LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

MOGALAKWENA DISTRICT

MEMORUNDOM

PHYSICAL SCIENCES

NATIONAL SENIOR CERTIFICATE

TERM 3 CONTROLLED TEST
08 SEPTEMBER 2023
GRADE 10

MARKS: 100 **TIME: 2 hours**

This question paper consists of 7 pages including this one

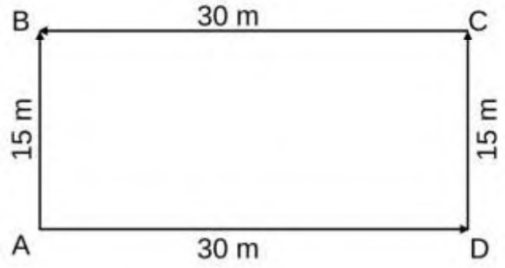
QUESTION 1

1.1. D ✓✓
1.2. B ✓✓
1.3. C ✓✓
1.4. A ✓✓
1.5. B ✓✓ **[10]**

QUESTION 2

2.1. The difference in position (space) ✓✓ (2)

2.2.1



Marking Criteria
- ✓ lines drawn to scale
- ✓ 4 arrows shown, touching each other
- ✓ correct shape of drawing

(3)

2.2.2 Distance=AB+BC+CD+DA

=(15)+(30)+(15)+(30)

=90m✓✓ (2)

2.3.1 Avarage Speed $= \frac{\text{distance}}{\text{time}}$✓

$= \frac{90\text{m}✓}{19\text{ s}✓}$

$= 4.74\text{m.s}^{-1}$✓

(4)

[10]

QUESTION 3

3.1 The simplest whole number ratio of atoms in a compound. ✓✓ (2)

3.2.1 %H= 100-65,31%-32,65%=2,04% (2)

3.2.2

	H	S	O	
Mass (g)	2.04	32.65	65.31	
M (g/mol)	1	32	16	
Mole=m/M	2.04	1.02	4.08	✓✓
Ratio	2	1	4	✓

Empirical formula H_2SO_4✓

(4)

3.3

3.3.1 water changes into gas ✓ and leaves the (system)✓ (2)

3.3.2

	$CuSO_4$	H_2O	
Mass (g)	4	2.257	✓
M (g/mol)	159.50	18	
Mole=m/M	0.0251	0.125	✓✓
Ratio	1	**5** ✓	

3.4. The mass of one of a substance measured in $g.mol^{-1}$✓✓ (2)

3.5.1. $M(Al_2(SO_4)_3) = 2(27) + 3(32) + 12(16)$
$= 342\ g.mol^{-1}$✓✓ (2)

3.5.2 $\%\ Al = \frac{2(27)}{342} \times 100$
$= 15,79\%$✓

$\%\ S = \frac{3(32)}{342} \times 100$
$= 28,07\%$✓

$\%\ S = \frac{12(16)}{342} \times 100$
$= 56,14\%$✓

(3)

3.5.3 **POSITIVE MARKING FROM**

$n(Al_2(SO_4)_3) = \frac{m}{M}$ ✓

$= \frac{85,5}{342}$ ✓

$= 0,25\ mol$ ✓ (3)

[24]

QUESTION 4

4.1. The energy an object has because of its position in the gravitational field ✓relative to some reference point ✓ (2)

4.2 E_P=mhg✓

= (65)+(9.8)+(4.5)✓

=2 866,5J✓ (3)

4.3 The net/total mechanical energy (sum of kinetic and gravitational potential energy) in an isolated/closed system✓ remains constant/ is conserved✓

(2)

4.4

$(E_p + E_k)_{top/bo} = (E_p + E_k)_{bottom/onder}$ ✓

$mgh + 0 = mgh + ½mv^2$

$(65)(9,8)(4,5)$✓ $= 0 + ½(65)v^2$ ✓

$v = 9,39\ m\cdot s^{-1}$ ✓

OR/OF

$(E_p + E_k)_{top/bo} = (E_p + E_k)_{bottom/onder}$ ✓

$mgh + 0 = mgh + ½mv^2$

2 866,5 ✓ $= 0 + ½(65)v^2$ ✓

$v = 9,39\ m\cdot s^{-1}$ ✓

(4)

4.5

OPTION 1

$(E_p + E_k)_{top} = (E_p + E_k)_{bottom}$

$mgh + 0 = mgh + ½ mv^2$ ✓

$(65)(9,8)h$ ✓ $+ 0 = 0 + ½ \times 65 \times (9,39)^2$ ✓

$637h = 2\ 865,6$

$h = 4,49\ m$

No✓: $h = 4,49\ m < 6m$ ✓

OPTION 2

$E_{p\ at\ Y} = mgh$✓

$= (65)(9,8)(6)$ ✓

$= 3\ 822\ J$ ✓

$E_{mech} < E_{p\ at\ Y}$ ✓therefore he will not reach point Y✓

(5)

[16]

QUESTION 5

5.1 The rate ✓ of change of velocity ✓. (2)

5.2

5.2.1

$\Delta x = v_i \Delta t + \frac{1}{2} a \Delta t^2$ ✓

$\Delta x = 0(2)$ ✓ $+ \frac{1}{2}(15)2^2$ ✓

$\Delta x = 30$ m ✓

(3)

5.2.2 positive marking from question 5.2.1

OPTION 1/*OPSIE 1*	OPTION 2/*OPSIE 2*
$v_f^2 = v_i^2 + 2a\Delta x$ ✓ $v_f^2 = 0^2$ ✓ $+ 2(15)(30)$ ✓ $v_f = 30$ m·s^{-1} to the right ✓/*regs*	$v_f = v_i + a\Delta t$ $= 0$ ✓ $+ 15 \times 2$ ✓ $v_f = 30$ m·s^{-1} to the right ✓/*regs*

Accept: To the right/East/In the direction of motion

(3)

5.3

When following a car, a motorist should keep a safe distance such that it takes more than 2s ✓to reach the same position ✓ as the car in front.

OR

The car will need 2 s to stop in an emergency and not hit the car in front. ✓✓ (2)

5.4

Convert 90 km·h^{-1} into m·s^{-1}/*Skakel 90 km·h^{-1} om na m·s^{-1}*

$\frac{90 \text{ km}}{1 \text{ h}} = \frac{90 \times 10^3}{3600}$ ✓ $= 25$ m·s^{-1} ✓

OPTION 1/*OPSIE 1*:

$\Delta x = v_i \Delta t + \frac{1}{2} a \Delta t^2$ ✓

$\Delta x = (25)(2)$ ✓ $+ \frac{1}{2}(0)2^2$ ✓

$\Delta x = 50$ m ✓

OPTION 2/*OPSIE 2*:

$\Delta x = \left(\frac{v_i + v_f}{2}\right) \Delta t$ ✓

$\Delta x = \left(\frac{25 + 25}{2}\right)$ ✓(2) ✓

$\Delta x = 50$ m ✓

(6)

5.6

$$\frac{108\ km}{1\ h} = \frac{108 \times 10^3}{3600} \checkmark = 30\ m \cdot s^{-1}$$

Difference in speed/*Verskil in spoed*: 30 – 25

$= 5\ m \cdot s^{-1}$

Car has to travel 30 m (80 – 50) at 5 $m \cdot s^{-1}$ to be at a 2 second distance behind the truck. Therefore: distance = (v) (t)

30 = (5) (t(

t = 6 s

✓ ✓ ✓ ✓

(5)

[21]

QUESTION 6

(2)

6.1 30 m/s ✓✓

6.2 40m/s ✓✓ (2)

6.3 The speed decreases ✓ uniformly (from 40 m/s to 0 m/s)✓

OR

The car slows down✓ and finally stops✓

(2)

6.4

$$a = \frac{\Delta y}{\Delta x} \checkmark$$

$$= \frac{(0) - 40}{25 - 20} \checkmark \checkmark$$

$$= -8\ m \cdot s^{-2} \checkmark$$

(4)

6.5 Equal to✓ , Same gradient ✓ (2)

6.6

OPTION 1/*OPSIE 1*

Displacement = Area under the v-t graph✓

Verplasing = Oppervlakte onder v-t grafiek

$=(A_{trapezium} + A_{rectangle/reghoek} + A_{triangle\ 1/driehoek\ 1}) - A_{triangle\ 2/driehoek\ 2}$

$= ½ (40+30)(5)$✓ $+(15x40)$ ✓$+ ½ (5 x40)$✓ $– [½ (2,5 x 20)]$✓

= 850 m✓ east/*oos*✓

OR/*OF*

Displacement= Area under the v-t graph✓

Verplasing = Oppervlakte onder v–t grafiek

$= (A_{trapezium/trapesium} + A_{rectangle/reghoek} + A_{triangle/driehoek}) - A_{triangle/driehoek}$

$= ½ (20+15)(10)$✓ $+ (30 x 20)$✓ $+ ½ (5 x40)$ ✓$– ½ (2,5 x 20)$✓

= 850 m✓ east/*oos*✓

(7)

[19]

Total 100