LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

MOGALAKWENA DISTRICT

PHYSICAL SCIENCES

NATIONAL SENIOR CERTIFICATE

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TERM 1 CONTROL TEST
07 MARCH 2023
GRADE 12

MEMORANDUM

MARKS : 100 **DURATION: 2 hours**

STARTING TIME: 08H00

This question paper consists of 10 pages including this one

SECTION A : PHYSICS (PAPER 1)

QUESTION 1

1.1 A✓✓ (2)

1.2 C✓✓ (2)

1.3 C✓✓ (2)

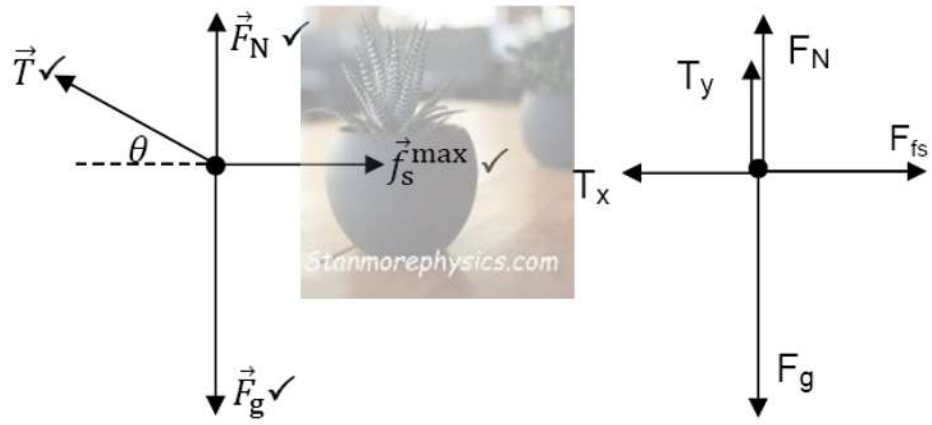
1.4 B✓✓ (2)

1.5 C✓✓ (2)

[10]

QUESTION 2

2.1 (4)



1 mark per arrow and label
Subtract 1mark for each of the following errors:
- No dot shown
- T shown with its components (unless components in dashed lines)

2.2 (5)

$fs^{max}=\mu_s N$ ✓

$120=(0,34)N$ ✓

$N=352,9412N$

Vertical forces; taking up as positive

$F_{net}=0$
$T_y+N-F_g=0$ ✓
$T_y+352,9412$✓ $-(50)(9,8)$✓ $=0$
$T_y=137,06N$

2.3

2.3.1 DECREASES ✓ (1)

2.3.2 From $T_y=T\sin\theta$ .The angle (θ)increases✓, the vertical component of the tensional force $T_y$will increase✓ (2)

OR

From: $N+T_y=F_g$
(θ)increases/$T_y$will increase✓
The parcel will not push as hard into the table surface ✓so the normal force will decrease in magnitude

[12]

QUESTION 3

2.1 An object which has been given an initial velocity and then it move under the influence of the gravitational force only. ✓✓ (2)

2.2

2.2.1 (4)

OPTION 1	
Upward positive	Downward positive
$v_f=v_i+a\Delta t$✓	$v_f=v_i+a\Delta t$✓
$-30=30$✓ $+(-9.8)\Delta t$✓	$30=-30$✓ $+(9.8)\Delta t$✓
$\Delta t=6,12\ s$✓	$\Delta t=6,12\ s$✓

OPTION 2	
Upward positive	Downward positive
$v_f=v_i+a\Delta t$✓	$v_f=v_i+a\Delta t$✓
$0=30$✓ $+(-9.8)\Delta t$✓	$0=-30$✓ $+(9.8)\Delta t$✓
$\Delta t=3,06\ s$	$\Delta t=3,06\ s$
Total time =(2)(3,06) = 6,12 s✓	Total time =(2)(3,06) = 6,12 s✓

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OPTION 3	
Upward positive	Downward positive
$\Delta y = v_i\Delta t + {}^1/_2\, a\Delta t^2$✓ $0 = (30)\Delta t$✓ $+ {}^1/_2\,(-9{,}8)\Delta t^2$✓ $\Delta t = 6{,}12\ s$✓	$\Delta y = v_i\Delta t + {}^1/_2\, a\Delta t^2$✓ $0 = (-30)\Delta t$✓ $+ {}^1/_2\,(9{,}8)\Delta t^2$✓ $\Delta t = 6{,}12\ s$✓

2.2.2 POSITIVE MARKING FROM QUESTION 2.2.1 (4)

OPTION 1

UPWARD POSITIVE

$\Delta y = v_i + {}^1/_2\, a\Delta t^2$✓

$\Delta y_{last} = \Delta y_{(6.12)} - \Delta y_{(5.12)}$

$= \{30(6{,}12) + {}^1/_2\,(-9{,}8)(6.12)^2\}$✓

$-\{30(5{,}12) + {}^1/_2\,(-9{,}8)(5,12)^2\}$✓

= -25, 076

Distance= 25, 08 m ✓

OR

DOWNWARD POSITIVE

$\Delta y = v_i + {}^1/_2\, a\Delta t^2$✓

$\Delta y_{last} = \Delta y_{(6.12)} - \Delta y_{(5.12)}$

$= \{-30(6{,}12) + {}^1/_2\,(9{,}8)(6.12)^2\}$✓

$-\{-30(5{,}12) + {}^1/_2\,(9{,}8)(5,12)^2\}$✓

= 25, 076

Distance= 25, 08 m ✓

OPTION 2

UPWARD POSITIVE	DOWNWARD POSITIVE
$v_f = v_i + a\Delta t$ $= 0 + (-9{,}8)(2{,}06)$✓ $= -20{,}188\ m.s^{-1}$	$v_f = v_i + a\Delta t$ $= 0 + (9{,}8)(2{,}06)$✓ $= 20{,}188\ m.s^{-1}$

$\Delta y = v_i\Delta t + {}^1/_2\, a\Delta t^2$✓ $= (-20,188)(1) + {}^1/_2\,(-9,8)(1)^2$✓ = -25, 09 m Distance = 25, 09 m✓ **OR** $\Delta y = \left(\frac{v_f+v_i}{2}\right)\Delta t$✓ $= \left(\frac{-20,188+(-30)}{2}\right)(1)$✓ $= -25,09\ m$ Distance = 25,09 m✓ **OR** $v_f{}^2 = v_i{}^2 + 2a\Delta y$✓ $(-30)^2 = (-20,188)^2 + 2(-9,8)\Delta y$✓ $\Delta y = -25,12\ m$ Distance = 25,12 m✓	$\Delta y = v_i\Delta t + {}^1/_2\, a\Delta t^2$✓ $= (20,188)(1) + {}^1/_2\,(9,8)(1)^2$✓ = 25, 09 m Distance = 25, 09 m✓ **OR** $\Delta y = \left(\frac{v_f+v_i}{2}\right)\Delta t$✓ $= \left(\frac{20,188+(30)}{2}\right)(1)$✓ $= 25,09\ m$ Distance = 25,09 m✓ **OR** $v_f{}^2 = v_i{}^2 + 2a\Delta y$✓ $(30)^2 = (20,188)^2 + 2(9,8)\Delta y$✓ $\Delta y = 25,12\ m$ Distance = 25,12 m✓

2.3

2.3.1 0 ms^{-1} ✓ (1)

2.3.2 $\Delta t = 0,76 - 0,64 = 0,33\ s$ ✓✓ (2)

2.3.3 (2)

OPTION 1	**OPTION 2**
$\Delta t = \frac{(1,90-0,67)}{2}$ ✓ = 0,62 s ✓ (0, 615 s)	$\Delta t = \frac{(1,90+0,67)}{2}$ ✓ = 1, 285 s $\Delta t = 1,285 - 0,67$ = 0,62 s ✓ (0, 615 s)
OPTION 3	**OPTION 4**
$\Delta y = v_i\Delta t + {}^1/_2\, a\Delta t^2$ $(-1,85) = 0 + {}^1/_2\,(-9,8)\Delta t^2$✓ $\Delta t = 0,61\ s$ ✓ $(0,6145\ s)$	$v_f{}^2 = v_i{}^2 + 2a\Delta y$ $0 = v_i{}^2 + 2(-9.8)(1,85)$ $v_i = 6,02\ m.s^{-1}$ $v_f = v_i + a\Delta t$ $0 = 6,02 + (-9,8)\Delta t$✓ $\Delta t = 0,61\ s$✓

[15]

QUESTION 4

4.1 $E_k = {}^1/_2 mv^2$✓ (3)

$37,5 = {}^1/_2 (12)v^2$✓

$v = 2,5\ m.s^{-1}$✓

4.2 The total linear momentum of an isolated system remains constant/ (is conserved) ✓✓ (2)

4.3 **POSITIVE MARKING FROM QUESTION 3.1** (4)

$\sum p_i = \sum p_f$ ✓

$\underline{(30)v_i + (12)(2,5)✓ = (30+12)(3,2)✓}$

$\therefore v_i = 3,48\ m.s^{-1}$✓

4.4 (4)

OPTION 1	**OPTION 2**
$F_{net}\Delta t = \Delta p$✓ $F_{net}(0,2)✓ = 30(3,2 - 3,48)✓$ $F_{net} = -42$ N $\therefore F_{net} = 42$ N✓	$F_{net}\Delta t = \Delta p$✓ $F_{net}(0,2)✓ = 12(3,2 - 2,4)✓$ $\therefore F_{net} = 42$ N✓
OPTION 3	**OPTION 4**
$v_f = v_i + a\Delta t$ $3,2 = 3,48 + a(0.2)$ ✓ $a = -1,4\ m.s^{-2}$ $F_{net} = ma$✓ $= (30)(-1,4)$ ✓ $= -42$ $\therefore F_{net} = 42$ N✓	$v_f = v_i + a\Delta t$ $3,2 = 2,5 + a(0.2)$ ✓ $a = 3,5\ m.s^{-2}$ $F_{net} = ma$✓ $= (30)(-1,4)$ ✓ $\therefore F_{net} = 42$ N✓

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[13]

SECTION B : CHEMISTRY (PAPER 2)

QUESTION 1

1.1 C✓✓ (2)

1.2 B✓✓ (2)

1.3 A✓✓ (2)

1.4 B✓✓ (2)

1.5 D✓✓ (2)

[10]

QUESTION 2

2.1

2.1.1 A/B✓ (1)

2.1.2 F✓ (1)

2.1.3 C✓ (1)

2.2 5-bromo-2,2-dimethylhexane (3)

Marking Criteria

✓For identifying the main chain correctly (hexane)

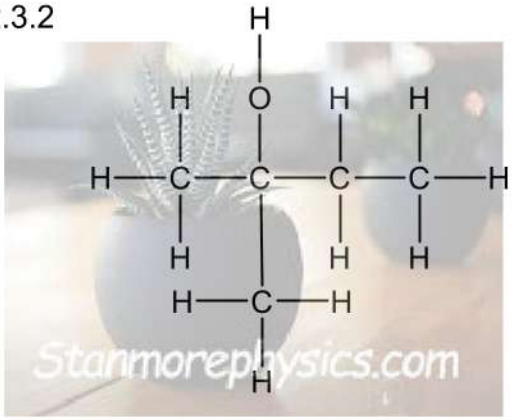
✓ For identifying the branches correctly (bromo, methyl)

✓ For the correct IUPAC name

2.3

2.3.1 The C atom to which the hydroxyl group is bonded to is bonded to 3 carbons atoms✓✓ (2)

2.3.2 (3)



Marking Criteria
✓For – OH
✓ For- Methyl (CH_3) on carbon number 2
✓-Whole structure is correct

2.4

2.4.1 Ethanol and propanoic acid✓✓ (2)

2.4.2 Esterification✓ (1)

[14]

QUESTION 3



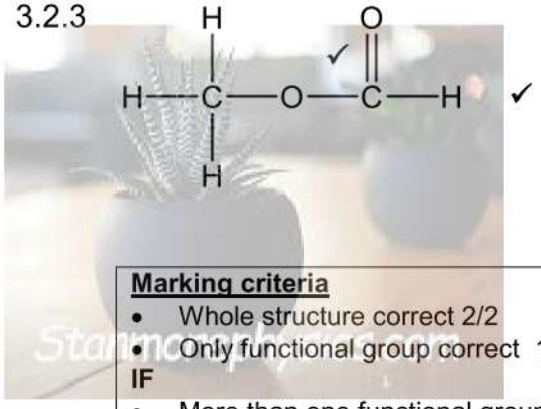
3.1 The temperature at which the vapour pressure of a substance equals atmospheric/external pressure. ✓ ✓ (2)

3.2

3.2.1 Carboxyl (group) ✓ (1)

3.2.2 Propanoic acid✓ (1)

3.2.3 (2)



Marking criteria
- Whole structure correct 2/2
- Only functional group correct 1/2

IF
- More than one functional group/wrong functional group 0/2
- If condensed structural formulae used 1/2

3.3 A✓ (2)

Lowest boiling point./Shortest chain length✓

3.4

3.4.1 The same molecular mass/molecular size. ✓ (1)

3.4.2 Primary✓ (2)

OH group is bonded to a C atom bonded to one other C atom. ✓

OR

OH group is bonded to a C atom that has two H atoms.

3.4.3 (4)

Marking guidelines
• BOTH have hydrogen bonding.
• Compare number of sites for hydrogen bonding.
• Compare strength of IMFs.
• Compare energy required.

- Both compounds/X and B have (in addition to London forces and dipole dipole forces) hydrogen bonding. ✓
- Compound **X**/$CH_3CH_2CH_2OH$/propan-1-ol/alcohol has one site for hydrogen bonding and compound **B**/ethanoic acid/carboxylic acid has two/more sites for hydrogen bonding✓

  OR

  B/ethanoic acid/carboxylic acid has two/more sites for hydrogen bonding.
- Intermolecular forces in compound **B**/ethanoic acid/carboxylic acid are stronger than intermolecular forces in compound X/$CH_3CH_2CH_2OH$/ propan-1-ol/alcohol. ✓

  OR

  Intermolecular forces in compound X/$CH_3CH_2CH_2OH$/ propan-1-ol/alcohol are weaker than intermolecular forces in compound B/ethanoic acid/carboxylic acid.
- More energy is needed to overcome/break intermolecular forces in compound **B**/ethanoic acid/carboxylic acid than in compound X/CH3CH2CH2OH/ propan-1-ol/alcohol. ✓

  OR

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Less energy is needed to overcome/break intermolecular forces in compound X/$CH_3CH_2CH_2OH$/propan-1-ol/alcohol than in compound **B**/ethanoic acid/carboxylic acid.

[15]

QUESTION 4

4.1

4.1.1 Dehydration ✓ (1)

4.1.2 Hydration ✓ (1)

4.1.3 Dehydrohalogenation/ dehydrobromination ✓ (1)

4.2

4.2.1 Substitution/Hydrolysis ✓ (1)

4.2.2
- Dilute base/sodium hydroxide/NaOH ✓
- Moderate temperature/(mild) heat ✓

(2)

4.3 NaOH/KOH ✓ (1)

4.4 (3)



4.5 Butane✓ (1)

[11]

GRAND TOTAL: 100 MARKS