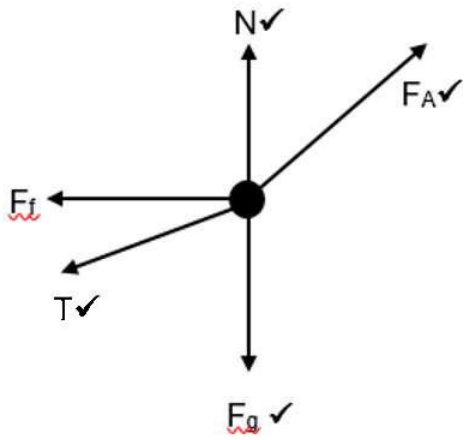
QUESTION 2/ *VRAAG 2*

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 acceleration that is directly proportional to the net force✓ and inversely proportional to the mass of the object.✓

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

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)

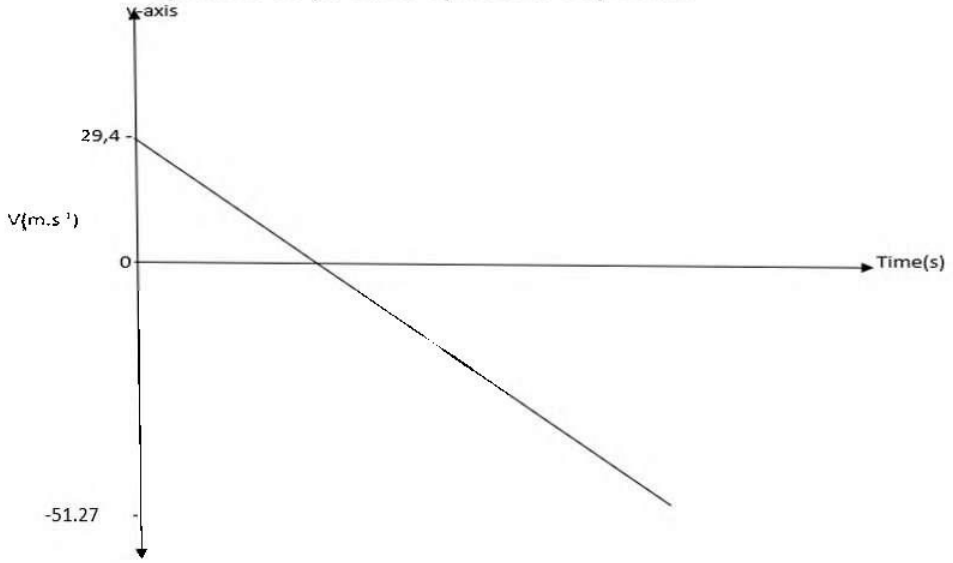
3.3.2 **Positive marking from 3.3.1/*Positiewe nasien van 3.3.1***
$V_f{}^2 = V_i{}^2 + 2a\Delta y$✓
$= \underline{(29,4)^2} + 2(-9,8)\,\underline{(-90)}$ ✓
$= -51,27\ m.s^{-1}$
$= 51,27\ m.s^{-1}$ downwards✓/*afwaarts* (3)

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

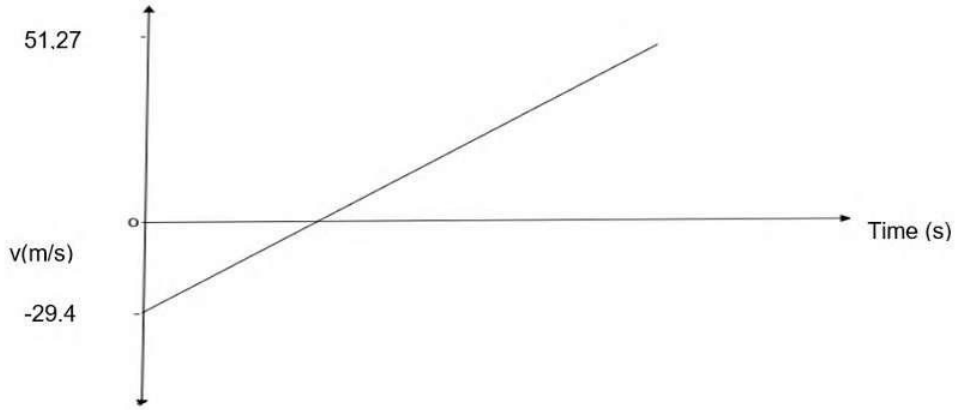
Option 1 /*Opsie 1* (upwards as positive/*opwaarts as positief*)	**Option 2/*Opsie 2*** (upwards as negative/*Opwaarts as negatief*)
$Fnet = \frac{\Delta P}{\Delta t}$✓ $F_{net} = \frac{m(Vf-Vi)}{\Delta t}$ 130✓ $= \frac{1,2(16,5-(-51,27))}{\Delta t}$✓ $\Delta t = 0,63s$✓	$Fnet = \frac{\Delta P}{\Delta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

(4)

3.4 Upwards as positive/*Opwaarts as positief*



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

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

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

= 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)

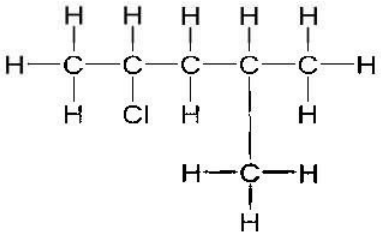
5.2.2 C_nH_{2n+2}✓ (1)

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)

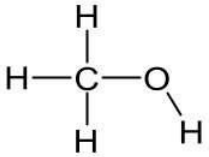
5.3.1 *Structural isomers*- organic compounds with the same molecular formula but different structural formula.
✓✓/*Struktuur isomere - organiese verbindings met dieselfde molekulêre formule maar verskillende struktuur formules.* (2)

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

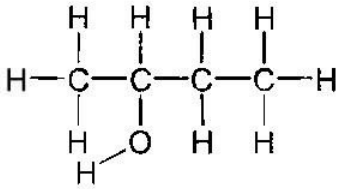
7.1.1 Elimination/ Dehydrohalogenation/ Dehydrobromination. ✓ /*Eliminasie/Dehidrohalogenering/Dehidrobromering* (1)

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)

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