



**education**

Department of  
Education  
FREE STATE PROVINCE

**CONTROL TEST / *KONTROLETOETS***

**GRADE 10 / *GRAAD 10***

**PHYSICAL SCIENCES  
*FISIESE WETENSKAPPE***

**MEMORANDUM**

**NOVEMBER 2021**

**MARKS: 100 / *PUNTE: 100***

**TIME: 2 HOURS / *TYD: 2 UUR***

**This memorandum consists of five pages.  
*Hierdie memorandum bestaan uit vyf bladsye.***

### QUESTION 1 / VRAAG 1

- 1.1 D ✓✓      1.2 B ✓✓      1.3 B ✓✓      1.4 A ✓✓  
1.5 D ✓✓      1.6 C ✓✓      1.7 B ✓✓      1.8 C ✓✓  
1.9 B ✓✓      1.10 B ✓✓

[20]

#### Marking criteria (Definitions) / Nasienriglyne (Definisies)

If any one of the underlined key phrases in the **correct context** is omitted, deduct one mark.

Een punt word verbeur as enige van die onderstreepte sleutelfrases in die korrekte konteks uitgelaat is.

### QUESTION 2 / VRAAG 2

- 2.1 Rate of change in displacement. ✓✓  
*Tempo van verandering in verplasing.* (2)  
2.2 The car is moving at a constant ✓ velocity ✓  
*Die motor beweeg teen 'n konstante snelheid.* (2)  
2.3  $30 \text{ m} \cdot \text{s}^{-1} = \frac{30 \times 3600}{1000} \checkmark = 108 \text{ km} \cdot \text{h}^{-1} \checkmark$  (2)  
2.4  $20 \text{ s} \checkmark$  (1)

2.5.1

Option 1 / Opsie 1	Option 2 / Opsie 2
$\Delta x = \left(\frac{v_f + v_i}{2}\right) \Delta t \checkmark$ $\Delta x = \left(\frac{20+0}{2}\right) 30 \checkmark$ $= 300 \text{ m} \checkmark$	$\text{Area} = \frac{1}{2} bh \checkmark$ $= (0,5 \times 30 \times 20) \checkmark$ $= 300 \text{ m} \checkmark$

(3)

#### 2.5.2 POSITIVE MARKING FROM 2.5.1. / POSITIEWE NASIEN VANAF 2.5.1.

Option 1 / Opsie 1	Option 2 / Opsie 2	Option 3 / Opsie 3
$v_f = v_i + a\Delta t \checkmark$ $20 \checkmark = \underline{0 + a(30)} \checkmark$ $a = 0,67 \text{ m} \cdot \text{s}^{-2} \checkmark$	$v_f^2 = v_i^2 + 2a\Delta \checkmark$ $20^2 \checkmark = \underline{0 + 2a(300)} \checkmark$ $a = 0,67 \text{ m} \cdot \text{s}^{-2} \checkmark$	$\Delta x = v_i \Delta t + \frac{1}{2} a \Delta t^2 \checkmark$ $\underline{300 = 0 + (0,5) a(30)^2} \checkmark \checkmark$ $a = 0,67 \text{ m} \cdot \text{s}^{-2} \checkmark$

(4)

- 2.6 Vector ✓ it is a physical quantity with magnitude and direction. ✓✓  
*Vektor; dit is 'n fisiese hoeveelheid met grootte en rigting.* (3)  
[17]

**QUESTION 3 / VRAAG 3**

3.1 The sum of the gravitational potential energy and kinetic energy. ✓✓  
*Die som van gravitasie-potensiële en kinetiese energie.* (2)

3.2  $E_m(B) = E_m(A)$  ✓  
 $E_m(B) = mgh + 0$   
 $= (3)(9,8)(17)$  ✓ + 0 ✓  
 $= 499,8 \text{ J}$  ✓ (4)  
**[6]**

**QUESTION 4 / VRAAG 4**

4.1 R ✓ (1)

4.2 The net charge of an isolated system ✓ remains constant ✓ during any physical process.  
*Die netto lading van 'n geïsoleerde sisteem bly konstant tydens enige fisiese proses.* (2)

4.3  $Q = \frac{(Q_1 + Q_2)}{2}$  ✓ =  $\frac{4 \times 10^{-9} + (-6 \times 10^{-9})}{2}$  ✓ =  $-1 \times 10^{-9} \text{ C}$  ✓ (3)  
**[6]**

**QUESTION 5 / VRAAG 5**

5.1 The opposition to the flow of charge **OR** die ratio of the potential difference across a resistor to the current in the resistor. ✓✓  
*Die weerstand teen die vloeï van lading **OF** die verhouding van die potensiaalverskil oor 'n resistor tot die stroom in die resistor.* (2)

5.2  $R_T = R_s + R_{//}$  ✓  
 $= 4 + 2,22$  ✓  
 $= 6,22 \Omega$  ✓ (4)  
 $\frac{1}{R_{//}} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{4} + \frac{1}{5}$  ✓  
 $R_{//} = 2,22 \Omega$

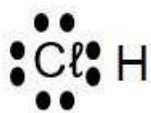
5.3.1  $V = \frac{W}{Q}$  ✓  
 $= \frac{120}{10}$  ✓  
 $= 12 \text{ V}$  ✓ (3)

5.3.2  $I = \frac{Q}{\Delta t}$  ✓  
 $= \frac{10}{5,18}$  ✓  
 $= 1,93 \text{ A}$  ✓ (3)  
**[12]**

## QUESTION 6 / VRAAG 6

- 6.1.1 A substance that cannot be separated into simpler components ✓ by physical methods. ✓  
*'n Stof wat nie in eenvoudiger komponente opgebreek kan word deur fisiese metodes nie.* (2)
- 6.1.2 (i) B ✓ (1)
- (ii) A ✓ (1)
- 6.2.1 The temperature at which the vapour pressure equals the atmospheric (external) pressure. ✓✓  
*Die temperatuur waarby die dampdruk gelyk is aan die atmosferiese (eksterne) druk.* (2)
- 6.2.2 Solid to liquid ✓ *Vastestof na vloeistof* (1)
- [7]**

## QUESTION 7 / VRAAG 7

- 7.1.1 Atoms with the same number of protons, but a different number of neutrons. ✓✓  
*Atome met dieselfde hoeveelheid protone maar verskillende hoeveelhede neutrone.*  
**OR/OF**  
Atoms with the same atomic number, but different mass numbers.  
*Atome met dieselfde atoomgetal, maar verskillende massagetalle.* (2)
- 7.1.2 **Any three / Enige drie** ✓✓✓  
35 = mass number; 35 = no. of nucleons; 17 = no. of protons; 17 = no. of electrons; 18 = no of neutrons  
*35 = massagetal; 35 = aantal nukleone; 17 = aantal protone; 17 = aantal elektrone; 18 = aantal neutrone* (3)
- 7.1.3  $A_r = \frac{\text{total mass of the atoms}}{\text{total number of atoms}} = \frac{(35 \times 76) + (37 \times 24)}{76 + 24} \checkmark = \frac{3548}{100} = 35,48 \checkmark$   
 $A_R = \frac{\text{totale massa atome}}{\text{totale aantal atome}}$  (3)
- 7.2.1 The mutual attraction between two atoms ✓ resulting from the simultaneous attraction between their nuclei and the outer electrons. ✓  
*Die wedersydse aantrekking tussen twee atome wat ontstaan vanweë die gelyktydige aantrekking tussen hulle kerne en buite-elektrone.* (2)
- 7.2.2 Covalent/Kovalent ✓ (1)
- 7.2.3  (2)
- Marking criteria / Nasienriglyne**

  - 2 shared electrons between H and Cl ✓  
*2 gedeelde elektrone tussen H en Cl*
  - 8 electrons around Cl ✓  
*8 elektrone rondom Cl*
- 7.2.4 1 ✓ (1)

**[14]**

### QUESTION 8 / VRAAG 8

8.1 Law of conservation of mass / *Wet van behoud van massa* ✓ (1)

8.2  $M_R = 12 + 4(1) + 2(2 \times 16)$  ✓ = 80 g·mol<sup>-1</sup> ✓ (1)

$M_P = 12 + 2(16)$  ✓ +  $2[2(1) + 16]$  ✓ = 80 g·mol<sup>-1</sup> (4)

8.3  $M(Na_2CO_3) = 106 \text{ g mol}^{-1}$  ✓  
 $M(XH_2O) = 268 - 106$  ✓  
 $= 162 \text{ g mol}^{-1}$   
 $n(H_2O) = \frac{162}{18}$  ✓  
 $= 9 \text{ mol}$  ✓ (4)

8.4.1 The simplest whole number ratio of atoms in a compound. ✓✓  
*Die eenvoudigste heelgetal verhouding van atome in 'n verbinding.* (2)

8.4.2 mol (Accept mole in English) ✓ (1)

8.4.3  $n_C = \frac{m}{M} = \frac{6}{12}$  ✓ = 0,5 mol      Once/Eenmalig ✓  
 $n_H = \frac{m}{M} = \frac{1,5}{1}$  ✓ = 1,5 mol       $n_C = \frac{m}{M}$   
 $n_{Cl} = \frac{m}{M} = \frac{17,75}{35,5}$  ✓ = 0,5 mol  
 $n_C:n_H:n_{Cl} = 0,5:1,5:0,5$  ✓ = 1:3:1 ∴ CH<sub>3</sub>Cl ✓ (6)  
**[18]**

**GRAND TOTAL / GROOTTOTAAL: 100**